Functional vs. lexical: a cognitive dichotomy

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Abstract

This paper explores the nature of the distinction between lexical and functional expressions within natural languages. It discusses some of the linguistic properties that have been said to distinguish the two types and concludes that there are no necessary or sufficient linguistic conditions that identify an expression as being of one type or the other, a conclusion that indicates that the difference between them is not categorial. A review of experimental evidence concerning human processing of language and observed behaviour in language acquisition and breakdown, however, supports the idea that the distinction is categorial. This contradiction between the results of linguistic and psycholinguistic reasoning is argued to reflect a difference between properties of E-language and I-language and that the functional/lexical distinction holds of former but not necessarily of the latter. It is argued that E-linguistic concepts, such as local syntactic distribution, are linguistically significant and should be incorporated into theoretical analyses of natural language. A theory of categorisation at different levels of the grammar is proposed that allows language specific, E-linguistic, expressions to be related to universal (I-linguistic) categories that can be manipulated by principles of Universal Grammar. The hybrid syntactic framework that results is shown to provide a basis for the explanation of the psycholinguistic and linguistic properties of functional expressions and brings into question whether the functional/lexical distinction is significant at the level of I-language/Universal Grammar.

1. Introduction[1]

There has been a persistent tendency within the grammatical tradition to divide grammatical categories and parts of speech into two superclasses. The distinction appears, for example, in the differentiation made between ‘grammatical’ (or functor) expressions and ‘contentive’ ones (Bolinger 1975). The former consist of those expressions, words and bound morphemes, that serve a purely grammatical function, while the latter provide the principal semantic information of the sentence. In recent years within transformational syntax, the distinction has (re-)surfaced as a contrast between ‘functional’ and ‘lexical’ categories (Stowell 1981, Ouhalla 1991, Kayne 1994, Chomsky 1995, etc.). This distinction shares properties with that made between grammatical and contentive expressions in that it applies to bound morphs as well as to independent words and reflects a primary semantic distinction between theta-assigning (contentive) categories and non-theta-assigning (functional) ones (Grimshaw 1990). It also reflects the distinction made in the classical grammatical tradition between ‘accidence’ and ‘substance’. The former refers primarily to the grammatical (morphological) categories exhibited by a language, like case, tense, etc., that are the parochial characteristics of word formation of a particular language, while the substantives are the linguistically universal classes and properties. Hence, functional elements may be associated with the accidental morphological properties of a language and so implicated in parametric variation. Lexical expressions, on the other hand, provide the universal substance of the sentence through their semantic content.

The significance of this distinction has apparently received strong psycholinguistic support over recent years with extensive evidence being provided that the processing of functional expressions differs from that of contentive ones (see below for references). Evidence from aphasic breakdown, language acquisition, priming experiments and so on all indicate that a small subset of words are processed differently from the majority of the basic expressions of a language. This difference in

1. This is a revised version of a paper delivered to the International Conference on syntactic Categories which is based on a working paper given in the Dept. of Linguistics at the University of Edinburgh. I am grateful to Bob Borsley, Caroline Heycock, Dick Hudson, Jim Hurford, Jim Miller, Louise Kelly, Ruth Kempson, Simon Kirby, Richard Shillcock and an anonymous referee for helpful comments and suggestions on earlier drafts of this paper. I doubt if any of the above would agree wholeheartedly with what follows.

processing may be argued to reflect the different syntactic properties exhibited by the two macro-classes of elements and hence provide a sound psychological underpinning to recent developments in linguistic theory.

However, despite the centrality of functional categories within current linguistic theory and the robustness of the psycholinguistic evidence for their significance in processing, there remains considerable inclarity about what exactly the term ‘functional’ picks out from the expressions of a language, what constitutes a functional category and what is the relationship between functional expressions, broadly construed, and the functional categories identified for a language, either specifically or universally.

Typically within transformational grammar, the functional categories include complementizer, tense and agreement, and are distinguished from the major categories of noun, verb, adjective, adverb and (to a certain degree) preposition. Within the psycholinguistic literature, however, expressions, like *there*, *here*, and so on, within the major classes, and discourse markers like *therefore*, are often included in the set of functional elements, while certain expressions often considered to be members of functional classes (like certain quantifiers, e.g. *many*, *several*, and the numerals) are treated as non-functional. The relation between the experimental evidence and the theoretical distinction is thus more problematic than at first appears. In particular, the question arises as to whether the functional distinction is categorial, as has been suggested in certain studies of first language acquisition (see Morgan, Shi and Alopenna 1996). If it is, then the nature of this categorial split and the way that it interacts with further categorisation becomes an important question. If it is not, then one must ask what is the relation between the set of functional expressions and the functional categories that are recognised within syntactic theory.

In this paper, I explore these questions, beginning with a review of the general linguistic properties that have been said to be illustrative of the distinction and the psycholinguistic evidence for the nature of the functional/lexical divide. The main problem is shown to centre around whether the distinction should be made at the level of the expression or at some more abstract level of categorisation. Noting that the evidence for a categorial distinction to be made between functional and lexical expressions comes principally from psycholinguistic studies, I argue that the distinction is best viewed in terms of Chomsky (1986)’s differentiation between I-language and E-language. The discussion then moves on to a discussion of the nature of E-linguistic categorisation and its relation to I-linguistic (universal) categories. The paper ends by questioning the need to set up the specific functional categories independently of functional lexemes themselves and suggests a model of the grammar that attempts to reconcile the psycholinguistic properties of functional expressions and their position within theoretical syntax.

2. Characterising Functional Expressions

Within general linguistic theory, the identification of functional expressions and, especially, functional classes is controversial and problematic. Within transformational grammar, the syntactically significant functional classes include complementizer, determiner and INFL, the latter of which is now often decomposed into Tense and Agr(eement), following Pollock 1989[2]. Other functional categories are regularly added to the list, most frequently verbal categories such as Neg(ation) (Pollock 1989), Asp(ect) (Hendrick 1991), and Focus (Tsimpli 1995 inter al.), but also nominal categories such as Det(erminer) (Abney 1989), Num(ber) (Ritter 1991), and K (case) (Bittner and Hale 1996). In frameworks such as Kayne 1994 and Cinque 1998, functional categories are set up independently of any morpho-phonological considerations leading to a proliferation of such categories which are empty of all content, syntactic, semantic and phonological (their content coming from contentive specifiers).

In this section, I am concerned with the general linguistic properties that have been proposed to characterise functional categories (see also Abney 1986 for some discussion). The ones that I am interested in are defined over the functional expressions that instantiate the categories, rather than over more abstract properties (such as the ability to assign theta roles). In the discussion that fol-

2. But see Chomsky 1995 for a rejection of Agr as an independent functional category.

lows, I shall be concerned only with the behaviour of morphs or the observable characteristics of the classes they comprise. The syntactic properties discussed below are thus intended to be predicated of free and bound morphs such as articles, demonstratives, quantifiers, pronouns, complementizers, agreement affixes, tense and reflexes of other inflectional elements, and not of the more abstract concepts with which they may be associated. The abstract functional categories of Kayne (op. cit.) are hence omitted from consideration as they cannot directly provide evidence for a macro-functional category.

2.1 Closed versus open

The distinction between functional and lexical parallels (and is often conflated with) that drawn between ‘closed’ and ‘open’ classes of expressions (Quirk et al. 1972:2.12-2.15). Functional classes like pronoun, article, conjunction, etc., form classes whose membership is fixed, while noun, verb and adjective are open classes whose membership can be extended through borrowing or by transparent derivational means. Typically, functional classes are small and listable for any language and the total number of all such elements within a language is considerably smaller than the numbers of open class expressions. Thus, the number of independent (wordlike) functional expressions within English has been said to be around 150 (Shillcock and Bard 1993) which only increases slightly if bound morphemes are included in the total.

This criterion is not entirely straightforward, however. In the first place, there are a number of subgroups of the traditional open classes that form closed subclasses. For example, auxiliary verbs form a closed subclass of verbs and days of the week, months of the year, points of the compass, etc., form closed subclasses of nouns that show idiosyncratic syntactic behaviour (compare (1a) with (1b-1c) and (1d) with (1e)).[3]

1a I’ll see you Tuesday/on Tuesday/the first Tuesday after Easter.

1b I’ll see you tomorrow/*on tomorrow/*on the first tomorrow after Easter.

1c I’ll see you *breakfast/at breakfast/at the first breakfast after Lent.

1d The exiles went North/to the North/to North London/North of Watford.

1e The exiles went *London/to London/to London town/*London of Ontario.

While the class of auxiliary verbs is usually taken to comprise a class of functional expressions, it is not normal to so classify the nominal subclasses indicated above, despite the fact that they clearly define a closed class of expression. Hence, the membership of some expression in a closed class is not by itself sufficient to make that expression (or the class that contains it) a functional one.

Conversely, being identified as a functional expression may not always imply that the class it belongs to is closed. For example, the class of adverbs, generally construed as an open class, contain the expressions *here* and *there* which are often classified with functional expressions, being essentially ‘pro-adverbs’. Furthermore, there are closed classes, such as the pronouns, whose functional status is unclear and which are variously classified as reflexes of either major or functional categories (Noun, Agr or Det). Thus, while there is a strong correlation between functional status and closed class, the property is neither necessary nor sufficient to distinguish functional classes from lexical ones.

2.2 Phonology and Morphology

A number of phonological differences between the functional and lexical expressions have been noted. For example, evidence from English indicates that non-affixal functional expressions typically lack metrical stress (see Cutler and Norris 1988) and their vowels tend to be reduced and centralised (although this is unlikely to be true for all affixes in highly inflecting languages). For English, this phonological difference can also be seen in the general lack of initial strong syllables for functional expressions (9.5% of the 188,000 words in the London-Lund corpus) while it is common for lexical expressions (90%) (see Cutler and Carter 1987). This reduced phonological status of functional expressions is reflected in their morphological structure. Functional expres-

3. I am grateful to R A Hudson for bringing these examples to my attention.

sions tend to be less independent than lexical expressions and are often encoded as bound morphs or clitics, as illustrated in (2).

2a I'll work it out. (< will)

2b *I'll the kettle (< fill).

2c We've arrived. (< have)

2d *We've on Sunday (< leave)

However, phonological reduction may also occur with lexical expressions in certain contexts. For example, it is likely to occur if a lexical expression is repeated or strongly predictable from the discourse context. In certain cases some expressions may even lose their lexical integrity, e.g. *wanna* < *want to*, *gonna* < *going to*, the latter contraction occurring in real lexical constructions (in British English, at any rate) as in *I'm* [gəʊnə] *London*. On the other hand, it is possible in certain circumstances to accent functional expressions, e.g. in contrastive focus: *I saw THE best book on Minimalism today*, *Cinderella HAS gone to the ball*, etc. Thus, while phonological and morphological reduction is indicative of functional status, it is not criterial.

Following the general tendency for functional expressions to form closed classes, we find that they do not generally undergo derivational or other word formation processes like compounding (*unfair* ~ **unmany*, *verbify* ~ **himify*, *owner* ~ **haver)*. It is certainly true that books about morphology discuss only such processes as they apply to content words and there are few uncontroversial examples of derivation as applied to functional expressions. On the other hand, the lack of derivation is not a sufficient criterion for functional status as many lexical expressions fail to undergo expected or possible derivational processes (e.g. *unhappy* ~ **unsad* ~ **unmany*). Hence, again, we see that the lack of derivational morphology associated with functional expressions is not a sufficient condition to distinguish functional expressions from lexical expressions.

2.3 Syntax

There are a number of syntactic differences that have been said to distinguish lexical and functional expressions. In the first place, the latter appear in more restricted syntactic contexts than the former. For example, functional expressions usually appear in just a few syntactic contexts and these are definitional of the class they belong to. Thus, modals must appear in construction with[4] a bare V (or zero proverb) (*Kim may go*/*Kim may*/**Kim may going*/**Kim may a dog*); articles all appear in construction with a following noun and nowhere else (*the goose*/**the ran*, etc.); quantifiers appear independently (*many/all)* or in construction with a following noun (*many geese*/*all sheep*) or with a following *of* phrase (*many of the sheep/all of the sheep*) and so on. For lexical expressions, on the other hand, syntactic context varies widely and is not definitional of the class as a whole, or even of distinct subclasses. For example, lexical expressions may appear in various syntactic environments: e.g. verbs may appear with or without direct objects or with sentential or nominal complements or with NPs in various cases (e.g. partitive for accusative in Finnish etc.) (*believe Ø/the story/that Kim is mad/Kim to be mad*); nouns may appear with or without determiners (*water/ the water/ the water of Leith*); adjectives may appear predicatively or attributively, and so on. Thus, the fact that an expression is a verb says nothing about the number and class of its complements. However, identifying an expression as a (proper) quantifier (in English) automatically predicts that it may appear on its own, with a common noun phrase or with a following *of* phrase containing a definite NP.

Furthermore, if a functional expression can appear with an expression with a particular property then it will appear with all expressions with the same property. Thus, *the* can appear with any common noun in English, *a* can appear with any singular count noun, *be* can appear with any transitive verb that has an *en* form, and so on. For lexical expressions, however, there is no guarantee that an expression can appear with all relevant complements. Thus, while transitive verbs all take NP direct objects (by definition), it is not the case that a particular transitive verb will appear with every NP because of selectional restrictions (e.g. *kick the football*/**kick many ideas*). It is also possible for lexical expressions to be so restricted in their distribution that they will appear with only

4. In other words, 'must be followed by a phrase headed by'.

one or two items in the language (e.g. *addled* in English which can collocate only with the words *eggs* and *brains*). The possibility of restrictive collocation does not seem to hold of functional expressions and may be attributed to the fact that such expressions typically do not impose idiosyncratic semantic selectional restrictions on their complements.

Another aspect of the syntactic restrictedness of functional expressions is that there are no processes that alter their selectional properties as there are for lexical expressions. Thus, there are no processes that apply to functional expressions[5] that alter the status of their semantic arguments (as in passivisation, raising, etc.), whereas such processes are common for lexical expressions and ensure that they appear in a wider range of syntactic contexts. Furthermore, it is not normally the case that long distance dependencies alter the contexts in which functional expressions may be found. Question movement, topicalisation, extraposition, etc., which may radically alter the environments in which lexical expressions are found, do not generally apply to the complements of functional expressions. This is necessarily true of affixes, but also holds of more independent expressions, hence the ungrammaticality of expressions like **cats, Kim really liked the* parallel to *The cats, Kim really liked*.

This is not always true of all classes of functional expressions, however. For example, both auxiliaries and prepositions in English permit the extraction of their following complements, e.g. *Who did Kim give the book to?*, *What town did Kim send the cat to?*, *Lou said he must go to town, and so go to town, he must*. However, such extractions are not common and are often subject to restrictions not apparent with lexical expressions. Thus, in English, the topicalisation of a VP after a modal or auxiliary is strongly literary while extraction from prepositional phrases is not completely free. It does not, for example, apply to clausal complements (assuming that complementizers like *because* are prepositions, see Emonds 1976) (e.g. **Kim is mad, Jo is not happy because*), nor to prepositional ones (**Through what did Kim go out?* parallel to *What did Kim go out through?*). It is worth noting in this regard that auxiliaries and prepositions both have stronger semantic argument properties than many other functional expressions and given the association often made between argument structure and extraction[6], it is possible that it is this property that is responsible for such exceptions to the general rule.

Conversely, there are processes that apply to functional expressions that do not apply to lexical ones. An obvious example are the auxiliary verbs in English which may appear before the subject (*Will Hermione sing?*/**Sings Hermione?*); host the negative clitic *n't* (*Hermione won't sing*/**Hermione singn't*); and permit cliticisation to a preceding element (*Hermione'll sing soon*). While there are some verbs that occupy an awkward midway position between auxiliary and main verb in allowing some of these processes (like *need*, *dare* see Pullum and Wilson 1977 inter al.), the majority of verbs show none of them.

Groups of functional expressions also tend to cluster together around a particular major class (e.g. determiners and quantifiers with nouns, tense, aspect and agreement with verbs) and these groupings define syntactic domains of a particular type (an extended projection in the terminology of Grimshaw 1991). Thus, in English any expression appearing after *the* must be interpreted as nominal, while any expression appearing with a modal must be verbal, e.g. (3a, 3b). Where functional expressions from different domains are combined, the result is generally gibberish, e.g. (3c).

3a the kill (N) ~ may kill (V)

3b the killing of the whale (N) ~ may kill the whale (V)

3c *the ran ~ *many bes ~ *may them

The same strict interpretation of syntactic domain does not hold of combinations of lexical expressions, and apparently anomalous combinations of expressions (e.g. adjective plus verb) do not necessarily lead to nonsense. Thus, the strings *slow ball* or *cat killer* may be used in different environments without being incomprehensible, compare (4a) with (4b) and (4c) with (4c).

4a Kim hit a slow ball (N).

5. This is true for the functional instantiations of expressions that have both functional and lexical uses.
6. Witness the ECP of Chomsky 1981, etc., the Slash Termination Metarule of Gazdar et al. 1985 and Kempson 1995's type-theoretic analysis of gaps.

4b Kim slow balled it into the back of the net (V).

4c Felix was a cat killer (A/N).

4d Felix cat killered it round the garden (V).

Another important property of functional expressions is that they can alter the categorial status of lexical expressions, while the latter cannot 'coerce' functional expressions out of the domain that they define. Thus, tense morphemes are always verbal, articles are always nominal, whatever lexical expression they appear with.[7] Looked at extensionally, once an functional expression has been assigned to a general domain (nominal, verbal or whatever) then it always remains in that domain (although certain ones may be underspecified, like English *ing* forms which can appear in nominal or verbal contexts, see Borsley and Kornfilt this volume). Lexical expressions, on the other hand, are freer to appear in different syntactic domains.[8]

Thus we have a situation where functional expressions generally exhibit a more restricted syntax, are more categorially determinate than lexical expressions and often also associated with syntactic positions that cannot be occupied by lexical expressions. Furthermore, they cannot be coerced out of their syntactic category in the same way as lexical expressions. These properties are more robustly and generally applicable to functional expressions than those discussed in previous sections. Again, however, they are neither fully necessary nor sufficient to guarantee that some expression is functional, since there are lexical expressions with restricted syntax (e.g. *addled* noted above) and that resist appearing as a member of more than one category, and there are functional ones that appear in a wider range of contexts and as member of different categories (e.g. the participle forms in English) and which do only appear in positions that can be occupied by lexical ones (e.g. pronouns).

2.4 Semantics

The most quoted semantic difference between the two classes of expression is that functional expressions have a 'logical' interpretation, while lexical expressions have a denotative one. Thus, we find that major word classes have been traditionally defined in terms of their supposed semantic denotations. Nouns are notionally classed as expressions that name persons, places or things, verbs are classed as expressions that denote actions, processes, states, and so on. Although structuralist linguists have denied the utility of such notional definitions of the parts of speech, the concept was defended in Lyons 1966 and has re-entered the literature in terms of semantic sorts. Thus, many theoretical frameworks make use of Davidson's ontological distinction between events and individuals (see Davidson 1967). Although the correspondence is not strictly parallel to the syntactic classification of verb versus noun (phrase), its recent appearance indicates a persistent tendency for lexical expressions to be defined in terms of their denotation, i.e. through the ontological properties of the sorts of thing they typically identify. (See also Anderson 1997 for other a recent notional theory of the parts of speech.)

Functional expressions, on the other hand, are said not to denote in the same way: they do not pick out sets of primitive elements and ontological considerations do not have an effect on their classification. Instead, functional expressions typically semantically constrain relations between basic denotational classes or provide instructions for where to look for the denotation specified by an associated lexical expression. So, for example, quantifiers relate cardinalities and proportions of elements between nominal and verbal denotations; articles provide information about the discourse status of a referent; tense provides information about the relative time an event occurs; modals provide information about the status of an event or proposition (e.g. as possible, necessary, etc.).

However, such an approach begs many questions. Precisely what it means to have a logical interpretation is not easy to define and the attempt at a characterisation of the semantics of functional expressions in the previous paragraph is not easy to sustain. For example, while it is often true that functional expressions constrain relations between classes of primitive denotata, this does not hold of anaphoric expressions such as pronouns, pro-adverbs, etc. which have a referential

7. Witness the current vogue for verbalising common nouns in American English.

8. In languages exhibiting more inflection that English, the freedom of content words to appear in different domains is limited. However, if one looks at roots, as opposed to stems or words, then it is often found that the same freedom in syntactic category is exhibited (Sasse 1993:653).

rather than a relational function. Furthermore, many lexical expressions denote relations which may, as in the case of verbs taking intensional complements like *want*, be as complex in semantic structure as more obviously functional expressions. Nor is it possible to maintain a view of functional expressions in which they typically convey less information (in some sense) than lexical ones. The semi-copular verbs in English such as *seem*, *appear* and so on, are typically treated as lexical expressions despite the fact that the information they convey bears comparison with that conveyed by the modal auxiliaries like *can*, *may*, which are treated as functional. Moreover, certain apparently functional expressions like quantifiers such as *several* and numerals again appear to convey as much information as lexical nouns such as *number*, *mass* and so on. It appears, therefore, that while there does intuitively seem to be some content to the idea that the major lexical classes denote ontologically basic elements, a purely semantic characterisation of the difference between functional and lexical expressions is unlikely to be sustainable.

A more robust semantic property that differentiates the two classes, however, can be found in the inter-relations that are found between members of different subclasses of expressions. Lexical expressions are linked in complex arrays of sense relations and exhibit identifiable semantic relations with each other, in terms of synonymy, hyponymy, selectional restrictions, and so on, (see Cruse 1986 for an extended discussion). These properties constitute the subject matter of most work on lexical semantics and provide interesting insights into the way our experience of the world is structured. No such sense relations obtain between (subclasses of) functional expressions. While classes of functional expressions do exhibit similarities in meaning, this always results from the defining characteristics of the class itself. Thus, *the* and *a*, might be described as 'opposites' (or co-hyponyms) of definiteness, but the relation between them is not one that is identifiable in groups of lexical expressions, nor is there ever a corresponding superordinate expression (i.e. no general purpose definite/indefinite marker) which can be transparently related to other subclasses of functional expressions.[9] Quantifiers also form a class which exhibit a number of logical relations with each other, but these result from the basic semantics of the class in determining relations between sets and the common characteristics are constrained by properties like permutation and conservativity, etc. (see van Benthem1986) which are hypothesized to be universal, unlike the parochiality exhibited by semantic fields in different languages. In other words, classes of functional expressions are semantically isolated, while lexical expressions are linked in complex arrays of meaning relations.

Another semantic property displayed by lexical expressions but not by functional ones involves 'coercion' or the modification of the denotation of one lexical expression by that of another. A classic example of this involves the influence of a complement noun phrase on the aktionsart of a sentence (see Verkuyl 1993, inter alia). Thus, a bounded NP object like *three dinners* with an essentially unbounded process verb like *eat* produces an interpretation of the event as bounded, i.e. as an accomplishment, while a semantically unbounded NP (mass or bare plural) induces a process interpretation (5a - 5c). This does not happen with functional expressions whose interpretation remains constant whatever semantic characteristics are displayed by the expression with which they combine. Notice further that combining a distributive quantifier with a mass term (or vice versa), does not affect the basic interpretation of the quantifier which remains distributive (or mass). So *three wines* is distributive/count in (5d) and *much sheep* remains mass in (5e), despite the normal denotation of the complement noun.

5a	Kim ate all day.	*Unbounded/Process*
5b	Kim ate three ice creams.	*Bounded/Accomplishment*
5c	Kim ate ice cream all day.	*Unbounded/Process*
5d	Kim drank three wines.	*Count*
5e	Much sheep was eaten by the infected cattle.	*Mass*

The effects of semantic coercion go beyond aktionsart, however. Because of the existence of

9. Generic pronouns like *one* in English or *Man* in German are not counterexamples to this. Such elements remain third person singular, even when their interpretation may range over all persons and numbers. They could not be described as semantic superordinates of all pronouns.

selectional restrictions, different combinations of lexical expressions may give rise to metaphorical effects requiring inferencing to resolve apparent contradictions. In other words, attempts will be made to accommodate apparently anomalous combinations of lexical expressions, yielding metaphorical interpretations that may alter the basic type of object described by a phrase. Thus, in (6a) the event described is a physical one, while in (6b) an abstract event is described (see Pittock 1992 for some discussion of this form of semantic coercion). Contradictions generated by combinations of functional expressions, on the other hand, lead to incomprehension/ungrammaticality (**all some books* cf. *all the books*,). In other words, the meaning of a functional element is not negotiable: there is no ‘inferential space’ between a functional expression and the expressions with which it combines.

6a The river flowed to the sea *Physical*

6b Kim’s thoughts flowed to Skye *Abstract*

A further semantic property of functional expressions that has been noted is that they may yield no semantic effect in certain environments. This is typically said of case or agreement and in Chomsky 1995 a distinction is made between interpretable and non-interpretable features from which a number of theoretical consequences are derived. It is certainly the case that grammatical properties which are determined by other elements may not be semantically interpreted. Thus, the preposition *to* following a ditransitive verb like *give* is said not to have a semantic role but to act like a case-marker, in distinction from its use following an intransitive verb of motion like *go*. However, it is unlikely that any grammatical distinction that is not purely morphological (e.g. declensional class and the like) is entirely without interpretative capability. For example, agreement is often asserted (usually without discussion) to be an instance of a category without semantics, its sole role being to encode dependency relations. But this is shown to be false when one takes into account examples where agreement relations are broken (instances of grammatical disagreement). Where expected patterns are disrupted, the disagreeing feature signalled by the functional expression (usually an affix) induces an interpretation based on the interpretation of that feature. We find examples of this in many languages that have a system of agreement, as illustrated in the examples from Classical (Attic) Greek in (7a - 7b). In (7a), there is a disagreement in number on the verb which emphasizes the individual nature of the withdrawal, and in (7b) there is a disagreement in gender that signals the effeminacy of the subject (see Cann 1984 ch. 6 for further discussion of such phenomena).[10]

7a to stratopedon ɑnɛkho:ru:n *Thucydides 5.60*
the army[sg] withdraw[3pl]
‘The army are withdrawing (severally)’

7b kle:sthEnE:s ‘ Esti sopho:tatE:
Kleisthenes[masc] is wise[superlative,fem]
‘Kleisthenes is a most wise woman

However, while it does not appear to be true that functional expressions always lack semantic effect, it is true that this is often suppressed or eliminated in normal environments. Such is not the case with lexical expressions, however. The meaning of a lexical expression is not fully suppressed even in strongly idiomatic or metaphorical environments, as can be seen in the ways in which metaphors and idioms can be felicitously extended. For example, (8a) makes a better extension of the figurative sentence in (6b) than (8b), while (8c) is a more informative statement than (8d), showing that the literal meaning of expressions is not completely suppressed in coerced (metaphorical or idiomatic) interpretations.

8a and eddied around the poor cottage where her mother lived.

8b ??and exploded beside the poor cottage where her mother lived.

8c Tabs were kept on the victim but they kept blowing off.

8d ??Tabs were kept on the victim, but they were very noisy.

Although an absolute distinction between the semantic properties of functional and lexical

10. For discussion of other ways that AGR might contribute to semantic interpretation, see Adger 1994 and Cormack 1996.

expressions cannot probably be made, semantic differences between the two classes do thus exist. Lexical expressions engage in rich semantic relations with others of the same sort, but their interpretation is subject to inferential manipulation in context. The semantics of functional expressions, on the other hand, may be suppressed in normal environments, but their interpretation cannot be coerced by other expressions with which they appear.

2.5 Diachrony, polysemy and homonymy

If there were a strong categorial differentiation between functional and lexical expressions, this would imply that the sets of expressions that make up the two macro-classes are discrete. This requires formally identical morphs that have both functional and lexical manifestations to be treated as homonyms rather than polysemes, which typically do not involve different categories. Hence, the morph *to* in English in its grammatical usage as a case marker ought to be classed as functional, whilst its manifestation as a preposition of motion should be classed as a lexical homonym. However, it is far from clear that the two uses of the preposition are as distinct as homonymy implies. For example, as a case-marker *to* only marks noun phrases whose relation to the event described by the main verb is such as can be described as a goal. There are no examples of this preposition marking patient, theme or source noun phrases, indicating that it is a semantically reduced variant of lexical, *to*.[11] This observation has led to the view, advocated in Adger and Rhys 1994, that case-marking prepositions (and other functional expressions in Chinese, see Rhys 1993) mediate the thematic role assigned by a verb. Thus, while such prepositions, whose appearance is determined by a verb, do not themselves assign a full thematic role to their complement noun phrases, they provide bridges to help verbs assign the correct thematic roles to their arguments and so must be of the right sort to identify that role. If we accept this view, then we could hypothesize that there is only a single preposition *to*[12] in English which has functional and lexical manifestations.

Other evidence against homonymy comes from diachronic processes of Grammaticalization. According to a recent theory (Hopper and Traugott 1993), an expression develops into a grammatical homonym through a period of polysemy involving pragmatic enrichment (9).

9 single item > polysemy (pragmatic enrichment) > homonymy (‘bleaching’)

It is the middle phase that poses problems for the idea that there is a discrete categorial difference between functional and lexical. The notion of polysemy requires there to be a single lexeme used in different contexts to give different but related meanings. If the dichotomy between functional and lexical is analysed in terms of discrete categories, then it should be impossible for any expression to have polysemous uses that straddle the boundary between them.

However, it is clear that this is precisely what does happen where a lexical expression is in the process of developing grammatical uses. An example of this sort of polysemy is given by the verb *have* in certain dialects of English.[13] The different constructions involving *have* do not partition neatly in terms of their syntactic properties according to whether they are contentive (i.e. semantically ‘full’) or functional (semantically bleached). Thus, from a semantic point of view the decrease of semantic effect goes from Process (*Jo had a party)*, through Possessive (*Jo has three books*), to Causative (*Jo had the cat cremated*), Modal (*Jo had to go home*) and Perfect (J*o had gone home*) (10a). However, classic tests for auxiliaryhood in English (see Pullum and Wilson 1977) show a different pattern that cuts across the semantic development, with the possessive showing more auxiliary-like behaviour than the causative or modal uses (10b).[14]

10a Process > Possessive > Causative/Modal > Perfect

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11. Even the often cited preposition *with* in sentences like *Kim credited Lou with more intelligence* retains a reflex of its comitative uses in that it identifies a property associated with (or predicated of) the direct object by the subject.

12. I ignore the infinitive marker, for convenience, but see Miller 1986 for an argument that this is a reflex of the same element.

13. In most dialects, the lexeme has either become fully grammaticalised as a support verb, with its main verb possessive function being replaced by the periphrastic *have got,* or developed into a full homonym, with the possessive function failing to display any auxiliary properties at all.

14. The grammatical judgements here are my own and those of other speakers of RP English in Scotland. That there is wide variation in the grammatical properties shown by the verb *have* in its different uses is not of significance here. What is important to note is that expressions in the process of Grammaticalization may show a mismatch between their semantic and syntactic development as functional expressions.

10b Process/Causative > Modal > Possessive > Perfect

The mismatch between the auxiliary status of the verb in each construction and its semantic content seems to deny any clear distinction between the contentive and functional uses of this expression, thus undermining the idea that there is homonymy, and leading to the conclusion that *have* is a single polysemous expression in this English dialect. The fact that one must recognise functional/lexical polysemy, at least for certain stages in the Grammaticalization of an expression, makes a strong categorial distinction between functional and lexical expressions problematic.

2.6 Discussion

From the above discussion it appears to be true that certain grammatical tendencies are related to the functional/lexical distinction. Functional expressions tend to form closed classes; to be phonologically and morphologically reduced; to appear in a restricted range of often idiosyncratic syntactic environments; to appear in general categorial domains from which they cannot be shifted; to have meanings which may be fully suppressed in certain environments; and to allow the possibility of syntactically and semantically coercing lexical expressions. Lexical expressions, on the other hand, seem not to have these properties, but to form open classes, to be morphologically free, to appear in a wide range of syntactic environments, and to be categorially and semantically coercible. However, none of these linguistic characteristics is individually sufficient or uniquely necessary to determine whether a particular expression in some language is functional or lexical. Furthermore, the discussion in section 2.5 shows that, if the functional/lexical dichotomy is categorial, it cannot be discretely so, since a single expression may show behaviour that combines both functional and lexical properties. This type of pattern, where grammatical properties cluster around groups of expressions but do not fully define them and where there is not a discrete boundary separating one class of expressions from another, is typical of a number of linguistic notions like subject, head, and so on. Such 'cluster concepts' characterise gradients from one type of expression to another depending on the number of properties exhibited but seem to reflect linguistically significant distinctions.

There are four ways to approach a cluster concept of this sort. In the first place, one may deny the utility of the concept in linguistic description. Secondly, one may treat the concept as prototypical, allowing more or less determinable deviations from a putative norm. Thirdly, one may restrict the set of properties indicative of the category to a potentially relevant subset in order to make the concept absolute. Finally, one may assume that the concept is essentially primitive and that variability in associated properties is explicable through other means.

With regard to a categorial distinction between functional and lexical expressions, the first position is the one taken in Hudson (this volume, 1995) which accepts the importance of the notion of functional expression (Hudson's Function Word) but denies that Function Word Category has any linguistic significance. The fact that categories are only as useful as the generalisations that can be made using them makes the lack of any defining (and, therefore, predictable) properties of functional expressions strongly indicate that a category, functional, is not a linguistically useful one. However, the fact that there are strong tendencies for functional expressions to exhibit certain types of property supports the second position which might be taken by proponents of Cognitive Grammar (Langacker 1987, Taylor 1989). In such a view, there would be a prototypical functional category which would be, for example, phonologically reduced, affixal, syntactically restricted to a single domain and semantically impoverished in some sense. Instantiations of this category would more or less conform to this prototype and shade into the prototypical lexical category.

The third approach that could be taken to the apparent cluster concept of functional category appears to be the one often taken in the Principles and Parameters literature. Here an abstract view of categorisation is assumed that maps only imperfectly onto particular classes of (distributionally defined) expressions within a particular language. Functional categories, for example, may be defined as ones that do not assign a theta-role, but that select a particular (often unique) type of syntactic complement (Grimshaw 1990). These theoretically motivated properties abstract away from the directly observable properties of functional expressions and allow the categorial distinction to be made uniformly at a more remote level of analysis.

The final view of the categorial divide is the least is well supported by the linguistic data, but it is the one that will be pursued in this paper. In other words, I explore the idea that the functional/ lexical distinction is useful at some level of description, is not a prototypical concept, is not abstract but is categorial. To provide evidence that this is the case, however, I do not intend to explore further the linguistic properties of such expressions. Instead I will examine the psycholinguistic evidence in favour of there being a significant difference in the processing of the two classes of expression. Although it is not common to resort to experimental or pathological evidence to support linguistic hypotheses, the growing body of psycholinguistic research into the distinction between lexical and functional expressions is too extensive and important to ignore. Although none of the evidence is uncontroversial, the picture that emerges is one where the psychological treatment of functional expressions differs significantly from that of lexical ones, lending credence to the idea that they instantiate a primary categorial distinction.

3. The Psycholinguistic Evidence

Evidence for the significance of the functional/lexical distinction from a psychological perspective comes from three principal sources: language processing; patterns of aphasic breakdown; and language acquisition. Exactly what the functional elements are within a language is not, however, clearly defined in the psycholinguistic literature and the distinction between functional and contentive elements is often rather crudely drawn. Typically, such expressions are referred to as 'closed class' items, even though, as pointed out in section 2.1, this is not a particularly good determinant of functional status. Fairly uncontroversially, however, such a view leads to classes of expressions such as determiners (especially articles, demonstratives and certain quantifiers like *every* and *all*), auxiliary and modal verbs, prepositions, (certain) complementizers and pronouns being treated as functional. More controversially, also included within this grouping are the 'pro-adverbs', *here* and *there*, clausal connectives such as *therefore* and intensifiers such as *so*, *very*, etc. Other possible functional expressions, such as certain quantifiers like *several*, *many* may be excluded from consideration as are expressions, such as the quasi-modals *need*, *dare*, etc., which behave syntactically partly like functional expressions and partly like contentive ones. In the discussion that follows, I shall be deliberately loose in my terminology, reflecting the looseness apparent in the psycholinguistic literature.

3.1 Processing

Experiments to test the psychological mechanisms underlying language processing provide strong support for there being a significant difference in the way certain functional elements behave. In the first place, there is evidence that functional expressions are not affected by speech errors. For example, spoonerisms only involve pairs of contentive expressions, and never involve functional ones (Garrett 1976, 1980). Thus, one gets errors like *The student cased every pack* but not *Every student packed the case* for *The student packed every case* or *A student likes the lecturer* for *The student likes a lecturer*. Processing models (e.g. Garrett 1980) have tried to explain this effect by assuming a level at which lexical expressions are represented in the syntactic tree, prior to the insertion of the functional elements. Erroneous replacements and switches are then held to apply at this prior level, giving the observed errors.

Secondly, normal adults show a frequency effect in lexical decisions with contentive expressions. In other words, normal adults respond quicker in timing experiments to more frequent words. This does not apply to functional expressions, where response times for all expressions is similar, even if on a straight count the items differ in absolute frequency (e.g. between *the* and *those*) (Bradley, Garrett and Zurif 1980). These results are controversial and Bradley's dual access route to the lexicon has been challenged in e.g. Besner 1988, Gordon and Caramazza 1982, 1985, amongst others, which report work that indicates that there is a frequency effect with functional expressions, as well as with lexical expressions. It may therefore be the case that both classes do show frequency effects, but that there is a limit to the effect with the most frequent expressions, a group that is dominated by functional expressions (Richard Shillcock p.c.).

More robust evidence comes from experiments that show that normal subjects take longer to reject non-words based on lexical expressions than those based on functional expressions, e.g. *thi-*

nage vs. *thanage* (Bradley 1978, and replicated by others, see Matthei and Kean 1989). This implies that the linguistic processing mechanism ‘knows’ that a word is a functional expression and thus ‘knows’ that it will not undergo any derivational processes. For lexical expressions, the processor appears to make a wider search for matching candidates within the lexicon. Thus, it appears that the linguistic processor is able to recognise instantly a derived form as based on a functional expression and reject the form without trying to identify whether the form is well-formed and/or attested.

Word priming experiments (see especially Shillcock and Bard 1993) show that there is a difference in priming between certain functional expressions and lexical expressions. Lexical expressions prime lexical homophones (so, for example, the verb *arose* primes the noun *rose*) and they also prime semantically related expressions (or example, *wood* also primes *timber*). Functional expressions, however, do not prime homophones (e.g. *would* does not prime *wood*) nor do they appear to prime semantically related expressions (e.g. *may* does not prime *must* or *might*). Further evidence for the distinction between functional expressions and lexical expressions is afforded by the informational encapsulation of lexical items during processing. Priming effects are independent of the syntactic structure within which a lexical item is embedded. So, *rose* primes both the noun (and semantically associated *flower*) and the verb (see Tannenhaus et al. 1989). Functional expressions, however, are affected by syntactic context: where the syntax strongly favours a functional expression, only the functional expression will be activated. Hence after an initial noun phrase [wʊd] does not prime *wood* (or *timber*), etc. This connection between syntax and closed class items is further supported by evidence from bilinguals where in code-switching situations the functional expressions used tend to come from the language that supplies the syntax (Joshi 1985).

3.2 Acquisition and Breakdown

Evidence from first language acquisition and from different types of language breakdown resulting from brain trauma also show distinctions in the behaviour of functional and lexical expressions. There have been numerous studies whose focus has been on the acquisition of grammatical elements (see, for example, Bloom 1970, Bowerman 1973, Radford 1990, and the papers in Morgan and Demuth 1996, among many others). The data from these studies are not uncontroversial, but they indicate that functional expressions typically appear later in child language production than lexical expressions, and that functional categories appear later than lexical ones. Crosslinguistically, however, this is probably not absolutely true. For example, Demuth 1994 reports that Sesotho children produce a number of functional, or function-like, elements from an early age (she cites passive morphology as an example) and claims of this sort for English tend to ignore the affix *ing* which is acquired and produced relatively early (de Villiers and de Villiers 1978). Furthermore, studies like Gerken and McIntosh 1993 indicate that children who fail to produce function words are nevertheless sensitive to their appearance in input and suggest that therefore children may have representations of such expressions before they use them. Morgan et al. 1996 further hypothesize that the functional/lexical split is innate and that children use the phonological differences to group expressions into the two classes. This, they suggest, helps the identification of word-meaning mappings by cutting down the amount of utterance material that the child must attend to. Thus, children may indeed have some (possibly underdetermined) concept of the functional expressions in the language they are acquiring. This implies that any relative lateness in the production of functional expressions may be due to the communicative needs of the learner, since lexical expressions carry greater information than functional expressions and therefore are likely to be fully represented and so produced earlier. It also implies that functional expressions which carry a lot of semantic information or are otherwise salient in the speech stream (e.g. because of regular morphology or phonological prominence) may be acquired relatively early while less informative or salient elements will be acquired later.[15] Whatever the precise characterisation of first language acquisition, however, the importance and robustness of the functional/lexical divide is clear and that the acquisition of syntax proper by first language learners is co-incident with the production of

15. A theory of the acquisition of verbal morphology along these lines was presented in a talk by the author and M E Tait presented to the Linguistics Association of Great Britain and a number of places in the UK in 1991.

functional expressions is an accepted fact.

Because of the difficulties in interpreting what children are producing or comprehending and the problems and controversies that surround the nature of child language, patterns of aphasic breakdown are, in many ways, more interesting for our purposes, because we see in such cases what happens when damage occurs that to a full adult grammar. The evidence can thus be taken as strongly indicative of the nature of the mature language faculty.

Aphasias can be characterized broadly as fluent and non-fluent. Fluent aphasias (Wernicke's) are characterised by the use of functional expressions, control of syntactic operations (movement), production of speech at a normal rate of speed, and appropriate intonational patterns; but comprehension is disrupted and access to information associated with lexical expressions is deficient, particularly with regard to predicate-argument structure and lexical semantics. Agrammatic aphasia (Broca's), on the other hand, is characterised by slow or very slow speech, no control of sentence intonation, impaired access to functional expressions, no control of syntactic operations; but comprehension, provided syntactically complex sentences are avoided, is unimpaired and lexical expressions are generally used appropriately, indicating full access to semantic information (see Goodglass 1976). What is interesting here is that in agrammatic aphasia semantic processing appears to be intact, while syntactic processes are disrupted.

Some representative examples of agrammatic speech (taken from Tait and Shillcock 1993) appear in (11a-11f). (11a) and (11b) illustrate difficulties with participle formation (and one example of an omitted determiner); (11c) from Italian shows difficulty with gender agreement in both articles and verbs; in (11d) from Dutch there is a missing auxiliary; (11e) from German displays wrong case assignment (accusative for dative); and (11f) from French indicates difficulty with prepositions.

11a burglar is open the window

11b Little Red Hood was visit forest grandmother

11c il, la bambina sono, e andata
the.m, the.f girl have has gone

11d ik nou 21 jaar gewerkt
I now 21 years worked

11e die Oma sperrt ihn auf
the grandmother opens him.acc

11f j'ai pris chemin de d'orthophoniste en voiture
I have taken road from/of of speech-therapist in car

Of course, the syntactic impairment shown by such dysphasics is not absolute, an all or nothing affair affecting the whole of a subclass of functional expressions or all occasions of utterance (cf. (11a) where there is one omitted determiner and one overt one). However, it is clear that there is difficulty in production[16] and that this principally affects functional expressions, both words and affixes.

There is also evidence that agrammatic aphasics have difficulty in interpreting non-canonical structures. For example, many agrammatics have difficulty understanding passive sentences which cannot be disambiguated through semantics alone. In experiments it has been shown that performance in understanding passives where the thematic roles are easily assignable is significantly better than comprehension of passives where no semantic clues are available (Saffran et al. 1980, Schwartz et al. 1980).

12a The hunter shot the duck.

12b The duck was shot by the hunter.

12c The square shot the circle.

12d The square was shot by the circle.

Furthermore, it is reported in Bradley et al. 1980 that agrammatic aphasics appear to show fre-

16. The data from comprehension are more difficult to assess, see Bastiaanse 1995 for some discussion

quency effects for functional expressions. Although, as noted above, the conclusion drawn by Bradley that normals do not show such effects with functional expressions is controversial, the effect of frequency on the recognition of words by aphasic speakers is apparently more marked than for normal ones. Again, the test for recognition of non-words based on closed and open class items is more robust and has been replicated. Broca’s aphasics show no difference in reaction times between the two types of non-words, indicating that their recognition of functional expressions is impaired.

3.3 Discussion

The psycholinguistic evidence points to a strong distinction in the processing of functional expressions and contentive (lexical) ones. In particular, the evidence from word priming indicates that functional expressions are not encapsulated from syntax since the syntactic context that surrounds functional expressions affects lexical access whereas syntactic context has no effect on the lexical access of contentives. Furthermore, functional expressions are recognised quickly by the processor and do not appear to interact with the mechanisms that identify contentive expressions. The data from language acquisition and language breakdown also show that functional expressions are closely linked with syntactic operations like passive, dative shift, etc., while lexical expressions provide sufficient information for basic semantic processing to occur, even in the absence of coherent syntax. There is thus not only strong support for a significant distinction to be made between functional and lexical elements but also for the hypothesis that functional expressions are more closely associated with (local) syntactic processing than lexical ones, which themselves are more strongly implicated in semantic processing.

Evidence from neurobiology further supports the significance of the distinction between functional and lexical expressions and the association of the former with syntactic processing, as it suggests that the two types may be stored in different parts of the brain. For example, the loss of the ability to manipulate syntactic operations in patients who have damage in the anterior portion of the left hemisphere, along the angular gyrus (Broca's area), indicates that the syntactically significant functional expressions may be located in this area. Patterns that emerge from fluent aphasias indicate that lexical expressions are less strongly localized, though a general tendency toward localization within the posterior portion of the left hemisphere is attested. Following left hemispherectomy, the right hemisphere may take over functions involving lexical expressions, with a remapping of activity to that hemisphere, but it cannot take over the functions of functional ones. Speech is possible, with normal comprehension and communication, but syntactic complexity is absent. There is also evidence from neurobiological studies that indicate differences in the storage of lexical and function items. It appears that neuronal assemblies corresponding to function words are restricted to the perisylvian language cortex, while those corresponding to content expressions include neurons of the entire cortex (see Pulvermüller and Preissl 1991 and the discussion of neurobiological implications for language acquisition in Pulvermüller and Schumann 1994).

Unfortunately, as was seen in section 2, the robust psycholinguistic evidence for the distinction is not reflected in the linguistic properties exhibited by the two macro-classes of expression. If the functional/lexical dichotomy is categorial, there should, as Hudson (this volume) notes, be ‘generalisations which would not otherwise be possible’ without the categorisation. In other words, the identification of an expression as functional will predict some subset of its grammatical properties. Furthermore, in a strict interpretation of the distinction between the two categories, there should be no expressions that are morpho-syntactically attributable to both classes. If a lexeme is identified as a member of a contentive class by certain grammatical properties, then it should not exhibit properties centrally associated with functional ones (and vice versa). An implication of this is that Grammaticalization processes, whereby contentive expressions become functional, should exhibit an instantaneous shift from one class to the other at some point in the diachronic development. This in turn implies that lexemes that appear to have both lexical and functional uses should behave as homonyms and so should exhibit morpho-syntactic properties that are entirely independent of each other.

The fact that these properties do not appear to hold indicates that the important psycholinguistic notion of the functional/lexical distinction does not constitute a linguistic category. On the other hand, the notion does mirror the conceptual distinction between grammatical and contentive categories within linguistic theory and there are clear connections between the psycholinguistic conception of functional expressions and their linguistic behaviour. Thus, although there are no necessary and sufficient conditions that identify expressions as of one type or another, as noted in section 2.6, functional expressions are generally associated with restricted syntactic contexts and are not amenable to syntactic or semantic coercion while lexical ones appear in a wider range of syntactic contexts and are syntactically and semantically coercible. This is reminiscent of the association of functional expressions with semantic processing and lexical ones with semantic processing noted above. We appear to have a situation, therefore, in which an important psycholinguistic distinction is not fully reflected in linguistic properties, but where there is a clear, but imprecise, relation between the processing properties associated with functional and lexical expressions and their general syntactic and semantic behaviour.

3.4 E-language and I-language

The apparent contradiction between the categorial nature of the functional/lexical distinction implied by the psycholinguistic evidence and the non-categorial nature of the distinction implied by the lack of definitional linguistic properties can be usefully approached in terms of the distinction between E-language and I-language made in Chomsky 1986. The term 'E-language' in that work is used to refer to the set of expressions that constitute the overt manifestation of a language in terms of actual utterances and inscriptions. It is something that may be observed directly as the output of linguistic behaviour, an extensional or ostensive view of language that may be equated with the structuralist and mathematically formal notion of a language as a set of strings of basic elements. Different from this is I-language which is characterised as an internal representation of structures that gives rise to the external manifestation of a particular language. I-language may be construed as a metalanguage that generates (or otherwise characterises) E-language and is equated in Chomsky 1986 with a parametrised state of Universal Grammar. I-language thus consists of grammatical elements that are universally available to humans and which are manipulable by universal linguistic principles. E-language, on the other hand, necessarily consists of language particular elements (the expressions of the language) whose description at the level of the given phenomena must also be parochial and not necessarily amenable to analysis that is crosslinguistically generalisable.

Considerations of this sort led Chomsky (1986) to argue that it is I-language which is the proper object of inquiry for linguistics, because it is this that results from the operation of universal linguistic principles and is thus directly relevant for the understanding of Universal Grammar. E-language, on the other hand is, for Chomsky, relegated to the status of an epiphenomenon, a symptom of language rather than its substance. Leaving aside the ideological battle that informs much of the debate around this topic, we may question whether there are in fact no aspects of E-language that are best described on their own terms: i.e. for which an I-language explanation misses the point and fails to adequately characterise all the relevant properties. Indeed, it is precisely with respect to this question about the nature of the functional/lexical dichotomy that the potential drawbacks of having a purely I-linguistic characterisation of the language faculty are thrown into focus.

Psycholinguistic investigation into language processing is principally concerned with the investigation of human responses to E-language. Descriptions of aphasic behaviour or first language acquisition relate to the linguistic expressions that are produced or, less frequently, comprehended by the people being studied. Priming and other sorts of psycholinguistic experimentation record reactions to written or spoken tokens of expressions that are (or are not) part of a particular E-language. We may, therefore, hypothesize that the functional/lexical dichotomy indicated by psycholinguistic evidence is an ostensibly E-language notion and we may assume that at the level of E-language (the set of expressions, particularly basic expressions, that extensionally define a language), the distinction is categorial, since it does identify a significant grouping of expressions that show identifiable traits in parsing and production (functional expressions are not encapsulated in processing, are accessed quickly, etc.). This hypothesis is supported by the fact that the set of functional expressions within a particular language is always *sui generis* in the sense that different languages overtly manifest different types of functional expression. English, for example, has no overt manifestation of gender agreement, nominal case or switch marking, whereas a language like Diyari (Austin 1981) has morphemes that express these concepts but no person agreement or aspect marking. I-language relates principally to the need to account for universal properties of language whereas the ‘accidence’ of grammar has traditionally been viewed as a language specific phenomenon, but one that determines the properties of a specific language independently of its ‘substance’. Insofar as accidence and functional expressions coincide, we might expect the study and analysis of this aspect of grammar to be language specific.

In current transformational grammar, of course, the variability associated with accidence is attributed to universal parameters and, as such, is in the domain of I-language rather than E-language. However, parameters are intended to determine variable properties of language that are linked together in some way. Arbitrary variations in the grammar of a language (e.g. a language has ejective consonants, fusional morphology, no overt WH-expressions, etc.) are relegated to the lexicon. What is not addressed is how significant such language specific properties are and how much they contribute to the linguistic structures of a language beyond an epiphenomenal haze of arbitrary attributes. There is no a priori reason why external and non-universal properties cannot be linguistically significant. Aspects of E-language may determine certain aspects of grammaticality and interact with I-linguistic properties in interesting ways. In fact, the association of functional expressions with local syntactic processing and their independence from semantic processing implies a radical differentiation in the ways that functional and lexical expressions are represented.

This hypothesis, that the functional/lexical distinction is an E-language phenomenon, will be pursued in the remainder of this paper with a view to proposing a view of the grammar whereby extensional/external properties of language interact with intensional/internal ones that marries aspects of processing and theory in an interesting way.

4. Categorising functional expressions

At the end of the previous section, the hypothesis was promoted that the functional/lexical distinction is categorial at the level of E-language. We will refer to this E-language category (‘E-category’) as ‘functional’ and take it to apply to the set of expressions in any language which show the psychological properties illustrated in the last section. In other words, the hypothesis is that the categorisation of functional expressions is determined for an individual language through properties of processing and frequency. It is possible that certain types of phonological cue may also help to define this category[17]. In other words, such a categorisation is determined by properties that clearly belong to E-language and, hence, it must be language specific and not determined by universal factors. This is not to deny that expressions with certain inferential or semantic properties (such as anaphors and tense) will tend to be encoded by functional expressions, but the categorisation of the expressions of a language into functional and lexical is one that is determined by the external manifestation of that language, as discussed above.

This primary categorisation into the macro-classes, functional and lexical, induces a split in the vocabulary that permits further (E-)categorisation to take place. In this section, I explore the nature of this further categorisation and develop a view of the way a theory of syntax may developed which utilises the different types of information associated with the two types of expression.

4.1 Defining E-categories

Although not much in vogue in many current approaches to syntax, the quintessential type of syntactic categorisation has generally been determined though properties of distribution. This approach to categorisation finds its most elaborated form in the writings of the European and American structuralists (see, for example, Hockett 1954, Harris 1951, Hjelmslev 1953). Morphosyntactic classes are defined by the syntagmatic and paradigmatic properties of expressions, typically through the use of syntactic frames: expressions are grouped into classes according to their ability to appear in a position determined by a particular frame. Clearly again, this type of categori-

17. See also Gerken 1996 and Gerken and McIntosh 1993 for a discussion of morpho-phonological properties that enable children to acquire this distinction.

sation is induced by properties of E-language, as it depends solely on the appearance of expressions with one another and not on more abstract linguistic properties. Hence, one might look for further subcategorization of the lexical and functional categories to be determined by such a process.

There is, however, a well-known methodological problem with this type of classification: how to determine which distributional frames are significant and which are not. In the classical model, categorisation is meant to be automatic and determined without reference to semantics so that any linguistic context can in principle be used to define a distributional frame (see particularly works by Harris). In practice, of course, this ideal is not (and cannot be) met for all expressions in a language. The semantics of an expression is often used to determine whether it should be identified as a preposition or an adverb, a pronoun or a proper name, a verb or an adjective, before any distributional analysis is carried out. More problematic is the selection of significant distributional frames. For reasons to do with selectional restrictions, register, and other factors, if categorisation is determined by distributional frames that are allowed to mention specific words, then most almost all expressions in a language, including major class ones, will define unique word classes, since they will appear in a unique set of contexts. Clearly, if this applies to lexical as well as functional expressions, then this is problematic from the point of view of the grammar, since in the worst case it requires the same number of distributional (E-)categories as lexical expressions, preventing significant generalisations to be made. To get around this problem, structural linguists have tended to use broad, and sometimes arbitrary, syntagmatic frames to define word classes.

This methodological problem is one that led to the move away from distributional theories of categorisation to ones that rely on abstract or notional properties. In fact, however, the difficulty disappears if categorisation is determined, not with respect to *all* basic expressions in a language, but only with respect to the functional ones. As noted in section 2.1, the number of functional expressions is itself small, so that even if every functional expression in a language appears in a unique set of contexts, the number of different categories that need to be recognised will still be small (no greater than the number of functional expressions). Furthermore, since there are no operations that alter the syntactic environment of functional expressions in the same way as for lexical ones, the number of significant contexts for any single functional expression, abstracting away from individual lexical expressions, will be small. Moreover, since functional expressions can appear with all members of an associated lexical class, and coerce lexical expressions to be of the appropriate class in context, we may further abstract away from individual lexical expressions and refer only to major class labels. Thus, instead of classifying articles in English in terms of an indefinite number of frames [__ *dog*], [__ *student*], [__ *hamster in a cage*], etc., they are classified in terms of the single frame [__ N].

In order that the distributional definitions of functional categories are not circularly re-applied to the definition of the major parts of speech (e.g. by taking the frame [*the* ___] to identify particular lexical expressions as nouns), labels like N and V must be taken to be *a priori* categories which the class of functional expressions define extensionally. Thus, in English, whatever expression appears in construction with *the, some*, etc. is necessarily (headed by) a noun or with *may, will*, etc. is necessarily (headed by) a verb. In other words, E-functional categories are defined over the class of functional expressions and a small set of major class labels like N and V, the latter of which are universally given and hence may be considered to form part of the vocabulary of I-language.

A restricted vocabulary, of course, does not guarantee that the set of distributional frames that needs to be considered will also be small or even finite. However, it seems (again because of the restricted syntactic distribution of functional expressions) that significant distributional frames will be in the region of two to four words in length. In general, increasing the size of the context used to identify classes of functional expressions will have no effect on the membership of those classes.[18] For example, with respect to the illustrative set of frames for part of the functional system in English below[19], frames like [__ V+*ed the* N], or [__ *has been* V+*ing*], etc., will pick out exactly the

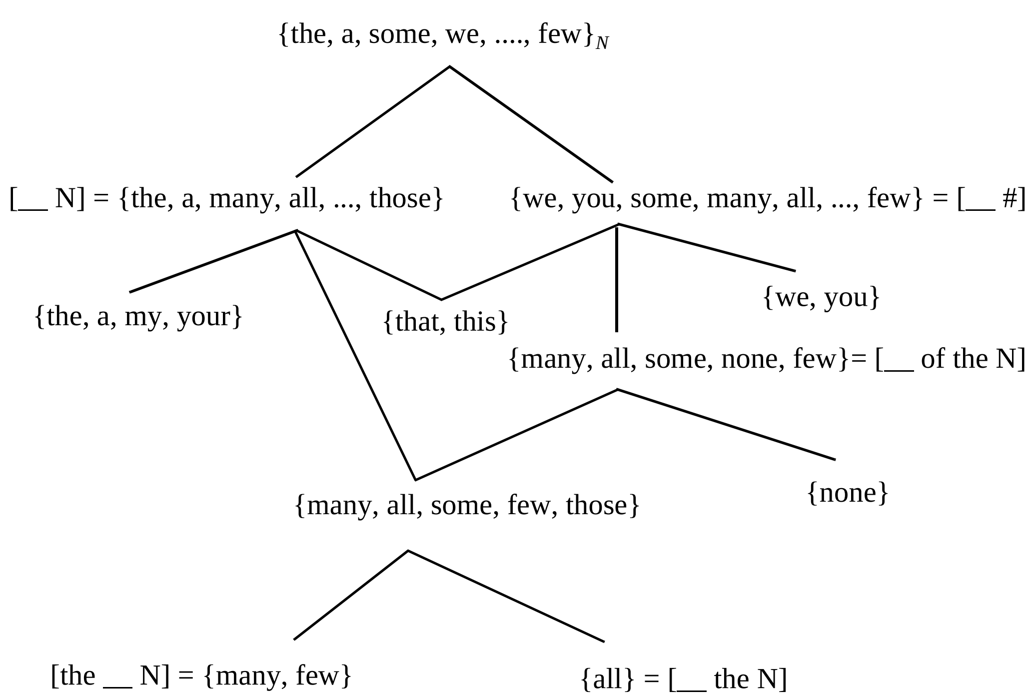
18. This may be significant for first language acquisition, if assumptions about learning such as those made in Ellman (1993) and Ellman et al. (1996) are valid.
19. Note further that the frames abstract away from allomorphy, i.e. affixes refer to morphemes, not morphs and so we have *s* for the plural morpheme, etc. This is not necessary, but simplifies the exposition.

same class of expressions as (13h); frames like [__ N *of the* N], [__ A N], [__ A A N], etc. will pick out the same class as (13a), and so on.

13a [__N] = {*the, a, every, much, no, my, your*}$_N$
13b [__ N+*s*] = {*the, some, many, few, all, no, those, my, your*}$_N$
13c [*the* __ N+*s*] = {*many, few*}$_N$
13d [__ *of the* N] = {*all, many, few, some, none*}$_N$
13e [__ *the* N] = {*all*}$_N$
13f [__ V+*s*] = {*he, she, it, this*}$_N$
13g [__V] = {*you, they, I, we, those, these, many, several, few*}$_N$
13h [__ V+*ed*] = {*I, you, he, she, it, we, they*}$_N$
13i [N+__] = {-*s*}$_N$
13j [V __] = {*here, there*}$_{Adv}$
13k [A+__] = {-*ly*}$_{Adv}$

One of the interesting things to note about functional E-categories is that they cut very finely. For example, given the representative data about the functional expressions in the nominal field in (13a) to (13e) above, we find that the different distributional classes are not fully generalisable to all members of this subclass. Thus, while most of the expressions that satisfy the frame [__ *of the* N] (abstracting here away from number) also satisfy [__ N], at least one does not, i.e. *none*, and while most expressions that satisfy [__ V] satisfy [__ N] (and vice versa), not every relevant expression satisfies both (the personal pronouns satisfy the first but not the second while the articles *a*, *the* and possessive pronouns satisfy the second and not the first). However, some of the frames considered above do appear to be predictive: [__ *of the* N] predicts [__ V] and [*the* __ N] and [__ *the* N] predict [__ N] and [__ V] (when restricted to functional expressions, as we are doing). The intersection of the classes defined by [__ *of the* N] and [__ N] yields a further class. We can diagram these relations using the (subsumption) lattice in (14) where the nodes correspond to sets of expressions that can appear in a particular frame, to the intersection of classes defined by different frames, or to the complement of such intersections with respect to the two original sets. In this way, a complex array of distributional categories emerges.

14



As one goes down the lattice, the categories (necessarily) become smaller, with *all* and *none* defining categories of their own. Indeed, if one cuts across the lattice with further properties (like syntactic number) then further differentiation occurs, with, for example, *a* and *much* being distinguished from *the* and *no,* and so on. Ultimately, the process leads to very small classes of expression, often containing only one member. This approach to the categorisation of functional expressions thus yields a set of relations between individual morphemes that essentially treat each such morpheme as syncategorematic (or equivalently acategorematic) whose syntactic interpretation is given by its position within a distributional lattice like those shown above. It comes as no surprise in such a view of functional categories that there will be expressions which are entirely *sui generis* and appear not to relate directly to other functional expressions (like perhaps the complementizer *that,* see Hudson 1995).

If it is the case that basic syntactic environments define a (meet semi-)lattice in terms of the elements that appear in them, then one only has to know the point at which a particular element is attached to the lattice to know its distribution. This is, of course, equivalent to defining a set of grammatical rules (of whatever sort) and assigning expressions to particular labels introduced by those rules, in the normal structuralist mode.[20] It is not here important how the syntactic relations between the nodes on the lattice are determined and with what generality. What is important is that a structuralist distributional approach directly induces the categorisation of functional expressions, both at and below word level, and, because of the syntactically restricted nature of such expressions, such an approach can in principle provide an exhaustive characterisation of the restricted environments in which functional expressions can appear.

4.2 I-categories and E-projections

As noted above, distributional classes such as those shown in (13) define E-categories, since they are extensionally defined over the vocabulary of English. Clearly, in such a categorisation, the principal categorial distinction must be between functional and lexical, since this provides the restriction on the given data that makes distributional categorisation possible. The functional expressions essentially then define the E-categories of the lexical expressions through the use of universal major class labels.[21] Although such an approach is in principle capable of yielding an exhaustive characterisation of the strictly local dependencies of the vocabulary of a language, as it stands it determines only subclausal constituents. Functional expressions do not provide sufficient information to enable distributionally defined phrases to be combined. Something more is needed that can induce the set of permitted combinations and presumably account for general, putatively universal, linguistic processes like unbounded dependencies and suchlike. Within transformational grammar, universal syntactic processing is assumed to operate only over I-language entities and so the relation between E-categories and I-categories becomes an important issue.

One of the features of classifying functional expressions in terms of their distribution is that, because of their strict association with particular domains (nominal, verbal), basic labelling of phrases that are the output of the distributional grammar discussed in the last section can be done with respect to these domains, as indicated by the subscripts around the classes in (13). Thus, the different classes labelled *N* and *V* above are functional classes related to the universal I-categories noun and verb, respectively.[22] Note that the I-categorial label is not equivalent to the E-categorial label used in the distribution frames themselves. Thus, we cannot substitute *the* (or *the N*, or any pronoun) for N in the frames (13a) to (13d). In fact, we can usefully here distinguish between the

20. The latter is essentially the approach taken in GPSG, where different subcategorization environments for functional expressions are labelled uniquely using a number. The functional, lexicon then specifies for each functional expression the subcategorization numbers associated with it, as illustrated for *all* in (i - iv) (cf. Gazdar et al. 1985).

i	$N'' \rightarrow H'$, {SUBCAT: 21}	(*all boys*)
ii	$N'' \rightarrow$ H[DEF]$''$, {SUBCAT:22}	(*all the boys*)
iii	$N'' \rightarrow$ H[DEF,of]$''$, {SUBCAT:23}	(*all of the boys*)
iv	$N'' \rightarrow$ H[SUBCAT:24]}	(*all*)

21. Note that such a categorisation of lexical categories is independent of semantic or notional considerations and does not permit ideas of greater or lesser prototypicality amongst members of the major categories like noun and verb (see Newmeyer this volume for a critique of approaches to linguistic categorisation based on prototypes).

22. Hence, we follow Hudson (this volume) in claiming that the is a noun that appears with another noun, but it is so in a very different sense to the way in which father is a noun which appears with another noun. In the latter case, the transitivity results from the fact that student denotes a two-place relation, whilst the transitivity of the results from its distributional properties.

E-category N (or V) and its I-category counterpart *N* (or *V*). If we take the position that these latter labels are the ones that are visible to Universal Grammar, then we may understand the combination of functional expressions with a lexical expression as recursively defining the resulting (complex) expression as being of the appropriate I-category. Functional classes may thus be construed as defining E-projections (to slightly modify the concept of extended projection of Grimshaw 1991) of the major class label they contain. This is illustrated in (15) below, where the complex expressions are defined by the distributional grammar associated with the functional expressions and the categorial label gives the resultant I-category. Note that it is not important exactly how (or whether) the internal structure of such phrases is represented. What is important is that the phrases are constructed from information provided by the E-categories of the functional expressions within a given language and that they are labelled with the I-category associated with the major class of the lexical expression they contain.

15a [cat+s]$_N$

15b [the cat+s]$_N$

15c [all the cat+s]$_N$

Through their associated I-category, E-projections are visible to Universal Grammar (however construed) and so may be combined through the syntactic operations that the grammar permits. One of the universal aspects of syntactic combination assumed in all current theories of syntax is the combination of lexical predicates and their arguments. Information about lexical argument structure necessarily comes from the lexical expression in an E-projection, as in (16), and E-projections may be combined by some tree-forming operation (like 'Merge' in Chomsky 1995), as illustrated in (17).[23]

16a <[kick+ed]$_V$, <AGENT,PATIENT>>

16b <[have kick+ed]$_V$, <AGENT,PATIENT>>

16c <[may have kick+ed]$_V$, <AGENT,PATIENT>>

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<[may have kick+ed]$_V$, <AGENT,*PATIENT>>

<[may have kick+ed]$_V$, <AGENT,PATIENT>> <[all the cats]$_N$>

This view of the grammar, whereby combinations of a lexical expression and its associated functional structure is defined by distributional grammar and further combination is done through the manipulation of major I-categories and argument structure, provides a way to accommodate properties of linguistic expressions that are indicated by the psycholinguistic evidence and provides a solution to a number of the problems of characterising functional categories discussed in section 2.

From the processing point of view, the fact that functional expressions are associated with syntactic frames in a different way from lexical ones and that they are strictly associated with syntactic frames can be used as an explanation for: why only lexical expressions prime homonyms; why the rejection of non-words based on functional expressions is faster than those based on lexical ones; and why the processing of functional expressions is not encapsulated from syntax, but that of lexical ones is not. Furthermore, since the variables in distributional frames are associated with the

23. The information about argument structure shown in (16) and below is given in terms of θ-roles. The actual representation is clearly not important and any of the means of representing this information in different theories could be used (e.g. as types as in Kempson, Meyer-Viol and Gabbay (this volume) or as the ARG-S list in HPSG, Manning and Sag 1995. All that is important is that arguments become saturated as syntactic combination proceeds.

major lexical classes, only these classes of expressions will be affected by spoonerisms. In terms of language breakdown, the association of functional expressions with local syntax means that the loss of such elements automatically entails the loss of their associated syntactic properties. Hence, in Broca's aphasia what is left intact is the ability to manipulate argument structure and so semantically coherent expressions can be constructed using only lexical expressions. In addition, if the representation of E-categories is essentially lexical, then particular functional expressions (and their associated syntax) may be lost, while other such expressions may be retained, giving rise to partial fluency. Hence, it is not necessary to assume, as Ouhalla 1993, that breakdown necessarily involves a complete functional class.

The linguistic consequences of the approach also go some way to explaining the existence of expressions that show non-functional properties and why certain of the properties discussed in section 2 are not good indicators of functional status. In the first place, the property of closed versus open classes becomes mostly irrelevant. All functional classes are necessarily closed (and small), given the natures of E-categorisation. However, all such classes are associated with some lexical (I-)category and so the fact that certain functional expressions have the distribution of lexical classes is non-problematic and expected, since the null environment (within an E-projection) is a possible environment (e.g. $[\text{there}]_{ADV}$, $[\text{she}]_{N}$, etc.).

Secondly, nothing in the model prevents certain expressions which have similar semantic functions to functional expressions from being treated as lexical. So perhaps certain quantifiers may appear in the grammar as lexical nouns with argument structure (like perhaps *several*) while others (like *every*) are only associated with the I-category noun through its position in an E-projection. Provided that the semantic force of the two expressions can be expressed (which it must be able to), the difference in syntactic status is immaterial.

Furthermore, expressions that have both lexical and functional properties is not disallowed. Such expressions can be assigned to a major E-category (through its semantic sort) but also be associated with functional domains. So, *have* may be a verb through its association with the sort *event*, but may also be associated with distributional frames like $[\_\_\ \text{V+ed}]_{\text{V}}$ and so on. This predicts that polysemous expressions that cross the functional divide are expected to show syntactic behaviour that is not determined by whether the expression is being used as a lexical or a functional element, hence the mixture of auxiliary and main verb uses of *have* whether or not it is used as a possessive verb or a causative marker.

The general syntactic properties of functional expressions noted in section 2.3 also follow from this model. Since distribution is defined with respect to a major class label and not individual lexical items, a functional expression cannot differentiate between members of the class and so cannot select any subset of them to appear with. This property also predicts that coercion will always be to the class required by the functional expression, and not vice versa, and that functional expressions cannot coerce each other. Furthermore, if long distance dependencies are determined by argument structure, as noted in footnote 6., then the extraction of parts of an E-projection will be impossible, predicting the ungrammaticality of **cats, Kim really thought Lou liked the*.[24] Finally, the difference in the syntactic operations that govern the construction of E-projections and their combination into clauses allows, but does not require, functional expressions to appear in syntactic contexts in which lexical expressions cannot.

The strong differentiation made between functional expressions and lexical ones may also form the basis of an explanation for other properties noted above. For example, phonological and morphological reduction may be expected for functional expressions given the close association between expressions in an E-projection and their predictability, while lexical ones are not predictable. The proposal made above, which utilises aspects of different syntactic theories in having the grammar partly defined by distributional rules and partly by more abstract properties of Universal Grammar, thus provides a potential basis of explanation for a whole range of phenomena that are problematic when approached from the viewpoint of a theory that envisages just one type of syntactic representation for all expressions in a language.

24. The fact that prepositions and auxiliaries in English permit long distance dependencies must result from their double status as both functional and lexical.

4.3 *FUNCTIONAL* I-categories

The picture of the grammar presented above, in which functional expressions define (distributionally determined) local domains over which universal grammatical principles operate, leaves out the relation between the E-categorial functional classes and the functional categories familiar from much recent syntactic theory. To relate the two notions, we might hypothesize the existence of an I-language category, *FUNCTIONAL*, which would consist of the non-major categories familiar from current transformational grammar, *AGR*, *COMP*, *DET*, *TNS*, etc., i.e. a set of grammatical categories. The *FUNCTIONAL* categories are, however, independent of the language particular morphs that somehow encode them, since they are, by being objects in I-language, necessarily universal, whereas functional classes are language particular and defined solely through their distribution within the language and not according to their relation to some abstract linguistic property. The independence of I-language and E-language categories presents a particular problem for functional elements that is not apparent with lexical ones.

The E-categorisation of lexical expressions into nouns, verbs and so on is determined by their co-occurrence with nominal and verbal functional elements (words or affixes). However, functional expressions do not classify lexical expressions into those classes, since the distributional definition of functional classes cannot, by hypothesis, refer to individual lexical items nor, as we have seen, can we classify lexical expressions according to distributional frames defined by the functional ones without circularity. Major class membership must thus be determined in some other way, presumably through basic ontological properties as suggested in notional definitions of the major parts of speech.[25] The I-category associated with a lexical expression is thus determined by the I-category associated with a particular functional expression (or directly in the lexicon, if the expression can appear without any accompanying functional expression, such as adjectives and proper names in English). Its association with an E-category is, however, mediated by its semantic properties (such as its sort).[26] Because of this, there is no particular problem in understanding the relation between the major E-language and I-language categories or relating lexical expressions with particular I-categories.

However, this transparency of relatedness between I- and E- categories and between expressions and I-categories does not hold for the relationship between functional classes and *FUNCTIONAL* categories. Individual functional expressions, for example, typically encode more than one traditional grammatical category. Hence, while the article *the* in English could be considered to instantiate only the category of definiteness (18a), its indefinite counterpart encodes both (in)definiteness and number (being singular) (18b). The quantifier *every* encodes number (singular) and the fact that it is a quantifier (18c), while the *my* encodes definiteness, agreement (pronominality) and possession (18d). However, distributionally these expressions form a functional class. What then is the relationship between this class and the *FUNCTIONAL* categories? Most obviously, the hypothesis should be that the functional class relates to the union of all *FUNCTIONAL* categories with its members (18e) or to their intersection (18f). Unfortunately, neither of these potential solutions tells us anything useful, since not all the members of the class exhibit all the properties indicated and there is no one property shared by every member of the class.

18a the: [*DEF*]

18b a: [*DEF*, *NUM*]

18c every: [*NUM*, *QNT*]

18d my: [*DEF*,*POS*,*AGR*]

18e {the, a, my, ..., every} = [*DEF*,*POS*,*AGR*,*NUM*,*QNT*]

18f {the, a, my, ..., every} = Ø

25. Alternatively, while expressions (roots or words) in the lexicon may be associated a single major class (particularly derived expressions, e.g. *prevarication* N, **Mary prevaricationed* versus *prevaricate* V **the prevaricate of the lecturers was very irritating*), it may be the case that this information is accidental in the same way that words like trousers are accidentally syntactically plural and not central to their syntactic definition.

26. Such an approach allows for lexical expressions to be ‘coerced’ into different syntactic categories, since it will be the semantics that mediates the assignment to an E-category, and thus to an I-category. Assuming that major I-categories are associated with semantic sorts, where the semantics of an expression is consistent with being expressed by different sorts, the expression may be assigned to a number of major E-categories.

A further problem with the mapping between functional expressions and *FUNCTIONAL* categories has to do with the fact that certain expressions perform different grammatical functions according to their local syntactic context. For example, the morph *-ed* in English is interpreted either as perfect or passive (or adjectival) depending on whether it appears with the verb *have* or the copula *be* (or no verb at all). It is argued in Cann and Tait 1995 (and re-iterated in Cann 1998) that this morph is not homonymous between aspect and voice, but has a single interpretation (as an unaccusative state) whose other properties are determined by the elements with which it combines.[27] If this is correct, then the mapping from individual functional expressions to *FUNCTIONAL* categories is not necessarily one-to-one and thus non-transparent.

It is not only the mapping from functional E-categories to *FUNCTIONAL* I-categories that is problematic, but so also is the reverse mapping from I-category to E-category. Firstly following from the observation above concerning the encoding of a number of grammatical categories by a particular functional expression, it is clear that a particular *FUNCTIONAL* category may be instantiated by a number of E-categories: agreement, for example, is distributed across nominal and verbal functional classes in many languages; definiteness may be distributed across articles, possessive pronouns and certain quantifiers; and so on. More importantly, *FUNCTIONAL* categories may be realised not only by functional expressions (affixes or semi, -bound forms like the articles in English) but also by lexical ones, which may or may not be in the process of grammaticalization. For example, *TENSE* in English may be realised by affixes (*-ed*, *-s*), auxiliary verbs (*will)* or fully lexical verbs (*go* as in *be going to).* In Diyari, a number of *TENSE* and *ASPECT* distinctions are encoded by what appear to be full verbs followed by participles. For example, the habitual or intermediate past is indicated by the use of the verb *wapa*- meaning ‘go’, while *pada*- ‘lie’ indicates recent past, *wara*- ‘throw’ indicates immediate past and *wanti*- ‘search’ indicates distant past (Austin 1981:89). There is thus no direct correspondence between *FUNCTIONAL* category and functional expression.

The Diyari example above also indicates a problem with *FUNCTIONAL* categories and their relation to functional classes that is part of a common concern for all universalist theories of linguistic categorisation. As is well known, different languages often instantiate different values for a certain category (e.g. different types of past tense in Diyari) and no language morpho-syntactically encodes every possible grammatical category. The question that arises is whether all the different values and all the different categories are to be considered universal. If so, then the theory of Universal Grammar requires every possible variation of a grammatical category to be at least immanently present in every human language, leading to further problems with regard to the representation of the non-overt categories within I-language. The position that all values of grammatical categories (or indeed all grammatical categories) are universal is not likely to be tenable, given the thousands of variations in the number and type of distinctions made crosslinguistically in all areas of the grammar. However, if categories like ‘distant past’ are not universal, they must be represented as E-categories defined by morpho-syntax of the language concerned. Since I-categories and E-categories are defined independently of each other, this leads to the uncomfortable situation where some functional expressions within a language encode (universal) *FUNCTIONAL* categories but others must contribute semantic information without the mediation of such an I-category. Whether or not it is possible to identify any ‘significant’ universal grammatical categories that must exist independently of any sets of associated functional classes, the fact that at least some functional expressions remain unassociated with any *FUNCTIONAL* category raises the possibility that the content of such expressions is always input into the grammar without this sort of mediation.

Considerations such as the one-to-many mapping between functional expressions and functional categories, the failure of the latter to consistently map onto functional classes (or even functional expressions) and the problem of apparently language specific functional categories leads to a view of the grammar where the latter have no independent syntactic status. Indeed, one might hypothesize that if *FUNCTIONAL* categories are dissociated from distributional criteria (and thus any direct connection with functional classes), then all that is left of their content are the semantic functions they perform. Since such functions vary across functional expressions in a single language and across different languages, it may be that the categories themselves are not independently signifi-

27. A similar story may be put forward for the progressive and gerundive interpretations of verbs with the suffix -ing.

cant and the content of functional expressions is projected directly into the semantic content of the expression without augmenting the syntactic information of the label of the expression (E-projection), as illustrated in (19).

19a <cat, {*INDIV*(x), *CAT*(x)}>[28]

19b <[cat+s]$_N$, {*MORE-THAN-1*(x), *INDIV*(x), *CAT*(x)}>

19c <[the cat+s]$_N$, {*DEF*(u)[u:*MORE-THAN-1*(u), *INDIV*(u), *CAT*(u)]}>

19d <kick, {*PROCESS*(e), *KICK*(e,x,y)}, <AGENT,PATIENT>>

19e <[may kick]$_V$, {*POSSIBLE*(s)[s:*PROCESS*(e), *KICK*(e,x,y)]}, <AGENT,PATIENT>>

The difficulties found in mapping between functional E-categories and *FUNCTIONAL* I-categories thus point to the conclusion that there is no need to posit the existence of a *FUNCTIONAL* I-category with its associated set of universal grammatical categories, and thus lends support to Hudson (this volume)'s contention that the Function Word Category is not linguistically significant. However, the case against there being such a set cannot really be made on theory-independent grounds. It may, therefore, be necessary in certain frameworks to posit a set of *FUNCTIONAL* I-categories in order to account for putative universal relations between them. If such universals are part of the grammar, and are not just emergent properties of grammatical systems in use as argued in Kirby 1998, then one could take the position that particular functional expressions do contribute information about grammatical categories. However, the significant distinction made here between functional expressions and grammatical categories still requires that such categories should not have independent syntactic status. Instead, one would have to treat functional expressions as augmenting the label of an E-projection with the labels of the *FUNCTIONAL* categories with which it is associated, as illustrated in (20). Such labels would be manipulable by universal syntactic operations, but it would still be the case that functional expressions would not head *FUNCTIONAL* projections and these would therefore not be manipulable independently of major class label. There can therefore be no head movement (although there could still be movement to a 'specifier' position and features (grammatical categories) could still be checked).[29]

20a [cat+s]$_{\{N,AGR\}}$

20b [the cat+s]$_{\{N,NUM,DET\}}$

20c [have kick+ed]$_{\{V,ASP\}}$

5. Conclusion

In the above discussion, it is argued that there is a primary categorial division between functional and lexical expressions, but that this is defined at a language-specific, and not a universal, level of linguistic description. A model is proposed in which functional classes (a notion of E-language) are defined distributionally and themselves determine the local syntactic domains in which lexical expressions are inserted. By defining the distribution of major lexical classes and giving rise to extended projections, functional expressions help to define the map between E-language and I-language. These domains (E-projections) are associated with a universal syntactic label (an I-category) such as *N*, *V*, etc., which is manipulable by principles of Universal Grammar. The content of functional expressions is mapped directly onto the semantic content of the projection (or onto a restricted set of universal *FUNCTIONAL* categories which augment major class labels).

While the theory of grammatical structure presented here is not directly translatable into any of the current theories of syntax (except perhaps Word Grammar (Hudson 1990) and LDS_{NL} (Kempson, Meyer-Viol and Gabbay this volume), it is not fundamentally inconsistent with any of them and could be adapted to a minimalist transformational framework or HPSG. However, it does have a number of consequences which do require the re-thinking of a number of hypotheses concerning

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28. The details of the semantic representations below are not important and are for illustrative purposes only. What is significant is that the information provided by the functional expressions does not change the syntactic status (categorial label or argument structure) of the phrase.

29. The picture that emerges here is presaged in the discussion in Chomsky 1995 Chapter 4 with regard to the lack of independent AGR nodes.

putative universal relations governing grammatical categories, since in the model proposed above, any such relations cannot be directly stated in the syntax.

In the first place, and most importantly, it follows that because there are no universal morpho-syntactic functional categories, it cannot be the case that basic functional structures are universally determined. The E-projections which provide the functional baggage of a lexical term will necessarily vary from language to language, and so the grammatical categories associated with projections (if any) are also likely to vary. Following on from this is the consequence that there can be no theory of linguistic parameters of the sort envisaged in Ouhalla 1991 and other work. Even if there is a set of *FUNCTIONAL* categories, these cannot have a separate syntactic existence, as argued in the last section. Hence, the I-category of *TENSE* cannot itself select some other category such as *AGR* or *V*, since it can never appear independent of the E-categories that encode it and these are themselves not in the domain of I-linguistic principles. Parametrisation can only therefore be defined over the labels of E-projections, which, as already stated, are likely to vary from language to language, depending on the functional expressions in the language and the set of grammatical categories that they encode.

A further consequence is that categorial distinctions not morphologically present in a particular language cannot be used in the analysis of that language. Thus, use of independent agreement categories (either subject or object) are not licensed for descriptions of English, since there is no way that subject agreement can be differentiated from tense and no object agreement is ever manifested. Tait and Cann (1990) suggest that this restriction follows from a principle they refer to as the PF-Licensing Principle which requires all nodes in a syntactic tree to have a phonological 'signature' of some sort[30]. Such a principle follows automatically from the conclusions reached here and implies a very strict constraint on the appearance of empty functional categories within syntax which would exclude much of Kayne 1994's accounts of word order derived from a universal underlying SVO order.

The ideas presented above thus clearly present certain difficulties for current transformational syntax but they embody observations about processing behaviour not usually incorporated into linguistic theory. The separation of I-language from E-language, the recognition that properties of the latter may be significant and the hypothesis that the functional/lexical dichotomy is linguistically significant but separated from universal aspects of language enable the development of view of grammar that may one day reconcile the apparently conflicting hypotheses about linguistic structure that result from experimental psycholinguistic investigation and from the arguments of theoretical syntacticians.

6. References:

Adger, D. (1994) Functional heads and interpretation. Unpublished PhD. dissertation, University of Edinburgh.

Adger, D. and Rhys, C. S. (1994) 'Argument structure and the English Gerund'. In C. S. Rhys, D. Adger and A. von Klopp (eds) *Edinburgh Working Papers in Cognitive Science* Vol. 9 *Functional Categories, Argument Structure and Parametric Variation*. University of Edinburgh, Centre for Cognitive science: 27-48.

Austin, P (1981) *A Grammar of Diyari, South Australia*. Cambridge, Cambridge University Press.

Bastiaanse, R. (1995) 'Broca's aphasia: a syntactic and/or a morphological disorder? A case study'. *Brain and Language* 48:1-32.

van Benthem, J. (1986) *Essays in Logical Semantics*. Dordrecht, D. Reidel.

Besner, D. (1988) 'Visual word recognition: special purpose mechanisms for the identification of open and closed class items?'. *Bulletin of the Psychonomic Society* 26:91-93.

Bittner, M and K Hale (1996) 'The structural determination of case and agreement'. *Linguistic Inquiry* 27: 531-604.

Bloom, L. (1970) *Language Development: Form and Function in Emerging Grammars*. Cambridge, Massachusetts, MIT Press.

30. See Tait 1991, Cann 1993 and Cann and Tait 1995 for further discussion and see Speas 1995 for similar ideas.

Bloomfield, L. (1933) *Language*. New York.
Bolinger, D. (1975) *Aspects of Language* (2nd edition). New York, Harcourt Brace Janovich.
Borsley, R and Kornfilt, (this volume) 'Mixed extended projections'.
Bowerman, M. (1973) *Early Syntactic Development: a Cross-linguistic Study with Special Reference to Finnish*. Cambridge, Cambridge University Press.
Bradley, D. (1978) Computational distinctions of vocabulary type. Cambridge, Massachusetts, MIT Press.
Bradley, D., Garrett, M. F. and Zuriff, E. B. (1980) 'Syntactic deficits in Broca's aphasia'. In D. Caplan (ed.) *Biological Studies of Mental Processes*. Cambridge, Massachusetts, MIT Press.
Cann, R. (1984) Features and Morphology in GPSG; Unpublished doctoral dissertation, University of Sussex.
Cann, R. (1993) 'Patterns of headedness'. In G. Corbett, N. M. Fraser and S. McGlashan (eds.) *Heads in Grammatical Theory*. Cambridge, Cambridge University Press: 44-72.
Cann, R (1998) 'Specifiers as secondary heads'. In D. Adger, S. Pintzuk, B. Plunkett and G. Tsoulas (eds.) *Specifiers: Minimalist Approaches.* Oxford, Oxford University Press: 21-45.
Cann, R and M E Tait (1994) 'Raising morphology'. In C. S. Rhys, D. Adger and A. von Klopp (eds) *Edinburgh Working Papers in Cognitive Science* Vol. 9 *Functional Categories, Argument Structure and Parametric Variation*. University of Edinburgh, Centre for Cognitive Science: 1-23.
Chomsky, N. (1981) *Lectures On Government And Binding*; Dordrecht, Foris Publications.
Chomsky, N (1986) *Knowledge of Language*. Praeger Press, New York.
Chomsky, N (1995) 'Categories and Transformations'. In *The Minimalis*t *Program*. Cambridge, Massachusetts, MIT Press.
Cinque, G (1998) *Adverbs and Functional Heads:a crosslinguistic perspective*. Oxford, Oxford University Press.
Cormack, A. (1996) 'Without specifiers'. To appear in D. Adger et al. (eds.) *Specifiers*. Oxford, Oxford University Press.
Cruse, D. (1986) *Lexical Semantics*. Cambridge, Cambridge University Press.
Cutler, A. and Carter, D. M. (1987) 'The predominance of strong initial syllables in the English vocabulary'. *Computer Speech and Language* 2:133-142.
Cutler, A. and Norris, D. G. (1988) 'The role of strong syllables in segmentation for lexical access'. *Journal of Experimental Psychology: Human Perception and Performance* 14: 113-121.
Davidson, D. (1967) 'The logical form of action sentence'. In N. Rescher (ed.) *The Logic of Decision and Action*. Pittsburgh, University of Pittsburgh Press.
Demuth, K (1994) 'On the underspecification of functional categories in early grammars. In B. Lust, M Suner, and J Whitman (eds.) *Syntactic Theory and First Language Acquisition: Cross-Linguistic Perspectives.* New Jersey, Lawrence Erlbaum.
Emonds, J (1976) *A Transformational Approach to English Syntax*. Academic Press, New York.
Gabbay, D. and Kempson, R. (1992) 'Natural language content: a proof-theoretic perspective'. In *Proceedings of the 8th Amsterdam Semantics Colloquium*. Amsterdam.
Garrett, M. (1976) 'Syntactic processes in sentence production'. In R. Wales and E. Walker (eds.) *New Approaches to Language Mechanisms*. Amsterdam, North Holland.
Garrett, M. (1980) 'Levels of processing in sentence production'. In B. Butterworth (ed.) *Language Production* Vol. 1. London, Academic Press.
Gazdar, G., E. Klein, G. K. Pullum and I. A. Sag (1985) *Generalized Phrase Structure Grammar*; Oxford. Basil Blackwell.
Gerken, L (1996). 'Phonological and distributional information in syntax acquisition'. In Morgan and Demuth (1996): 411-425.
Gerken, L. and McIntosh, A. B. J. (1993) 'The interplay of function morphemes and prosody in early language'. *Developmental psychology 29*: 448-457.
Goodglass, H. (1976) 'Agrammatism'. In H. Whittaker and H. A. Whittaker (eds.) *Studies in Neurolinguistics* Vol. 1. New York, Academic Press.
Gordon, B. and Camarazza, A. (1982) 'Lexical decision for open- and closed-class words: failure

to replicate differential frequency sensitivity.' *Brain and Language* 15: 143-160.

Gordon, B. and Camarazza, A. (1985) 'Lexical access and frequency sensitivity: frequency saturation and for open/closed class equivalence.' *Cognition* 21:95-115.

Grimshaw, J. (1990) *Argument Structure*. Cambridge, Massachusetts, MIT Press.

Grimshaw, J. (1991) 'Extended projection'. Unpublished MS, Brandeis University.

Harris, Z. (1951) *Methods In Structural Linguistics*; Chicago, Illinois. Chicago University Press.

Hendrick, R (1991) 'The morphosyntax of aspect'. *Lingua* 85: 171-210.

Hjelmslev, L. (1953) *Prolegomena to a Theory of Language*. Bloomington, indiana, Indiana university press.

Hockett, C. F. (1954) 'Two models of grammatical description'. *Word* 10: 210-233.

Hopper, P. J. and E. C. Traugott (1993) *Grammaticalization*. Cambridge, Cambridge University Press.

Hudson, R A (1995) 'Competence without Comp?'. In B. Aarts and C. Meyer (eds.) *The Verb in Contemporary English*. Cambridge, Cambridge University Press:40-53.

Hudson, R (this volume) 'Syntax without functional categories'.

Joshi, A. J. (1985) 'Processing of sentences with intrasentential code switching'. In D. R. Dowty, L. Kartunnen and A. M. Zwicky (eds.) *Natural Language Parsing*. Cambridge, Cambridge university Press.

Kayne, R (1994) *The Antisymmetry of Syntax*. Cambridge, Massachusetts, MIT Press.

Kempson, R (1995) 'Natural language interpretation as labelled natural deduction'. In F R Palmer (ed.) *Grammar and Meaning*. Cambridge, Cambridge University Press.

Kempson, R. (1996) 'Crossover: a dynamic perspective'. In Jensen, S. (ed.) *SOAS Working Papers 6*.

Kempson, R. and Meyer-Viol, (this volume) '

Kirby, S (1998) *Function, Selection and innateness: the emergence of language universals*. Oxford, Oxford University Press.

Langacker, R (1987) 'Nouns and verbs'. *Language* 63:53-94.

Lyons, J. (1966) 'Towards a notional theory of the "parts of speech"'. *Journal of Linguistics* 2:209-236.

Manning, C D and I A Sag (1995) 'Dissociations between argument structure and grammatical relations. Unpubl. MS., Carnegie Mellon University and Stanford University.

Matthei, E. H. and Kean, M.-L (1989) 'Postaccess processes in the open vs. closed class distinction'. *Brain and Language* 36: 163-180.

Miller, J. E. (1986) *Semantics and Syntax*. Cambridge, Cambridge University Press.

Morgan, J. L. and Demuth, K. (eds.) (1996) *Signal to Syntax*. Mahwah, New jersey. Lawrence Erlbaum.

Morgan, J. L., Shi, R. and Alopenna, P. (1996) 'Perceptual basis of rudimentary grammatical categories: toward a broader conceptualization of bootstrapping'. In Morgan and Demuth 1996:263-283.

Newmeyer, F. (this volume) 'The discrete nature of syntactic categories: against "prototype theory"'.

Ouhalla, J (1991) *Functional Categories and Parametric Variation*. Routledge, London.

Pittock, A. G. M. (1992) Knowledge elicitation, semantics and inference. Unpublished PhD. dissertation, University of Edinburgh.

Pollock, J-Y (1989) 'Verb movement, universal grammar and the structure of IP'. *Linguistic Inquiry* 20, 365-424.

Pollard, C and I A Sag (1994) *Head-driven Phrase Structure Grammar*. Chicago, University of Chicago Press.

Pullum, G K and D Wilson (1977) 'Autonomous syntax and the analysis of auxiliaries'. *Language* 53:741-788.

Pulvermüller, F. and Schumann, J. H. (1994) 'Neurobiological mechanisms of language acquisition'. *Language Learning* 44:681-734.

Pulvermüller, F. and Preissl, H. (1991) 'A cell assembly model of language. *Network* 2:455-468.

Quirk, R,

Radford, A (1990) *Syntactic Theory and the Acquisition of English Syntax*. Oxford, Basil Blackwell.

Rhys, C. S. (1993) Functional projections and thematic role assignment in Chinese. unpublished PhD. dissertation, University of Edinburgh.

Saffran, E, M Schwartz and O Marin (1980) 'The word order problem in agrammatism: production'. *Brain and Language* 10:263-280.

Sasse, H-J (1993) 'Syntactic Categories and Subcategories'. In J. Jacobs (ed.) *Syntax*: *an international handbook of contemporary research*. Berlin, Walter de Gruyter:646-686.

Schwartz, N, E. Saffran and O Marin (1980) 'The word order problem in agrammatism: Comprehension'. *Brain and Language* 10:249-262.

Shillcock, R C and E G Bard (1993) 'Modularity and the processing of closed-class words'. In G. Altman and R. Shillcock (eds.) *Cognitive Models of Speech Processing*. Cambridge, MA.: 163-185.

Speas, M (1995) 'Economy, agreement and representation of null arguments'. Unpublished MS, University of Massachusetts.

Stowell, T. (1981) Origins of Phrase Structure; unpublished doctoral dissertation, MIT.

Tait, M E (1991) The syntactic representation of morphological categories. Unpublished Doctoral Dissertation, University of Edinburgh.

Tait, M E and R Cann (1990) 'On empty subjects'. In the Proceedings of the Workshop on Parametric Variation, Centre for Cognitive science, University of Edinburgh.

Tait, M. E. and R C Shillcock 1992 'An annotated corpus of crosslinguistic non-fluent aphasic speech'. ESRC report, Centre for Cognitive Science/Dept. of Linguistics, University of Edinburgh.

Tannenhaus, M K, J M Leiman and M S Seidenberg 1987 'Context effects in lexical processing'. In U Frauenfelder and L Tyler eds. *Spoken Word Recognition*.

Taylor, J R (1989) *Linguistic Categorization: prototypes in linguistic theory*. Oxford, Clarendon Press.

Tsimpli, M I (1995) 'Focusing in Modern Greek'. In K E Kiss (ed.) *Discourse Configurational Languages*. Oxford, Oxford University Press: 176-206.

de Villiers, J and P de Villiers (1978) *Language Acquisition*. Cambridge, Mass., Harvard University Press.

Verkuyl, H. J. (1993) *A Theory of Aspectuality*. Cambridge, Cambridge University Press.