The notion of 'head' in the description of English: assessment of the semantic and the morphosyntactic locus criteria[1]

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Résumé

Cette étude porte sur la notion de tête, et la hiérarchie dans les syntagmes nominaux et verbaux en anglais contemporain. Il n'existe aucun consensus sur les critères qui permettent de l'identifier ni de définition satisfaisante de cette notion. La tête est régulièrement définie comme le constituant qui domine l'ensemble, une définition vague et générale qui mérite d'être précisée. Cet article a pour vocation d'être une introduction à l'état de l'art sur la question des critères qui permettent d'identifier la tête, ainsi qu'à analyser, discuter et revoir certains arguments de Zwicky, Hudson et Croft en particulier. Il se concentre sur le critère sémantique et sur le concept de locus morphosyntaxique. Nous pouvons conclure cet article en affirmant que ces deux critères sont tout à fait pertinents pour déterminer la tête malgré l'existence de cas particuliers qui semblent, à première vue, invalider la règle générale. Pour expliquer l'hétérogénéité lorsqu'on compare les résultats de plusieurs critères, deux hypothèses ressortent : considérer que la tête est un gradient et que certaines têtes ne présentent pas forcément tous les symptômes de tête, et envisager que plusieurs hiérarchies co-existent sans qu'elles ne soient contradictoires comme la hiérarchie sémantique et la hiérarchie syntaxique.

Mots-clés : Tête, hiérarchie, unité porteuse de l'information primaire, locus morphosyntaxique

Abstract

This study focuses on the notion of head, and the hierarchy in noun phrases and verb phrases in contemporary English. There is no consensus on the criteria for identifying it, nor is there a satisfactory definition of this notion. The head is regularly defined as the constituent that dominates the whole, a vague and general definition that deserves to be clarified and specified. The aim of this paper is to provide an introduction to the state of the art on the question of head identifying criteria and to analyse, discuss and review some of the arguments claimed by Zwicky, Hudson and Croft specifically. It focuses on the semantic criterion and on the concept of morphosyntactic locus. A conclusion to this article would be to state that these two criteria are relevant to determine headedness despite some specific cases which seem to, at first glance, invalidate the general rule. To explain the heterogeneity when comparing the results of different criteria, two hypotheses stand out: considering that the head is a gradient and that some heads do not necessarily exhibit all the symptoms of headedness, and contemplating the fact that several hierarchies co-exist without being contradictory such as the semantic and the syntactic hierarchies.

Key-words: Head, hierarchy, primary information bearing unit, morphosyntactic locus

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Introduction

"A grammar without heads is as misguided as a portrait-painting showing everything from the shoulders down," Hudson (1993: 289) writes. This idea of a hierarchical structure with a head and dependencies is essential to most linguists regardless of their theoretical background. Indeed, heads are often described as an essential element of language (as in Cotte 2012, Mel'čuk 2015, and Gerdes & Kahane 2022) deserving studies of their own. However, it sometimes remains unclear what should be considered a head.

Before the 1970s, the heads of phrases were almost universally considered to be lexical elements as in Bloomfield (1933) and Sweet (1891): the noun was identified as the head of the noun phrase (henceforth 'NP'), for example *cat* in

(1) a black cat[2]

and the lexical verb as the head of the verb phrase (henceforward 'VP'), *found* in

(2) have found it

There was one exception: the head of a preposition phrase (henceforth 'PP') was and still is considered to be the preposition even in the traditional description of English (as in Bloomfield 1933, Sweet 1891 and Payne 2002, amongst others), and therefore corresponds to a grammatical element. One could wonder why a grammatical element is accepted as the head in this case. If the existence of the PP whose head is a grammatical word is rarely called into question in traditional grammar, it would not be far-fetched to contemplate a similar hierarchy in the nominal field.[3] This is precisely what emerged from 1970 onwards: grammatical words began to be analysed as heads, as in the DP hypothesis which states that the determiner is heading a determiner phrase (Abney 1987), and in the IP analysis i.e. the inflection being the head of an inflection phrase (Chomsky 1986, 1991).

The initial debate on grammatical versus lexical heads raises a multitude of questions: questions about how 'head' should be defined; about what VP stands for exactly and what it consists of, and about the categorisation of the determiner and personal pronouns. The present study will be focused on both the nominal and the verbal fields insofar as their structural hierarchies are the ones which are the least consensual.

The main issue that needs to be addressed is: how should the head be defined? What criteria should be used to identify the head of a construction? The aim of this paper is to assess some criteria that have been proposed in the literature. In particular, I will address two of the most important criteria selected for headedness: on the one hand, the semantic criterion which includes the 'kind-of argument' (Zwicky 1985) that Langacker (1987) calls 'profile determinacy' as well as the concept of 'Primary Information Bearing Unit' (Croft 1991); and on the other hand, a syntactic criterion, the morphosyntactic locus.

First, I shall focus on the lack of precise definition of the notion of 'head' and introduce Zwicky's eight criteria. Then I will assess the semantic criterion. Finally, I will deal with the concept of morphosyntactic locus.

[2] All examples in this article are taken from the *Corpus of Contemporary American English* (Davies, 2008-) unless otherwise mentioned.

[3] It should be borne in mind that in generative grammar, prepositions are not always considered as grammatical words. Indeed, Littlefield (2006), as referred to by Khalifa (2017), distinguishes in the prepositional domain "semi-lexical prepositions" and adverbs which have the {+ Lexical} trait; and particles and functional prepositions which do not.

1. What makes a head: definition and criteria

If the notion of head is central, what exactly makes a head?

Haspelmath (1995: 98) writes:

> While the notion of 'head' is of fundamental importance for many approaches to syntax, opinions on its precise interpretation vary widely, just like many other aspects of language structure.

It is impossible to define the notion of head without mentioning that of dependency, as the two are linked and cannot be studied separately. The head is also regularly defined by linguists (such as Zwicky 1985: 2) as the constituent which dominates the phrase. Zwicky (*ibid*.) states that this rudimentary idea can be interpreted in many different ways. There is therefore a need to define the head more precisely, to try to see whether there are linguistic signs that mark the head, whether dependencies are marked, and thus to identify which markings are likely to indicate a head or a dependency.

The literature on the notion of head that I focused on has the following history. Zwicky (1985) aimed at re-exploring the definition of head by seeking to determine criteria identifying the head in different constructions. Hudson responded in another paper, "Zwicky on Heads", in 1987. Zwicky published a second article entitled "Heads, bases and functors" in 1993. Finally, Croft (1996) reviewed Zwicky's and Hudson's arguments concerning the appropriate criteria to identify heads. It is therefore relevant to compare Zwicky's, Hudson's and Croft's papers in an attempt to determine which criteria should be selected.

Zwicky examines eight criteria to identify heads:

1. The "**semantic argument"** which corresponds to the most important semantic element and serves as "argument" to a "functor". According to Zwicky, in Det + N, the noun is the semantic argument while the determiner is the functor.

2. The "**morphosyntactic locus**", the element that bears the morphosyntactic markings of the syntactic relationships between the construction and other syntactic units. For example, *eats* in

(3) She **eats all the Brazil nuts**

is the morphosyntactic locus because it bears the inflection *-s* which is an indicator of the syntactic relationship between the VP and the subject NP.

3. The *"***subcategorisand**" i.e the element that is subcategorised according to what it combines with: for example, *a* combines with singular count nouns. Thus, the subcategorisand is the determiner in Det + N.

4. The "**governor**", meaning the constituent that selects the morphosyntactic features of the governed. According to Zwicky, in Aux + VP, Aux is the governor because it selects the form of the lexical verb. For instance, in

(4) I have done it

have requires the lexical verb to have the form V-EN.

5. The "**determinant of concord**" i.e. the element that determines agreement which will be realised on the second element[4]. Zwicky (1985: 9) argues that the noun in Det + N is the determinant of concord meaning the determiner needs to agree with the noun.

[4] The difference between 4. and 5. is admittedly not very clear according to Zwicky (1985: 7). This is beyond the scope of the present study and will be the topic of further investigation.

Compare:

(5a) this cat
(5b) these cats

6. The "**obligatory constituent**", that is the element that cannot be elided, for example, the noun in Det + N.

(6) I feel sorry for **the black cats**.

(6) could be slightly manipulated into *I feel sorry for **black cats*** where *the* has been deleted while the noun *cats* is required in the NP.[5]

7. The "**distributional equivalent**" for example V in V + NP: *write* in

(7) write a book

It is argued that *write a book* has the same distribution as *write*.

8. The "**ruler**" i.e. the label that Zwicky gives to what Hudson and other dependency grammarians call 'head', which he defines as the element on which one or more elements depend(s). Zwicky (1985: 14) refers to it as a "head-like notion".[6]

All these criteria deserve to be reviewed and will be. Yet, for lack of space, this paper will be focused on only two i.e. the semantic criterion and the morphosyntactic locus. Out of the eight criteria studied by Zwicky, it seems essential to deal with the semantic criterion, focusing on the element carrying the main information and denoting the same kind of thing as that denoted by the whole, because it is the oldest criterion (Sweet 1891) and because it is found in many sources (namely Zwicky 1985, 1993, Hudson 1987, Croft 1996 and Mel'čuk 2015 amongst others) – with subtle yet important differences and sometimes varying labels. It is also what could be called an 'intuitive' criterion insofar as when one thinks of a head, the most important element semantically speaking comes to mind. Then I shall talk about the morphosyntactic locus, because 'head' is a syntactic function thus syntax is central when dealing with the notion of head, and it is the only criterion that Zwicky does not discard in his paper claiming the morphosyntactic locus should replace the notion of head.

2. Assessment of the semantic criterion

2.1. Introduction of the Primary Information Bearing Unit criterion

Let us begin with the semantic criterion insofar as the definition of head could be "at root semantic" (Zwicky 1985: 4). Indeed, intuitively, the notion of 'head' involves the most important element, semantically speaking, in a construction. In the early days of this notion, different authors already alluded to this intuition, such as Jespersen who wrote "we always find that there is one word of supreme importance" that he called the "chief idea" (Zwicky 1985: 2 quoting Jespersen 1924: 96). The semantic criterion could then be considered as the oldest criterion regarding headedness.

The concept of Primary Information Bearing Unit (PIBU), which draws on this intuition, is addressed by Croft (1996). PIBUs correspond to "content words", i.e. lexical elements, because they are the ones that provide the most semantic content to the unit. In the nominal domain, for example, the article only specifies whether the referent is indefinite or

[5] It could be argued that even in *I feel sorry for **black cats***, a zero article (ø) is present. The obligatoriness criterion, same as the others, must be reviewed.
[6] This should not be analysed as a criterion. Zwicky considers that heads in dependency grammar are not what he refers to as heads, hence this label and definition.

definite, whereas nouns categorise and therefore indicate that the referent shares certain characteristics with the other elements of its category. This is in line with Zwicky's "semantic argument" criterion, which consists in selecting the semantic head in a construction: the noun in NPs and the lexical verb in VPs containing an auxiliary (Zwicky 1985: 4)[7].

Similarly, Croft analyses nouns and lexical verbs as being the PIBUs of NPs and VPs respectively.

2.2. Discussion of the PIBU by Croft: lexical items vs functional items

Croft (1996: 58) states that "the functional categories (Det and Aux) grammaticalize, and get reduced in their grammatical behavior. The lexical heads do not". He adds that before the process of grammaticalisation, functional words are heads and lexical words are dependents.

2.2.1. Verbal domain: semantic meaning of auxiliaries and lexical verbs

Croft's reasoning is as follows:

> Auxiliaries often begin as main verbs, with the future main verb in a subordinate clause. The main auxiliar verb (sic) gets grammaticalized, and the constituent structure of the construction is reanalyzed from [V [VP]] to [Aux VP]]. (Croft 1996: 58).

This hypothesis is also recognised by Heine (1993: 104): "auxiliaries tend to lose overt properties of a head and increasingly acquire the appearance of a "satellite" of the main verb."

Indeed, auxiliaries are stripped of their semantic meaning, a phenomenon known as semantic bleaching, which goes hand in hand with grammaticalization. According to Croft, this happens because auxiliaries are not PIBUs, contrary to lexical verbs. It is true that auxiliary *do* in particular is deprived of semantic meaning and it is no doubt for this reason, added to the already very general meaning of lexical *do*, that it is used as a 'dummy', as a support for negative and interrogative constructions (Gardelle & Lacassain 2012: 293). The lexical verb *do* is the least grammatical of the various uses of DO, but it already has a loose semantic sense insofar as it simply refers to a dynamic process. Grammatical *do* corresponds to an abstract 'doing' of the speaker, who re-processes the subject-predicate relationship. It is used to form interrogative and declarative constructions with negative polarity, but does not add any particular meaning to the clause. While it is difficult to consider the expletive auxiliary *do* as head, it is impossible to consider it as a PIBU. Croft (1996) argues that *have* and *be* have no meaningful information content either, even though *have* expresses a break and *be* a continuity.

However, it is not as straightforward to say that modals have no information content whatsoever. Whether they are epistemic or root modals, they seem to bring a significant semantic meaning to the clause.

For instance, compare:

(8a) To her credit, she **might** be a great teacher. I'm not sure.
(8b) To her credit, she [is] a great teacher.

In (8b), the speaker takes account of the subject-predicate relationship <she – be a great teacher> and states that it holds true whereas in (8a), by using *might*, the speaker does not say that <she – be a great teacher> is validated because they are not sure whether it holds true or not, which, as a matter of fact, is formulated by the speaker right after: "I'm not sure".

[7] Though, it should be specified that in VPs with no auxiliary, which Zwicky notes V + NP, the lexical verb is considered to be the semantic functor and the NP the semantic argument. This is one of the reasons it is best to retain Zwicky's kind-of argument and the concept of PIBU and not the semantic argument which does not equate the notion of head.

Here the modal changes the meaning completely because in (8b) the speaker believes she is a great teacher while in (8a), they do not know if she is a great teacher or not.

However, it is not always the case.

(9a) He **might** be stupid, selfish, and deserve no better, but privileged he isn't.
(9b) He [is] stupid, selfish and deserves no better, but privileged he isn't.

Notice that there is very little difference between examples (9a) and (9b) because it is a *might* of concession. Indeed, (9a) could be glossed as 'Although he is stupid, selfish and deserves no better, he isn't privileged'. Thus, here, the modal barely adds anything in terms of semantic meaning. Still, it has a pragmatic value.

We can conclude that "the semantics of the modal auxiliaries is a highly complex matter" as Huddleston (1997 [1984]: 165) writes. There are some modal auxiliaries that do contain significant semantic meaning and some that do not. Thus, it seems coherent to say that auxiliaries even modal auxiliaries are not PIBUs hence not semantic heads, even though some of them bring significant information content.

What is noteworthy is the fact that this holds true as well for lexical verbs: some contain significant semantic meaning, others do not. Indeed, so far, apart from '*deserve no better'* in (9a) and (9b), only examples with copulas have been selected. It is certainly not the best examples to show that lexical verbs carry the main semantic meaning in the VPs and are the PIBUs. Indeed, when it comes to copulas with predicative nouns or adjectives, Croft (1996: 64) analyses the latter as the PIBUs, "the copula verb itself [being] of minimal semantic content, adding only a predicative function." This is legitimate especially given the fact that, in the African American Vernacular English, the copular verb can be deleted under certain conditions[8] as in

(10) No, we all brothers in this.

Similarly, lexical verbs within complex verbal structures are not semantically rich. What Nickel (1968) calls 'complex verbal structures' are the association of a light verb (a name that comes from the fact that the semantics it contains are light) such as *do/give/have/make/take* with a deverbal noun as in

(11a) do the cleaning
(12a) give a kiss
(13a) have a drink
(14a) make a contribution
(15a) take a breath

Here, the lexical verbs cannot be analysed as PIBUs; it is the direct object that holds the main information. However, this is a special case to a rule that remains true i.e. prototypically, lexical verbs can be identified as PIBUs. Furthermore, these complex verbal structures can easily be replaced by the corresponding lexical verbs, which will then be the PIBUs of their respective construction:

(11b) clean
(12b) kiss
(13b) drink
(14b) contribute
(15b) breathe

Despite the cases of copulas and of complex verbal structures where the lexical verb has minimal semantic content, it can still be assumed that lexical verbs are the PIBUs in prototypical

[8] Labov 1995: 25-54

examples as in:

(16) If Donald Trump is President, he will appoint liberals.

where *will* "merely ground[s] (situate[s]) that process in the future" (Croft 1996: 59), it tells us that the subject-predicate relationship has not been validated yet, and *appoint* holds the main information. Indeed, looking in dictionaries such as the Merriam-Webster, while *appoint* is defined as "to name officially", *will*'s definition is: "used to express futurity". *Will* has then a use, it is a grammatical tool, whereas *appoint* has a semantic meaning. Lexical verbs are thus the PIBUs within their construction.

Of course, there are counter-examples to this assertion where lexical verbs cannot be analysed as PIBUs as has been seen with copulas and light verbs. There are two positions that one can adopt. The first is to say that lexical verbs are PIBUs prototypically, which does not mean that special cases cannot arise where they are not PIBUs, and thus not the heads of their construction. The second position would be to consider that lexical verbs are PIBUs and that they are always the head of their constructions but that headedness is a gradient and criteria that makes a head are best described as symptoms of headedness that is to say that copulas and light verbs are lesser heads, not prototypical heads, and do not exhibit the PIBU symptom (ideas of a criterion as a symptom and headedness as a degree expressed in Croft 1996: 48 and 52). A last hypothesis remains, but it would require further demonstration and investigation that ought to be provided in future research: if it is considered that there are several co-existing hierarchies, it could be inferred that copulas and light verbs are not the semantic heads but may be analysed as syntactic heads.

2.2.2. Nominal domain: semantic meaning of nouns and determiners

As for the nominal domain, it seems logical to consider the noun as the PIBU of the NP. Take for example the NP

(17) a cat

a indicates a single entity unknown to the hearer in the prototypical case and *cat* denotes "a small animal with fur, four legs, a tail, and claws, usually kept as a pet or for catching mice" (Online Cambridge Dictionary). Note the number of properties given to describe it: the Adjectival Phrase *small*, one PP and no fewer than four complement NPs describing its physical attributes and its relationship with people. Each time the word *cat* is used, all these properties are implicitly contained in the word, in addition to other properties that a particular referent may have, such as the colour of its fur. The noun therefore contains important semantic information, more than an article can convey, and should therefore be identified as the PIBU.

Nonetheless, some determiners also contain significant information. Let us look at the following NP:

(18) her book

While *book* merely categorises the referent, *her* indicates that the owner of the book is a unique human animate entity, and that she is female. Indeed, nouns only categorise, better than any part of speech, admittedly, but that is the only thing they do (Mignot 2017: 127).

However, even when the argument that *her* indicates a significant amount of information is considered, *book* still contains all the information linked to the categorisation of this noun: the book contains written bound pages, it has a title, a beginning, an end and a back cover. Therefore, it can reasonably be claimed that the noun is the PIBU within NPs.

2.3. The kind-of argument

Croft (1996) adds that being the PIBU is not enough to be the head of a construction; the PIBU must be what he calls the "profile determinant" of the whole phrase, a notion he borrows from Langacker (1987). This notion is equivalent to the 'kind of X' notion which corresponds to Zwicky's first criterion.

To be more accurate, Zwicky's first criterion in Zwicky (1985) is the "semantic argument", which contrasts with Hudson (1987), who considers the "semantic functor" to be the head. What is worth noting is that Zwicky (1993) selects the functor instead of the semantic argument as being a notion parallel to that of head. He states that "there is no longer a single notion of 'head'" (1993: 308) and that "three notions […] coincide in prototypical instances of heads: the semantic functor (F); the base (B), which is the required participant in a combination […] and the head (H)"[9] (1993: 293).

Croft (1996) considers that both linguists are wrong in using the concepts of semantic functor and semantic argument to define the notion of head:

> Zwicky and Hudson proceed to go in opposite directions in defining this notion, and both of those directions are incorrect, or rather, lead to anomalous conclusions. (Croft 1996: 51)

Indeed, he states that being the same 'kind of X' is a different semantic property from being 'functor' or 'argument' and adds that when it is a case of modification, the semantic argument will be the head, and when it is a case of government/agreement, the semantic functor will be the head (Croft 1996: 52). He gives the examples of:

(19) "the broken vase"
(20) "The vase broke."

In both cases, *vase* is the semantic argument. However, in (19), which is the case of modification, *vase* is the head, whereas in (20), the case of government/agreement, *vase* is the dependent, and it is the semantic functor, *broke*, which is the head. Croft notes that it is possible to say that *the broken vase* is a type of vase (a kind of vase), and *The vase broke* is a type of breaking (a kind of breaking).

Zwicky would actually agree with this reasoning. Indeed, in Zwicky (1993: 293), he posits that the alignment of H with F (head with semantic functor) is "broken" in case of modification meaning that the head in a head/modifier case is the semantic argument.

The facts that the dichotomy semantic argument/semantic functor yields different results depending on the construction studied and that Zwicky selects the semantic argument as a potential criterion for headhood in 1985, and its exact opposite, the semantic functor in 1993 hint at the irrelevance of the concepts of semantic argument and semantic functor when it comes to the notion of 'head'. Moreover, while Zwicky picks semantic functor over semantic argument in 1993, he keeps this idea of 'kind of X' throughout both his 1985 and 1993 articles: "the meaning of *will sing* is a subtype of the meaning of *sing*" (1993: 304).

Moreover, selecting Hudson's semantic functor or Zwicky's semantic argument would be like choosing between grammatical items and lexical ones as heads. This is not the goal here. Therefore, it seems more coherent to me to retain this idea of 'kind of X' or type of X, which indeed, is different from the semantic argument. In Croft's example (20), *broke* is the semantic functor but (20) is a kind of breaking so the semantic argument does not pick the same candidate

[9] According to Zwicky (1993: 309-310), F corresponds to the semantic functor, the agreement target, the government trigger and it is lexically subcategorised; H the morphosyntactic locus and the category determinant; and B the obligatory constituent, the distributional equivalent and the 'kind of X'.

as the ‘kind of X’ notion.

Croft (1996: 52) also argues that:

> headedness may be a matter of degree, that is, the degree to which some element's denotation matches the denotation of the whole in semantic type. This match may not be perfect.

Indeed, it is easier to say that *the broken vase* is a type of vase than that *The vase broke* is a type or instance of breaking[10]. This idea of degree is quite promising and could explain the fact that Zwicky's criteria do not always select the same head and can be applied at various degrees to different constructions.

Zwicky writes:

> In a combination X + Y, X is the 'semantic head' if, speaking very crudely, X + Y describes a kind of the thing described by X. (Zwicky 1985: 4)

For example, if X corresponds to the lexical verb *leave* and Y to the auxiliary *will*, in the VP:

(21) “will leave”

"*will leave* describes a kind of leaving" (Zwicky 1985: 4).

Even if Zwicky's formulation is peculiar[11], it is nonetheless intelligible and rather intuitive: the VP "*will leave*" does not refer to every process said by *leave*, but to a specific process, anchored in a situation. It is therefore a type of leaving, and not a type of willing. Admittedly, this argument is much clearer in the nominal domain: the NP *these cats* in (5b) does not refer to all the members of the category 'cat', but to specific entities in this category; or when dealing with PPs:

(22) under the chair

does not refer to a type of chair, but to a type of location, a place[12].

It should be noted that for Aux + VP, Zwicky did not use his original (in both meanings of the word) example

(23) "must control those penguins”

announced in his introduction but chose a completely different example, namely "*will leave*". This must be because it seems much harder to say that "*must control those penguins*" is a type of control (rather than a type of obligation) than "*will leave*"[13]. Indeed, just as Hudson chooses to analyse "*may control those penguins*", it would be interesting to analyse Zwicky's example: "*must control those penguins*" could easily be described as a type of controlling. Indeed, if Zwicky's example expresses an epistemic modality, it is possible to gloss it in the following way, as Hudson does for his own example: ‘Surely they control those penguins’. However, it can be argued that (23) corresponds to a kind of strong possibility, not a type of controlling: ‘It is highly likely that they control those penguins’. Note that glossing is only

[10] This has to do, above all things, with the fact that nouns categorise better than any part of speech, and dealing with the type of the whole is dealing with categorisation.

[11] Langendonck disagrees with this formulation, stating that it makes little sense, and decides to extend this criterion: “the whole construction refers to an instance of what the model refers to” (Langendonck 1994: 247). Whether Zwicky’s formulation is adopted or Langendonck’s, the idea stays the same: the whole construction, i.e. here the VP, “will leave” refers to an instance of what the model refers to that is an instance of or a ‘kind of’ leaving.

[12] A reviewer notes that localisation is less obvious in *listen to me* than in other examples. I do acknowledge this but it could be argued that there is a more abstract localisation at stake.

[13] What should be noticed here is that both Zwicky and Hudson use examples that serve their argument. It is crucial to use authentic examples and still address prototypical, non-prototypical and even contradictory cases.

possible when the modality expressed is epistemic, but if it is root modality, it is still possible to say that "*must control those penguins*" corresponds to a type of duty or obligation.

Let us analyse examples from the COCA, insomuch as the previous examples seem hardly believable in authentic discourse. When looking at the following example,

> (24) Future generations of Americans must know that such behaviour is not only unacceptable but also bears grave consequences.

it is quite possible to argue that this is a kind of necessity, but also a kind of knowing.

It seems easier to say that it is a kind of **knowledge** that is **necessary** to master, which would imply that *must* and *know* work as a pair, a unit, and that one cannot be omitted in favour of the other, and without it being at all obvious to establish, at least when only considering the 'kind of X' argument, a direction of dependence. They both contribute to the general meaning and both bring significant semantic sense.

Let us now observe an example with epistemic modality:

> (25) Ryan voted to cut its funding 7 times. He must know something!

In this case, *must* expresses a very strong probability, quasi-certainty on the part of the speaker. Here too, it can be glossed in the following way: 'Surely, he knows something', which could indicate that this is a type of knowing. However, it is also possible to say 'It is highly likely that he knows something', which seems to point to the opposite: it is a type of very strong probability. Even with authentic examples, these tests are inconclusive: both paraphrases are possible, which is not enough to decide which element is the 'kind of the whole' or the head of the construction, if this criterion is to be kept.

This 'kind-of X' argument seems much more applicable to the nominal domain, as was seen earlier. It seems more natural to say that (5a) *this cat* is a type of 'cat' rather than a type of 'entity close to the referent'. And yet, Croft says it could be argued that:

> It is the determiner that achieves the act of reference and therefore most closely denotes the same thing as the whole noun phrase, namely a thing whose identity is established and is situated in the domain of discourse and the speaker and hearer's mutual knowledge. (Croft 1996: 55)

He still considers the noun to be the PIBU and states: "what happens in reference is that the whole noun phrase fixes reference. Reference cannot succeed without some categorization of the object in almost all cases" (Croft 1996: 55). It is possible to consider here again the idea of a pair working together: the noun and the determiner are both needed to refer to the extralinguistic world. That is why it is challenging to determine which of them is the head, both in VPs and in NPs.[14]

For these cases, Croft adds that:

> If there are two candidates for profile determinant, the one that is not the PIBU will undergo grammaticalization and possibly be attracted and absorbed by the true (PIBU) head. (Croft 1996: 58-59)

This idea of absorption could, for example, be applied to the auxiliary. When a clause without an expressed auxiliary becomes negative or interrogative, auxiliary DO appears, and instead of considering that it has been added to the clause, it could be assumed that DO is contained in the lexical verb and only becomes visible in specific contexts. It is also possible to consider that DO is not contained in the lexical verb but that it is present without being visible

[14] It should be noted that Gerdes and Kahane (2022: 365) treat the noun and determiner as co-heading the NP. This possibility will be explored in future research.

(what is called 'covert').

This process of absorbing a grammaticalised element can also be applied to determiners. Croft suggests that determiners start out as demonstratives[15], then become articles attached to the noun. “When that stage is accomplished, the noun-plus-determiner-affix becomes a single word carrying out the referring function” (Croft 1996: 58). “The affixed article may disappear, leading to an articleless NP in which the noun is the only strong candidate for headhood.” (Croft, *ibid.*). Indeed, the determiner does not seem to be a strong candidate for headhood when it is not visible which makes it seem like the noun has absorbed it as in:

(26) Black and brown cats are less likely to be adopted.

However, if it is considered, as many linguists do (such as Cotte 1996: 33, Moncomble 2009, Gardelle & Lacassain 2012: 248, Larreya & Rivière [2010] 2014: 171), that there is the zero article (∅) and that it is of equivalent status to the other visible determiners, it can still be seen as a potential head candidate. In the case of the zero article, it has not been absorbed by the noun but is simply phonologically unrealised: ∅ *Black and brown cats are less likely to be adopted.* I cannot conclude for now that determiners such as the zero article are (or not) heads[16], but what I can state is the fact that determiners including the zero article should be treated as potential head candidates.

2.4. A narrower extension

2.4.1. Nominal domain

Croft (1996) specifies that, in order to determine which element should be identified as the PIBU of the construction, one would need to determine which one has a narrower semantic extension. According to Croft, then, the head should be identified as the element that is the ‘kind of the whole’ i.e. the profile determinant and the PIBU that has the narrower extension. For instance, in the NP:

(27) the table

Croft, following Langacker's analysis, explains that *the* and *table* both denote 'a thing' but *the* denotes a very general ‘thing’ insofar as it applies to a multitude of situations, situations where the co-speaker knows what the speaker is referring to.

> However, THE profiles a thing at a very high degree of generality (schematicity): the only restriction is that it is uniquely available to speaker and hearer in the discourse context. (Croft 1996: 59)

A *table* is a piece of furniture with four legs and a flat surface. *The* thus has a wider scope than a noun such as *table*. In other words, *table* can refer to fewer entities than *the*.

However, it should be noted that not all nouns are semantically very rich. Some are extremely general and can be applied to many situations, such as *thing*, *event* or *term*. Nevertheless, determiners remain the elements of the NPs that do not offer great semantic wealth and are the most general.

2.4.2. Verbal domain

Similarly, in the verbal domain, looking at the example:

[15] Although Croft does not specify which determiners, a reviewer notes that this is only valid for definite determiners.

[16] Substantial work on assessing other criteria and advancing other arguments needs to be accomplished first before coming to an informed conclusion.

(28) will swim

will can be applied to a wide variety of processes whereas *swim* corresponds to a more limited number of types of processes.

One can also think about the Code property contained in the "NI**C**E properties", which corresponds to the synthetic capacity of auxiliaries. When the following question is asked:

(29) "Will you guide and govern and protect your people to the best of your ability, according to law and custom?"

the new queen answers "*I will*" (example from *Long Live the Queen*, Georgina Bensley): *will* can be described as coding "*guide and govern and protect my people to the best of my ability, according to law and custom*". It is possible to wonder if this is a case of anaphora as it is argued here, or a case of ellipsis. Zwicky (1985: 13) who considers obligatoriness as a potential criterion for headhood, makes the distinction between "constituents that are optionally present and those that are elliptical". He would argue here that the obligatory elements are the lexical verbs and their complements (what he calls 'VP') and not the auxiliary; and that it is a case of ellipsis. This requires further inquiry and will be addressed in future works.

In any case, even if the synthetic power of auxiliaries is considered, it can be safely assumed that they have the less narrowed extension and that they do not contain as much information as lexical verbs, because it is necessary to distinguish between the information expressed directly by the element and that which is simply retained in memory.

This idea of narrower extension is useful as well for examples such as (23) where it proved to be challenging to determine if the modal auxiliary or the lexical verb was an instance of the whole, the 'kind of the whole'. In (23), *must* has a larger extension than *control* thus *control* is the PIBU that has the narrower extension.

Consequently, it seems legitimate to conclude that the PIBUs with the narrower extension are respectively lexical verbs in VPs and nouns in NPs. For the semantic criterion to be thorough, the head should be identified as the profile determinant and the PIBU that has the narrower extension.

2.5. A relevant criterion?

However, I think it is still important to point out that some linguists do not consider the PIBU to be a relevant criterion when discussing the notion of head. This is the case of Schachter (1983: 150-151), who argues that heads are not necessarily more semantically salient than their dependents. He does not really justify his position, simply stating that the PIBU criterion is not "relevant" to the notion of head. He adds that Hudson and the supporters of dependency grammar would also discard this criterion in relation to the head, saying: "the distinction between heads and dependents is a purely syntactic one, without any necessary semantic correlates".

Certainly, the PIBU is not an absolute criterion and it may not always identify the head of a construction. Indeed, prepositions would not be identified as the PIBU - although as has been seen they can be identified as the 'kind of the whole' - and yet they are traditionally considered to be the heads of PPs. However, despite the existence of semantically bleached prepositions, as a whole, prepositions seem to retain more semantic information than, say, an article[17].

Furthermore, it would be a mistake not to consider semantics as it is highly likely to

[17] It is possible to describe a preposition in terms of semantic traits while it seems much more difficult for an article.

play a significant role in defining heads and dependencies and this should at least be taken into account when dealing with the notion of head.

The most likely scenario is that there are several hierarchies at work in the language, and that the PIBU criterion allows us to identify one of these hierarchies: the semantic one. This does not mean, however, that there are no other hierarchies and therefore no other heads. This criterion therefore remains highly relevant and valid for identifying the head of a construction at least when studying the semantic hierarchy.

3. Assessment of the morphosyntactic locus criterion

3.1. Defining the morphosyntactic locus

So far, I have dealt with semantic arguments, but a head is a syntactic function, it is thus only legitimate to address syntax. Let us now explore the possibility that the head corresponds to the morphosyntactic locus, Zwicky's (1985) only remaining criterion. He defines it as the element bearing the (morphosyntactic) marks of the syntactic relations between the construction and other syntactic units. It consists in considering that the marks are "actual bits of inflectional material" and that the inflectional locus within a construction is a candidate for headedness (Zwicky 1985: 6).

(30a) The child knows his mother is there.
(30b) The children are losing a week of school.

For example, the distinction between the singular *the child* (30a) and the plural *the children* (30b) is linked to the distinction between a singular VP such as (30a) *knows his mother is there* and a plural (30b) *are losing a week of school*.

Zwicky also insists on the fact that the morphosyntactic locus should not be considered simply to be "a place" but a specific constituent (Zwicky 1985: 6). Morphosyntactic loci are therefore linked to the concept of percolation, "a principle that morphosyntactic features of the head match the morphosyntactic features of the constituent that it is the head of" (definition given by Croft 1996: 48). These are gender, number, person, case and tense inflections.

3.2. Identification of the morphosyntactic locus

3.2.1. Verbal domain

According to Zwicky, the morphosyntactic locus is more easily identified in the following constructions: Aux +VP, V + NP and Det + N. In Aux + VP, the morphosyntactic locus is the auxiliary because, being the first verb of an auxiliary + verb construction, it carries the inflection, the conjugation mark. In addition to tense variation, there are distinctions of number and person in the auxiliary *be*:

(31) "am/is/are/was/were controlling those penguins"

(Zwicky's example), which are linked to the distinctions of the subject, the NP. It should be noted that here again, Zwicky does not use his original example ("*must control those penguins*"), as *must* is always a finite form and never takes an inflectional suffix. The *be* auxiliary is more relevant because it is the auxiliary that has the most different forms depending on the person expressed by the subject.

In the V + NP construction, i.e. a VP without an expressed auxiliary, it is the verb that will carry the inflection such as *controls* in

(32) He controls the election.

so it should be identified as the morphosyntactic locus.

Zwicky considers two constructions for what is traditionally treated as a VP: Aux + VP and V + NP. In the first construction, the auxiliary is the morphosyntactic locus and therefore the head of the construction, and in the second the lexical verb is the morphosyntactic locus and therefore the head.

It is debatable whether considering two different phrases or subtypes of phrases is a satisfactory conclusion – a VP with an auxiliary headed by the auxiliary and a VP without an auxiliary headed by the lexical verb. It could be argued that the gain in simplicity is beneficial enough to accept this loss in harmony at the level of the syntactic description. Taking up the 'kind of X' argument again, this would also make it easier to interpret the results: the VP with an auxiliary represents the 'kind of the whole' expressed by the auxiliary (for example *must know*: a kind of obligation) and the VP without an auxiliary represents the 'kind of the whole' expressed by the lexical verb (e.g.: *know*: a kind of knowing)[18]. The results would be heterogeneous because they are two different (sub-)types of constructions. The criterion of the obligatory element would also be an argument in favour of this hypothesis. What about auxiliaries that have no inflection (i.e. modals)? One could wonder if they should still be considered to be morphosyntactic loci keeping in mind the fact that modals had inflections in Early Modern English (such as *will, wils, wilt*). These are thought-provoking questions to raise, and deserve further consideration and inspection before coming to a conclusion on the need for two subtypes of VPs.

3.2.2. Nominal domain

At first glance, in the nominal domain, the noun is identified as the morphosyntactic locus. If *the child* in (30a) and *the children* in (30b) are compared again, in both, *the* does not undergo any change, while the ending <-ren> is added to the noun to form the plural.

However, Hudson notes that number is not only indicated by nouns, but also by determiners "*this/these, that/those, much, many, few, little, both, either, neither, a(n)*" and all cardinal numerals. He adds that some nouns, such as "*sheep*" and "*fish*" do not have a plural form. Building upon this argument, the case of non-count nouns which do not mark number, such as *love*, could be mentioned. Finally, he notes that, in some varieties of English[19], certain nouns can appear in the singular when combined with cardinal numerals to signify plurality without this being agrammatical. Hudson (1987: 122) gives the examples of:

(31)"three pound"
(32) "five mile"[20]

Hudson (*ibid*.) concludes that "it is at least debatable whether number is indicated by the noun rather than by the determiner". He also mentions the case of apposition, where he identifies pronouns as determiners and observes that these "determiners" mark the case whereas nouns do not as in "*we students*" (Hudson: *ibid.*). He thus considers the determiner to be the morphosyntactic locus in an NP.

[18] Though it should be kept in mind the fact that VPs with the modal *will* for instance can hardly be called 'instances, subtypes or kinds of 'willing'' so that the lexical verb in these cases would remain the "profile determinant" as Langacker (1987 quoted by Croft 1996: 52) calls it.

[19] The author does not specify which.

[20] These two examples do not seem to be very common, when looked at in the *COCA* at least, only yielding 21 entries for (31), and 75 for (32). However, if the entries of proper nouns are not taken into account – 17 – and examples where 'five mile' behaves as a modifier of a noun such as "*a five mile radius*" – 41 –, only 17 occurrences are left for (32). Still, as could be expected, the results for (31) are higher in the *BNC* yielding 154 occurrences against 193 entries for *three pound**s*** (31). Thus, (31) is much more common than (32).

Some determiners do indeed convey number: *this*, *that* and *a(n)* indicate singularity while *those* and *these* indicate plurality; *many* and *much* refer to a large quantity, *few* and *little* a small quantity, *both* to two elements. Thus, taking this evidence into account, it could be argued that these determiners are the morphosyntactic loci.

However, when looking at the rest of Hudson's arguments, it is more contestable. Indeed, count nouns that do not mark plurality are a minority. Finally, his last argument on apposition only works if considering pronouns as determiners. Hudson supports this theory by arguing that personal pronouns cannot be combined with determiners (example and ideas by Hudson 1987: 122):

(33) "*you those students"

His last argument implies that personal, demonstrative and quantitative pronouns should be in the same category as determiners, a debate I will not get into in this article and for which he brings too little proof. At this stage at least, it seems more legitimate to identify the noun as the morphosyntactic locus of the NP because, in English, it is the element that is most often marked by the plural.

Reaching the end of this discussion, one may wonder if the morphosyntactic locus is really a criterion or a symptom of headedness. While the morphosyntactic locus is the only non-discarded criterion for Zwicky, Croft thinks that:

> however useful the concept of morphosyntactic locus may be, it is not the concept we should call the head of a constituent - it is better to describe it as a symptom, not an explanation, of the head. (Croft 1996: 48)

Talking about a symptom of a head is useful because it introduces the idea that headedness is a gradient. It is quite possible that the head of a construction does not always exhibit all the symptoms or all the criteria that identify a head. This analysis would account for the ambiguous cases or counter-examples such as light verbs and copulas.

Conclusion

While the notion of 'head' has long been established and applied in various theories, there is no consensus on its precise meaning and on the relevant criteria for its identification within a construction. As has been seen, some linguists such as Zwicky (1985) consider that not everyone uses the same notion when talking about 'head'. After reviewing the semantic and the morphosyntactic locus criteria, it can be concluded that both are relevant to the notion of head. The 'kind of X' argument and the PIBU offer a semantic definition of heads, while the morphosyntactic locus deals purely with syntax.

The results are not always homogeneous when confronting criteria. Is it then a reason to discard certain criteria, in favour of harmony? Can certain criteria be considered to be valid or not, and how can it be determined?

All these questions are extremely complex and stay unanswered for now. This is why the definition of head, even in linguistic books, remains extremely general and vague: that which controls the whole, that which dominates the whole. It is probable that a comprehensive definition cannot be produced and applied universally to all types of phrases. Yet, as Hudson (1987: 125) reminds us, any rule can be subject to exceptions, non-prototypical and particular cases: this does not invalidate the rule. It is therefore still possible to work out a precise definition of head. While Zwicky (1985) discards all the criteria studied apart from that of the morphosyntactic locus, which he even considers to be the notion that should once and for all replace that of head, Hudson (1987: 124) affirms that 'head' corresponds to the morphosyntactic

locus, the subcategorisand, the governor, the distributional equivalent, the obligatory element, and the 'kind of X'. He admits that these criteria and properties are only strong tendencies, which means that there may be cases that seem to go against the rule. Even though Zwicky discards most of his criteria in 1985, he incorporates them back in the discussion about 'head' in 1993 stating that 'head' is not a single notion but involves three notions (base, head, and functor) that include these criteria. For instance, the base corresponds to the obligatory element and thus refers to the obligatoriness criterion.

Furthermore, as Croft (1996: 52) says, "headedness may be a matter of degree". Like Croft, I consider that Zwicky's morphosyntactic locus and other "criteria", are symptoms of headhood, not criteria. However, while Croft argues for a semantic definition of 'head' where the head is the PIBU and the profile determinant of the whole construction – that is a subtype of the whole -, I argue that this is also a symptom, not a criterion. One or more symptoms may not be present in certain elements that can nonetheless be identified as heads of a construction.

Another satisfactory conclusion would be to consider that there are different hierarchies at stake and that there are not conflicting but co-existing. This could explain the mismatch between some morphosyntactic loci and some PIBUs. For example, the auxiliary is the morphosyntactic locus in an auxiliary and verb construction while the lexical verb is the PIBU that has the narrower extension. It would mean that the auxiliary is the syntactic head and the lexical verb the lexical head.

In addition to Zwicky's other criteria, further arguments can be taken into account when discussing the notion of head, such as arguments from different languages, arguments based on phonology (stress in particular), comparison with other phrases, in particular PPs with DPs, or language acquisition in children. It is also possible to consider diachronic arguments by studying Old or Middle English. Certain special cases can also be used as arguments to determine the head of a construction, such as the genitive, free relatives and appositions. This needs to be and will be the subject of further research, as well as addressing Zwicky's remaining criteria in further works in an attempt to formulate a precise definition of head and its criteria.

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