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Dependency in language

Igor Mel'čuk

Université de Montréal

This paper presents a general overview of the notion of linguistic dependency and of its application in formal modeling of Language. Three major types of dependency are distinguished: semantic, syntactic and morphological dependencies; all cases of their 14 possible combinations in a sentence are examined and illustrated. Each type of dependency is characterized in some detail. For syntactic dependency, three sets of formal criteria are introduced; for morphological dependency, its two major subtypes – agreement and government – are described. The main advantages of syntactic dependency are shown, as well as a case of its insufficiency (in coordination). The place and the role of phrases within dependency framework are touched upon. The so-called Bracketing Paradox is briefly discussed.

1. Introductory remarks

1.1 The task stated

This text does not present new facts or new ideas about known facts. Its goal is to sum up my own experience of more than half a century of work on linguistic dependencies and to better organize the knowledge acquired over this period. It is based on several publications (Mel'čuk 1963, 1974, 1979, 1988, 2002, 2003 and 2009; Mel'čuk & Pertsov 1987), which allows me to skip a detailed explanation of the nature of linguistic dependency. I will also abstain from rigorously presenting the necessary notions and formalisms of the Meaning-Text theory (the reader is kindly invited to consult the appropriate titles: e.g. Mel'čuk 1974: 31ff, 1981, 1988: 43–101, 1997, 2006: 4–11, 2012, 2013 and Kahane 2003). Finally, there will be only a dire minimum of references.

My task is three-pronged: (i) to offer the reader a concise overview of what must be known about linguistic dependencies to successfully use them (“Dependencies 101”); (ii) to emphasize the advantages of dependencies in linguistic description; (iii) to sketch the place and the use of phrases (\approx constituents), within a strict dependency approach.

But first, a bit of personal experience.

1.2 Some History

I met syntactic dependency for the first time in 1956 while developing a Hungarian-to-Russian machine translation system: Melčuk 1957. Here is an example from this paper: translation of the Hungarian sentence (1a) into Russian – as (1b).

- (1) a. *A legtöbb nyelvnek sok idegen eredetű szava van.*
the most language-SG.DAT many foreign “originary” word-SG.NOM.3SG is
- b. *V bol’sinstve jazykov est’ mnogo slov inostrannogo proisxoždenija.*
in majority-SG.PREP language-PL.GEN is many word-PL.GEN foreign-NEU.SG.GEN origin-SG.GEN
 ‘Most languages have many words of foreign origin.’

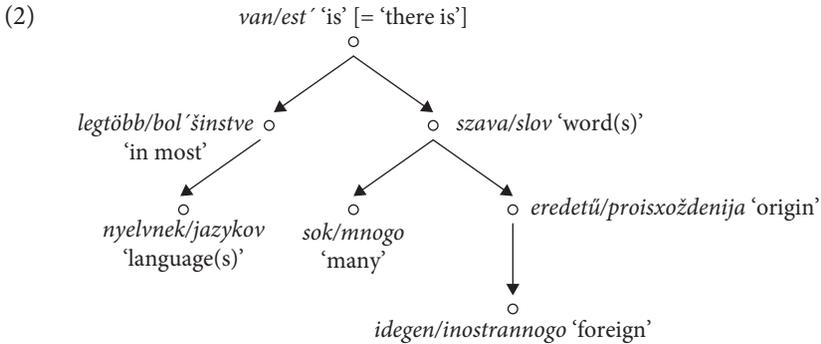
At least four problems have to be dealt with by a machine translation system to obtain (1b) from (1a):

- The grammatical number of nouns ‘language’ and ‘words’: they are singular in Hungarian – because of a quantifier, which in Hungarian requires the singular of the quantified noun, but must be plural in Russian – for the same reason, since the Russian quantifiers require the plural of the noun (with the exception of so-called “small” numerals: 1, 2, 3 and 4).
- The agreement of the adjective INOSTRANNYJ ‘foreign’ with the noun PROISXOŽDENIE ‘origin’ in Russian; in Hungarian, adjectives do not agree with nouns.
- The dative of the noun NYELV ‘language’ in Hungarian, induced by the verb VAN ‘[there] is’, corresponds to the Russian preposition V ‘in’, induced by the verb EST’ ‘[there] is’, equivalent of VAN.
- Word order: some Hungarian words precede their “governors,” while their Russian equivalents follow theirs; cf.: Hung. *szava van* ≡ Rus. *est’ slova*, Hung. *eredetű szava* ≡ Rus. *slov proisxoždenija*.

I was unable back then, and I am still unable now, to figure out how to formulate the corresponding rules, if the Hungarian sentence is parsed into constituents, that is, supplied with a phrase structure. The constituency approach, borrowed by computational linguists in the ex-USSR from American and British linguistics, was in 1950’s the only well-known formal framework, yet I felt very strongly that there was no way you could translate by means of bracketed phrases. And

my attempts to find a proper way to translate a given text lead me to syntactic dependencies.¹

The above problems can indeed be easily solved by using syntactic dependencies. Let us consider an approximate dependency tree for both sentences in (1):



Based on dependencies arrows linking the lexemes, it is obvious how to formulate the rules for the necessary changes between Hungarian and Russian in the four above cases. (Namely: “If there is a quantifier depending on an N, this N is singular in Hungarian and plural in Russian”; “In Russian, an ADJ agrees with the N it depends on”; “In Hungarian, an N depending on the verb VAN as its object must be in the dative, while in Russian, an N depending on the verb EST’ as its object must be introduced by the preposition V ‘in’ and be in the prepositional case”; “An N_1 depending on an N_2 must precede the N_2 in Hungarian, but follow it in Russian.”). It became very soon clear that a successful machine translation needs – as a kind of hinge between sentences of two different languages – a syntactic structure, and this structure must be written in terms of dependencies.

1.3 Dependency and Meaning-Text stratificational approach

To see all advantages of dependency representation of utterances, especially in what concerns syntactic dependency, you have to use dependencies in a package together with several other important techniques. I know of three conditions

1. Of course, I was not alone: at least in Germany, France and Czechoslovakia several researchers were inching forward along the same difficult path, and for the same reasons as myself. Interestingly, in the USA, David Hays (1964) and Julia Robinson (1970) formulated explicitly the basic tenets of dependency syntactic description, but theirs remained voices crying out in the desert.

imposed on linguistic research and description that must be met for syntactic dependencies to show all their power.

- Semantic representation as a starting point. The very first thing to do in any linguistic study is to present a formal description of the meaning of the expressions examined – in order to establish the correspondences between the expressions and its meaning. The guiding slogan here is: “We say what we think!”
- Synthetic perspective. A linguistic description is better done from meaning to text: the linguist aims at modeling the activity of the Speaker, who produces texts, not that of the Addressee, who interprets/understands them. The guiding slogan: “To use language is to speak!”
- Stratificational description. Each type of major linguistic unit (sentences and wordforms) is represented under different aspects specific to it, so that different formalisms are needed. As a result, several levels of linguistic representation and different structures within a representation are distinguished; these representations and structures are related by formal rules of the linguistic model. The guiding slogan: “Dead flies and meatballs should be served separately!”²

In other words, dependencies and a meaning-to-text stratificational linguistic model have to be used together – lock, stock and barrel.

As far as the characterization of the Meaning-Text model is concerned, two major simplifications are recurred to in this article:

1. While the bottom level is the Semantic representation [= SemR], the upper level in all the examples below is the Deep-Morphological representation [= DMorphR] of the sentence, the reason being that dependencies do not manifest themselves on closer-to-surface levels.
2. Instead of full linguistic representations, I deal here only with their main structures; for instance, instead of the complete SemR of a sentence (which includes the Semantic Structure, the Sem-Communicative Structure, the

2. This is a punchline of an old Jewish joke. A poor guy comes to a shabby diner, a typical greasy spoon, and asks for a helping of meatballs. When the dish arrives, he sees several dead flies on the meatballs; calling up the waiter, he indicates the problem to the latter. The waiter explodes in self-assured indignation: – Screw off! If you don't like our meatballs, go somewhere else!! – and starts rolling up the sleeves, getting ready for a physical assault. – No, no, you misunderstood me, – screams the customer. – I have nothing against your meatballs, but I would like to have my dead flies separately and my meatballs separately.

Rhetorical Structure, and the Referential Structure), only its main structure, i.e. the Semantic Structure [= SemS], will be considered.

As far as the proposed definitions of linguistic phenomena are concerned, only prototypical cases of these phenomena are taken into account. Therefore, several definitions given below are incomplete. However, they are sufficient for my purposes here.

2. Different types of linguistic dependency

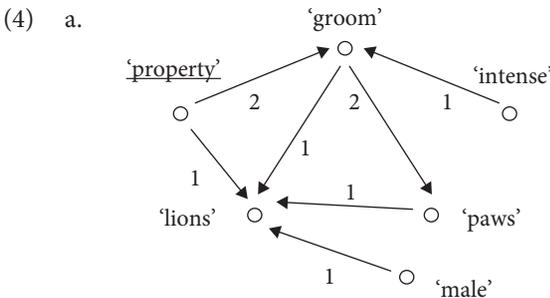
Let us take a simple sentence and describe it scientifically:

(3) *Male lions carefully groom their paws.*

The task of the linguist describing a sentence can be reduced to three basic steps:

- Propose a formal representation of the meaning of this sentence, or its SemR.
- Propose a formal representation of its physical – that is, phonic – form, or its Phonic representation [= PhonR].
- Propose a system of rules that, applied to the SemR of sentence (3), produce its PhonR. Such a system, valid for a language as a whole, is a correspondence $\{\text{SemR}_i\} \Leftrightarrow \{\text{PhonR}_i\}$, or a linguistic model.

I will illustrate this approach by indicating for sentence (3) its SemS and its DMorphS (in conformity with the simplifications formulated in 1.3):



- b. MALE < LION_{PL} < CAREFULLY < GROOM_{IND, PRES, 3, PL} < THEIR < PAW_{PL}
 The symbol “<” indicates linear order.

Literal reading of the SemS in (4a):

‘Male lions have the property of intensely grooming their paws’

The SemS in (4a) in predicate-argument notation:

Property(Male(lions_{*i*}); Careful(lions_{*i*}; Groom(Paws(lions_{*i*}))))

The subscript *i* indicates coreference.

The SemS in (4a) is written in terms of semantic dependency. In order to go from (4a) to (4b), two intermediate structures of sentence (3) – the Deep-Syntactic structure [= DSyntS] and the Surface-Syntactic structure [= SSyntS] – are needed; both are based on syntactic dependency (see Section 5). The rules for the “SSyntS \leftrightarrow DMorphS” transition use morphological dependency (see Section 6). What are these three types of dependency?

Dependency is a binary relation that is anti-reflexive, anti-symmetrical and non-transitive; it can be figured by an arrow:

Governor \longrightarrow Dependent.

Semantic Dependency [= Sem-D]

If the SemS is written in a formal language derived from the language of predicate calculus,³ all semantic elements, or *semantemes* (= signified of full lexemes), in it are linked by a dependency relation. This is semantic dependency, corresponding to a “predicate ~ argument” relation; a predicate is the Sem-Governor of its arguments. Since a predicative semanteme, as was empirically established, can have up to six arguments, six relations of Sem-D are distinguished: 1, 2, ..., 6. (These distinguishers are asemanic: see Section 4.)

Syntactic Dependency [= Synt-D]

The SemS is a *network*, and the MorphS, a *chain*. The SyntS as a convenient bridge between the SemS and the MorphS must be a dependency tree. Synt-Ds link lexemes that label the nodes of the SyntS; these links do two things:

1. Synt-D between the elements of a (syntactic) phrase determines the distribution of the phrase within sentences – that is, its capacity to be used in a particular syntactic position. Thus, in the phrase L_1 -synt \rightarrow L_2 the Governor is L_1 if and only if L_1 -synt \rightarrow L_2 is used like L_1 (\approx can replace L_1) rather than like L_2 .
2. Synt-D controls the linear position of the Synt-dependent with respect to its Synt-governor. Thus, for instance, in English, in Basque and in French we have Adj \leftarrow -synt-N (the Adj \leftarrow -synt-N phrase is used like an N and not like an Adj), and an Adj is positioned with respect to the modified N: in English, before N; in Basque, after N; and in French, before or after N, according to several conditions.

3. I don't think there is another formal language fit for describing linguistic meaning. At least, all projects of semantic metalanguages I have seen propose something equivalent to the language of predicate calculus.

Morphological Dependency [= Morph-D]

Sem-**D** and Synt-**D** are cross-linguistically universal: there is no language without Sem-**D** and Synt-**D**; in a language, there is no sentence without Sem-**D** and Synt-**D**, which link all the words of the sentence. But Morph-**D** is found only in some languages – those that feature at least one of two types of Morph-**D**: agreement and government; and even in a language with morphology, not all words in any sentence are morphologically linked. Thus, in (3), the verb GROOM agrees with the subject LION_{PL}, and this is the only morphological link in this sentence.

To sum up:

Sem-**D** holds between semantemes, which are signified of lexemes:

' L_1 -sem $\rightarrow L_2$ ' means ' $L_1(L_2)$ ' – that is, the semanteme ' L_2 ' is a semantic argument of the predicative semanteme ' L_1 '.

Synt-**D** holds between lexemes:

L_1 -synt $\rightarrow L_2$ means that (i) L_1 determines the distribution (= the passive valence) of the phrase L_1 -synt $\rightarrow L_2$ within sentences and (ii) L_2 's linear position is determined with respect to L_1 : L_2 precedes L_1 , follows it, or can precede or follow (depending on particular conditions).

Morph-**D** holds between grammemes and syntactic features of lexemes:

L_1 -morph $\rightarrow L_2$ means that a grammeme or a particular syntactic feature of L_1 determines some grammemes of L_2 .

Sem-**D**s and Synt-**D**s are universal and form connected structures (for sentences); they are reflected in sentence representations: in semantic networks and syntactic trees. Morph-**D**s are language-specific and do not form a connected structure (within a sentence); they are not explicitly shown in any sentence representations, but are used in syntactic rules that ensure the morphologization of the SSynt-structure.

These three types of dependency do not exhaust all linguistic dependencies: there is also communicative dependency, which we will ignore.

3. Fourteen possible combinations of the three types of linguistic dependency

The mutual logical autonomy of the three types of dependency is demonstrated by the fact that they cooccur: two lexemes L_1 and L_2 in a sentence can be linked by

any combination of dependencies out of the 14 logically possible ones. Here is an overview of these possibilities.

-
- | | | |
|-------------------|--------------------|--|
| 1. L_1 | L_2 : | No dependency whatsoever between L_1 and L_2 ; e.g. HERE and POSSIBILITY _{PL} in the last sentence preceding this table. |
| 2. L_1 —sem→ | L_2 : | Only Sem- D between L_1 and L_2 ; e.g. JOHN and LAUGH in <i>John broke out laughing</i> : ‘start’-1→‘laugh’-1→‘John’. |
| 3. L_1 —synt→ | L_2 : | Only Synt- D between L_1 and L_2 ; e.g. TAKUSAN ‘many/ much’ and YOMU ‘read’ in Jap. <i>Yoko+wa hon+o takusan yom+u</i> lit. ‘Yoko _{THEME} book _{ACC} many read _{PRES} ’ = ‘Yoko reads many books’; semantically, ‘takusan’ bears on ‘hon’, and morphologically, <i>takusan</i> is an invariant adverb. |
| 4. L_1 —morph→ | L_2 : | Only Morph- D between L_1 and L_2 ; e.g. IČ ‘our’ and HEBGNU-(<i>jič</i>) ‘ran.away.our’ in Tabassaran <i>Ič mudur uc^{wh}u+na hebgnu+jič</i> lit. ‘Our goat.kid you-to ran.away-our’ = ‘Our goat kid ran away to you’, where HEBGNU depends morphologically on the pronoun IČ ‘our’ (= agrees with it), without any Sem- or Synt-link between them. |
| 5. L_1 —sem→ | —synt→
L_2 : | Sem- D and Synt- D between L_1 and L_2 go in the same direction, no Morph- D ; e.g. READ and NEWSPAPER in <i>John is reading a newspaper</i> . |
| 6. L_1 ←synt— | L_2 : | Sem- D and Synt- D between L_1 and L_2 go in opposite directions, no Morph- D ; e.g. INTERESTING and NEWSPAPER in <i>an interesting newspaper</i> , where NEWSPAPER semantically depends on INTERESTING, since the former is a Sem-argument of the latter. |
| 7. L_1 —morph→ | L_2 : | Sem- D and Morph- D between L_1 and L_2 go in the same direction, no Synt- D ; e.g. the clitic <i>le</i> _{DAT} ‘to.him/to.her’ in Sp. <i>Juan le quiere dar un libro</i> ‘Juan wants to give him a book’ depends semantically and morphologically on the verb DAR ‘give’, while syntactically it depends on the Main Verb QUERER ‘want’, since it forms a phrase with it and is positioned with respect to it. |
| 8. L_1 ←morph— | L_2 : | Sem- D and Morph- D between L_1 and L_2 go in opposite directions, no Synt- D ; e.g. Marie and belle ‘beautiful’ in Fr. <i>Marie semble belle</i> ‘Mary seems beautiful’: Marie depends semantically on belle, being its argument, but belle depends morphologically—for number and gender—on Marie. |
| 9. L_1 —morph→ | L_2 : | Synt- D and Morph- D between L_1 and L_2 go in the same direction, no Sem- D ; e.g. AB ‘from’ and URBS ‘city’ in Lat. <i>ab urbe condita</i> lit. ‘from city founded’ = ‘from the founding of the City [= of Rome]’. |
| 10. L_1 ←morph— | L_2 : | Synt- D and Morph- D between L_1 and L_2 go in opposite directions, no Sem- D ; e.g. TEMPERATURE and BEGIN in <i>The temperature begins to fall</i> : syntactically, TEMPERATURE depends on BEGIN, but morphologically, the other way around; semantically, they are unrelated. |
| 11. L_1 —synt→ | —morph→
L_2 : | Sem- D , Synt- D and Morph- D between L_1 and L_2 in the same direction; e.g. <i>vižu</i> ‘I.see’ and <i>Maš+u</i> _{ACC} ‘Mary’ in Rus. <i>Vižu Mašu</i> ‘I see Mary’. |
-

—sem→ 12. L ₁ ←synt→L ₂ : ←morph—	Sem- D and Synt- D between L ₁ and L ₂ go in the same direction, Morph- D is opposite; e.g. polypersonal agreement of the Main Verb in a case-less language: Abkhaz <i>Nadš'a sara i+s+əl+teit' aš^wq^wə</i> lit. 'Nadsha me gave a book', where the Main Verb agrees, by its prefixes, with all three actants (in person and gender); semantically and syntactically, actants depend on the verb, which depends on them morphologically (on each of them, in different categories).
—sem→ 13. L ₁ ←synt—L ₂ : —morph→	Sem- D and Morph- D between L ₁ and L ₂ go in the same direction, Synt- D is opposite; e.g. the idafa construction in Iranian languages: Persian <i>ketab+e nav</i> 'book-IDAFA new', where KETAB 'book' is a semantic argument of NAV 'new' and receives from it the morphological marker -e, while syntactically being its governor.
←sem— 14. L ₁ —synt→L ₂ : —morph→	Synt- D and Morph- D between L ₁ and L ₂ go in the same direction, Sem- D is opposite; e.g. NOUVELLE 'piece.of.news' and INTÉRESSANT 'interesting' in Fr. <i>nouvelle_(fem)SG intéressant +e_{FEM.SG}</i> 'interesting piece of news'.

4. Semantic dependency

Speaking of Sem-**D**, one has to insist, first of all, that there are no meaningfully distinguished Sem-relations that would correspond to Fillmore's Deep Cases or "Semantic Roles" (= "θ-roles") of the Generative Grammar. It is linguistically inconsistent to explicitly indicate that in *John loves Mary*, 'John' is related to 'love' as Experiencer, and 'Mary', as Source/Object. "Experiencer" is actually a binary predicate 'X is Experiencer of Y' = 'X experiences Y', and as such, it would require a meaningful indication of the Sem-relations between itself and its own arguments; this indication – another predicate – will in turn require the same thing once again; etc. This creates infinite regression, which can be stopped only by an arbitrary decision about which Sem-relations and under which conditions must be considered non-predicates or, at least, not quite normal predicates. (However, postulating some Sem-relations that are not full-fledged predicates is a *contradictio in adjecto*.) Moreover, any such "strange" predicate is also capable to appear, as a normal predicate, on a node – and not on an arc – of a semantic network. The bottom line is that different Sem-**D**s are simply distinguished (by arbitrary symbols, for instance, numbers), but they cannot be positively identified. The semantic role of an argument with respect to its predicate is given by the semantic decomposition of the predicate:

'John←1-loves-2→Mary' =

'John←1-experiences strong affection [for] and sexual attraction-[to]-2→Mary'.

NB: However, the names of “semantic relations” can be used informally for better clarity, as a kind of abbreviation. Thus, L_1 can be called Experiencer with respect to L_2 to mean that ‘L’ is the SemA 1 of the predicate ‘experience’ which is inside the semantic decomposition of ‘ L_2 ’, etc.

5. Syntactic dependency

5.1 Deep- vs. surface-syntactic dependency

Speaking of Synt-**D**, one has to emphasize the distinction of two sublevels of syntactic representation: Deep-Syntactic vs. Surface-Syntactic representation, *resp.* structure [= DSyntR vs. SSyntR and DSyntS vs. SSyntS]. While DSyntR is cross-linguistically universal, SSyntR is language-specific. The DSynt- vs. SSynt-distinction allows for useful generalizations in syntax and for the formulation of simpler and more efficient semantic – i.e. {SemR} \Leftrightarrow {DSyntR} – rules. For instance, the verb HELP takes a DirO (*help-[the]-DirO*→neighbor), and its Russian equivalent POMOGAT’ requires an IndirO (in the dative: *pomogat’-IndirO*→sosed+u): these are different syntactic constructions. But at the DSynt-level, where surface peculiarities are not taken into account, the two constructions are “homogenized”:

HELP-II→NEIGHBOR and POMOGAT’-II→SOSED

The DSynt- vs. SSynt-distinction requires establishing two sets of syntactic relations: Deep-Syntactic vs. Surface-Syntactic relations.

5.2 Deep-Syntactic relations

The DSyntRels are supposed to be language-independent; each DSyntRel is necessary and all of them are sufficient in the following sense:

- || Necessity: Each DSyntRel is found in many, if not all, languages.
- || Sufficiency: The DSyntS of any sentence of any language can be conveniently represented in terms of the DSyntRels available.

NB: The last statement is true only if we allow for the use, in the DSyntS, of fictitious lexemes, called upon to represent lexical-type meanings expressed by syntactic constructions (= constructional phrasemes) such as *N after N* (*page after page*), *N V_{INF}* (*Me be afraid!?!?*), *There are N and N* (*There are linguists and linguists*), etc. Such constructions are language-specific and fairly variegated; as a result, they cannot be described by universal DSyntRels.

Each DSyntRel stands for a family of particular syntactic constructions found in particular languages: the DSyntRel is intended to represent them in a more abstract way. The DSyntRels are semantically-geared generalizations over specific SSyntRels of various languages; at the Deep-Synt-level, only most general Synt-Ds are distinguished. Thus, as shown above, the direct-object construction, the indirect-object construction and the prepositional construction governed by different verbs are all reduced to the DSyntRel II.

The set of DSyntRels is determined by the following five DSynt-oppositions:

1. Coordination vs. Subordination: syntactic constructions which represent lists (of lexical expressions) ~ constructions which represent texts other than lists. The first class – coordinate constructions – manifests two DSyntRels, called COORD(inative) [*Mary*, –COORD→*Peter*, –COORD→*Alan*; *New York*–COORD→*or Boston*] and QUASI-COORD [*in Boston*–QUASI-COORD→*on Fleet Street*–QUASI-COORD→*at her parents*']; the DSyntRels of the second class of constructions are subordinate.
2. Weak vs. Strong Subordination: constructions with no strong structural links between elements ~ constructions with strong structural links. The first class—weak subordinate constructions—is represented by the DSyntRel APPEND(itive) [*He is*, –APPEND→*unfortunately, absent*].
3. Modification vs. Complementation: modification-based constructions ~ complementation-based constructions. Modification is a Synt-D such that in the phrase L_1 –synt→ L_2 the Sem-D goes in the opposite direction: ' L_1 ←sem– L_2 '. Complementation is a Synt-D such that in the phrase L_1 –synt→ L_2 the Sem-D goes in the same direction: ' L_1 –sem→ L_2 '. The DSyntRels of the first class are ATTR(ibutive) [*He works*–ATTR→*hard*]; the DSyntRels of the second class are actantial.
4. Restrictive vs. Descriptive Modification: constructions with restrictive modification ~ constructions with descriptive modification. The first class—restrictive, or identifying, modification—is represented by the DSyntRel ATTR (which by default is understood as restrictive): *He reads only interesting (Spanish) books*; the second class—descriptive, or qualifying, modification—is represented by the DSyntRel ATTR_{descr}: *These three students, who just returned from Europe, were selected to represent the department*.
5. Different Actantial Roles: I, II, ..., VI, II_{dir.sp}. Constructions with actantial DSyntRels are divided into seven classes, according to the maximal number of DSyntAs that a lexical unit in natural language can have, which is six, plus a special DSyntRel for Direct Speech ('WOW!'←II_{dir.sp}–SAY_{PAST}–I→ALAN ↔ *Alan said: 'Wow!'*).

The full inventory of DSyntRels is represented in Figure 1:

Coordinate DSyntRels		Subordinate DSyntRels										
		Weak subordinate DSyntRel	Strong subordinate DSyntRels									
			Modification: Attributive DSyntRels				Complementation: Actantial DSyntRels					
COORD	QUASI-COORD	APPEND	ATTR	ATTR _{descr}	I	II	III	IV	V	VI	II _{dir.sp}	
1	2	3	4	5	6	7	8	9	10	11	12	

Figure 1. Inventory of DSynt-relations

5.3 Surface-syntactic relations: Criteria for establishing surface-syntactic relations in a language

Given the abstract nature of Synt-**D** (it is not directly perceivable by our mind or senses), three groups of formal criteria are needed for establishing inventories of SSynt-relations for particular languages: A. Criterion for SSynt-connectedness between two lexemes L_1 and L_2 in a sentence (= for the presence of a SSyntRel); B. Criteria for the SSynt-dominance between L_1 and L_2 (= for the orientation of the SSyntRel); C. Criteria for the specific type of the given SSyntRel.

SSynt-Connectedness: Criterion A

Criterion A (prosody and linear order): Potential prosodic unity and linear arrangement

In a sentence, the lexemes L_1 and L_2 have a direct Synt-**D** link only if L_1 and L_2 can form in language **L** a prosodic unit—a prosodic phrase of **L**, such as *of century*, *spouts water*, *the window* or *stained glass*, out of any context; the linear position of one of them in the sentence must be specified with respect to the other.

A prosodic phrase is specified by the linguistic intuition of speakers. A prosodic phrase in language **L**, or potential prosodic phrase, is an expression of **L** that exists outside of any context; a prosodic phrase in a sentence *S* of **L**, or actual prosodic phrase, is a continuous fragment of *S* separated by (potential) pauses and featuring a particular contour. A potential prosodic phrase always is (or, more precisely, can be implemented as) an actual prosodic phrase, but not vice versa: thus, in the sentence *Three of, so to speak, one-sheet atlases need a special support system*, the sequence *three of* is an actual prosodic phrase, but by no means a potential phrase of English. (The difference between potential and actual prosodic phrases parallels that between wordforms of language and wordforms of discourse; see Melčuk 1993:187–188.)

For instance, in the sequence *for several decades*, FOR and DECADE_{PL} are syntactically linked: *for decades* is a prosodic phrase of English, and *for* has to be positioned before *decades*.

In the formulations of Criteria B and C, a different notion of phrase is used: a syntactic phrase, which is, roughly speaking, a syntactic subtree and/or its projection (for more, see Section 9). In principle, “prosodic phrase” ≠ “syntactic phrase.” Thus, in the Serbian sentence (5), the boldfaced part is an actual prosodic phrase (in this particular context, not in the language), but by no means a syntactic phrase (neither in this sentence, nor in the language); on the other hand, Serbian syntactic phrases *video*→*ga* ‘having.seen him’ and *sam*→*video* ‘am having.seen’ do not correspond to any prosodic phrases in this sentence (but they can form prosodic phrases in other contexts).

- (5) *Juče sam ga, kao što znaš, video*
 Yesterday am him as that know-PRES, 2SG having.seen
 ‘Yesterday, as you know, I saw him.’

SAM and GA are clitics, which explains their specific linear position.

SSynt-Dominance: Criteria B

Criterion B1 (syntactic): The passive SSynt-valence of a syntactic phrase

|| In the syntactic phrase L_1 -synt→ L_2 , the lexeme L_1 is the Synt-governor, if the passive SSynt-valence of the whole phrase is determined by the passive Synt-valence of L_1 to a greater extent than by that of L_2 .

Thus, the passive SSynt-valence of the syntactic phrase *for decades* is fully determined by the preposition; therefore, *for*-synt→*decades*.

If Criterion B1 does not establish the Synt-governor, Criterion B2 should be applied.

Criterion B2 (morphological): The inflectional links between a phrase and its external context

|| In the phrase L_1 -synt→ L_2 , the lexeme L_1 is the Synt-governor, if L_1 controls the inflection of lexemes external to the phrase or its own inflection is controlled by such lexemes.

The wordform L_1 is called the morphological contact point of the phrase L_1 -synt→ L_2 .

Thus, in the Russian phrase *divan-krovat'* lit. ‘sofa-bed’, Criterion B1 does not establish the Synt-governor (both components are nouns and have the same passive valence). But Criterion B2 singles out DIVAN_(masc) as the Synt-governor: *ët+ot*

[MASC.SG] *divan-krovat'* byl+Ø [MASC.SG]... 'this sofa-bed was...,' where the external agreement is with DIVAN_(masc), and not with KROVAT'_(fem) ⟨*èt+a *divan-krovat'* byl+a...⟩; therefore, DIVAN-synt → KROVAT'.

If Criterion B2 does not establish the Synt-governor, Criterion B3 should be applied.

Criterion B3 (semantic): The denotation of a phrase

|| In the phrase L_1 -synt→ L_2 , the lexeme L_1 is the Synt-governor, if the denotation of the phrase L_1 -synt→ L_2 is a subset of the denotation of L_1 rather than a subset of the denotation of L_2 .

For instance, in the phrase *noun suffix*, the Synt-governor is SUFFIX, because *noun suffix* denotes a kind of suffix, rather than a kind of noun.

One can say (with Zwicky 1993:295–296) that in a two-word phrase the Synt-governor is the phrase syntactic category determinant, or – if there is no such syntactic determinant – the phrase morphological behavior determinant, or – in case both syntactic and morphological determinants are absent – the phrase semantic content determinant.

Types of SSynt-Relations: Criteria C

For each phrase L_1 -**r**→ L_2 , one has to know exactly which type **r** of Synt-**D** links its lexemes. If one of Criteria C is not satisfied, the presumed SSyntRel **r**[?] should be split in two (or more) SSyntRels.

Criterion C1 (minimal pairs): Absence of semantic contrast

|| An SSyntRel **r** cannot describe two phrases $w_1(L_1)$ -**r**[?]→ $w_2(L_2)$ and $w_3(L_1)$ -**r**[?]→ $w_4(L_2)$, which (1) contrast semantically and (2) differ formally only by some syntactic means of expression—i.e. by word order, syntactic prosody or syntactic grammemes.

$w(L)$ stands for “a wordform w of the lexeme L .”

The SSynt-configuration Rus. DESJAT'←**r**[?]-DOLLAR_{PL} has two implementations with different meanings: *desjat' dollarov* ‘10 dollars’ vs. *dollarov desjat'* ‘maybe 10 dollars’. The formal difference between the two phrases is purely syntactic: word order; therefore, the presumed SSyntRel **r**[?] is to be split in two different SSyntRels:

DESJAT'←**quantitative**-DOLLAR ⇔ *desjat' dollarov*

vs.

DESJAT'←**approx-quant**-DOLLAR ⇔ *dollarov desjat'*

Criterion C2 (mutual substitutability): Syntactic substitutability

An SSyntRel \mathbf{r} of \mathbf{L} must possess the following property (= “quasi-Kunze property”): \mathbf{L} has a syntactic class X , different from substitute pronouns and such that, for any SSynt-phrase $L\text{-}\mathbf{r}\rightarrow\Delta_{(Y)}$, replacing $\Delta_{(Y)}$ by $\Delta_{(X)}$ (but not necessarily vice versa!) in any SSyntS of \mathbf{L} does not affect its syntactic well-formedness.

$\Delta_{(X)}$ stands for “a SSynt-subtree whose head is a lexeme of the syntactic class X .”

In the phrases *have-r[?]*→*been* and *be-r[?]*→*going* the presumed SSyntRel $\mathbf{r}[?]$ does not have the quasi-Kunze property:

**have-r[?]*→*going* and **be-r[?]*→*been*;

therefore, there are two different SSyntRels:

HAVE–perfect-analytical→BE (*been*) and
BE–progressive-analytical→GO (*going*).

Criterion C3 (repeatability): Repeatability with the same Synt-governor

An SSyntRel \mathbf{r} must be non-repeatable (= no more than one branch labeled \mathbf{r} can start from a Synt-governor) or unlimitedly repeatable (= any number of branches labeled \mathbf{r} can start from a Synt-governor).

In Persian, expressions of the following type are extremely widespread:

- (6) *Ramin+ra*←*r-kärd-r[?]*→*bedar* ‘He/she/it awoke Ramin.’
Ramin DirO made awakening [Noun]
lit. ‘[He/she/it] made [the] awakening Ramin.’

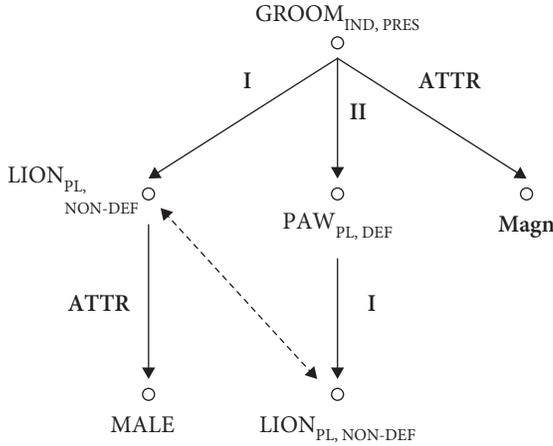
These expressions are built on verbal collocations of the *bedar kârd* ‘awakening made’ = ‘woke up’ or *dârs dâd* lit. ‘lesson gave’ = ‘taught’, which, although they seem to include a DirO, such as BEDAR or DÂRS, behave as transitive verbs and take – as a whole – a “genuine” DirO (since the suffix *-ra* is an unmistakable marker of DirO). The presumed SSyntRel $\mathbf{r}[?]$ (direct-objectival?) in such expressions would be limitedly repeatable – just twice. Therefore, there are two different SSyntRels: RAMIN←dir-obj(ectival)–KÄRD–quasi-dir-obj→BEDAR; the noun in such verbal collocations (as *bedar kârd* ‘awakening made’) is considered to be a Quasi-DirO.

Using the above criteria (plus, in many cases, considerations of analogy), a list of SSyntRels for a particular language can be obtained; the Appendix presents such a list for English (based on Melčuk & Pertsov 1987: 85–156 and Melčuk 2009: 52–58). For establishing verb-controlled SSyntRels in French, see Iordanskaja & Melčuk 2009; a list of SSyntRels in Russian is found in Iomdin 2010.

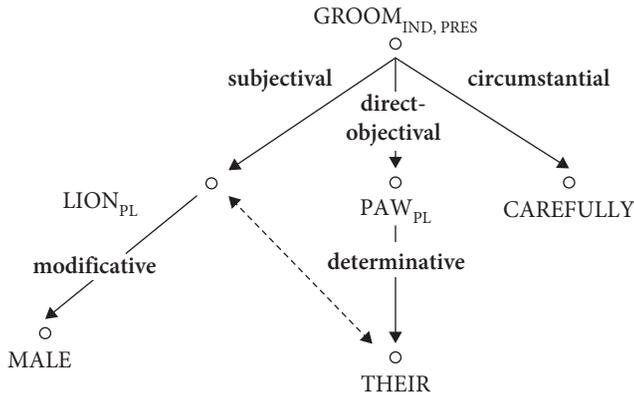
5.4 Examples of deep- vs. surface-syntactic structures

In order to show how Synt-relations work, both SyntSs of sentence (3) are quoted.

(7) a. The DSyntS of sentence (3)



b. The SSyntS of sentence (3)



‘←----->’ stands for the link of coreferentiality.

For more on syntactic dependency (including abundant references), see Polguère & Melčuk (eds) 2009.

6. Morphological dependency

The two types of morphological links – agreement and government – are conveniently described in terms of dependency. Let us consider the Latin sentence (8), a

fragment of a poem by Catullus; it will serve to illustrate our discussion (for more on agreement and government, see Melčuk 2006: 3–105):

- (8) *Tu solebas meas esse aliquid*
 you-NOM used-2SG my-FEM.PL.ACC be-INF something-NOM
putare nugas.
 think-INF trifles_(fem)-PL.ACC
 ‘You used to think that my trifles are something.’

Take a pair of lexemes linked by Morph-D: $L_1 \leftarrow \text{morph} - L_2$.

6.1 Agreement

Lexeme L_1 agrees with lexeme L_2 with respect to inflectional category \mathbf{C}_1 if and only if the following two conditions are simultaneously satisfied:

1. L_1 is not a substitute pronoun that replaces an occurrence of L_2 .
2. L_1 must receive the grammeme $\mathbf{G}_1 \in \mathbf{C}_1$ that is selected depending:
 - either upon a grammeme $\mathbf{G}_2(L_2)$ such that $\mathbf{G}_2 \in \mathbf{C}_2$ and \mathbf{C}_1 is, as a rule, mirroring⁴ for \mathbf{C}_2 ;
 - or upon the value of a syntactic feature $\Sigma(L_2)$, this feature being an agreement class, pronominal person or pronominal number.

Sentence (8) presents two cases of agreement:

- MEUS_{L_1} ‘my’ agrees with NUGAE_{L_2} ‘trifles’ in gender (a syntactic feature of L_2), and number/case (grammmemes of L_2)
- SOLERE_{L_1} agrees with TU_{L_2} in person and number (syntactic features of L_2)

6.2 Government

Lexeme L_1 is governed by lexeme L_2 (L_2 governs L_1) with respect to inflectional category \mathbf{C}_1 if and only if the grammeme $\mathbf{G}_1 \in \mathbf{C}_1$ is selected depending:

- either upon the value of a syntactic feature $\Sigma(L_2)$ that is neither agreement class, pronominal person, or pronominal number [standard case; the value of $\Sigma(L_2)$ in question is an element of the government pattern of L_2];
- or upon a grammeme $\mathbf{G}_2 \in \mathbf{C}_2$ such that \mathbf{C}_1 is not mirroring for \mathbf{C}_2 [special case; for instance, the comparative in Russian, which governs the genitive of the comparate: *sil'n+ee*_{COMP} *smert+i*_{GEN} ‘stronger than death’].

4. An inflectional category \mathbf{C}_1 is mirroring for the category \mathbf{C}_2 if and only if the grammemes of \mathbf{C}_1 simply “reflect” the grammemes of \mathbf{C}_2 and do not do anything else.

Sentence (8) presents the following instances of government:

- SOLERE governs the nominative of TU_{NOM} and the infinitive of $PUTARE_{\text{INF}}$
- PUTARE governs the accusative of $NUGAE_{\text{ACC}}$ and the infinitive of $ESSE_{\text{INF}}$
- ESSE governs the nominative of $ALIQUID_{\text{NOM}}$

7. What syntactic dependency is good for

Among different linguistic phenomena that can be described adequately in terms of syntactic dependency, but cannot in terms of constituency, I will consider the following five.

7.1 Diatheses and voices

A diathesis of a lexeme L is the correspondence between its Sem-actants [= SemAs] and DSyntAs. To give an example, the verbs FOLLOW and PRECEDE have inverted diatheses: $X_I \text{ follows } Y_{II} \equiv Y_I \text{ precedes } X_{II}$; symbolically, their respective diatheses appear as $X \Leftrightarrow I, Y \Leftrightarrow II$ for FOLLOW and $X \Leftrightarrow II, Y \Leftrightarrow I$ for PRECEDE. Such a formulation, as well as the notion itself of actant – on three different levels (SemAs, DSyntAs and SSyntAs, see Melčuk 2004) – is possible only within a dependency framework.

In its turn, this description of diathesis leads to a clear definition of voice: a voice is, roughly speaking, a particular diathesis explicitly marked grammatically on the verb. Among other things, the correlation between the active and the passive can be represented in the same way as between two different lexical diatheses: $X_I \text{ follows } Y_{II} \equiv Y_I \text{ is followed by } X_{II}$. One can develop a calculus of voices by combining all permutations of DSyntAs of L with respect to its SemAs, DSyntAs' suppression and SemAs' referential identification (see Melčuk 2006: 181–262).

7.2 Lexical functions

To describe regular collocations of the type *wield authority*, *pursue a policy* or *honor a commitment*, Meaning-Text theory proposes an inventory of a few dozen Lexical Functions [= LFs]; cf. $\text{Real}_1(\text{AUTHORITY}) = \text{wield } [\sim]$, $\text{Real}_1(\text{POLICY}) = \text{pursue } [\text{ART } \sim]$, $\text{Real}_1(\text{COMMITMENT}) = \text{honor } [\text{ART } \sim]$. Similarly, for *empty promise*, *poor example* or *pipe dream*: $\text{AntiVer}(\text{PROMISE}) = \text{empty}$, $\text{AntiVer}(\text{EXAMPLE}) = \text{poor}$, $\text{AntiVer}(\text{DREAM}) = \text{pipe } [\sim]$. An LF is applied to the base of a collocation (in small caps above) and returns the corresponding collocates. LFs, specified for a lexeme in its lexical entry, allow for correct lexical choices under text generation or automatic translation, as well as for efficient paraphrasing, equally necessary for these

tasks. No less important is their role in lexicography, as well as in language teaching and learning.

The base of a collocation and its collocates are always linked by a particular Synt-**D**, specific for a given LF:

$$\text{Real}_1(\text{L})\text{-II}\rightarrow\text{L}, \text{L-ATTR}\rightarrow\text{AntiVer}(\text{L}), \text{etc.}$$

Thus, the LF formalism is only possible based on a dependency syntactic approach.

7.3 Phrasemes

Numerous phrasemes – idioms as well as collocations – do not easily lend themselves to a description in terms of constituents. Thus, any idiom one of whose actants depends syntactically on an “internal” element of the idiom raises a problem: what can be a phrase structure of such idioms as LOOSE [X’s] COOL, PULL [Y’s] LEG, CAT GOT [X’s] TONGUE, [X’s] GOOSE IS COOKED, DRAG [X’s] FEET, etc.? The same problem occurs for all collocations that accept free (= not-idiomatic) modifiers: *kick the filthy habit*, *pull many new strings*, *make an unbelievable headway*, etc. A dependency structure for all such expressions is straightforward.⁵

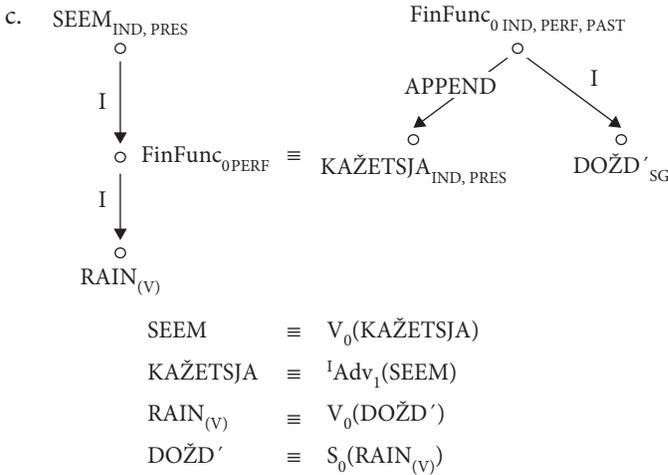
7.4 Paraphrasing

Expressing the syntactic structure of a sentence in terms of Synt-**D** opens the way for powerful paraphrasing – that is, the calculus of sets of semantically equivalent DSyntSs. Such paraphrasing proves to be absolutely necessary in translation because of lexical, deep-syntactic and morphological mismatches between sentences of different languages that translate each other (Mel’čuk & Wanner 2001, 2006, 2008). An example of mismatches can be seen in the translation of the English sentence (9a) into Russian (and vice versa):

- (9) a. *It seems to have stopped raining.*
 b. *Dožd’, kažetsja, perestal* lit. ‘Rain, [it] seems, stopped’.

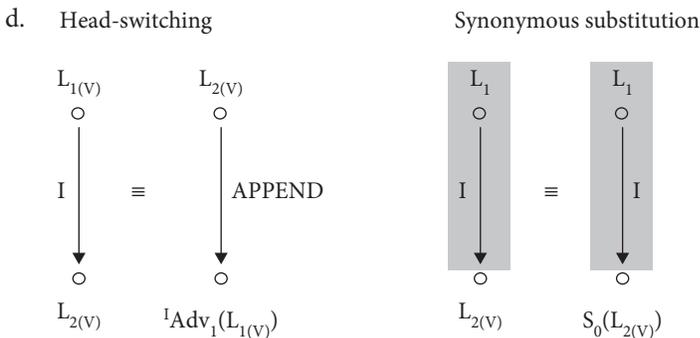
The corresponding DSyntSs of these sentences and relevant lexical equivalences are given in (9c):

5. W. O’Grady (1998) said that much, although he did it apologizing (to whom?) for using something looking like dependencies, but being “in fact” just an abbreviation for, as the author says, “more conventional syntactic structure” (p. 284).



FinFunc₀ in both trees is a lexical function meaning roughly ‘cease to take place’; FinFunc₀(RAIN_N) = *stop*, while FinFunc₀(DOŽD') = *končit'sja, pe-restat', prekratit'sja, projti*.

The DSynt-paraphrasing rules necessary for the transition presented in (9c) are as follows (with serious simplifications):



The shaded zones represent the context – that is, the elements that are not affected by the given rule, but control its applicability.

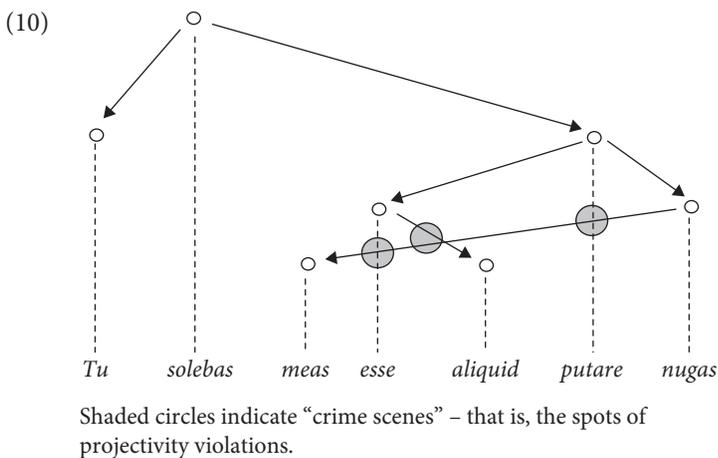
Given the limited number of LFs and of DSyntRels, on the one hand, and the fact that all DSynt-equivalences can be naturally reduced to binary transformations, it is possible to develop an exhaustive set of DSynt-paraphrasing rules, which are cross-linguistically universal (see Melčuk 1992 and 2013: 137–197; Milićević 2007).

7.5 Word order

One of the most universal properties of word order in different languages – so-called **projectivity** – can be noticed and described only in terms of dependency.

The word order in the sentence S is projective if and only if in the projection of the $SSyntS(S)$ on S no dependency arrow crosses another dependency arrow or a projection perpendicular.

Sentence (8) is non-projective; cf. its $SSyntS$ projected on it in (10):



A crushing majority of sentences in actual texts are projective, which allows for stating simpler and more general word order rules.

8. Where syntactic dependency is not sufficient

As far as I know, there is one syntactic phenomenon for whose description “pure” dependencies are insufficient: a coordinated phrase with a dependent (boldfaced below) that semantically bears either on the whole phrase (on all its elements) or just on one element. Here is a stock example:

- (11) a. **old men and women**: ‘old men and women’ or ‘old men and old women’.

This semantic contrast cannot be expressed in any natural way in terms of dependency. Therefore, an additional technique is necessary: if the suspicious element

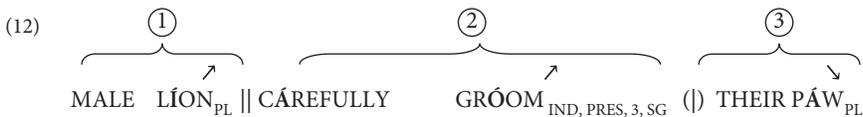
bears on the whole phrase, the corresponding subtree must be explicitly indicated, as is shown in (11b):

- b. *old*←[-*men*→*and*→*women*] : ‘old men and old women’
 vs.
old←*men*→*and*→*women* : ‘old men and women’

The subtree specified in such a way is called a *syntactic grouping*; a grouping corresponds to a syntactic phrase, but is not a constituent in the classical sense of the term (among other things, it does not presuppose a hierarchy of embeddings).

9. Constituents vs. phrases

Now, what about classical constituents? They cannot be part of a syntactic structure, simply because they – no matter how we define them – are themselves a linguistic means used to express the syntactic structure of a sentence. Therefore, their natural place is in the Deep-Morphological representation, where they appear in the DMorph-Prosodic structure, – not as constituents in the strict sense of the term, but as a specification of actual prosodic phrases, with the corresponding pauses, stresses and contours.⁶ Sentence (3) has the DMorphR in (12), with three prosodic phrases:



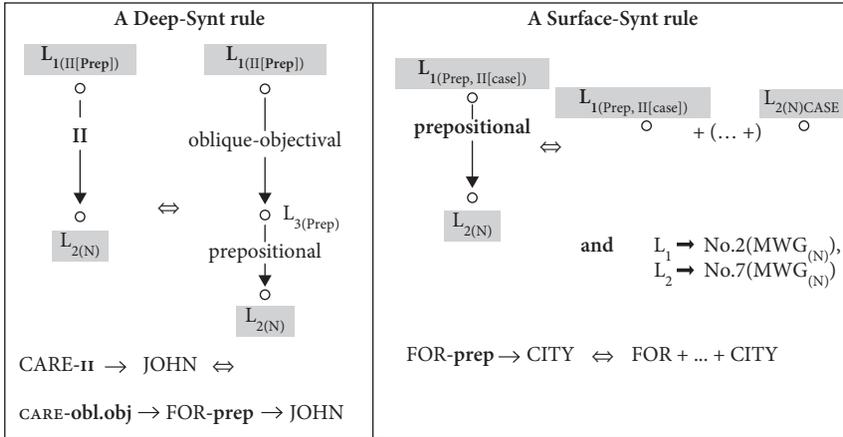
Note that these sentence fragments are not constituents: there is no hierarchy between them (= no embeddings of one into another).

However, as it often happens in linguistics, the term *phrase* is also widely used in a different sense: to mean a *syntactic phrase*. (Although I am trying, to the best of my abilities, to avoid polysemy of terms, I did not dare to replace *phrase*.) Syntactic phrases are of two major types:

- Potential syntactic phrases are abstract schemata of basic syntactic constructions of the language; they are stated in terms of parts of speech and syntactic features, such as $N \leftarrow V_{\text{FIN}}$, $V \rightarrow N$, $A \leftarrow N$, $\text{Prep} \rightarrow N$, $\text{Adv} \leftarrow V$, etc. Potential

6. The problem of constituents/phrases in the Meaning-Text approach was raised and discussed in much detail (using mainly German data) in Gerdes & Kahane 2007.

syntactic phrases are necessarily minimal, i.e. binary; they do not appear in syntactic representations, but are used in syntactic rules, both deep and surface. For instance:



“MWG” stands for ‘minimal word group,’ see immediately below; No.2 and No.7 refer to the corresponding positions in an MWG; “...” indicates a possible gap: *for this new and beautiful city*.

The left-hand part of any syntactic rule consists of a potential syntactic phrase, respectively, a Deep or a Surface one. The right-hand part of a Surface-Syntactic rule gives the basic information on the linear arrangement of the elements by specifying their mutual disposition, the possible gap between them and their positions in the corresponding MWG pattern. For instance, a nominal $MWG_{(N)}$ for Russian looks as follows:

1	2	3	4	5	6	7	8
coordinate conjunction	preposition	demonstrative	numeral	possessive adjective	adjective	noun	formula
ILI 'or'	DLJA 'for'	ÈTI 'these'	TRI 'three'	NAŠ 'our'	INTERESNYJ 'interesting'	PRIMER 'example'	(11)
<i>ili dlja ètiŭ trëx našix interesnyx primerov (11)</i> 'or for these three our interesting examples (11)'							

- Actual syntactic phrases are real expressions of the language, such as *John depends, depends on John, for her survival, depends on John for her survival*, etc. These phrases can be simple (= minimal: two lexemes) or complex (= any

number of lexemes). An actual syntactic phrase is a subtree of a SSyntS and/or its linear projection.

The DSynt-rule above covers such actual syntactic phrases as *depend on John*; more specifically, it produces their SSyntS:

DEPEND-II→JOHN ⇔ DEPEND-obl-obj→ON-prepos→JOHN

The SSynt-rule above ensures the linearization and morphologization of such actual syntactic phrases as Rus. *ot Džona* ‘on/from John’:

OT-prepos→DŽON ⇔ OT DŽON_{GENITIVE}

An actual syntactic phrase corresponds, most of the time, to a prosodic phrase; yet, as stated above, these two entities are conceptually different and do not always coincide. Thus, the DMorphR (13a) of sentence (8) has four prosodic phrases, while it contains only three actual syntactic phrases, shown in (13b):

- (13) a. DMorphR of sentence (8)
 $TU_{NOM} < SOLERE_{IND, IMPF, 2, SG} | < MEUS_{FEM, PL, ACC} |$
 $< ESSE_{INF} < ALIQUID_{NOM} | < PUTARE_{INF} < NUGA_{PL, ACC}$
- b. *tu solebas putare; meas nugas; esse aliquid*

10. “Bracketing paradox”

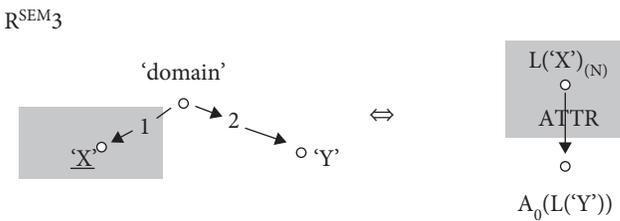
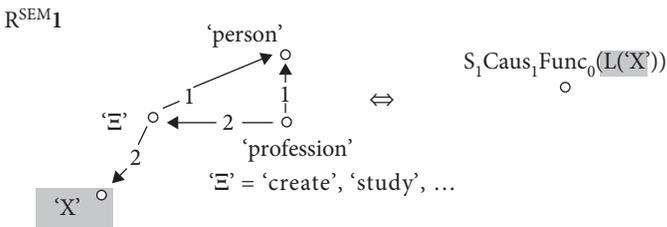
In linguistic literature, there is much talk of the “bracketing paradox,” observed, for instance, in the phrases of the type *historical novelist* or *nuclear physicist*. These phrases are problematic for some theoretical frameworks, because it is not a novelist who is historical and not a physicist who is nuclear, as the form of these phrases may suggest: the meaning and the form are not isomorphic. The suffix *-ist* seems to be added to a phrase rather than to a nominal stem, which would be the normal case: [*historical novel*]+*ist* ‘one whose profession is + to write historical novels’ and [*nuclear physics*]+*ist* ‘one whose profession is + to study nuclear physics’. But if a linguist’s task is to formally describe the correspondence between the meaning and the structure of these phrases, here is what we obtain.

First, we need the representations of the phrase in question at different levels: semantic, deep-syntactic, surface-syntactic and deep-morphological. (The surface-morphological, the morphic and the deep-phonetic representations – are not relevant for our problem.) Here are the main structures of these representations, sufficient for my purpose: the SemS, the DSyntS, the SSyntS, and the DMorphS.

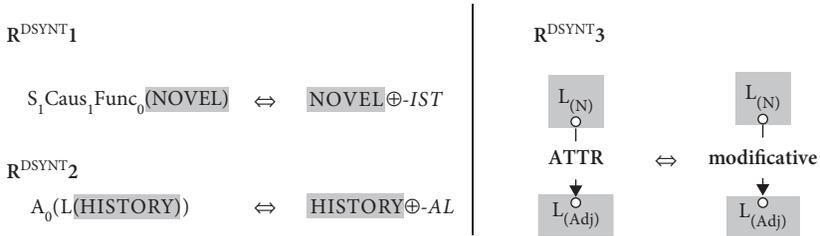
<p>The SemS of the phrase <i>historical novelist</i></p> <p>‘one’ ◦-1 → ‘person’ ‘create’ ◦-1 → ‘person’ ‘create’ ◦-2 → ‘profession’ ‘novels’ ◦-2 → ‘profession’ ‘novels’ ◦-1 → ‘domain’ ‘novels’ ◦-2 → ‘history’</p>	<p>The DSyntS of the phrase <i>historical novelist</i></p> <p>$S_1 \text{Caus}_1 \text{Func}_0(\text{NOVEL})_{\text{SG}}$ ↓ ATTR ↓ $A_0(\text{HISTORY})$</p> <p>$S_1 \text{Caus}_1 \text{Func}_0$ is a complex lexical function meaning roughly ‘one who causes X to exist’.</p>
<p>The SSyntS of the phrase <i>historical novelist</i></p> <p>$[\text{NOVEL} \oplus \text{IST}]_{\text{SG}}$ ↓ modificative ↓ $\text{HISTORY} \oplus \text{AL}$</p>	<p>The DMorphS of the phrase <i>historical novelist</i></p> <p>$\text{HISTORY} \oplus \text{AL} < [\text{NOVEL} \oplus \text{IST}]_{\text{SG}}$</p>

Second, we write rules that relate these representations:

Four Semantic rules (SemS \Leftrightarrow DSyntS rules)



Three Deep-Syntactic rules (DSyntS \Leftrightarrow SSyntS rules)



And nothing resembling a paradox can be found... The moral: if you do not want paradoxes, don't create them!

11. Conclusions

After this longish text, the conclusions can be very short:

- To describe the structure of linguistic expressions on all levels dependencies are necessary and sufficient.
- Semantic, syntactic and morphological dependencies should be strictly distinguished.
- Constituents (in the classical sense of the term) do not exist. Phrases do, of course, exist, but they are of two types: syntactic vs. prosodic; only prosodic phrases appear in a linguistic representation – in the DMorphR; syntactic phrases of different subtypes are used in syntactic rules only.

Acknowledgments

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Appendix: A Tentative List of English SSynt-Relations

I. Subordinate SSyntRels: 1 – 51

CLAUSE-LEVEL (= CLAUSAL) SSYNTRELS: 1–22

These SSyntRels link between themselves the elements of the sentence – the maximal syntactic phrases.

Valence-controlled SSyntRels: Complementation

Actantial SSyntRels

1. Subjectival:

I←subj–*am old*; *Intervention*←subj–*seems out of the question*.

Smoking←subj–*is* [dangerous].

That←subj–[*Alan can do that*]–*is* [clear].

It←subj–*is* [clear that *Alan can do that*].

2. Quasi-subjectival:

[*It*←subj–] *is*–[clear]–quasi-subj→*that* [*Alan can do that*].

3. Direct-objectival:

sees–dir-obj→*me*; [*to have*] *written*–dir-obj→*novels*

[*Helen*] *wants*–dir-obj→*Alan* [*to read*]; *worth*–[*a*]–dir-obj→*trip*

prefer–[*her*]–dir-obj→*staying* [*home*]

explain–[*to him*]–dir-obj→*that* [*Alan was absent*]

make–dir-obj→*it* [*possible to neutralize the consequences*]

4. Quasi-direct-objectival:

make–[*it possible*]–quasi-dir-obj→*to* [*neutralize the consequences*]

5. Indirect-objectival:
gives–indir-obj→*Alan/him* [some money]
gives–indir-obj–[some money]→to [Alan/him]
6. Oblique-objectival:
depends–obl-obj→*on* [Alan]; *my respect*–obl-obj→*for* [Alan]
translation–obl-obj→*from* [Lushootseed into Polish]
translation–[from Lushootseed]–obl-obj→*into* [Polish]
convince–[Alan]–obl-obj→*that* [he should work less]
7. Infinitival-objectival:
can–inf-obj→*read*; *want*–inf-obj→to [read]
 [Helen] *wants*–[Alan]–inf-obj→to [read].
 [Helen] *makes*–[Alan]–inf-obj→*read*;
 [her] *desire*–inf-obj→to [come home]
8. Copular [= copular-completive]:
be–copul→*easy*; *be*–[a]–copul→*teacher*; *be*–copul→*without* [a hat];
be–copul→*at* [home]
The problem was–copul→*that* [these components had to be interconnected].
9. Subject-completive:
seem–subj-compl→*easy*; *appears*–subj-compl→*as* [a victim]
become–subj-compl→*independent*; *was declared*–subj-compl→*dead*
10. Object-completive:
find–[this]–obj-compl→*easy*; *consider*–[him]–obj-compl→*as* [a victim]
make–[it]–obj-compl→*possible*; *make*–[Helen a good]–obj-compl→*wife*
11. Agentive:
written–agent→*by* [Alan]; *arrival*–agent→*of* [Alan]
shooting–agent→*of* [the hunters: ‘the hunters shoot’]
 [a] *translation*–agent→*by* [Alan];
 [I like] *for*←agent–[Alan to]–play [cards].
12. Patientive:
translation–patient→*of* [this text]
shooting–patient→*of* [the hunters: ‘the hunters are shot’]

Copredicative SSyntRels

13. Subject-copredicative:
 [Alan] *returned*–subj-copred→*rich*.
14. Object-copredicative:
 [Alan] *likes*–[Helen]–obj-copred→*slim*.
 [Alan] *hammered*–[the coin]–obj-copred→*flat*.

Comparative SSyntRel

15. Comparative:
older–compar→*than* [Leo]
 [Alan loves Helen] *more*–compar→*than* [Leo].
more–[important]–compar→*than* [Leo]
as–[important]–compar→*as* [Leo]

Non-valence-controlled SSyntRels: Modification

Absolutive SSyntRel

16. Absolute-predicative:

[His first] attempt-[a]-abs-pred→failure, [Alan ...]

[He went out, his] -anger-abs-pred→gone.

[He ran, his]-gun-abs-pred→in [his left hand].

Circumstantial SSyntRels

17. Circumstantial:

walk-circum→fast; delve-circum→deeply

[He] works-circum→there (in [this office]).

[will] write-[next]-circum→week

[He] ran,-[his]-circum→gun [in his left hand].

With←circum-[her paper finished, Helen]-can afford this trip.

18. Modificative-circumstantial:

[As always] elegant,←mod-circum-[Alan]-walked [away].

19. Appositive-circumstantial:

[An old] man,←appos-circum-[Alan]-works [less].

20. Attributive-circumstantial:

Abroad,←attr-circum-[Alan]-works [less].

Sentential SSyntRels

21. Parenthetical:

Oddly,←parenth-[Alan] works [less].

Alan, naturally,←parenth-accepted the offer.

As←parenth-[we have known for some time, Alan]-works [less].

To←parenth-[give an example, I]-consider [now nominal suffixes].

22. Adjunctive:

OK,←adjunct-[I]-agree.

PHRASE-LEVEL (= PHRASAL) SSYNTRELS: 23–51

These SSyntRels function within elements of the sentence – inside maximal phrases.

General Phrase SSyntRels**Non-valence-controlled SSyntRels: Modification**

23. Restrictive:

still←restr-taller; most←restr-frequent; not←restr-here

[Alan has] just←restr-arrived.

Noun Phrase SSyntRels**Valence-controlled SSyntRels: Complementation**

24. Elective:

[the] poorest-elect→among [peasants]

[the] best-[ones]-elect→of (from) [these boys]

five-elect→of [these books]

Mixed Type SSyntRels = Valence-controlled/Non-valence-controlled: Modification

25. Possessive:

Alan's←poss-arrival; Alan's←poss-bed; Alan's←poss-garden

26. Compositive:

man←-compos-[-*machine*]-*interaction*; *car*←-compos-*repair*
noun←-compos-*phrase*; *color*←-compos-*blind*

Non-valence-controlled SSyntRels: Modification

27. Determinative:

my←-determ-*bed*; *a*←-determ-*bed*; *those*←-determ-*beds*

28. Quantitative:

three←-quant-*beds*; [*three*←-num-junct-]-*thousand*←-quant-*people*

29. Modificative:

comfortable←-modif-*beds*; *visible*←-modif-*stars*
French←-modif-*production*

30. Post-modificative:

stars-post-modif-→*visible* (vs. *visible stars*)

31. Descriptive-modificative:

[*these*] *beds*, -descr-modif-→*comfortable* [*and not expensive*], ...

32. Relative:

[*the*] *paper*-[*that I*]-relat-→*read* [*yesterday*]
 [*the*] *paper*-[*I*]-relat-→*read* [*yesterday*]
the girl-[*who*]-relat-→*came* [*first*]

33. Descriptive-relative:

[*this*] *paper*-[*which I*]-descr-relat-→*read* [*yesterday*]
Alan, -[*who*]-descr-relat-→*loves* [*her so much*]

34. Appositive:

Alan-[*the*]-appos-→*Powerful*; *General*←-appos-*Wanner*
 [*the*] *term*-appos-→'*suffix*'

35. Descriptive-appositive:

[*This*] *term*-descr-appos-→(''*suffix*'') [*will be considered later*].
 [*You forget about*] *me*, -[*your*]-descr-appos-→*mother*.

36. Sequential:

man-sequent-→*machine* [*interaction*]
fifty-sequent-→*to* [*seventy dollars*]

37. Attributive:

learners-attr-→*with* [*different backgrounds*]
dress-attr-→*of* [*a beautiful color*]
years-attr-→*of* [*war*]; [*the*] *bed*-attr-→*of* [*Alain*]
 [*a*] *man*-[*the same*]-attr-→*age*

38. Descriptive-attributive:

[*Professor*] *Wanner*, -descr-attr-→*from* [*Stuttgart, was also present*].

Prepositional Phrase SSyntRels

Valence-controlled SSyntRels: Complementation

39. Prepositional:

in-prepos-→*bed*; *without*-[*three hundred*]-prepos-→*dollars*

40. Prepositional-infinitival:

to-prepos-inf-→*go* [*to bed*]

Verb Phrase (= Analytical Form) SSyntRels**Non-valence-controlled SSyntRels: Ancillary**

41. Perfect-analytical:
has-perf-analyt→*written*; *has-perf-analyt*→*been* [*beaten*]
42. Progressive-analytical:
was-progr-analyt→*writing*
43. Passive-analytical:
was-pass-analyt→*written*

Conjunction Phrase SSyntRels**Valence-controlled SSyntRels: Complementation**

44. Subordinate-conjunctive:
 [*Suppose*] *that*-[*Alan*]-*subord-conj*→*comes*.
 [*so*] *as*-[*not*]-*subord-conj*→*to* [*irritate Leo*]
45. Coordinate-conjunctive:
 [*Alan*] *and*-*coord-conj*→*Helen*
46. Comparative-conjunctive:
than-*compar-conj*→*Helen*; *as*-*compar-conj*→*always*
47. Absolute-conjunctive:
If-[*a*]-*abs-conj*→*pronoun*, [*the grammatical subject may...*]
while-*abs-conj*→*in* [*bed*]

Word-like Phrase SSyntRels**Non-valence-controlled SSyntRels: Ancillary**

48. Verb-junctive:
give-verb-junct→*up*; *bring-verb-junct*→*down*
49. Numeral-junctive:
fifty←*num-junct*-*three*; *fifty*←*num-junct*-*third*
50. Binary-junctive:
if-[...]-*bin-junct*→*then...*; *the*-[*more...*]-*bin-junct*→*the* [*more...*]
till-*bin-junct*→*after*
from-[...]-*bin-junct*→*to* [...]; *either*-[...]-*bin-junct*→*or* [...]
51. Colligative:
 [*is*] *dealt*-*collig*→*with* [*stranded prepositions*]

II. Coordinate SSyntRels: 52 – 53

Non-valence-controlled SSyntRels: Coordination

52. Coordinative:
Alan-*coord*→*and* [*Leo*]
rich,*-coord*→*intelligent*-*coord*→*and* [*beautiful*]
53. Quasi-coordinative:
 [*He was*] *abroad*-*quasi-coord*→*without*-[*a penny*]-*quasi-coord*→*in* [*a desperate situation*].
 [*These moneys we keep hidden*] *under*-[*a loose board*]-*quasi-coord*→*under*-[*the floor*]-*quasi-coord*→*under*-[*a chamberpot*]-*quasi-coord*→*under*[*my friend's bed*] [T. Capote, "A Christmas Memory"].