

# Dependency in Language-2011

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## Abstract

The paper aims at summarizing knowledge about linguistic dependency. Three types of dependency are considered: semantic, syntactic, and morphological; fourteen possible combinations thereof are presented. Each type of dependency is described in some detail. An overview of Deep-Syntactic relations is given, as well as the criteria for establishing Surface-Syntactic relations in particular languages. Some domains in which the advantages of dependencies manifest themselves in the clearest way are briefly sketched (diathesis and voice, lexical functions, paraphrasing, word order). The place of the notion of phrase within a dependency framework is characterized; an analysis of a “bracketing paradox” in terms of linguistic dependency is proposed.

## 1 Introductory Remarks

### 1.1 The Task Stated

This talk 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 materials that have been published (Mel'čuk 1963, 1974, 1979, 2002, 2003 and 2009) and that are easily accessible. Therefore, I will not explain the nature of linguistic dependency; I will also abstain from rigorously presenting the necessary notions and formalisms of 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 and Kahane 2003). Finally, there will be only a dire minimum of references.

The task of this talk is three-pronged:

- To present an overview of what must be known about linguistic dependencies to successfully use them (“Dependencies 101”).
- To emphasize the advantages of dependencies (with respect to constituents) in linguistic description.
- To sketch the place 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 the 1950's while developing a Hungarian-Russian machine-translation system: Mel'čuk 1957. Here is an example from this paper: translation of the Hungarian sentence (1a) into Russian.

(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'šinstve jazykov est' mnogo slov inostrannogo proisxoždenija.*  
in majority-SG.PR language-PL.GEN is many word-PL.GENforeign-N.SG.GEN origin-SG.GEN

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

- The grammatical number of the nouns ‘language’ and ‘word’: singular in Hungarian, because of a quantifier (which requires the singular of the quantified N in Hungarian), and plural in Russian—for the same reason, except that Russian quantifiers require the plural of nouns.
- The agreement of the adjective ‘foreign’ with the noun ‘origin’ in Russian (in Hungarian, adjectives do not agree with nouns).
- The dative of ‘language’ in Hungarian, induced by the verb VAN ‘[there] is’, corresponds to the Russian preposition V ‘in’, induced by the verb EST’ ‘[there] is’.
- Word order: some Hungarian modifiers precede the lexemes they modify while their Russian equivalents follow theirs; cf.:

Hung. *szava van*  $\Leftrightarrow$  Rus. *est' ... slov*

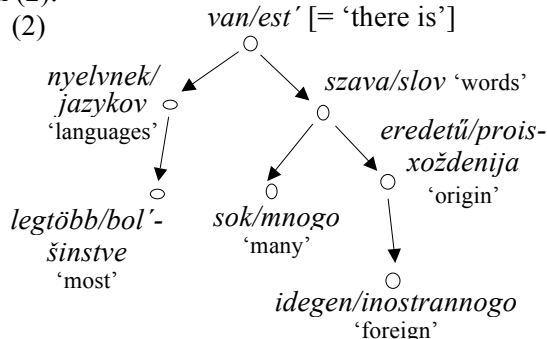
Hung. *eredetű szava*  $\Leftrightarrow$  Rus. *slov ... proisxoždenija.*

However, I was unable back then, and I am still unable now, to figure out how to formulate the corresponding rules if the sentence is simply parsed into constituents, that is, supplied only with a “pure” phrase structure. The constituency approach, borrowed by computational linguists in the ex-USSR from the USA and UK, was then the only well-known formal framework, yet I felt strongly that there was no way you could translate by means of bracketed phrases. And from my fu-



tile attempts to find a way to do so syntactic dependencies were born.<sup>1</sup>

The above problems can be easily solved by using syntactic dependencies. Let us consider an approximate dependency tree for both sentences in (2):



Based on dependency arrows linking the lexemes, it is easy to formulate the rules for the necessary changes between Hungarian and Russian in the four above cases. It became soon clear that automatic translation needs—as a kind of hinge between sentences of two languages—a syntactic structure, and this structure must be written in terms of dependencies.

### 1.3 Dependency and Meaning-Text Approach

To see all advantages of dependency representation, one has to use it in a package with several other techniques. Three conditions must be met for dependencies to show their full power:

- A semantic representation as a starting point — that is, 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 expression a given meaning and its possible expression). The guiding slogan here is: “We say what we think!”
- A synthetic perspective—that is, a linguistic description is done from meaning to text. You aim at modeling the activity of the Speaker, who produces texts, rather than that of the Addressee, who interprets/understands them. The guiding slogan: “To use a language is to speak it!”

<sup>1</sup> 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 and Julia Robinson formulated explicitly the basic tenets of dependency syntactic description as far back as 1960 and published their proposals, but theirs remained voices crying out in the desert...

- A stratificational description—that is, each type of major linguistic unit (such as sentences and words) is represented in terms of those properties that are specific to it, so that we need different formalisms for each type. Several levels of linguistic representation and different structures within the representation of a given level are distinguished; these representations and structures are related by means of formal rules of the linguistic model. The guiding slogan: “Dead flies and meatballs should be served separately!”<sup>2</sup>

### 1.4 Simplifications Used in This Talk

Concerning the characterization of a Meaning-Text model, two simplifications are resorted to:

1) While the bottom level is the Semantic representation [= SemR], the upper level in all the examples below is the Deep-Morphological representation [= DMorphR]. This means that the discussion of morphology will be completely left out, one of the reasons being that many languages (like Vietnamese or Mandarin Chinese) have no or very little morphology.

2) Instead of full linguistic representations, the paper deals only with their central structures. For instance, instead of the complete SemR of a sentence (which includes the Semantic Structure, the Sem-Communicative Structure, the Rhetorical Structure and the Referential Structure), only its central structure—i.e., the Semantic structure [= SemS]—will be considered.

Concerning the proposed definitions of linguistic phenomena, only prototypical cases are considered. This means that several definitions and characterizations given below are incomplete—that is, strictly speaking, incorrect. However, they are sufficient for my purposes here.

## 2 Different Types of Linguistic Dependency

Let us take a simple sentence:

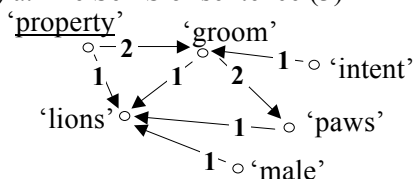
(3) *Male lions carefully groom their paws.*

<sup>2</sup> This is a punch line 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 some-where 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 and my meatballs separately.

The task of a linguist is to write a system of rules that, applied—among other things—to a formal representation of the meaning of this sentence, or to its SemR, produce the representation of its physical form, or its Phonic representation [= PhonR]. A system of rules such that it is valid for a language as a whole, or a linguistic model, is a correspondence  $\{\text{SemR}_i\} \Leftrightarrow \{\text{PhonR}_j\}$ ; however, as indicated, I will stop at the DMorphR.

Sentence (3) has the SemS in (4a) and the DMorphS (4b):

(4) a. The SemS of sentence (3)



Literal reading of the SemS in (4a):

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

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

Property(Male(lions<sub>i</sub>);  
Careful(lions<sub>i</sub>; Groom(Paws(lions<sub>i</sub>))))

b. The DMorphS of sentence (3)

MALE < LION<sub>PL</sub> < CAREFULLY <  
GROOM<sub>IND, PRES, 3, PL</sub> < THEIR < PAW<sub>PL</sub>  
(The symbol “<” means ‘immediately precedes’.)

This example illustrates three types of dependency:

—The SemS in (4a) is written in terms of semantic dependency (see 4).

—In order to go from (4a) to (4b), the Deep-Syntactic structure [= DSyntS] and the Surface-Syntactic structure [= SSyntS] are needed; both are based on syntactic dependency (see 5.4).

—The rules for the “SSyntS  $\Leftrightarrow$  DMorphS” transition use morphological dependency (see 6); the MorphS itself does not show them.

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

Governor  $\circ \longrightarrow \circ$  Dependent

### Semantic Dependency [= Sem-D]

If the SemS is written in a formal language derived from the language of predicate calculus,<sup>3</sup> semantic elements in it, or **semantemes** (= signified of lexemes), are linked by a dependency relation.

<sup>3</sup> I don’t think there is or can be another formal language fit for describing linguistic meaning. At least, all projects of ‘semantic metalanguages’ I have seen propose something fully equivalent to the language of predicate calculus.

This is **semantic dependency**, corresponding to a “predicate ~ argument” relation; the predicate is the Sem-Governor of its arguments. Since predicative semantemes have been found in various languages with up to six arguments, six relations of Sem-D are distinguished: 1, 2, ..., 6. (These distinguishers are asemantic: see 4.)

### Syntactic Dependency [= Synt-D]

As can be seen from (4), in Meaning-Text approach, the SemS of a sentence 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- $L_2$ , the Governor is  $L_1$ , if and only if  $L_1$ -synt- $L_2$  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 Adj is positioned with respect to N (in English, before N; in Basque, after N; and in French, before or after N, according to several conditions).

### Morphological Dependency [= Morph-D]

Sem-D and Synt-D are cross-linguistically universal in the following two senses:

—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<sub>PL</sub>, and this is the only morphological link in this sentence.

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

‘ $L_1$ -sem $\rightarrow$  $L_2$ ’ means ‘ $L_1(L_2)$ ’,

that is, semanteme ‘ $L_2$ ’ is a semantic argument of predicative semanteme ‘ $L_1$ ’.

Synt-D holds between lexemes:  $L_1$ -synt $\rightarrow$  $L_2$  means that it is  $L_1$  that determines the distribution

(i.e., the passive valence) of the phrase  $L_1$ -**synt**- $L_2$  within sentences. At the same time,  $L_2$ 's linear position in the sentence is determined with respect to  $L_1$ :  $L_2$  precedes  $L_1$ , follows it, or can precede or follow (as a function of some particular conditions).

Morph-**D** holds between grammemes and syntactic features of lexemes:  $L_1$ -**morph**- $L_2$  means that a grammeme or a syntactic feature of  $L_1$  determines some grammemes of  $L_2$ .

Sem-**D**s and Synt-**D**s form connected structures (within sentences); they are directly reflected in sentence representations—as semantic networks and syntactic trees. Morph-**D**s do not form a connected structure (within a sentence); they are not explicitly shown in any sentence representations,

but are used only in syntactic rules that ensure the morphologization of the SSynt-structure.

These three types of dependency do not exhaust all linguistic dependencies: for instance, there is communicative dependence, which will be ignored here.

### 3 Fourteen 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, with minimal examples.

1.  $L_1$              $L_2$ :        No dependency whatsoever between  $L_1$  and  $L_2$ ; e.g., HERE and POSSIBILITY<sub>PL</sub> in the preceding sentence.
2.  $L_1$  —**sem**→  $L_2$ :        Only Sem-**D** between  $L_1$  and  $L_2$ ; e.g., JOHN and LAUGH in *John broke out laughing*.
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. *Yoko+wa hon+o takusan yom+u* lit. ‘Yoko<sub>THEME</sub> book<sub>ACC</sub> many read<sub>PRES</sub>’ = ‘Yoko reads many books’; semantically, ‘takusan’ bears on ‘hon’, and morphologically, *takusan* is an invariable adverb.
4.  $L_1$  —**morph**→  $L_2$ :        Only Morph-**D** between  $L_1$  and  $L_2$ ; e.g., IČ ‘our’ and HEBGNU-(*jič*) ‘ran.away.our’ in Tabasaran *Ič mudur uc<sup>wh</sup>u+na hebgnu+jič* 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’, without any Sem- or Synt-link with it.
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 *John is reading a newspaper*.
6.  $L_1$     —**sem**→  
      ←**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 *an interesting newspaper*, where NEWSPAPER semantically depends on INTERESTING, since the former is a Sem-argument of the latter.
7.  $L_1$     —**sem**→  
      —**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 *le*<sub>DAT</sub> ‘to.him/to.her’ in Sp. *Juan le quiere dar un libro* ‘Juan wants to give him a book’ depends semantically and morphologically on the verb DAR, while syntactically it depends on the Main Verb QUERER ‘want’, since it forms a phrase with it (for the notion of phrase, see 5.3) and is positioned with respect to it.
8.  $L_1$     —**sem**→  
      ←**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. *Marie est devenue belle* ‘Mary has become beautiful’: MARIE depends semantically on BELLE, being its argument, but BELLE depends morphologically—for its number and gender—on MARIE.
9.  $L_1$     —**synt**→  
      —**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. *ab urbe condita* lit. ‘from city founded’ = ‘from the founding of the City [= of Rome]’.
10.  $L_1$     ←**synt**→  
      ←**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 *The temperature begins to fall*: syntactically, TEMPERATURE depends on BEGIN, but morphologically, the other way around.
11.  $L_1$     —**sem**→  
      —**synt**→  
      —**morph**→  $L_2$ :        Sem-**D**, Synt-**D** and Morph-**D** between  $L_1$  and  $L_2$  go all in the same direction; e.g., *vižu* ‘I.see’ and *Maš+u<sub>ACC</sub>* ‘Mary’ in Rus. *Vižu Mašu* ‘I see Mary’.

12.  $L_1 \begin{array}{l} \text{---sem---} \\ \text{---synt---} \\ \text{---morph---} \end{array} L_2$ : 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, as in Abkhaz *Nadš'a sara i+s+əl+teixxt' aš'q'w'ə* lit. 'Nadsha me gave a book', where the Main Verb *isəlteit'* agrees, by its prefixes, with all three invariable 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).
13.  $L_1 \begin{array}{l} \text{---sem---} \\ \text{---synt---} \\ \text{---morph---} \end{array} L_2$ : 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 *ketab+e nav* '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.
14.  $L_1 \begin{array}{l} \text{---sem---} \\ \text{---synt---} \\ \text{---morph---} \end{array} L_2$ : 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. *nouvelle*<sub>(fem)SG</sub> *intéressant*+e<sub>SG.FEM</sub> 'interesting piece of news'.

## 4 Semantic Dependency

Speaking of Sem-**D**, one has to insist that there are no “meaningfully” distinguished Sem-relations that would correspond to Fillmore’s Deep Cases or “Semantic Roles” (= “θ-roles”) of Generative Grammar. It is linguistically and logically inconsistent to explicitly indicate in a SemS 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 arguments, which will in turn require the same thing, etc. This creates infinite regression, and it 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 “not quite normal” predicate is also capable of appearing as quite a normal predicate, when it is associated with a node, and not with an arc, of a semantic network. The bottom line is that Sem-**D**s are simply distinguished (by arbitrary symbols, e.g., by numbers), but they cannot be positively identified. The semantic role of an argument 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 ‘ $L_1$ ’ is the SemA 1 of the predicate ‘experience’ in the semantic decomposition of ‘ $L_2$ ’; etc.

## 5 Syntactic Dependency

### 5.1 Deep- vs. Surface-Synt-Dependency

Speaking of Synt-**D**, one has to emphasize the distinction of two sublevels of linguistic representation in syntax: Deep-Syntactic vs. Surface-Syntactic representation, *resp.* structure [= DSyntR vs. SSyntR]. 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 rules, i.e., rules of the {SemR} ⇔ {DSyntR} transition. For instance, in English, the verb HELP takes a DirO (*help-[the]-dir-objectiveal→neighbor*), and its Russian equivalent POMOGAT’ an IndirO (in the dative: *pomogat’-indir-object→sosed+u*): two different syntactic constructions; but at the DSynt-level, where surface particularities 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-Synt-Relations

The DSyntRels are supposed to be language-independent; all the DSyntRels are necessary and the set thereof is sufficient:

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.

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.

Each DSyntRel stands for a family of particular syntactic constructions found in particular language-

ges; the DSyntRel is intended to represent them in a more abstract way. DSyntRels are semantic-gearred generalizations over specific SSyntRels of various languages; at the DSynt-level, only most general Synt-**D**s are distinguished. Thus, as shown above, the **direct-objective** construction, the **indirect-**

**objective** construction and the prepositional **oblique-objective** construction governed by different verbs are all reduced to DSyntRel **II**.

The full inventory of DSyntRels is represented in Fig. 1:

coordinate DSyntRels		subordinate DSyntRels									
		weak subordinate DSyntRel	strong subordinate DSyntRels								
			modification: attributive DSyntRels			complementation: actantial DSyntRels					
<b>COORD</b> <b>1</b>	<b>QUASI-COORD</b> <b>2</b>	<b>APPEND</b> <b>3</b>	<b>ATTR</b> <b>4</b>	<b>ATTR<sub>descr</sub></b> <b>5</b>	<b>I</b> <b>6</b>	<b>II</b> <b>7</b>	<b>III</b> <b>8</b>	<b>IV</b> <b>9</b>	<b>V</b> <b>10</b>	<b>VI</b> <b>11</b>	<b>II<sub>dir.sp</sub></b> <b>12</b>

**Figure 1:** Inventory of DSynt-relations

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

1. Coordination vs. Subordination: constructions which represent lists (of lexical expressions) ~ constructions which represent texts other than lists. The first class—coordinate constructions—manifest 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 Subordination vs. Strong Subordination: constructions with no strong structural links ~ constructions with strong structural links. The first class—weak subordinate constructions—is represented by the DSyntRel **APPEND**(itive) [*John is, -APPEND→unfortunately, absent*].

3. Modification vs. Complementation: modification-based constructions ~ complementation-based constructions. Modification is a Synt-**D**  $L_1$ -synt  $\rightarrow L_2$  such that ‘ $L_1 \leftarrow \text{sem} - L_2$ ’; complementation is a Synt-**D**  $L_1$ -synt  $\rightarrow L_2$  such that ‘ $L_1 - \text{sem} \rightarrow L_2$ ’. The DSyntRels of the first class are **ATTR**(ibutive) [*Alan works -ATTR→hard*]; the DSyntRels of the second class are actantial.

4. Restrictive Modification 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<sub>descr</sub>**: *These three students, who just returned from Europe, were selected to represent the department*.

5. Different Actantial Roles: I, II, ..., VI, II<sub>dir.sp</sub>. 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!’  $\leftarrow$  **II<sub>dir.sp</sub>** - SAY<sub>PAST</sub> - **I**  $\rightarrow$  ALAN  $\Leftrightarrow$   
‘Wow!’, said Alan.

### 5.3 Surface-Synt-Relations: Criteria for Establishing Surface-Syntactic Relations in a Language

Given the abstract nature of Synt-**D** (this dependency 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**. A criterion for SSynt-connectedness between two lexemes  $L_1$  and  $L_2$  in a sentence (= for the presence of a SSyntRel between them); **B**. Criteria for the SSynt-dominance between  $L_1$  and  $L_2$  (= for the orientation of the SSyntRel between them); **C**. Criteria for the specific type of the given SSyntRel between  $L_1$  and  $L_2$ .

SSyntRels hold between lexemes in a SSyntS; however, for simplicity’s sake, I will allow myself to use in the examples actual wordforms, where this does create confusion.

#### **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** an utterance—i.e., a prosodic unit, or a prosodic phrase of **L**—such as *the window, of John, spouts water or stained glass*, out of any context; the linear position of one of these lexemes in the sentence must be specified with respect to the other.

A prosodic phrase is not formally defined: it is determined by the linguistic intuition of speakers. A prosodic phrase in language **L**, or potential prosodic phrase, is an utterance of **L** that can exist outside of any context; a prosodic phrase in a sentence *S* of **L**, or actual prosodic phrase, is a fragment of *S* separated by pauses and featuring a particular intonation contour. A potential prosodic phrase is always an actual phrase, but not vice versa: thus, in the sentence *For his, so to speak, one-sheet atlas he needs a support system*, the sequence *for his* is an actual prosodic phrase, but not a potential prosodic phrase of English. The difference between potential prosodic phrases, or phrases of language, and actual prosodic phrases, or phrases of discourse parallels that between wordforms of language and wordforms of discourse.<sup>4</sup>

In the sequence *for several decades*, FOR and DECADE<sub>PL</sub> are syntactically linked: *for decades* is a prosodic phrase of English, and *for* has to be positioned before *decades*.

**A caveat:** The real state of affairs is, as always, more complicated. The formulation of Criterion A is simplified. First, in fact, Synt-**D** can link lexemes  $L_1$  and  $L_2$  that do not form a prosodic phrase in the language, but do form phrases  $L_1-L_2-L$  and  $L_2-L$ . For instance, since *left*<sub>L1</sub> *with*<sub>L2</sub> *John*<sub>L</sub> is a prosodic phrase of English and *with*<sub>L2</sub> *John*<sub>L</sub> also is, it follows that *left* and *with* are syntactically linked. Second, we have to reason in terms of syntactic classes rather than individual lexemes. Thus, if *by John* or *with caution* are prosodic phrases of English, we allow Synt-**D** between any preposition and any noun.

The formulations of Criteria B and C use a different notion of phrase: a syntactic phrase, which is, roughly speaking, a syntactic subtree and/or its projection (see 8). In principle, “prosodic phrase” ≠ “syntactic phrase”; thus, in the Serbian sentence (5), the boldfaced fragment is a prosodic phrase (in this 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’ are not prosodic phrases in this sentence (but they are in the language).

(5) **Juče sam ga, kao znaš, video**  
 yesterday am him as know- having.seen  
PRES. 2SG

‘Yesterday, I have, as you know, seen him’.

SAM ‘am’ and GA ‘him’ are clitics, which explains their specific linear position.

<sup>4</sup> Wordforms of language exist outside of any context: *birds, sprang, to*, etc. Wordforms of discourse appear in particular contexts only—as a result of an amalgam, such as Fr. *à le* ⇒ *au* /o/ or as that of a syntactic splitting, such as separable prefixes in German: *hört ... auf* ⇐ *auhört* ‘stops, ceases’. See Mel’čuk 1992a: 188ff.

## SSynt-Dominance: Criteria B

### Criterion B1 (syntactic): The passive Synt-valence of the 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 to a greater extent by the passive Synt-valence of  $L_1$  rather 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, and only if, Criterion B1 does not establish the Synt-governor, the next criterion should be applied.

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

In the syntactic 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 lexeme  $L_1$  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 have the same passive valence); but Criterion B2 singles out DIVAN<sub>(MASC)</sub> as the Synt-governor: *èt+ot* [SG. MASC] *divan-krovat’ byl+Ø* [SG.MASC]... ‘this sofa-bed was...’, where the external agreement is with DIVAN<sub>(MASC)</sub>, and not with KROVAT’<sub>(FEM)</sub> ⟨\**èt+a divan-krovat’ byl+a...*⟩; therefore, DIVAN-synt→KROVAT’.

If, and only if, Criterion B2 does not establish the Synt-governor, the next criterion should be applied.

### Criterion B3 (semantic): The denotation of the phrase

In the syntactic phrase  $L_1$ -synt— $L_2$ , the lexeme  $L_1$  is the Synt-governor, if  $L_1$ -synt— $L_2$  denotes a kind/an instance of the denotation of  $L_1$  rather than a kind/an instance of the denotation of  $L_2$ .

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 class 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 syntactic phrase  $L_1-r \rightarrow L_2$ , one has to know exactly which type  $r$  of Synt-D links the corresponding lexemes. If at least 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

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

An SSyntRel  $r$  cannot describe two phrases

$w_1(L_1)-r[?] \rightarrow w_2(L_2)$  and  $w_3(L_1)-r[?] \rightarrow w_4(L_2)$ , which 1) contrast semantically and 2) differ formally by some syntactic means of expression—i.e., by word order, syntactic prosody or syntactic grammemes.

The configuration Rus. DESJAT'← $r[?]$ →DOLLAR 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 SSyntRels:

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

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

#### Criterion C2 (substitutability in context): Syntactic substitutability

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

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

This means that an SSyntRel must have a prototypical Dependent, which passes with any possible Governor. In the phrases *have-r[?]*→*been* and *be-r[?]*→*going* the presumed SSyntRel  $r[?]$  does not possess the quasi-Kunze property:

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

Therefore, there are two different SSyntRels:

HAVE→**perfect-analytical**→BE  
vs.

BE→**progressive-analytical**→GO.

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

A SSyntRel  $r$  must be either non-repeatable (= no more than one branch labeled  $r$  can start from a Synt-governor) or unlimitedly repeat-

able (= any number of branches labeled  $r$  can start from a Synt-governor).

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

(6) *Ramin+ra*← $r$ -*kārd*- $r[?]$ →*bedar*

Ramin DirO made awakening[Noun]

lit. ‘[He/she/it] made [the] awakening Ramin’. = ‘He/she/it awoke Ramin’.

These expressions are built on verbal collocations of the type *bedar kārd* ‘awakening made’ = ‘woke up’ or *dārs dād* lit. ‘lesson gave’ = ‘taught’, which, although they seem to include a DirO, such as BEDAR or DĀRS, behave as transitive verbs and take—as a whole—a “genuine” DirO (the suffix *-ra* is an unmistakable marker of DirO). The presumed SSyntRel  $r[?]$  (direct-objectival?) in such expressions would be limitedly repeatable—just twice. Therefore, there are two different SSyntRels:

RAMIN←**dir-obj**-KĀRD→**quasi-dir-obj**→BEDAR

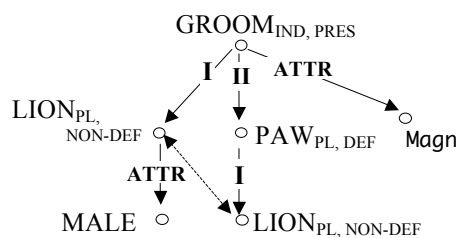
The nominal element in such verbal collocations is considered to be a Quasi-Direct Object.

Using the above criteria (plus considerations of analogy), a list of SSyntRels for a particular language can be obtained; in the Annex, I give such a list for English (Mel’čuk and Pertsov 1987: 85-156, Mel’čuk 2009: 52-58).

### 5.4 Examples of Deep- vs. Surface-Synt-Structures

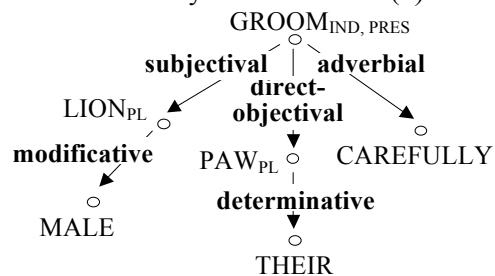
In order to show how Synt-relations work, the two (Deep- and Surface-) SyntSs of the sentence in (3) are given.

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



In the DSyntS of (7a) the link of coreferentiality is shown (←-----→).

b. The SSyntS of sentence (3)





## 6 Morphological Dependency

The two types of morphological relations—agreement and government—are conveniently described in terms of dependency. Let us consider the Latin sentence (8), a fragment of a poem by Catullus (for more on agreement and government, see Mel’čuk 2006: 31-105):

(8) *Tu solebas meas esse*  
 you-NOM used-2SG my-FEM.PL.ACC be-INF  
*aliquid putare nugas.*  
 something-NOM 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  $L_2$  in 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 mirroring<sup>5</sup> for  $\mathbf{C}_2$ ,—or upon the value of a syntactic feature  $\Sigma_2(L_2)$ , this feature being an agreement class, pronominal person or pronominal number.

Sentence (8) presents two cases of agreement:

- $\text{MEUS}_{L_1}$  ‘my’ agrees with  $\text{NUGAE}_{L_2}$  ‘trifles’—in gender (a syntactic feature of  $L_2$ ), and in number/case (grammmemes of  $L_2$  in this sentence)
- $\text{SOLERE}_{L_1}$  ‘use to’ agrees with  $\text{TU}_{L_2}$  ‘you’—in person and number (syntactic features of  $L_2$ )

### 6.2 Government

Lexeme  $L_1$  is governed by lexeme  $L_2$  ( $\leftarrow L_2$  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  $\Sigma_2(L_2)$  that is neither agreement class, pronominal person, or pronominal number [standard case];—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].

Sentence (8) presents the following instances of government:

<sup>5</sup> 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.

- $\text{SOLERE}_{L_2}$  governs the nominative of  $\text{TU}_{\text{NOM}}$  and the infinitive of  $\text{PUTARE}_{\text{INF}}$

- $\text{PUTARE}_{L_2}$  governs the accusative of  $\text{NUGAE}_{\text{ACC}}$  and the infinitive of  $\text{ESSE}_{\text{INF}}$

- $\text{ESSE}_{L_2}$  governs the nominative of  $\text{ALIQUID}_{\text{NOM}}$

## 7 What Syntactic Dependency Is Good For

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

### 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:  $X_I$  follows  $Y_{II} \equiv Y_I$  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 Mel’čuk 2004)—is possible only within a dependency framework.

This description of diathesis leads to clear definition of voice: a voice is a particular diathesis explicitly marked grammatically. Among other things, the correlation between the active and the passive voices can be represented in the same way:  $X_I$  follows  $Y_{II} \equiv Y_I$  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, DSyntA suppression and their referential identification (see Mel’čuk 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,  $\text{AntiVer}(\text{PROMISE}) = \text{empty}$ ,  $\text{AntiVer}(\text{EXAMPLE}) = \text{poor}$ ,  $\text{AntiVer}(\text{DREAM}) = \text{pipe} [\sim]$ . 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 is their role in lexicography, in language teaching and learning.

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

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

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

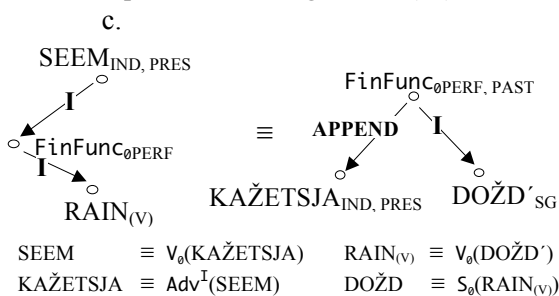
### 7.3 Paraphrasing

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, syntactic and morphological mismatches between sentences of different languages that translate each other (Mel’čuk and Wanner 2001, 2006, 2008). An example of such mismatches can be 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’.

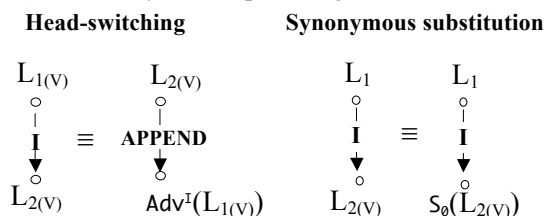
The respective DSyntSs of these sentences and lexical equivalences are given in (9c):



FinFunc<sub>0</sub> in both trees is a lexical function meaning roughly ‘cease to take place’; FinFunc<sub>0</sub>(RAIN<sub>N</sub>) = *stop*, while FinFunc<sub>0</sub>(DOŽD') = *končit'sja, perestat', prekratit'sja, projti*.

The DSynt-paraphrasing rules necessary for this transition are as follows (with serious simplifications):

(10) Two DSynt-Paraphrasing Rules



These rules are formulated in terms of Lexical Functions and simple DSynt-transformations. Given the limited number of LFs and of DSyntRels, on the one hand, and the fact that all

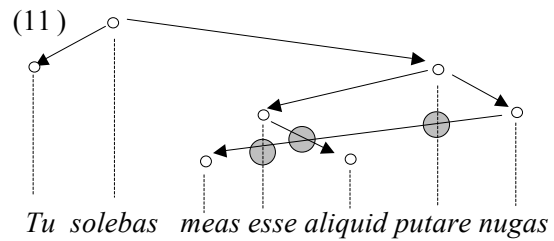
DSynt-transformations can be easily reduced to a few minimal ones, on the other, it is possible to develop an exhaustive set of DSynt-paraphrasing rules, which cover all potential paraphrases in all languages (Mel’čuk 1992b and Milićević 2007).

### 7.4 Word order

One of the most universal properties of word order in different languages—so-called **projectivity**—can be remarked 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. the SSyntS projected on it in (11); shaded circles indicate “crime scenes”—that is, the spots of projectivity violations:



However, a **crushed majority** of sentences in texts are projective, which allows for a simpler and more general word order, namely, under synthesis or analysis, it is required that the sentence produced or analyzed be projective. Non-projective sentences are not only very rare, but are possible solely under stringent conditions, which can be easily verified.

## 8 Where Syntactic Dependency Is Not Sufficient

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

(12) a. **old men and women:**  
either ‘old men’ + ‘women’  
or ‘old men’ + ‘old women’

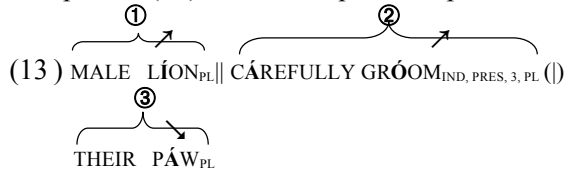
This contrast cannot be expressed in a natural way in terms of dependency so as to preserve the arborescent structure. Therefore, an additional technique is necessary: in case the suspicious element bears on the whole phrase, the corresponding subtree must be explicitly indicated, as in (12b):

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

The subtree specified in such a way is called a **syntactic grouping**; a grouping corresponds to a syntactic phrase, but it is not a constituent in the classical sense of the term.

## 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 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—but not as constituents in the strict sense of the term (constituents coming together to form a constituent of a higher rank and thus forming a hierarchy): as specification of actual prosodic phrases, with the corresponding pauses, stresses and contours. Sentence (3) has the DMorphR in (13), with three prosodic phrases:



Prosodic phrases fragments are by no means constituents: there is no hierarchy between them (= no embeddings).

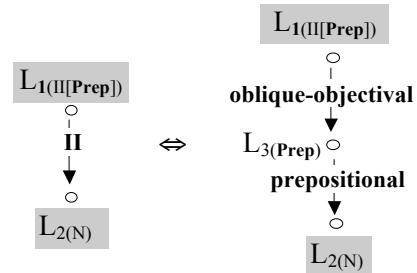
However, as it often happens in linguistics, the term *phrase* is also widely used in a different sense: as a **syntactic phrase**. (Although I am trying to avoid polysemy of terms, I did not dare to replace *phrase*.) Syntactic phrases are of two major types:

- **Potential syntactic phrases** are abstract schemata of basic syntactic constructions of a language; they are stated in terms of parts of speech and syntactic features, such as  $N \leftarrow V_{FIN}$ ,  $V \rightarrow N$ ,

$V \rightarrow N$ ,  $A \leftarrow N$ ,  $Prep \rightarrow N$ ,  $Adv \leftarrow V$ , etc. Potential 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, here are a DSynt-rule and an SSynt-rule.

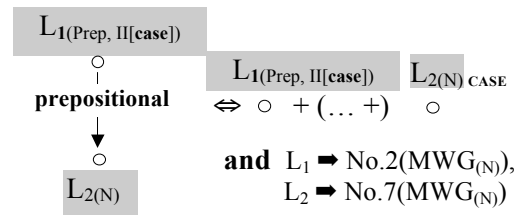
While a DSynt-rule describes a mapping of a deep subtree on a surface subtree, an SSynt-rule linearizes and morphologizes a surface subtree, using, among other means, general schemata, or patterns, of Minimal Word Groups.

### A Deep-Synt-rule



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

### A Surface-Synt-rule



“MWG” stands for ‘minimal word group,’ see below; No.2 and No.7 refer to the corresponding positions in an MWG pattern.

The left-hand part of any syntactic rule consists of a potential (Deep or Surface) syntactic phrase. 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<sub>(N)</sub> pattern 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 ètix trëx našix interesnyx primerov (11)</i> ‘or for these three our interesting examples (11)’							

**Figure 2:** Pattern of the Russian Nominal Minimal Word Group

- **Actual syntactic phrases** are real utterances 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 (= of any length: any number of lexemes). An actual syntactic phrase is a



subtree of an 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 ensures the linearization and morphologization of such actual syntactic phrases as Rus. *ot Džona* ‘from/on John’:

OT-prepos → DŽON ⇔ OT DŽON<sub>GENITIVE</sub>.

An actual syntactic phrase corresponds, most of the time, to a potential prosodic phrase—yet, as stated above, these two entities are conceptually different; thus, sentence (8) has the DMorphR as in (14a), with four prosodic phrases, while it contains only three actual syntactic phrases, shown in (14b):

(14) a. DMorphR of (8) (the symbol “<” indicates the immediate linear precedence)

TU<sub>NOM</sub> < SOLERE<sub>IND, IMPF, 2, SG</sub> | < MEUS<sub>FEM, PL, ACC</sub> |

< ESSE<sub>INF</sub> < ALIQUID<sub>NOM</sub> | < PUTARE<sub>INF</sub> < NUGA<sub>PL, ACC</sub>

b. *tu solebas putare; meas nugas;  
esse aliquid*

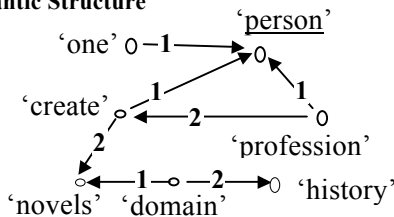
## 10 “Bracketing Paradox”

I became aware of the so-called “bracketing paradox” thanks to an exchange with T.M. Gross; I thank him for explaining to me why the phrases of the type *historical novelist* or *nuclear physicist* are problematic for some theoretical frameworks. 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 our task as linguists is to formally describe the correspondence between the meaning and the structure of these phrases, here is what we obtain.

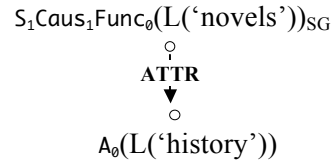
First, we need the representations of the phrase in question at different levels: semantic, deep-syntactic, surface-syntactic and deep-morphological.

**Four representations of the phrase** *historical novelist*

**Semantic Structure**

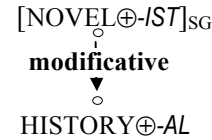


**Deep-Syntactic Structure**



S<sub>1</sub>Caus<sub>1</sub>Func<sub>0</sub> is a complex lexical function meaning roughly ‘one who causes to exist’.

**Surface -Syntactic Structure**

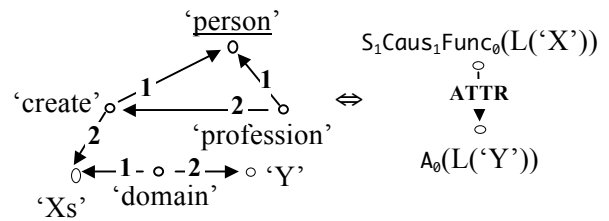


**Deep-Morphological Structure**

HISTORY ⊕ AL < [NOVEL ⊕ -IST]<sub>SG</sub>

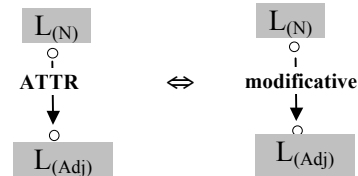
Second, we write rules that relate these representations, for instance:

**Semantic rule (SemR ⇔ DSyntR)**



**Deep-Syntactic rules (DSyntS ⇔ SSyntS)**

1. S<sub>1</sub>Caus<sub>1</sub>Func<sub>0</sub>(NOVEL) ⇔ NOVEL ⊕ -IST
2. A<sub>0</sub>(HISTORY) ⇔ HISTORY ⊕ AL
- 3.



Rules 1 and 2 are fragments of the lexical entries for the respective lexemes; HISTORY ⊕ AL will be turned into *historical* by morphological rules of allomorphy and morphological rules. Rule 3 realizes DSyntR ATTR by the SSyntRel *modificative*.

And nothing resembling a paradox can be found... The moral of the story: if you do not want paradoxes, don’t create them by your own descriptive means!

## 11 Conclusion

After this longish text, the conclusion can be very short: To describe the structure of linguistic expressions on all levels linguistic dependencies are necessary and sufficient. Constituents (in the classical sense) do not exist; phrases do of course exist, but they are of two types—prosodic and syntactic, and only prosodic phrases appear in a linguistic repre-

sentation (in the DMorphR); syntactic phrases are used in syntactic rules only.

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## Appendix: A Tentative List of English SSynt-Relations

### I. Subordinate SSyntRels: 1 - 50

CLAUSE-LEVEL (= CLAUSAL) SSYNTRELS: 1 - 21

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 [impossible]*.

*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 me]→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]

*convince*→[Alan]→indir-obj→*that* [he should work less]

###### 6. Oblique-Objectival:

*depends*→obl-obj→*on* [Alan]

*my respect*→obl-obj→*for* [Alan]

*translation*→obl-obj→*from* [French into Polish]

*translation*→[from French]→obl-obj→*into* [Polish]

###### 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. Completive:

*find*→[this]→compl→*easy*

*consider*→[Alan]→compl→*happy*

*make*→[it]→compl→*possible*

*make*→[Helen a good]→compl→*wife*

###### 9. Copular:

*be*→copul→*easy*; *be*→[a]→copul→*teacher*

*be*→copul→*without* [a hat]

*seem*→copul→*in* [a difficult position]

###### 10. 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].

###### 11. Patientive:

*translation*→patient→*of* [this text]

*shooting*→patient→*of* [the hunters: 'the hunters are shot']

##### Copredicative SSyntRels

###### 12. Subject-copredicative:

*[Alan] returned*→subj→copred→*rich*.

###### 13. Object-copredicative:

*[Alan] likes*→[Helen]→obj→copred→*slim*.

*[Alan] hammered*→[the coin]→obj→copred→*flat*.

##### Comparative SSyntRel

###### 14. Comparative:

*older*→compar→*than* [Leo]

*[He loves Helen] more*→compar→*than* [Leo].

*more*→[important]→compar→*than* [Leo]

*as*→[important]→compar→*as* [Leo]

##### Non-Valence-controlled SSyntRels: Modification

##### Absolutive SSyntRel

###### 15. Absolute-predicative:

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

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

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

##### Adverbial SSyntRels

###### 16. Adverbial:

*walk*→adverb→*fast*; *delve*→adverb→*deeply*

*[He] works*→adverb→*there* (in [this office]).

*[will] write*→[next]→adverb→*week*

*[He] ran*,→[his]→adverb→*gun* [in his left hand].

*With*←adverb→[the text finished, Helen]→*can afford* this trip.



17. Modificative-adverbial:  
[As always] **elegant**, ← **mod-adverb**-[Alan]-walked [away].
18. Appositive-adverbial:  
[An old] **man**, ← **appos-adverb**-[Alan]-works [less].
19. Attributive-adverbial:  
**Abroad**, ← **attr-adverb**-[Alan]-works [less].

#### Sentential SSyntRels

20. Parenthetical:  
**Oddly**, ← **parenth**-[Alan] works [less].  
Alan, **naturally**, ← **parenth**-accepted it.  
**As** ← **parenth**-[we know, Alan]-works [less].  
**To** ← **parenth**-[give an example, I]-consider [now nominal suffixes].
21. Adjunctive:  
**OK**, ← **adjunct**-[I]-agree

#### PHRASE-LEVEL (= PHRASAL) SSYNTRELS: 22 - 50

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

#### General Phrase SSyntRels

##### **Non-valence-controlled SSyntRels: Modification**

22. Restrictive:  
**still** ← **restr-taller**; **most** ← **restr-frequent**  
**not** ← **restr-here**  
[Alan has] **just** ← **restr-arrived**.

#### Noun Phrase SSyntRels

##### **Valence-controlled SSyntRels: Complementation**

23. Elective:  
[the] **poorest** ← **elect** → **among** [peasants]  
[the] **best** ← [ones] ← **elect** → **of** (from) [these boys]  
**five** ← **elect** → **of** these books  
[the] **most** ← [expensive car] ← **elect** → **in** [France]

##### **Mixed Type SSyntRels = Valence-controlled/ Non-Valence-controlled: Modification**

24. Possessive:  
Alan's ← **poss-arrival**; Alan's ← **poss-bed**  
Alan's ← **poss-garden**
25. Compositive:  
**man** ← **compos** [-machine]-interaction;  
**car** ← **compos-repair**  
**noun** ← **compos-phrase**; **color** ← **compos-blind**

##### **Non-Valence-controlled SSyntRels: Modification**

26. Determinative:  
**my** ← **determ-bed**; **a** ← **determ-bed**;  
**those** ← **determ-beds**
27. Quantitative:  
**three** ← **quant-beds**  
[three ← num-junct]-**thousand** ← **quant-people**
28. Modificative:  
**comfortable** ← **modif-beds**

**visible** ← **modif-stars**  
**French** ← **modif-production**

29. Post-modificative:  
**stars** ← **post-modif** → **visible** (vs. *visible stars*)
30. Descriptive-Modificative:  
[these beds, -**descr-modif** → **comfortable** [and not expensive], ...
31. Relative:  
[the] **paper** ← [that I] ← **relat** → **read** [yesterday]  
[the] **paper** ← [I] ← **relat** → **read** [yesterday]  
**the girl** ← [who] ← **relat** → **came** [first]
32. Descriptive-Relative:  
[this] **paper** ← [which I] ← **descr-relat** → **read** [yesterday]  
Alan, -[who] ← **descr-relat** → **loves** [her so much]
33. Appositive:  
Alan -[the] ← **appos** → **Powerful**  
**General** ← **appos-Wanner**  
[the] **term** ← **appos** → **'suffix'**
34. Descriptive-Appositive:  
[This] **term** ← **descr-appos** → (**'suffix'**) [will be considered later].  
[You forget about] **me**, -[your] ← **descr-appos** → **mother**
35. Sequential:  
**man** ← **sequent** → **machine** [interaction]  
**fifty** ← **sequent** → **to** [seventy dollars]
36. Attributive:  
**learner** ← **attr** → **with** [different backgrounds]  
**dress** ← **attr** → **of** [a beautiful color]  
**years** ← **attr** → **of** [war]; **bed** ← **attr** → **of** [Alain]  
**man** -[the same] ← **attr** → **age**
37. Descriptive-Attributive:  
[Professor] **Wanner**, -**descr-attr** → **from** [Stuttgart, was also present]

#### Prepositional Phrase SSyntRels

##### **A valence-controlled SSyntRel: Complementation**

38. Prepositional:  
**in** ← **prepos** → **bed**;  
**without** - [three hundred] ← **prepos** → **dollars**  
**a year** ← **prepos-ago**

##### **A non-valence-controlled SSyntRel: Complementation (by analogy)**

39. Prepositional-infinitival:  
**to** ← **prepos-inf** → **go** [to bed]

#### Verb Phrase (= Analytical Form) SSyntRels

##### **Non-valence-controlled SSyntRels: Ancillary**

40. Perfect-analytical:  
**has** ← **perf-analyt** → **written**  
**has** ← **perf-analyt** → **been** [beaten]
41. Progressive-analytical:  
**was** ← **progr-analyt** → **writing**



42. Passive-analytical:

*was*–pass-analyt→*written*

### Conjunction Phrase SSyntRels

#### **Valence-controlled SSyntRels: Complementation**

43. Subordinate-Conjunctive:

[*Suppose*] *that*–[*Alan*]–subord-conj→*comes*.

[*so*] *as*–[*not*]–subord-conj→*to* [*irritate Leo*]

44. Coordinate-Conjunctive:

[*Alan*] *and*–coord-conj→*Helen*

45. Comparative-Conjunctive:

*than*–compar-conj→*Helen*

*as*–compar-conj→*always*

46. 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**

47. Verb-junctive:

*give*–verb-junct→*up*

*bring*–verb-junct→*down*

48. Numeral-junctive:

*fifty*←num-junct–*three*

*fifty*←num-junct–*third*

49. Binary-junctive:

*if*–[...]-bin-junct→*then...*

*the*–[*more...*]-bin-junct→*the* [*more...*]

*till*–bin-junct→*after*

*from*–[...]-bin-junct→*to* [...]

*either*–[...]-bin-junct→*or* [...]

50. Colligative:

[*is*] *dealt*–collig→*with* [*stranded prepositions*]

## **II. Coordinate SSyntRels: 51 – 52**

#### **Non-valence-controlled SSyntRels: Coordination**

51. Coordinative:

*Alan*–coord→*and* [*Leo*]

*rich*,–coord→*intelligent*–coord→*and* [*beautiful*]

52. 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 chamber pot*]–quasi-coord→*under* [*my friend's bed*] [T. Capote, “A Christmas Memory”].

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