Functional Generative Description (FGD)
System of layers; lower layers

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Basic characteristics of FGD

- motivation: machine translation

- Petr Sgall (1967) *Generativní popis jazyka a česká deklinace*. Academia, Praha
- since 1970s ... together with Eva Hajičová, Jarmila Panevová

Diagram:

```
source language

'interlingua'

language independent representation

abstraction

target language

sentence ~ string of graphemes/phonemes
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Basic characteristics of FGD

• motivation: machine translation

[Diagram]

source language

‘interlingua’

language independent representation

language meaning ... transfer

target language

sentence ~ string of graphemes/phonemes

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Basic characteristics of FGD (cont.)

'classical' version of FGD:

- dependency framework
  - formal description
  - suitable mathematical formalism

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sleeps.Pred

brother.Sb often.Adv in.AuxP

my.Atr

study.Adv

his.Atr
```
Basic characteristics of FGD (cont.)

'classical' version of FGD:
• dependency framework
• stratificational approach

- language meaning ~ function
- string of graphemes/phonemes ~ form

synonymy • ambiguity
Basic characteristics of FGD (cont.)

'classical' version of FGD:
• dependency framework
• stratificational approach
• relation between a form and its function / a function and its form

functional
Basic characteristics of FGD (cont.)

'classical' version of FGD:
• dependency framework
• stratificational approach
• relation between a form and its function / a function and its form
• language meaning (not cognitive content)
• generative vs. analytical
Basic characteristics of FGD (cont.)

- tradition of Prague Linguistic Circle
  - structural school, since 1926
  - Mathesius, Trnka, Havránek, Mukařovský, Jakobson, Trubeckoj, Karcevskij, …

- language as a system ~ langue
  vs. individual utterances ~ parol

- stress on testable criteria for distinguishing lang. phenomena
Basic characteristics of FGD (cont.)

- tradition of Prague Linguistic Circle
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- language as a system ~ langue
  vs. individual utterances ~ parol
- stress on testable criteria for distinguishing lang. phenomena
- higher layers of language description (syntax)
- topic focus articulation as a part of language meaning
Two components of FGD

• generative component
  ~ to define all formally correct meaning representations
    (of possible sentences of a given language)
    • formalism: 1) phrase rules, phrase structure trees + functors
      2) dependency trees
    • push-down automaton
Two components of FGD

• generative component
  ~ to define all formally correct meaning representations (of possible sentences of a given language)
    • formalism: 1) phrase rules, phrase structure trees + functors
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    • push-down automaton

• translation component
  ~ translating meaning representations to lower layers
    • sequence of push-down transducers plus finite-state automaton
Main pillars of FGD

- system of layers
- valency theory
- topic focus articulation
- anaphora / coreference
System of layers in FGD

meaning  
________________________________________

________________________________________

deep / underlying syntax  
tectogrammar

surface syntax

________________________________________
morphematics

morphophonology

expression  
________________________________________

phonology/phonetics
System of layers in FGD (cont.)

sentence ... full representation on each layer of description

each layer ~ set of descriptions for all possible sentences
• finite set of elementary units
• finite set of operations and relations → set of complex units
• finite set of relations between sentence representations on a particular layer and its representations on adjacent layers
System of layers in FGD (cont.)

sentence … full representation on each layer of description

each layer ~ set of descriptions for all possible sentences

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• finite set of relations between sentence representations on a particular layer and its representations on adjacent layers

\[ \begin{align*}
& n+1 \quad \text{function} \\
& n \quad \text{form}
\end{align*} \]

\[ \begin{align*}
& R \\
& C
\end{align*} \]

**type C relations (composition):** elementary units constitute complex units i.e., relations between units of the same layer

**type R relations (representation):** form-function relation i.e., relation between adjacent layers
layer of phonetics

- **distinctive features** … elementary units
- **phones** (~ a speech sound) … complex units
- suprasegmental units … prosody, intonation
System of layers in FGD (cont.)

layer of phonetics
- distinctive features … elementary units
- phones (~ a speech sound) … complex units
- suprasegmental units … prosody, intonation

layer of phonology
- distinctive features … elementary units
- phonemes (~ ‘smallest’ units that distinguish meaning) … complex units
- asymmetry … allophones ~ variants of a single phoneme
- language dependent (sing vs. sin)
**System of layers in FGD (cont.)**

layer of morphonology

- morphoneme ~ set of phoneme variants
- e.g. k|c|č|.k in "matka"
- oô|ee in "foot"

Diagram:
- Morph
- Morphoneme
- Phoneme
- Distinctive feature
System of layers in FGD (cont.)

Layer of morphonology

- Morphoneme ~ set of phoneme variants
  - E.g. \( k|c|\check{c}|\dot{k} \) in "matka"

- Morph ~ string of morphonemes
  - Lexical variants: \((matk, matc, mat\check{c}, mat.k)\) ... 4 allomorphs
  - \(mat(k|c|\check{c}|.k)\) ... 1 morph

- Lexical variants: \((foot, feet)\) ... 2 allomorphs
  - \(f(oo|ee)t\) ... 1 morph
layer of morphematics

morpheme ~ the smallest component that has semantic meaning

- **lexical morpheme**
  - **roots**
    - e.g. lex. morpheme for *matka* consists of 4 allomorphs (*matk, matc, matč, mat.k*);
    - for *to write* (*writ, wrot*); for *leaf* (*leaf, leav*)
  - **derivational morphemes** (affixes: prefixes, infixes, suffixes, … )
    - *il-* (as in *illegal*), *non-* (as in *nonproblematic*)
    - *-ly* (as in *legally*), *-ess* (as in *actress*)
System of layers in FGD (cont.)

layer of morphematics

- morpheme ~ the smallest component that has semantic meaning
  - lexical morpheme
  - grammatical morpheme
    - inflectional affixes e.g. Cz: suffixes
      - nouns: case, gender, number, ...
      - verbs: gender, number, tense, voice,
    - Eng: suffixes
      - nouns: plural -s
      - verbs: past tense -ed, continuous –ing
layer of morphematics

morpheme ~ the smallest component that has semantic meaning

- lexical morpheme
- grammatical morpheme
  - inflectional affixes  e.g. Cz: suffixes
    nouns: case, gender, number, ...
    verbs: gender, number, tense, voice,
  - Eng: suffixes
    nouns: plural -s
    verbs: past tense -ed, continuous –ing
  - e.g. matk + a
    koup + il
  - boy + s
  - play + ed
  - sema … a combination of grammatical morphemes that characterize a lexical morpheme (or strings of lexical morphemes)
System of layers in FGD (cont.)

layer of morphematics
morpheme ~ the smallest component that has semantic meaning
- lexical morpheme
- grammatical morpheme
- formeme:
  sequence of morphs realizing a single tagmeme / sentence member
  lexical f., case f. (i.e., prep+case), conjunction formemes (i.e., conj+verb mood)

Cz:  vysok+á škol+a; lamp+a; na+lavic+i; chod+i; bud+e+chod+it
Eng: white-collar; lamp; on+ table; walk+s; will+be+walk+ing
System of layers in FGD (cont.)

morpheme ~ the smallest component that has semantic meaning

Czech … (inflection language):

nejneobhospodařovatelnější  
nej-ne- ob-hospod-ar’-ova-teln-ějš - í  
most-non- cultivate - [iter]- [adj] - [super]-[sg+nom+fem | sg+acc+neutr | … pl+voc+masc]  

23 combinations ("meanings")

grammatical morphemes
System of layers in FGD (cont.)

morpheme ~ the smallest component that has semantic meaning

Hungarian (agglutinative language):

- fi-ú  boy
- fi-a  his/her son
- fi-á-é  his/her son's (singular object)
- fi-á-é-i  his/her son's (plural object)
- fi-a-i  his/her sons
- fi-a-i-é  his/her sons' (singular object)
- fi-a-i-é-i  his/her sons' (plural object)

Turkish (agglutinative language):

Dilbilimciléstiremeyebilecekmızdenmiydiniz?
Dilbilim-ci-leş-tir-e-me-yebil-ecek-ler-i-miz-den-mi-ydi-niz

Were you one of those whom we would not be able to transform into a linguist?

Sibel Ciddi (2013)
System of layers in FGD (cont.)

Example of the Arabic MorphoTrees hierarchy

singular usage; individuation individual; unit/individuals

N-------2I N-------2R N-------2R
References

• Sgall, P. (1967) *Generativní popis jazyka a česká deklinace*. Academia, Praha
• Sgall, P. a kol. (1986) *Úvod do syntaxe a sémantiky*. Academia, Praha