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Not so simple!

Defining and measuring (linguistic) complexity a second/foreign language

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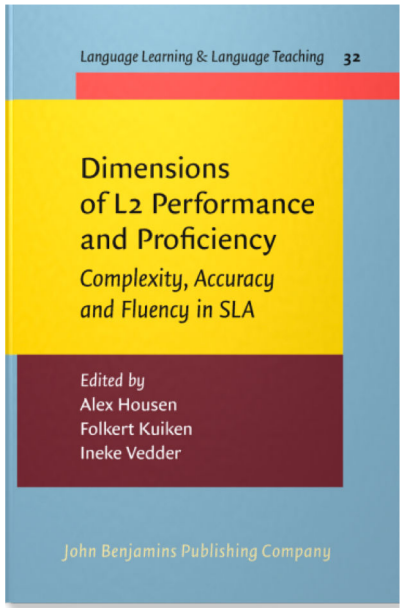
Complexity – Accuracy - Fluency - (CAF)

- **1970-1980s**: L2 pedagogy: Fluency *vs* Accuracy (Brumfit 1984; Hammerly 1988)
- **1990s**: F, A + **Complexity** as **principal dimensions of L2 performance, L2 proficiency** and **L2 development** (Skehan 1989, 1990, 1992; Wolfe-Quintero et al 1998).



CAF in AL and SLA research

- Prominent research variables
- Mainly used as *dependent/outcome variables*, i.e. as:
  - descriptors of L2 performance
  - indicators of L2 proficiency
  - indices of L2 development

… in studies on the effects of: learner variables (eg. age, aptitude, WM), learning contexts (eg. study-abroad vs. classroom), task features (planning, task complexity), types of instruction (eg. implicit vs explicit instruction, corrective feedback), etc.

(eg. Bygate 1996,1999; Collentine 2004; Derwing & Rossiter 2003; Foster & Skehan 1996, 2012; Iwashita et al 2008; Kuiken & Vedder 2011; Larsen-Freeman 2006; Muñoz 2008; Robinson 2007, 2011; Tavakoli & Skehan 2005; Spoelman & Verspoor 2010; Yuan & Ellis 2003; …).

Describe and characterize the differences between the following two extracts of spoken L2 English

- 2 learners/text samples:
  - German L1
  - End of primary school age
  - Retelling a wordless picture story about a boy, his dog and his frog

- Characterize and compare the L2 proficiency of these samples in terms of complexity, accuracy, and fluency

Complexity - Accuracy - Fluency (CAF)

- *Independent* dimensions of L2 proficiency, L2 performance and L2 development

- Many studies on how C-A-F vary:
  - over time in the course of L2 development
  - according to different types of tasks and activities that learners perform
  - according to different learning contexts and different methods of L2 teaching and instruction

Complexity - Accuracy - Fluency (CAF)

- But many inconclusive (sometimes contradictory) research results and findings, esp. with respect to complexity (cf. Housen & Kuiken 2009; Housen, Kuiken & Vedder 2012; Pallotti 2009; Hulstijn 2015).

=> Because of the inconsistencies in the way accuracy, fluency and esp. complexity have been defined and measured across studies (and sometimes within studies) (Norris & Ortega 2009; Larsen-Freeman 2009; Pallotti 2009; Housen, Kuiken & Vedder 2012).

Complexity

- Most ‘complex’ construct of the CAF triad
- Least understood, least clearly defined and least clearly operationalised

Overview

1. What is (linguistic) complexity?
2. How can linguistic complexity be analysed and measured?
3. How can (linguistic) complexity, and its analysis, be of relevance to language practicioners (esp. teachers).

Complexity in language sciences

- Formal, cognitive & functional linguistics
- Language typology
- Language evolution
- Language contact
- Sociolinguistics
- Psycholinguistics
- Applied Linguistics & Language Acquisition Research

The Equicomplexity Hypothesis

- All languages are equally complex overall.
- All languages are therefore equally difficult /easy to learn.

- "All languages have a roughly equally complex systems. There may be relative simplicity in one respect (eg. no word-endings) but this seems always to be compensated by relative complexity in another (eg. word-order)" (Crystal 1997:6)

- "There is no evidence that normal human languages differ greatly in the complexity of their grammar, or that there are any languages that are 'primitive' in the size of their vocabulary (or any other part of their language)."
(Hudson, 2002, ***83 Things Linguists Can Agree About***; *https://www.llas.ac.uk/resources/gpg/135*)

The Equicomplexity Hypothesis **challenged**

- ***Linguistic Niche Hypothesis:*** Languages differ and evolve in their complexity as they adapt to the environment (*niche*) in which they are used and learned (Lupyan & Dale 2010; Trudgill 2011; McWhorter 2008, 2011; Sampson, Gil & Trudgill 2009) .

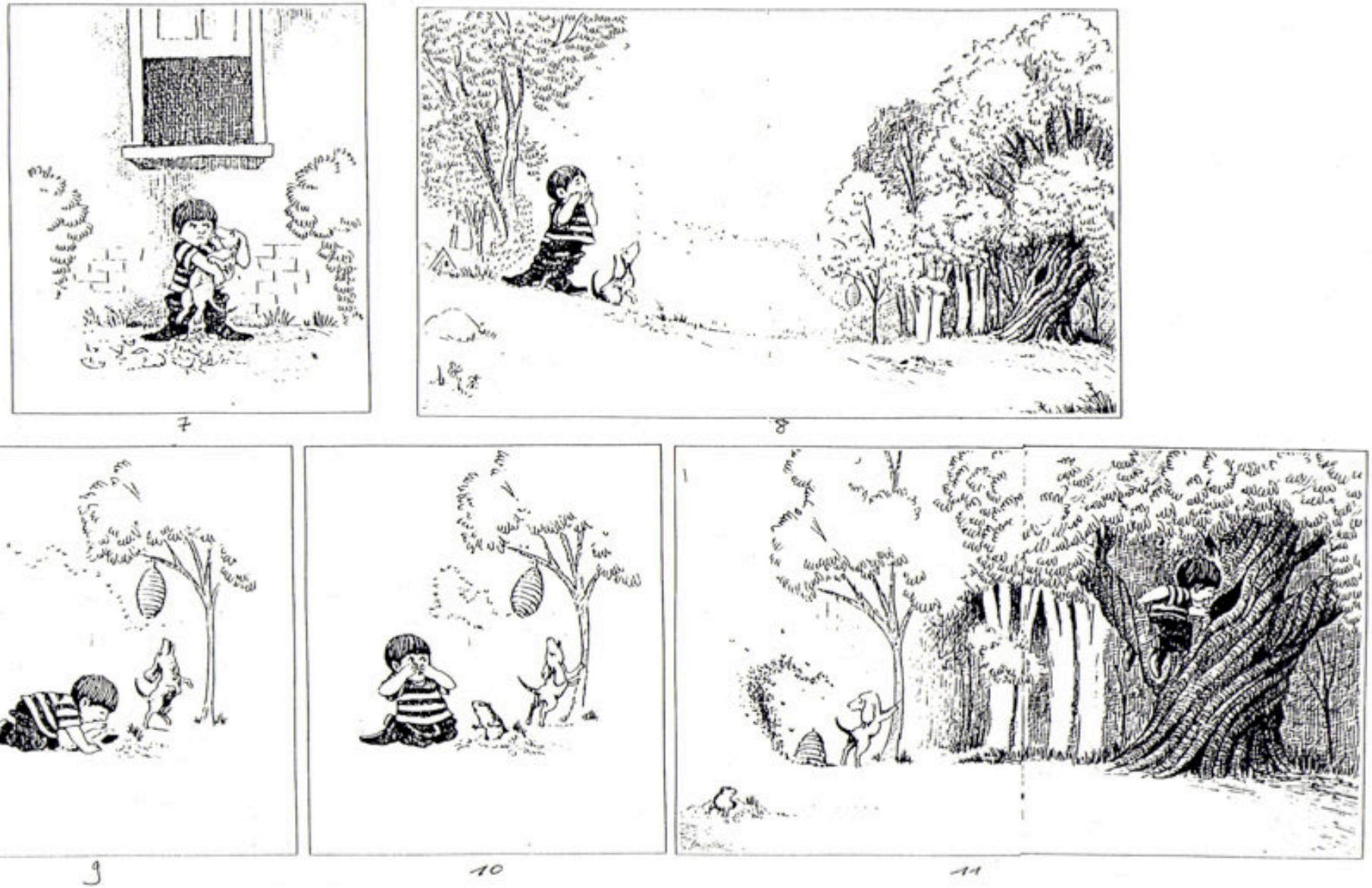
- Observations:
  - Older languages tend to be more complex than younger languages.
  - Languages spoken in isolated and/or closed tight-knit societies tend to preserve or develop complexity.

- Explanations: *language contact & language acquisition*:
  - early/first language acquisition by children tends to increase complexity.
  - large-scale second language acquisition (esp. by adults) tends to reduce complexity (simplification).

Overview

1. **What is (linguistic) complexity?**
2. How can it be measured?
3. How does complexity manifest itself in (second/foreign) language learners' use and development of a (second/foreign) language (e.g. vis-à-vis accuracy and fluency)?
4. How can complexity be of relevance to language practicioners (esp. teachers).

From: *Frog, Where Are You?* (Mayer, 1966)



Two excerpts from oral narratives (Frog-Story retellings)

(slightly adapted for purposes of illustration)

ESL Learner A:

The boy goes to the forest.
And he shouts and he looks for his frog.
And then he looks in the hole of an animal in the ground.
And his dog plays with the bees.

ESL Learner B:

The boy, who by now has entered the forest, continues to shout and look for his pet frog.

And while he is inspecting some kind of rodent's burrow, his dog starts frolicking with a beehive.

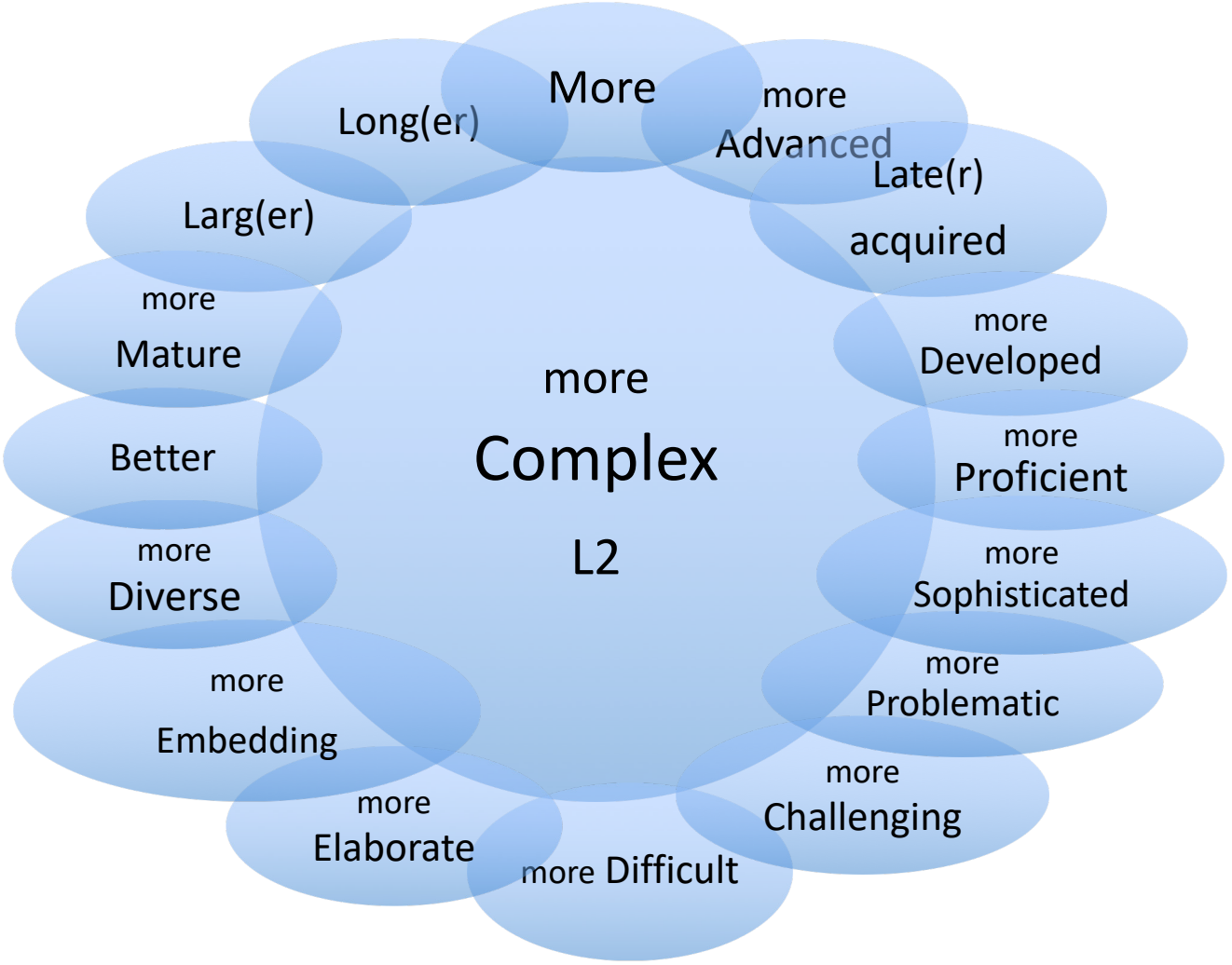
Complexity in AL & SLA research

- Many different meanings of *language complexity* in the applied linguistics and language acquisition literature
- No single generally accepted construct definition

Many different (and often vague or circular) definitions of Complexity in AL

- Complexity is the extent to which learners produce elaborated language (Ellis & Barkhuizen 2005:139).
- use of more challenging and difficult language … language that is more developed or at the upper limit of [learners'] IL system … can be considered more complex (Ellis 2008:490).
- complexity means that a wide variety of both basic and sophisticated structures and words are available to the learner (Wolfe-Quintero et al 1998:69, 101).
- complexity is the number of forms that must be manipulated and in the type of decisions that must be made (Dickerson 1990:240).
- complexity is contingent not so much on the number of forms … but on the number (and/or the type) of criteria to be applied to arrive at the correct form (Hulstijn & de Graaff 1994:103).
- 'Complexity refers to … the complexity of the underlying interlanguage system developed' (Skehan 2003:8).
- '…complexity would be associated with … discourse, in which propositions are more or less complex.' (Bygate 1999:195)
- '…the range of forms that surface in language production and the degree of sophistication of such forms' (Ortega 2003: 492; Ortega 2012:127)
- 'complexity refers to characteristics of utterances at the level of clause relations, that is, the use of conjunctions and, in particular, the presence of subordination' (Iwashita et al 2008:32).

Different definitions, meanings and interpretations of *Language Complexity in AL & SLA research*



(Bulté & Housen 2014)

Different definitions, meanings and interpretations of *Language Complexity in AL & SLA research*

- Contradictory views and findings on relationship between complexity and role of (implicit vs. explicit) teaching/instruction:
  - Teaching is more effective for, and should target, simple/easy L2 features (DeKeyser 1995; Krashen 1994; Pica 1985; Reber, 1989; Robinson 1996)
  - Teaching is more effective for, and should target, complex/hard L2 features (Hulstijn & de Graaff 1994; de Graaff 1997; Housen et al 2005)

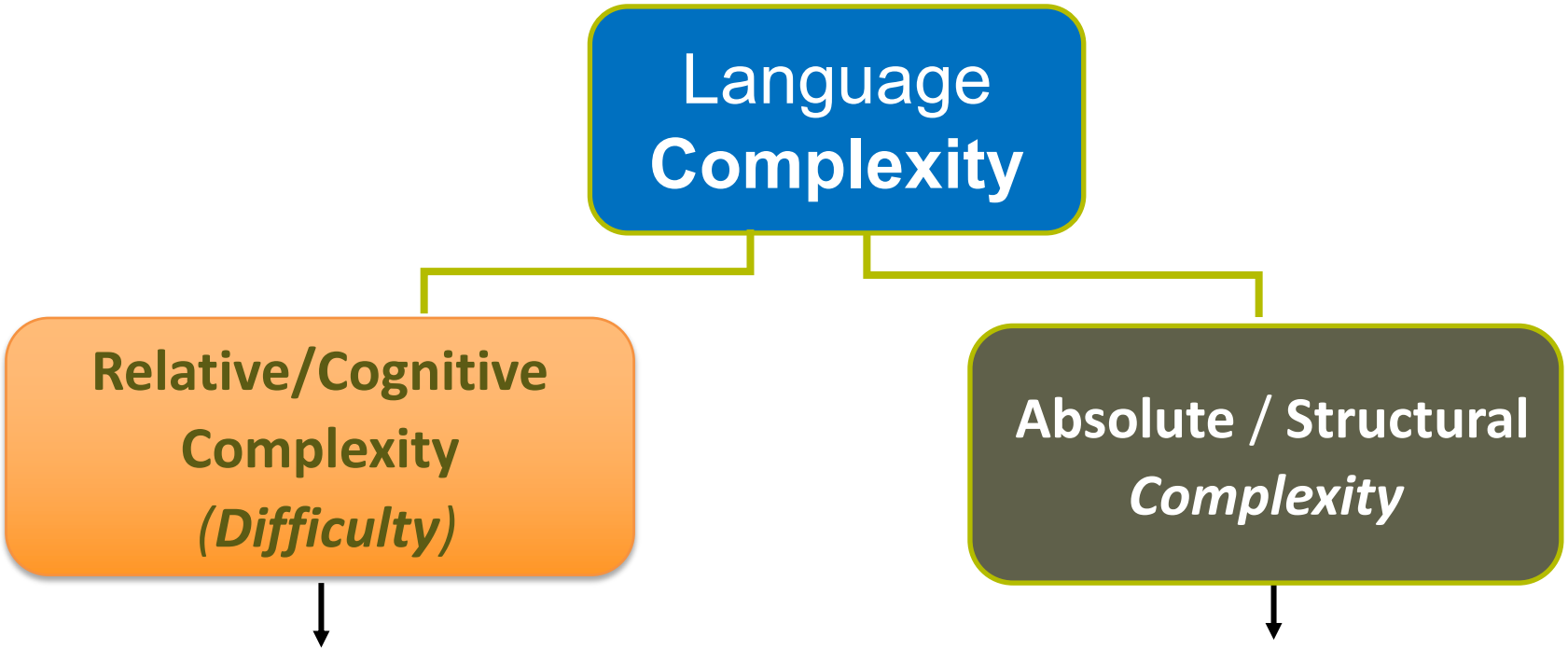
2 core meanings of *language complexity*

- Absolute/structural complexity vs. relative/cognitive complexity

- Merriam-Webster Dictionary:
  a. "composed of many interconnected parts" > *com* (together) + *plectere* (to braid)
  b. "hard to separate, analyze, or solve; *difficult*"

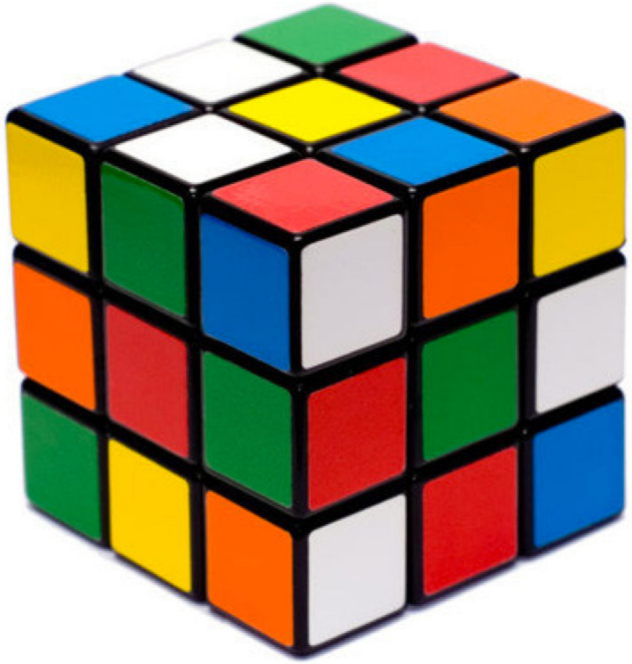
- "In linguistics, complexity refers to both the … internal structuring of linguistic units and the psychological difficulty in using or learning them" (Crystal 1997:76).

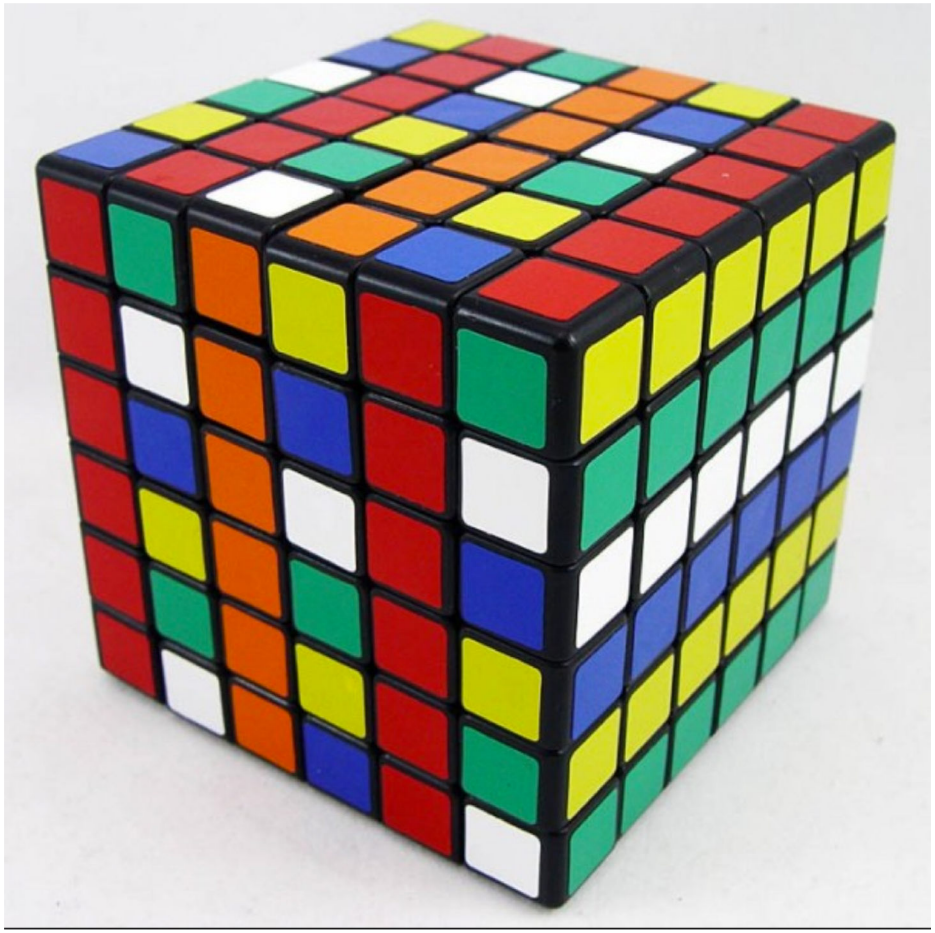
2 core meanings of *language complexity*



- From perspective of language learner/user (teacher)
- (Cognitive) effort, costs, resources and time required for using, processing or learning (or *teaching*?) language structures and patterns, and systems thereof.

- Intrinsic structural properties of language form and patterns, or of systems thereof
- Number of components of a structure or system, and number and intricacy of the relationships between the components.



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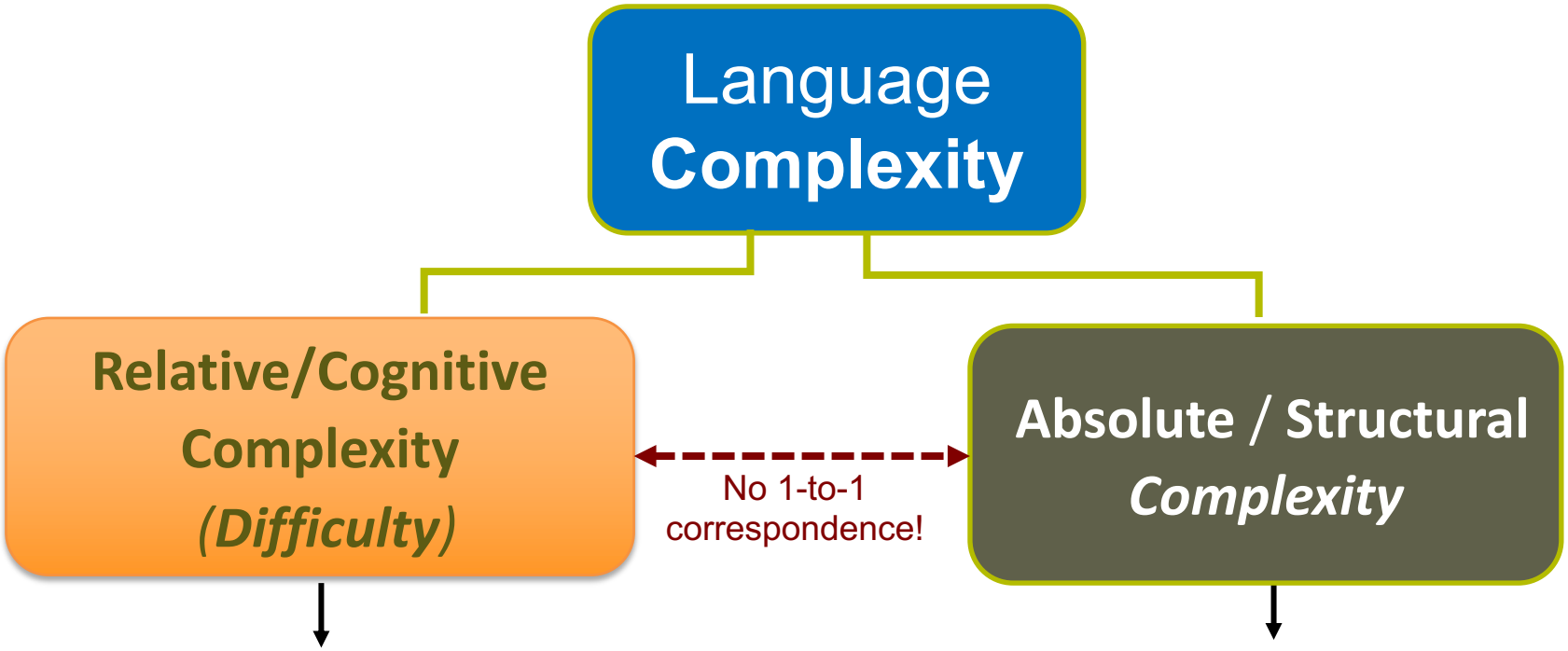
2 core meanings of *language complexity*



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Structural complexity ≠ difficulty

- English Simple Past *vs* Present Perfect:

  He called his mother vs. *He has called his mother*

  -> Simple Past structurally simpler than Present Perfect

  -> Simple Past less difficult to learn and use (correctly) than Present Perfect

- English Present Perfect *vs* Present Progressive:

  He has called his mother vs. He is calling his mother

  -> Both similar in terms of structural complexity

  -> Present Perfect more difficult to learn and use (correctly) than Present Progressive

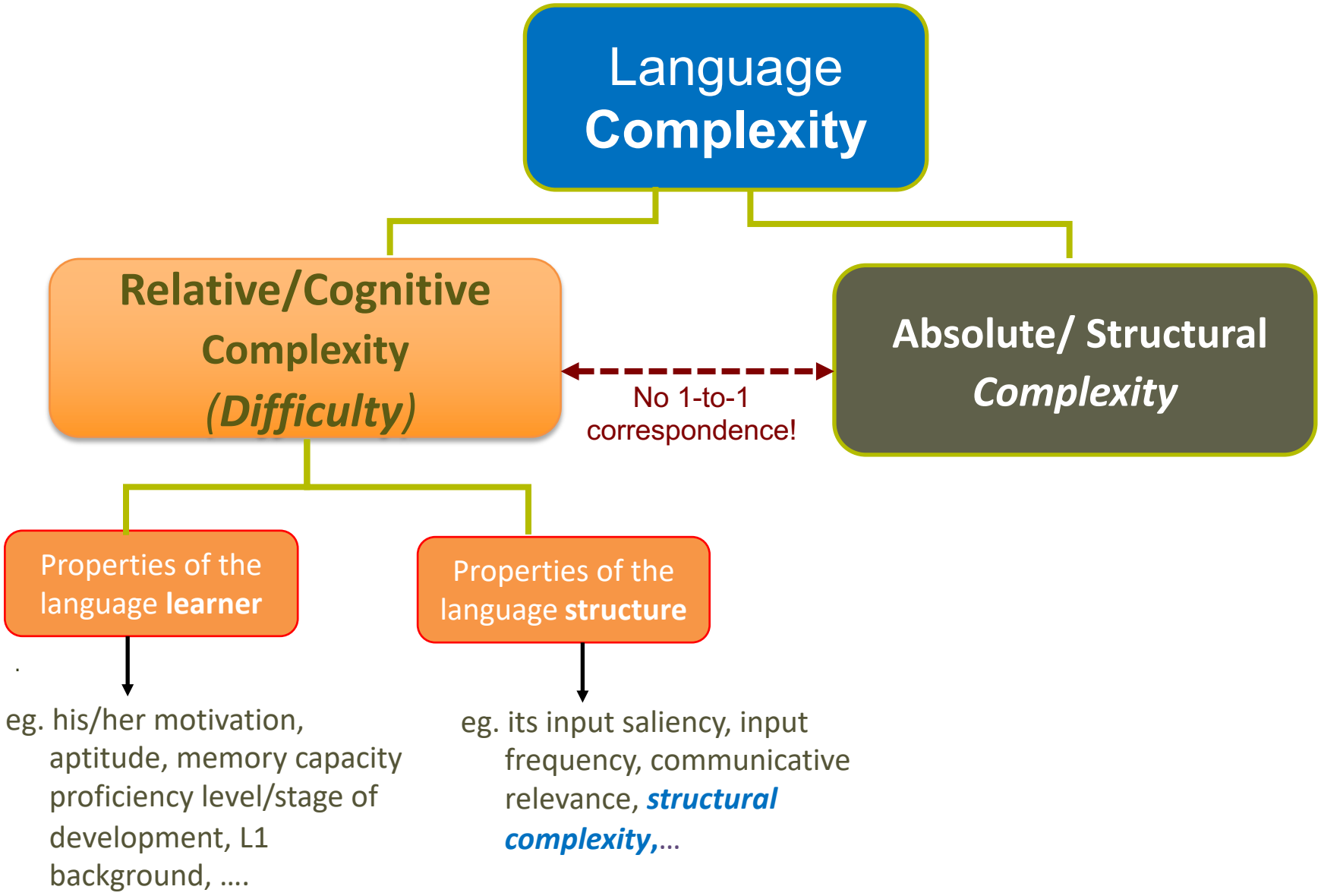
- English Plural *–s vs* Genitive *-'s*:

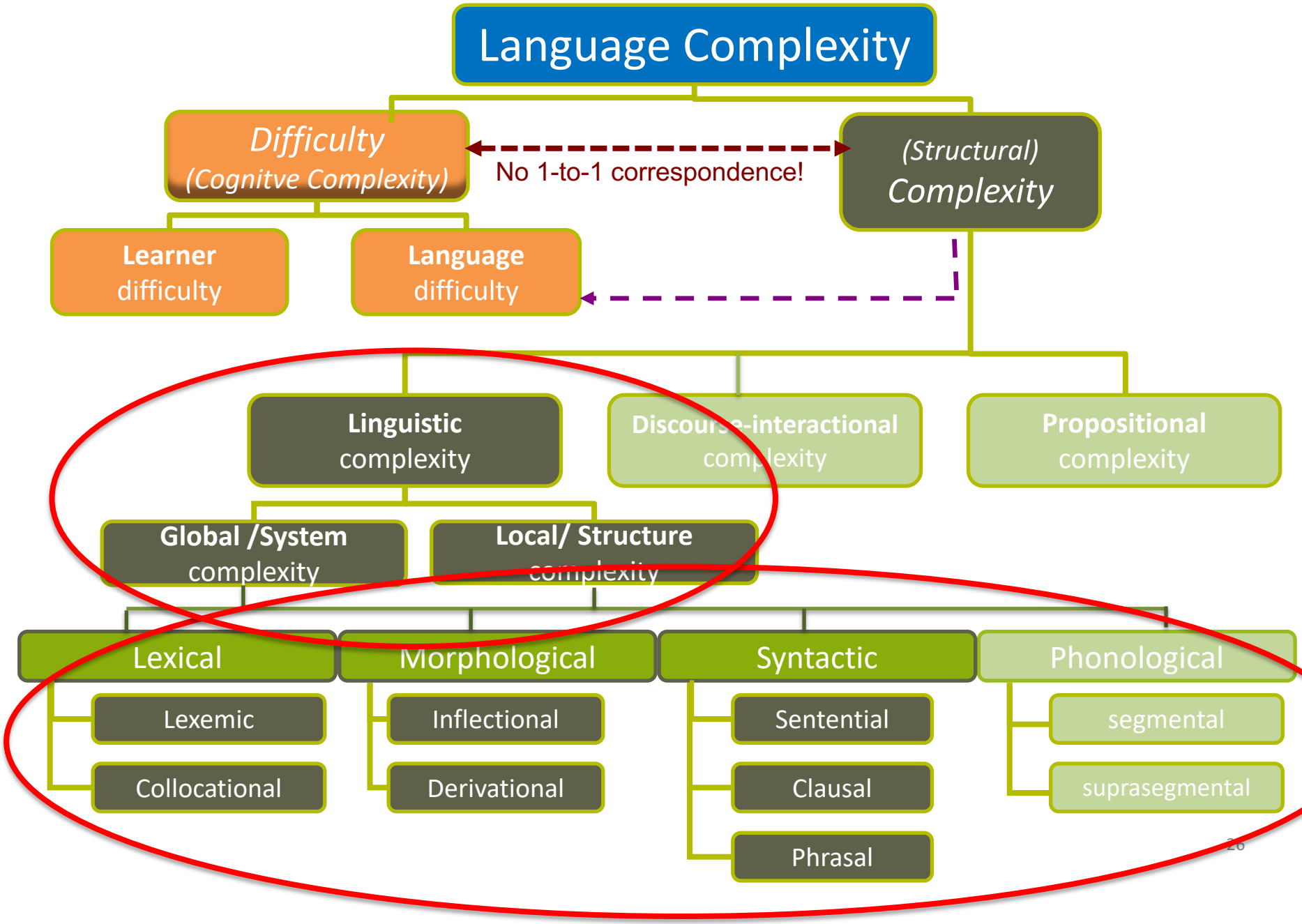
  The sultans and their wives vs. *The sultan's wives*

  -> Both similar (identical?) in terms of structural complexity

  -> Genitive more difficult to learn and use (correctly) than Plural

2 core meanings of *language complexity*




Language Complexity
Difficulty
(Cognitve Complexity)
No 1-to-1 correspondence!
(Structural)
Complexity
Learner
difficulty
Language
difficulty
Linguistic
complexity
Discourse-interactional
complexity
Propositional
complexity
Global /System
complexity
Local/ Structure
complexity
Lexical
Morphological
Syntactic
Phonological
Lexemic
Collocational
Inflectional
Derivational
Sentential
Clausal
Phrasal
segmental
suprasegmental

Linguistic Complexity in Applied Linguistics & SLA research

- Different manifestations of linguistic complexityl:
  - Diversity/richness
  - Depth/elaboration/compositionality (esp. through embedding)
  - Sophistication => Cognitive complexity/difficulty?

=> Linguistic complexity is a multi-componential, multi-facetted, multi-dimensional construct

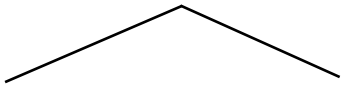
=> implications for complexity measurement

Overview

1. What is (linguistic) complexity?
2. **How can (linguistic) complexity be analysed and measured?**
3. How can (linguistic) complexity, and its analysis, be of relevance to language practicioners (esp. teachers).

Complexity assessment in AL & SLA

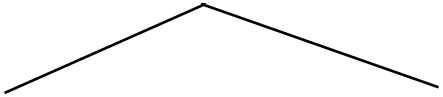
Subjectively: ratings



holistic analytic

Raters: laymen or experts (teachers, linguists)

Objectively: measures



holistic analytic

Examples:

- *Subclause Ratio* (SCR): number of subordinate clauses in a text divided by the total number of main + subclauses
- *Mean Length of Sentence* (MLS): total number of words in a text divided by the total number of sentences
- *Guiraud Index of Lexical Richness* (GI): the number of (content) word *types* in a text divided by the square root of the total number of word *tokens*.
- Cf. Body Mass Index (BMI), Intelligence Quotient (IQ)

Mathematical formulas used in L2 Complexity measures

1. Frequency count measures (*N*)

eg. *number of subclauses; nr of different word types; nr of past tense forms*

2. Ratio measures (x/y) (Percentages: x100 = %)

a. Fractions *(x'/x)*

eg. *subclauses/total clauses ; content words/total words*

b. Proportions (*x/y*)

eg. *subclauses/sentence; words/clause; morphemes/words*

c. Type/Token ratios (x_n/x)

eg. *lemmas / word tokens; grammatical word types / word tokens*

3. Complex measures (*indices*)

eg. *Weighted Subclause Ratio, IPSyn, Elaboration Index, Syntactic Complexity Formula, D, MDLT*

L2 Complexity measures

- Abundance of complexity measures (cf. Bulté & Housen: 40 different complexity measures in review of 40 studies on TBLT):

A. GRAMMATICAL COMPLEXITY

a. Syntactic

i. Overall

1. Mean length of T-unit
2. Mean length of c-unit
3. Mean length of turn
4. Mean length of AS-unit
5. Mean length of utterance
6. S-nodes / T-unit
7. S-nodes / AS-unit

i. Sentential - Coordination

ø Coordinated clauses / clauses

ii. Sentential - Subordination

8. Clauses / AS-unit
9. Clauses / c-unit
10. Clauses / T-unit
11. Dependent clauses / clause
12. Number of Subordinate clauses
13. Subordinate clauses / clauses
14. Subordinate clauses / dependent clauses
15. Subordinate clauses / T-unit
16. Relative clauses / T-unit
17. Verb phrases / T-unit

iii. Subsentential (Clausal + Phrasal)

18. Mean length of clause
19. S-nodes / clause

iv. Clausal

ø syntactic arguments / clause

v. Phrasal

ø Dependents or words / (N, V) phrase

vi. Other (± syntactic sophistication)

20. Frequency of passive forms
21. Frequency of infinitival phrases
22. Frequency of conjoined clauses
23. Frequency of Wh-clauses
24. Frequency of imperatives
25. Frequency of auxiliaries
26. Frequency of comparatives
27. Frequency of conditionals

b. Morphological

i. Inflectional

28. Frequency of tensed forms
29. Frequency of modals
30. Number of different verb forms
31. Variety of past tense forms

ii. Derivational

ø Measure of affixation

B. LEXICAL COMPLEXITY

a. Diversity

32. Number of word types
33. TTR
34. Mean segmental TTR
35. Guiraud
36. (Word types)^2 / words
37. D

b. Density

38. Lexical words / Function words
39. Lexical words / Total words

c. Sophistication

40. Less frequent words / Total words

L2 Complexity measures

- A valid measure is a measure that adequately captures the phenomenon that it intends to measure.

- As to now, no systematic validation of Complexity measures (nor of Fluency or Accuracy measures).

- NB! An invalid measure is not necessarily a measure that fails to differentiate between different learners, between different tasks, or between different proficiency levels.

  Perhaps such a measure captures a phenomenon that actually does not vary between the different learners/tasks/proficiency levels investigated (which would be a valid observation in and by itself, not necessarily the result of a flawed measure).

Calculating Complexity Measures

- laborious when done manually -> **(semi-)automatic tools** (esp. for English):
  - **CLAN** (eg. Freq, VocD) (B. MacWhinney; http://childes.psy.cmu.edu/clan/)
  - **RANGE** (Paul Nation; http://www.victoria.ac.nz/lals/about/staff/paul-nation; http://www.lextutor.ca/range/)
  - **VocabProfile** (+ other online tools at T. Cobb's Lextutor website: http://www.lextutor.ca/)
  - **Text Inspector** (http://textinspector.com ; taggers, D, MLTD)
  - **Morphological Complexity Index** (MCI) (Pallotti & Brezina: http://corpora.lancs.ac.uk/vocab/analyse_morph.php)
  - **Coh-Metrix** (hundreds of text measures, including complexity metrics: http://cohmetrix.memphis.edu)
  - **L2 Syntactic complexity analyzer & Lexical complexity analyzer** (X. Lu; http://www.personal.psu.edu/xxl13/download.html or http://aihaiyang.com/synlex/)
  - **Tool for the Automatic Analysis of Syntactic Sophistication and Complexity** (TAASSC) (C. Kyle: http://www.kristopherkyle.com/taassc.html)
  - **AC-IPsyn** (Index of Productive Syntax, IPSyn; Scarborough 1990); http://www.hlt.utdallas.edu/~nisa/ipsyn.html)
  - **Suite of Automated Linguistic Analysis Tools (SALAT)** (hundreds of tools for calculating complexity and accuracy metrics; https://www.linguisticanalysistools.org)

Two excerpts from oral narratives (Frog-Story retellings)

(slightly adapted for purposes of illustration)

Learner A:

The boy goes to the forest.
And he shouts and he looks for his frog.
And then he looks in the hole of an animal in the ground.
And his dog plays with the bees.

Learner B:

The boy, who by now has entered the forest, continues to shout and look for his pet frog.

And, while he is inspecting some kind of rodent's burrow, his dog starts frolicking with a beehive.

Measures of Lexical Complexity: Diversity

- **Type/Token Ratios (TTR)** : $\frac{\text{word Types}}{\text{word Tokens}}$

There are one hundred words in this paragraph. A *token* is a word occurrence, so the number of tokens in this paragraph is one hundred. A *type*, on the other hand, is a word treated as a category rather than as an occurrence. There are one hundred tokens in this paragraph, but how many of them are really different words—or different types? A simple way of counting the number of types is to count only the first occurrence of each word. When we do this, we find that there are forty-five word categories—or lexical types—in this paragraph.

TTR = 45/100 = 0.45

Measures of Lexical Complexity: Diversity

- **Type/Token Ratios (TTR)** : richness, range or size of the lexical repertoire of the learner (size of the mental lexicon).

$$\frac{\text{word Types}}{\text{word Tokens}}$$

Learner A: 23/35 = 0.66

Learner B: 32/35 = 0.91

Measures of Lexical Complexity: Diversity

- Simple TTR counts all words and word types, incl. function words. Do these contribute to the learner's lexical(rather than grammatical) proficiency?

- TTR is sensitive to differences in text length: longer texts get increasingly lower TTR scores

  => variants of the TTR that mathematically correct for the effects of text length differences: *Guiraud Index, D, Haas Index, Yule's K, HD-D, MLTD, …*

- **Guiraud Index**: square root in denominator

$$\frac{\text{(N + V + Adj + Adv) Types}}{\sqrt{\text{(n + v + adj + adv) Tokens}}}$$

A: 12/ SQRT 13 = 3.31
B: 19/ SQRT 19 = 4.36

- ***D*** (with CLAN command *VocD*)

A: *D* = 20.08
B: *D* = 60.02

Are the following texts equally lexically ‘complex’?

1) I went to the door and I saw two children and a cat.

TTR = 11/13 = 0.85

2) I proceeded to the entrance and I noticed two minors and a feline.

TTR = 11/13 = 0.85

Measures of Lexical Complexity: Sophistication

- Assumption: sophisticated words = less frequent words = more 'complex'
- Lexical Frequency Lists: frequency bands (1-1000 most frequent words; 1001-2000 most frequent, etc.)
  - Based on the British National Corpus (BNC) (per million words)
    - http://ucrel.lancs.ac.uk/bncfreq/flists.html
    - http://ucrel.lancs.ac.uk/bncfreq/lists/1_2_all_freq.txt
  - Based on the Corpus of Contemporary American English (COCA)
    - http://corpus.byu.edu/resources.asp
    - http://www.wordfrequency.info/
  - **Lextutor Website:**
    - http://www.lextutor.ca/freq/lists_download/
    - Longman Communication 3000 list

Measures of Lexical Complexity: Sophistication

- $$\frac{\text{Non-K1 word tokens}}{\text{word tokens}}$$

  A: 4/35 = 0.11
  B: 8/35 = 0.14

- $$\frac{\text{Non-K1 word types}}{\text{word tokens}}$$

  A: 4/35 = 0.11
  B: 8/35 = 0.14

- $$\frac{\text{Non-K1 word types}}{\text{word types}}$$

  A: 4/23 = 0.17
  B: 8/32 = 0.25

- $$\frac{\text{(K1 tokens x1) + (K2 tokens x 2) + (K3 tokens x 3) + (K4 tokens x 4)}}{\text{word tokens}}$$

  A: 41/35 = 1.17
  B: 49/35 = 1.40

(K1 = 1000 most frequent words, K2 = 1001-2000 most frequent words, etc.

Measures of Lexical Complexity: Sophistication

- Assumption: infrequent words = more sophisticated = more complex => Why? 🤔

  car = 324th most frequently occurring word in the British National Corpus

  tar = 26453th most frequently occurring word in the BNC

  But is *tar* structurally more complex than *car*?

  Or should we say that *tar* may be more *difficult* (to acquire) than *car* (because learners are not readily exposed to *tar)*?

Measures of Lexical Complexity: Sophistication

- Assumption: longer words = more sophisticated = more complex => Why? 🤔

- Word length as number of:
  - Letters (written) eg. *attention* = 9 letters
  - Phonemes (spoken) eg. *əˈtɛnʃ(ə)n* = 6/7 phonemes
  - Syllables eg. *ə|ˈtɛn|ʃ(ə)n* = 3 syllables
  - Morphemes eg. *at-tent-ion* = 3 (2) morphemes

eg. Mean Length of Words in Letters (MLWL): nr. of letters / nr. of words

A: 121/35 = 3.46
B: 149/35 = 4.26

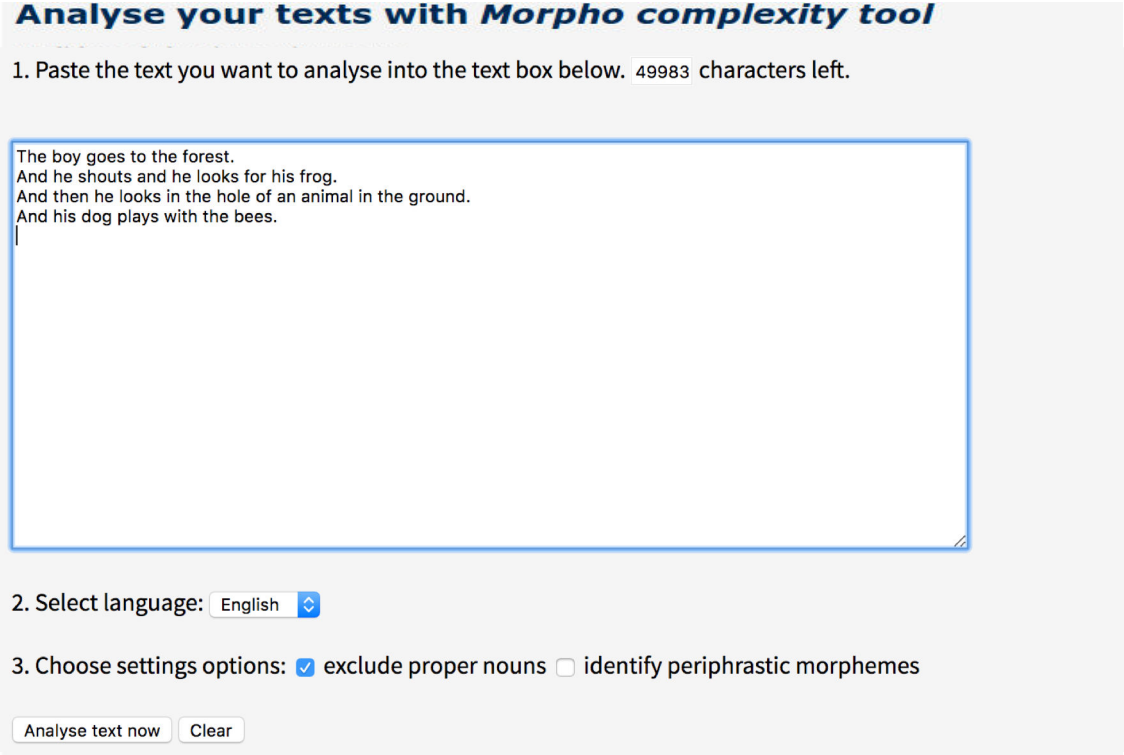
Measures of Morphological Complexity

- Morphological complexity, esp. the diversity (richness, size) of a text's/learner's inflectional morphological repertoire, is not often measured, and only few measures available.
- Most existing morphological complexity measures are fekt to be not sensitive enough to differentiate between different L2 learners or between different proficiency levels.
  - At least not between L2 English learners/texts (= most studied L2).
  - English is a morphologically poor language: little to learn in terms of inflectional morphology (only 7 inflectional categories), and learners quickly perform at 'ceiling levels'.
  - But important for other L2s (eg. Romance languages)!

Measures of Morphological Complexity: Diversity

1. Inflectional diversity

- Morphological Complexity Index (MCI)
  - Measures the diversity of different morphological operations ('exponents') in a text.
  - Automatic calculation: http://corpora.lancs.ac.uk/vocab/analyse_morph.php



A: MCI = 1

B: MCI = 2

(Pallotti & Brezina, 2015)

Measures of Morphological Complexity: Diversity

2. Derivational diversity

- A language like English may be morphological poor in terms of inflectional morphology, but rich in terms of derivational morphology.

  Inflectional: *cats*, *John's*, *bigger*, *visited*, *killing*, *sleeps.*

  Derivational: *unhappy, bilingual, rewrite, organize, quickly, fusion, manhood, priceless, antigovernmental, …*

- $$\frac{\text{Derivational morpheme Types}}{\text{Derivational morpheme Tokens}}$$

  A: = 0
  B: = 0

- Can be calculated automatically via: http://www.lextutor.ca/morpho/

Syntactic Complexity

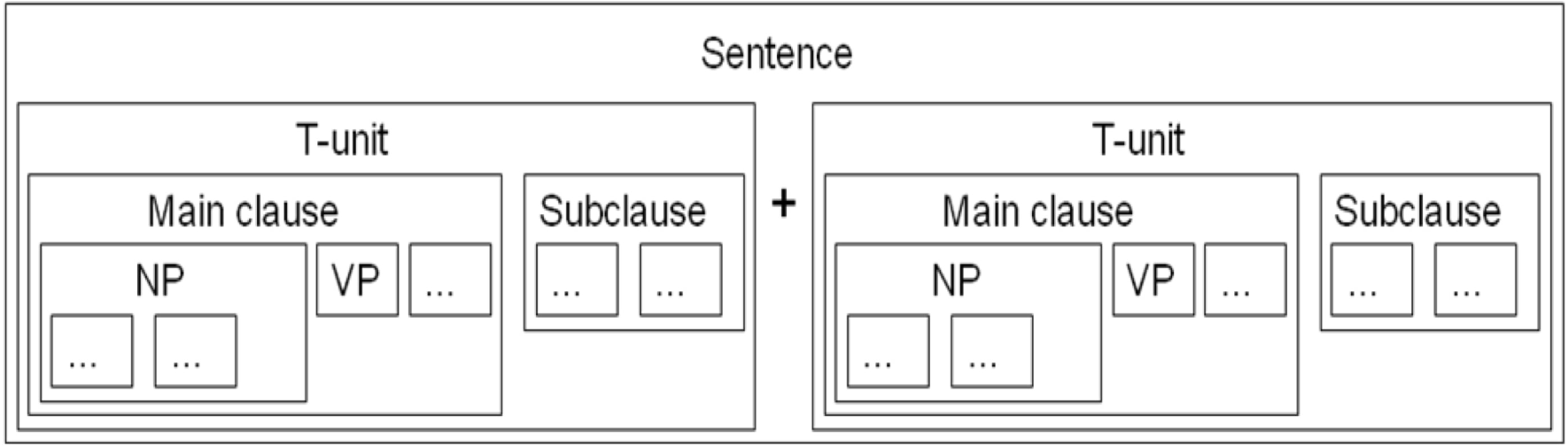
- Syntax: how words combine to form larger language units:

  phrases > *clauses* > *sentences*

Phrase: (*the man in the car*)

Clause: [*that* (*the man in the car*) (*was sleeping*)]

Sentence: { [*He says*] [*that* (*the man in the car*) (*was sleeping*)] }



Syntactic Complexity

- Most intensively measured dimension of L2 complexity
- Large repertoire of syntactic complexity measures

A. GRAMMATICAL COMPLEXITY

a. Syntactic

i. Overall

1. Mean length of T-unit
2. Mean length of c-unit
3. Mean length of turn
4. Mean length of AS-unit
5. Mean length of utterance
6. S-nodes / T-unit
7. S-nodes / AS-unit

i. Sentential - Coordination

ø Coordinated clauses / clauses

ii. Sentential - Subordination

8. Clauses / AS-unit
9. Clauses / c-unit
10. Clauses / T-unit
11. Dependent clauses / clause
12. Number of Subordinate clauses
13. Subordinate clauses / clauses
14. Subordinate clauses / dependent clauses
15. Subordinate clauses / T-unit
16. Relative clauses / T-unit
17. Verb phrases / T-unit

iii. Subsentential (Clausal + Phrasal)

18. Mean length of clause
19. S-nodes / clause

iv. Clausal

ø syntactic arguments / clause

v. Phrasal

ø Dependents or words / (N, V) phrase

vi. Other (± syntactic sophistication)

20. Frequency of passive forms
21. Frequency of infinitival phrases
22. Frequency of conjoined clauses
23. Frequency of Wh-clauses
24. Frequency of imperatives
25. Frequency of auxiliaries
26. Frequency of comparatives
27. Frequency of conditionals

Syntactic Complexity

- Most intensively measured dimension of L2 complexity
- Large repertoire of syntactic complexity measures

- What do syntactic complexity measures measure?:
  - Length of syntactic unit (phrase, clause, sentence, T-Unit, …) = overall syntactic Cxy
  - Embedding = depth or compositionality of syntactic units
  - Sophistication = cognitive or developmental difficulty of syntactic structures
  - Diversity = richness/range/size of the syntactic repertoire

Syntactic Complexity: Length measures

- **Mean Length of Unit (MLU) measures:**

1. Indicators of overall, global syntactic complexity (and of grammatical or even linguistic complexity in general?):
   - ML**S**entence
   - ML**C**lause
   - ML(**N**oun)**P**hrase.

Syntactic Complexity: Length measures

- **Mean Length of Unit (MLU) measures:**
  - Supra-Clausal Complexity: Mean Length of Sentence (MLS) :
    - nr. of words / nr. of sentences

A: 35/4 = 8.75
B: 35/2 = 17.5

  - Clausal Complexity: Mean Length of Clause (MLC) :
    - nr. of words / (finite) clauses

A: 35/5 = 7
B: 35/4 = 8.75

  - Phrasal Complexity: Mean Length of Noun Phrase (MLNP) :
    - nr. of words within NPs / nr of NPs

A: 18/6 = 3
B: 21/5 = 4.2

Syntactic Complexity: Length measures

- **Mean Length of Unit (MLU) measures:**

1. Indicators of overall, global syntactic complexity
2. Easy and automated computation: MLC, MLS (not yet MLPhrase)
3. MLU values do not increase indefinitely (also not in first language development) -> ceiling effects (esp. when learners start using ellipsis) -> loss of diagnostic value

Syntactic Complexity: Length measures

- **Mean Length of Unit (MLU) measures:**

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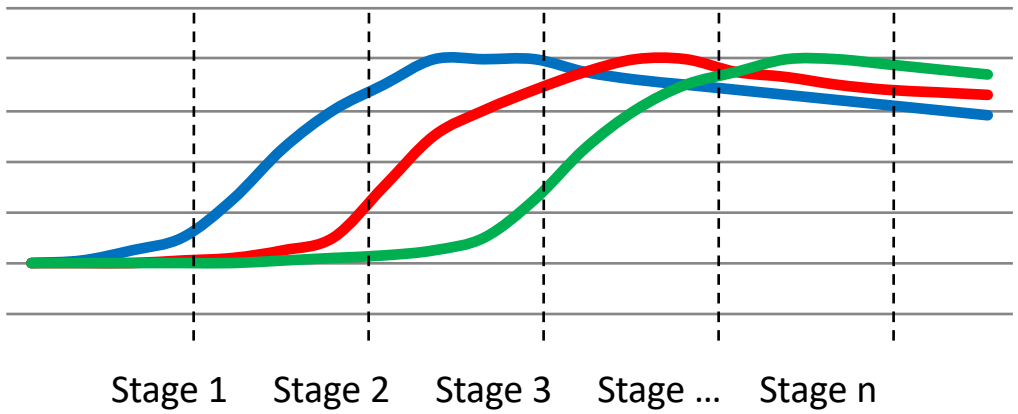
2. Easy and automated computation: MLC, MLS (not yet MLPhrase)
3. MLU values do not increase indefinitely (also not in first language development) -> ceiling effects (esp. when learners start using ellipsis) -> loss of diagnostic value
4. Increases in the lengths of different syntactic units take off and trail off at different stages of development/levels of proficiency



Syntactic Complexity: *embedding*

- Embedding: the integration of one syntactic unit in another.
- Embedding of **clauses (coordination, subordination)**:

I was born in Dresden.
Dresden was a very beautiful city.
[The Americans and British destroyed it in the War] and [this shocked me a lot.]
So I left Dresden.

[I was born in Dresden, [which was a very beautiful city] but [it was destroyed during the war by the allies forces, [which shocked me so much [that I left it]]]].

Syntactic Complexity: *embedding*

- Measures of **clause** embedding: Subordinate Clause Ratio (SCR)

  - Subordinate Clause Ratio (SCR):

$$\text{SubClause Ratio (SCR)} = \frac{\text{Subclauses}}{\text{Clauses}}$$

SCR of A: 0/5 = 0.0
SCR of B: 5/7 = 0.7

  - Coordination Clause Ratio (CCR):

$$\text{CorClause Ratio (SCR)} = \frac{\text{Coordinated clauses}}{\text{Clauses}}$$

CCR of A: 2/5 = 0.4
CCR of B: 2/7 = 0.3

Syntactic Complexity: *embedding*

- **Phrasal** embedding :

He won (the war)

He won (the war (for (independence)))

He became president **(** *after (the war (for (independence))))*

He became president **(** *after (the ((very long) and (extremely bitter)) war (for (independence))))*

- Complex NP Ratio (CxNPR):

Complex NP = NP with at least 1 determiner **+** 1 premodifier and/or 1 postmodifier

eg. *the tall man with the dog*

all my friends in Paris

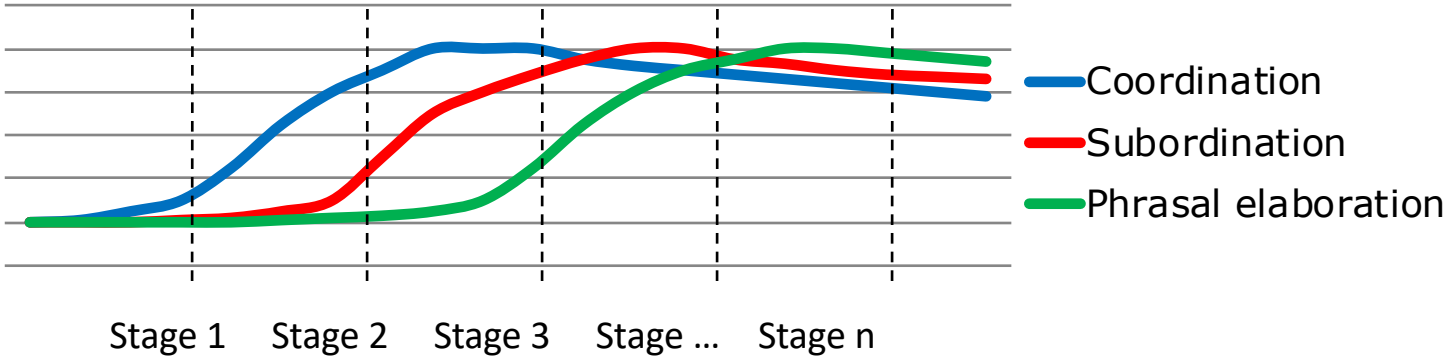
our youngest brother

$$\text{CxNP Ratio (CxNPR)} = \frac{\text{CxNPs}}{\text{NPs}}$$

CxNPR of A: 1/10 = 0.1
CxNPR of B: 2/7 = 0.3

L2 syntactic complexity development

- **lower** proficiency levels: syntactic complexification at the **sentence level**, through clause coordination
- **Intermediate** levels: syntactic complexification at the **sentence level**, through clause subordination
- **Advanced** levels: syntactic complexification at the **phrasal level, through** nominalizations and pre- and/or post-modification of the head noun.



=> Importance of measuring syntactic complexity at all 3 levels of syntax: sentential, clausal *and* phrasal level!

I was born in Dresden.
Dresden was a very beautiful city.
The Americans and British destroyed it in the War .
This shocked me a lot.
I left Dresden.

I was born in Dresden.
Dresden was a very beautiful city but the Americans and the British destroyed it during the war.
I was very shocked and so I left the city.

I was born in Dresden, which was a very beautiful city. When it was destroyed during the war by the Americans and British, I was so shocked that I left the city where I was was born and grew up.

The destruction of my beautiful native city Dresden by the allied forces during WW II so traumatized me that I left my native city.

Interim summary & comments

1. Linguistic complexity is a complex phenomenon of language; it is multidimensional, multilayered and multicomponential
2. Minimally specify whether linguistic complexity regards:
   - Lexicon, morphology, syntax (and relevant sub-levels)
   - Diversity, depth (compositionality) or sophistication
3. Most research has assessed complexity by means of objective quantitative measures rather than subjective holistic ratings. The correlation between measures and ratings is still unclear.
4. No single comprehensive measure of linguistic complexity exists. Several measures, judiciously selected, must be calculated to capture the full complexity spectrum.
5. Calculating complexity measures by hand is laboursome but it can be increasingly done automatically (for some types of complexity and some languages only).

Interim summary & comments

6. The validity and utility of linguistic complexity measures as indices of L2 proficiency and L2 development varies.
   - With the possible exception of lexical diversity measures, no complexity measure captures the full range of L2 proficiency levels or developmental stages
   - Linguistic complexity (esp. morphological and syntactic complexity) does not develop linearly. Periods of rapid development alternate with periods of relative stability or even backsliding (possible competition with accuracy and fluency)
   - Esp. from intermediate levels of proficiency onwards, fluctuations in linguistic complexity may also reflect language-specific and individual rhetorical choices (stylistic differences between oral/written and informal/formal language, between different discourse genres, between individual preferences).

Interim summary & comments

7. Linguistic complexity is not the same as language proficiency. Linguistically complex language is not necessarily proficient, mature, communicatively adequate or effective language.

   Being a complex speaker/writer is not the same as being a proficient, (communicatively) competent, mature, or effective speaker/writer.

I am practically industrious — painstaking, a workman to execute with perseverance and labour — but besides this there is a love for the marvellous, a belief in the marvellous, intertwined in all my projects, which hurries me out of the common pathways of men, even to the wild sea and unvisited regions I am about to explore.

– Mary Shelley, Frankenstein

She's just having a bad time. The initial labor is usually protracted. She's only having a bad time. Afterward we'd say what a bad time. And Catherine would say it wasn't really so bad. But what if she should die? She can't die. Yes, but what if she should die? She can't, I tell you. Don't be a fool. It's just a bad time.

-Ernest Hemingway, A Farewell to Arms

Overview

1. What is (linguistic) complexity?
2. How can (linguistic) complexity be analysed and measured?
3. **How can (linguistic) complexity, and its analysis, be of relevance to language practicioners (esp. teachers).**

Relevance of complexity analysis for language practicioners

- Potential relevance for language testers, text book and material developers, and teachers.
- Within the larger context of testing and teaching for linguistic-communicative competence.
- Raising (some) language practicioners' awareness about and insight in complexity (and fluency) as constructs so that their meanings become more explicit and precise.
- Raise teachers' and other practicioners' awareness about the developmental dynamics of linguistic complexity so that proficiency level-appropriate achievement goals regarding esp. syntactic complexity can be defined.

Relevance of complexity analysis for language practicioners

- Teach for linguistic complexity?: Raise students' awareness about the complexity (structural diversity and sophistication) of their vocabulary and sentences in accordance to communicative goals and sociopragmatic conditions.

Questions?
Comments?

(Let’s keep it simple)

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