Linguistics as a Model for the Cognitive Approaches in Biblical Studies
“Linguistics as a Model for the Cognitive Approaches in Biblical Studies”? 2011: The interaction of three disciplines
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2011: The interaction of three disciplines

Biblical studies

International SBL 2011

Linguistics

Cognitive studies

SBL Program Unit “Mind, Society, and Tradition”

This talk
What Cognitive Science (CS) is and is not about?

- CS is not about ‘cognition’, in the traditional sense,
  - excluding perception, irrational emotions, behavior, society…

- CS is about ‘cognition’ in the following sense:
  - mental functions of the human brain/mind, which require
  - information processing ability in the brain/mind, hence:
    1. computational aspects of CS,
    2. biological, psychological, neurological aspects of CS.
The cognitive turn in linguistics (1)

- Language viewed as
  - a biological phenomenon,
  - a product of the human brain,
  - which develops in childhood,
  - and evolved as a mental capacity of *Homo sapiens*.
The cognitive turn in linguistics (2): An over-simplified history of linguistics

<table>
<thead>
<tr>
<th>Middle Ages</th>
<th>“Philological” linguistics</th>
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Language belongs to...
The cognitive turn in linguistics (2):
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**The cognitive turn in linguistics (2): An over-simplified history of linguistics**

<table>
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<tr>
<th>Period</th>
<th>Approach</th>
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## The cognitive turn in religious studies:

**An over-simplified history of Biblical studies**

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<tr>
<th>Time Period</th>
<th>Approach</th>
<th>Biblically</th>
<th>Theologically</th>
</tr>
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<td>Middle Ages</td>
<td><em>Theology</em></td>
<td>...religious practice.</td>
<td>...the believer.</td>
</tr>
<tr>
<td>End 19th and 20th century</td>
<td><em>Historical approach</em></td>
<td>... the history of a religion.</td>
<td>... a people or a religion.</td>
</tr>
<tr>
<td>2nd half of 20th century</td>
<td><em>Structuralist and social</em></td>
<td>... studying communities.</td>
<td>... a society.</td>
</tr>
<tr>
<td>1st half of 21st century</td>
<td><em>Cognitive approaches</em></td>
<td>... studying human brain.</td>
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The cognitive turn in linguistics (3)

- Language produced by the human brain *in vivo*:
  - *Psycholinguistics, neurolinguistics.*

- Language produced by the computer *in silico*:
  - *Computational linguistics, language technology.*

- Language *as such*:
  - *Theoretical linguistics*: combine the best of pre-generative scholarly traditions with the best of cognitive science.
Parallels in the Cognitive Science of Religion

- Religion produced by the human brain *in vivo*:
  - *Psychology and neurology of religion, experimental CSR.*

- Religion produced by the computer *in silico*:
  - *Comp models. “CSR technology” supports policy making.*

- Religion *as such*:
  - *Religious studies: combine the best of pre-cognitive scholarly traditions with the best of cognitive science.*
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The cognitive turn in linguistics (4)

- Adopting methodologies from cognitive sciences:
  - Biology-motivated research questions: brain imaging, evolutionary history of language, etc.
- Formal models:
  - more precise formulations of the theories,
  - such that they can be implemented on computers, analyzed using mathematical tools, etc.
The cognitive turn in religious studies

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_HARDLY EXISTING! (as yet)_
Formal models in linguistics: Chomsky

Structuralist concepts turned into formalism:

- **Phrases** → phrase structure grammars, syntactic trees.
- (Binary) **distinctive features**:
  - Prague school (1930’s), Roman Jakobson:
    - For instance: *voiced* vs. *unvoiced*, *nasal* vs. *non-nasal*.
  - **Rules** in generative phonology (Chomsky & Halle 1968):
    - Word-final devoicing: [+voice] → [-voiced] / ___ #
    - Nasal assimilation: [+nasal] → [α place] / ___ [α place]
Formal models in linguistics: Chomsky

- German has word-final devoicing. English does not.
- What is different in the brain/mind of EN vs. DE speakers?
- Rules à la Chomsky & Halle (1968):
  - Phonology of German contains the rule
    \[ [+\text{voice}] \rightarrow [+\text{voiced}] / _/ __ # \]
    Applied to /hauz/, and get [haus]. Not applied to /hauz+er/.
  - Phonology of English does not contain this rule: [hauz].
  - Model: different rules in different speakers’ brain/mind.
Formal models in linguistics: Smolensky

- German has word-final devoicing. English does not.
- What is different in the brain/mind of EN vs. DE speakers?
- Constraints à la Prince and Smolensky (1993/2004):
  - Input: /haus/. Candidates: [haus] and [hauz].
  - Constraints: No_wordfinal.voiced; Faithful_to_input.
  - English $H_{EN}$: Faithful_to_input >> No_wordfinal.voiced $\rightarrow$ [hauz]
  - German $H_{DE}$: No_wordfinal.voiced >> Faithful_to_input $\rightarrow$ [haus]
- Model: different harmony in different speakers’ brain/mind.
Formal models in linguistics: Smolensky

Connectionist (neural network) underpinning of

- **Optimality Theory** (Prince and Smolensky 1993/2004):
  - Set of candidates: forms that occur in languages.
  - Each language \( L \) has specific harmony function \( H_L \).
  - Language \( L \) chooses best candidate, with respect to \( H_L \).
  - Neural networks can optimize such harmony functions. Hence, plausible model of the mind/brain.
The cognitive turn in linguistics: summary

- Why are grammars similar & different?
- Let us understand language in human mind/brain:
  - Bottom-up approach: psycho/neuro-linguistics.
  - Top-down approach: knowledge and methods accumulated by past generations of scholars, developed into formal, computable, but also neurologically plausible models.
- Thereby explain observed phenomena in phonology, morphology, syntax, semantics…
The cognitive turn in religious studies

- Why are religions similar & different?
- Let us understand religion in human mind/brain:
  - Bottom-up approach: ‘psycho/neuro-study’ of religion.
  - Top-down approach: knowledge and methods accumulated by past generations of scholars, developed into formal, computable, but also neurologically plausible models.
- Thereby explain observed phenomena: Bible (its text, history, reception…): such a phenomenon!
The cognitive turn in Biblical studies

- Refer to motifs and topics popular in CS or CSR when reading the Bible, or studying its reception.

- View its author/redactor/transmitter/copyist/translator/reader as a *Homo sapiens* with specific mental setup, as known from (or, at least, modeled by) CS and CSR.

- Use the Bible (its text, motifs, history, reception, etc.) as source of data falsifying/corroborating/improving theories in CS and CSR.
Thank you for your attention!

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Center for Religion and Cognition: http://www.religionandcognition.com/crc/