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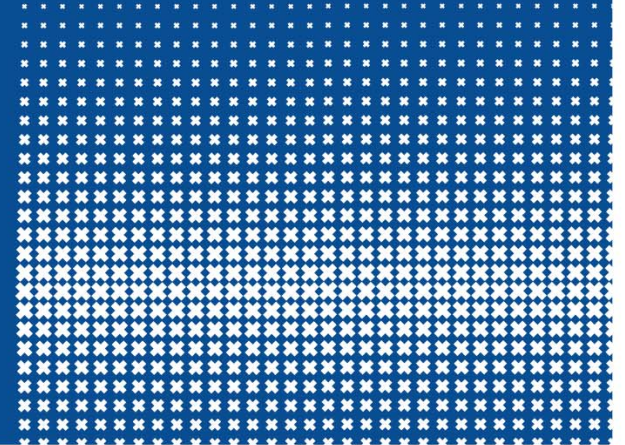
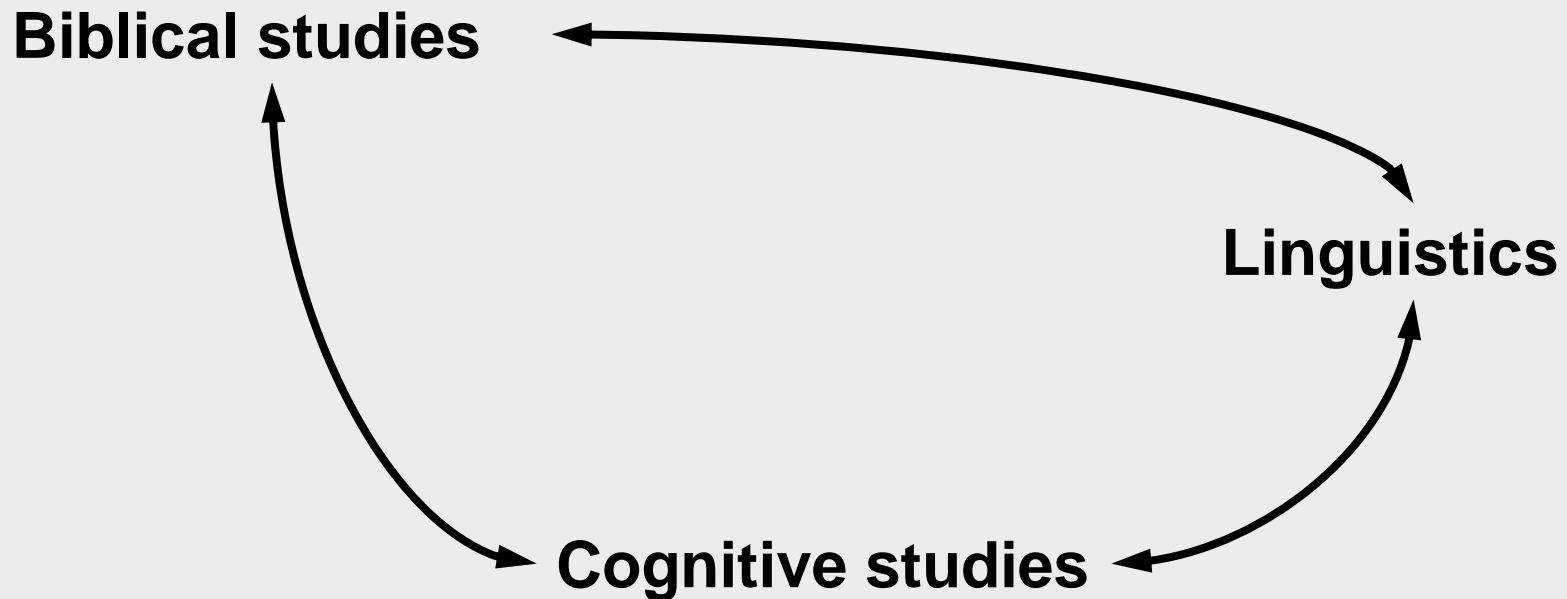**Tamás Biró**   SBL, London, 4 July 2011

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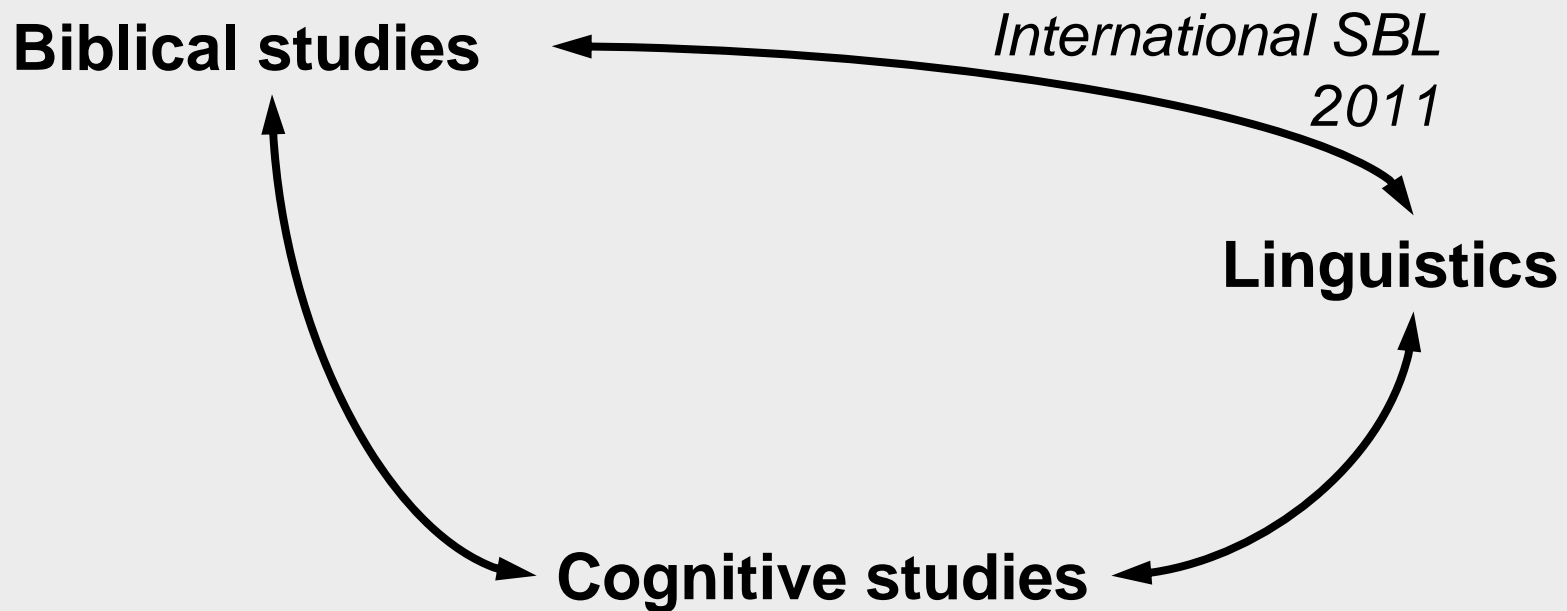
"Linguistics as a Model for the Cognitive Approaches in Biblical Studies"? 2011: The interaction of three disciplines

Biblical studies

Linguistics

Cognitive studies

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

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SBL Program Unit "Mind, Society, and Tradition"

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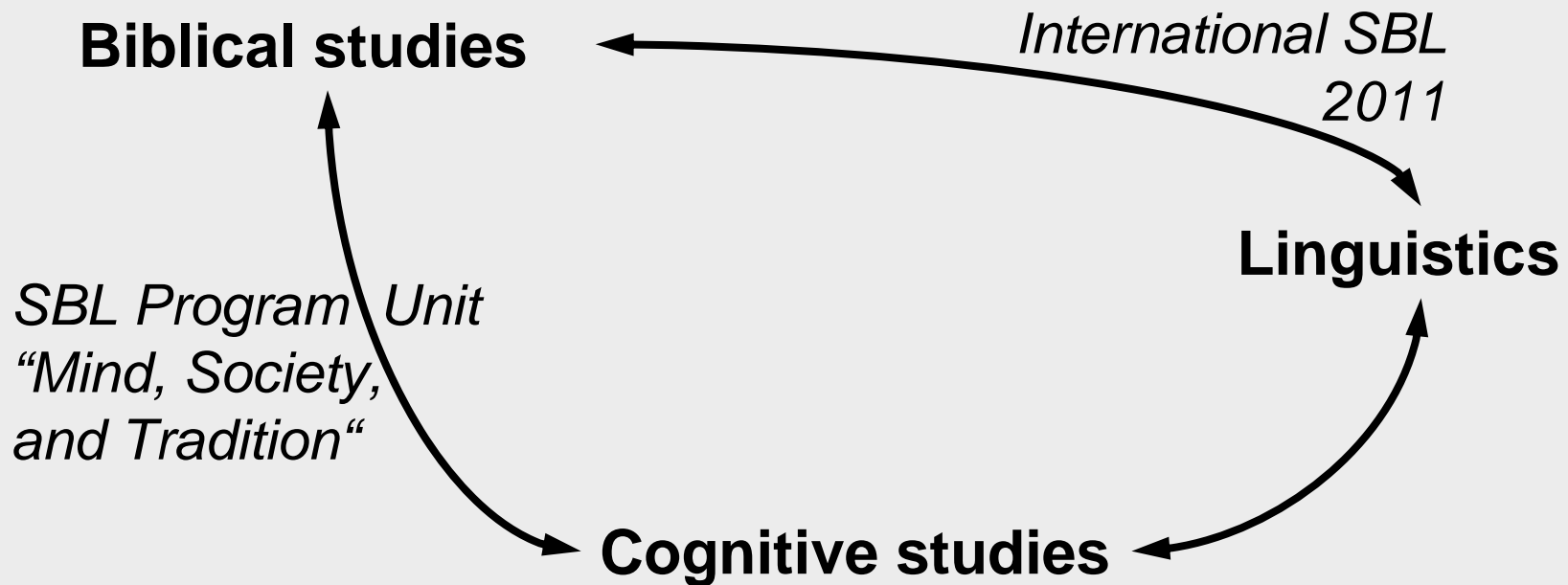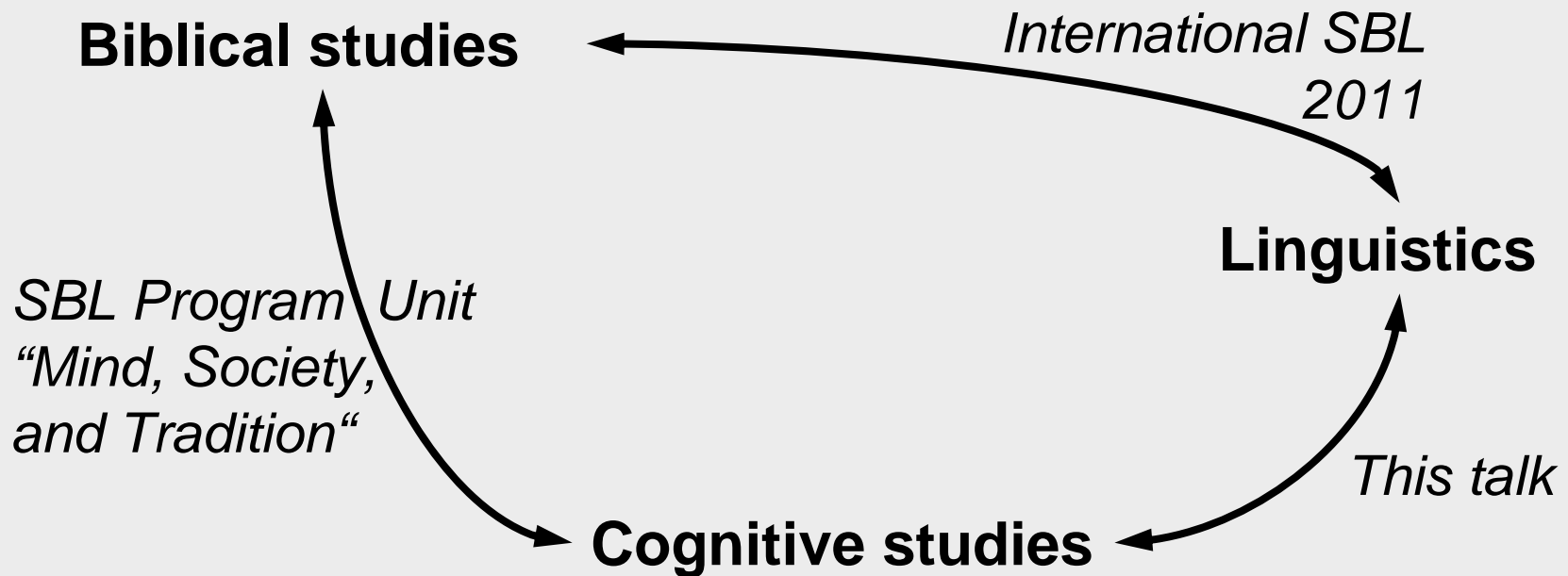
Biblical studies

International SBL 2011

Linguistics

SBL Program Unit "Mind, Society, and Tradition"

This talk

Cognitive studies

What Cognitive Science (CS) *is* and *is not* about?

- CS is <u>not</u> about 'cognition', in the traditional sense,

    - excluding perception, irrational emotions, behavior, society…

- CS is about 'cognition' in the following sense:

    - <u>mental functions</u> of the human brain/mind, which require

    - <u>information processing</u> ability in the brain/mind, hence:

        (1) computational aspects of CS,

        (2) biological, psychological, neurological aspects of CS.

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The cognitive turn in linguistics (1)

■ Language viewed as

  ■ a biological phenomenon,

Learnability

  ■ a product of the human brain,

  ■ which develops in childhood,

  ■ and evolved as a mental capacity of *Homo sapiens.*

Evolution

Tamás Biró: *Linguistics as a Model for the Cognitive Approaches…*   7/25

The cognitive turn in linguistics (2):
An over-simplified history of linguistics

		Linguistics is a tool to…	Language belongs to…
Middle Ages	*"Philological" linguistics*	…analyze (holy) texts.	… a text or author.

The cognitive turn in linguistics (2):
An over-simplified history of linguistics

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End 18th and 19th century	*Historical linguistics*	… the history of a nation.	… a nation or people.

The cognitive turn in linguistics (2):
An over-simplified history of linguistics

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1st half of 20th century	*Structuralist linguistics*	… studying human signs.	… a society.

The cognitive turn in linguistics (2):
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1st half of 20th century	*Structuralist linguistics*	… studying human signs.	… a society.
2nd half of 20th century	*Generative linguistics*	… studying human brain.	… a brain or a species.

The cognitive turn in religious studies:
An over-simplified history of Biblical studies

		Bible study is a tool to…	The Bible belongs to…
Middle Ages	*Theology*	…religious practice.	…the believer.
End 19th and 20th century	*Historical approach*	… the history of a religion.	… a people or a religion.
2nd half of 20th century	*Structuralist and social*	… studying communities.	… a society.
1st half of 21st century	*Cognitive approaches*	… studying human brain.	… a brain or a species.

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.

What Cognitive Science (CS) *is* and *is not* about?

- CS is *not* about 'cognition', in the traditional sense,

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- CS is about 'cognition' in the following sense:

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    (1) computational aspects of CS,

    (2) biological, psychological, neurological aspects of CS.

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

- Adopting methodologies from cognitive sciences:

  - Biology-motivated research questions: brain imaging, evolutionary history of religion, etc.

  - Formal models:

    HARDLY EXISTING! (as yet)

    - more precise formulations of the theories,

    - such that they can be implemented on computers, analyzed using mathematical tools, etc.

Formal models in linguistics: Chomsky

Structuralist concepts turned into formalism:

■ <u>Phrases</u> → phrase structure grammars, syntactic <u>trees</u>.

■ (Binary) <u>distinctive features</u>:

  ■ Prague school (1930's), Roman Jakobson:

    ■ For instance: *voiced* vs. *unvoiced, nasal* vs. *non-nasal.*

  ■ <u>Rules</u> 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].

   ■ <u>Model</u>: different rules in different speakers' brain/mind.

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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: /hauz/.   Candidates: [haus] and [hauz].

   ■ Constraints: No_wordfinal_voiced; Faithful_to_input.

   ■ English H_{EN}: Faithful_to_input >> No_wordfinal_voiced → [hauz]

   ■ German H_{DE}: No_wordfinal_voiced >> Faithful_to_input → [haus]

   ■ <u>Model</u>: different harmony in different speakers' brain/mind.

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Formal models in linguistics: Smolensky

Connectionist (neural network) underpinning of

- <u>Optimality Theory</u> (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, <u>plausible model of the mind/brain</u>.

The cognitive turn in linguistics: summary

- Why are <u>grammars</u> 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 <u>religions</u> 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!

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The cognitive turn in Biblical studies

■ Refer to <u>motifs and topics</u> 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 <u>mental setup</u>, as known from (or, at least, modeled by) CS and CSR.

■ Use the Bible (its text, motifs, history, reception, etc.) as <u>source of data</u> falsifying/corroborating/improving theories in CS and CSR.

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Thank you for your attention!

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