Toward an integrated analysis of verbal and visual data: The quest for expertise indicators

Toward an integrated analysis of verbal and visual data
—
the quest for expertise indicators

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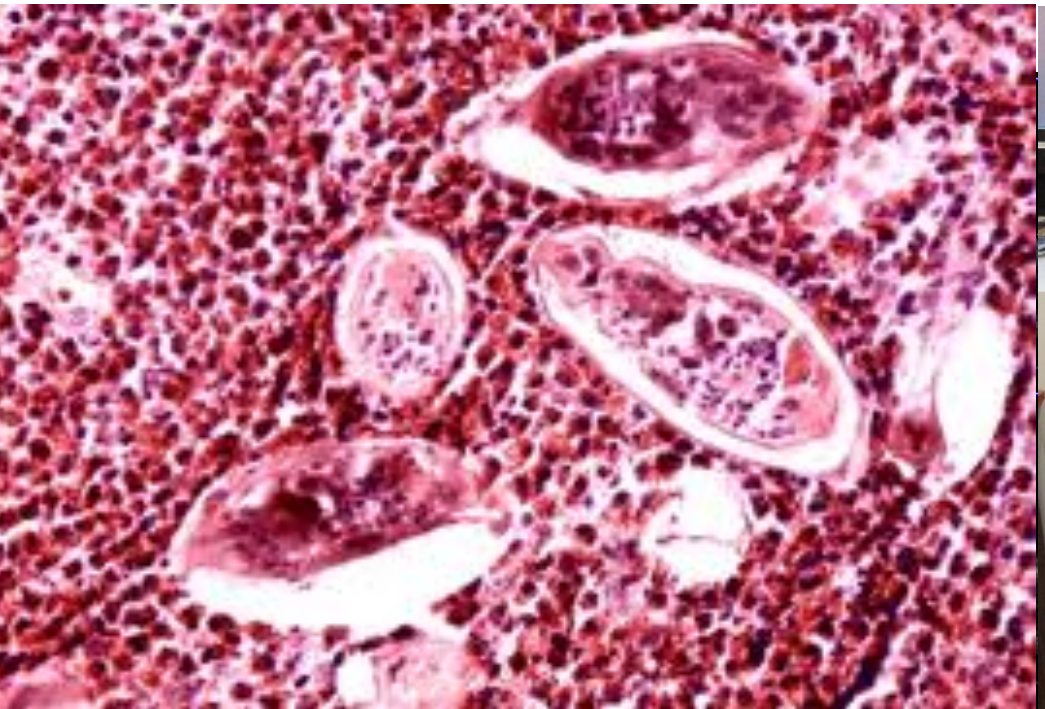
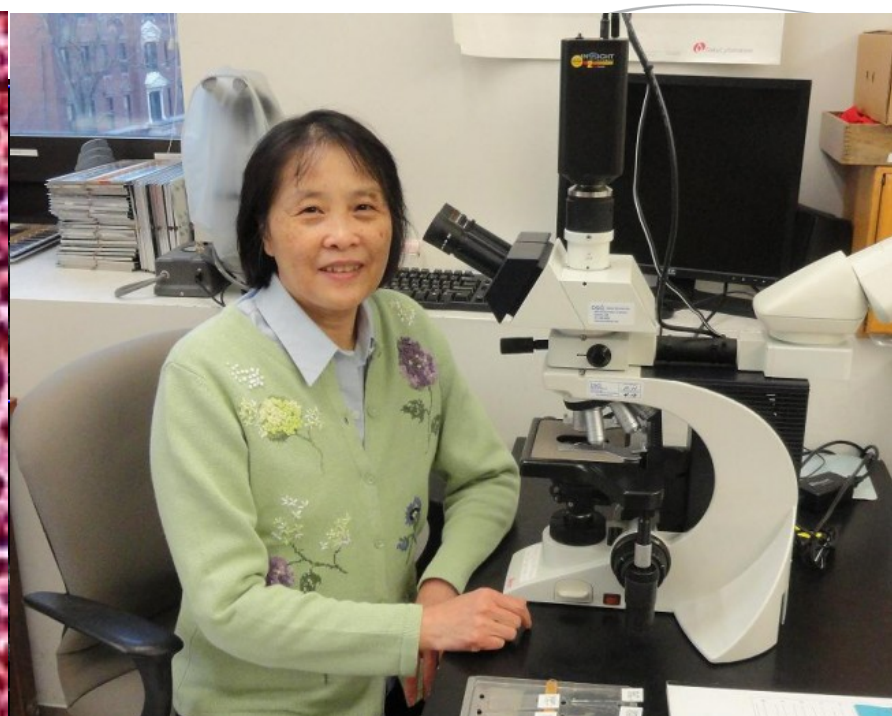
Goal

- Develop a theory of medical expertise development in visual domains
- … with the aim to develop instruction and support for different levels of development

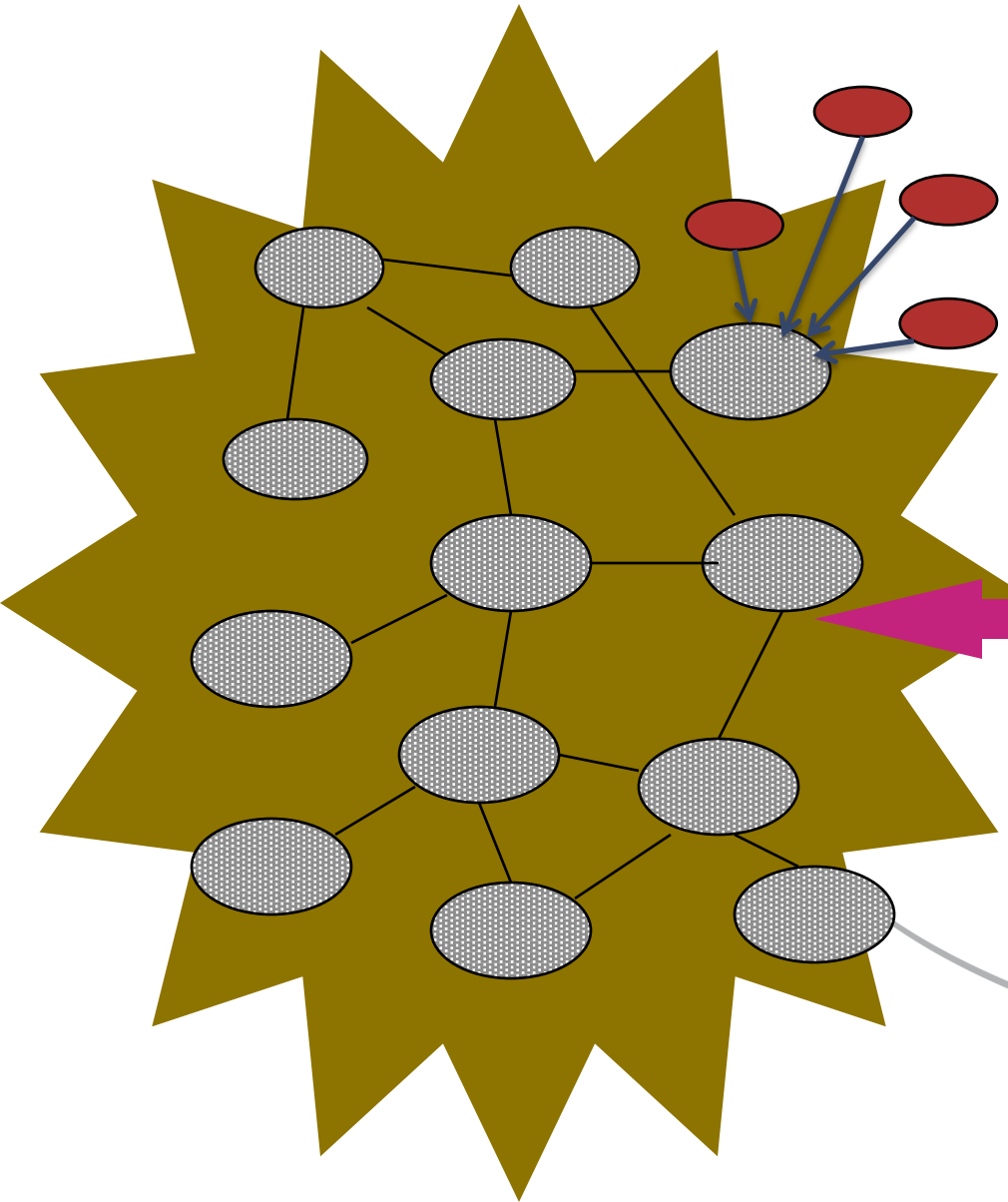




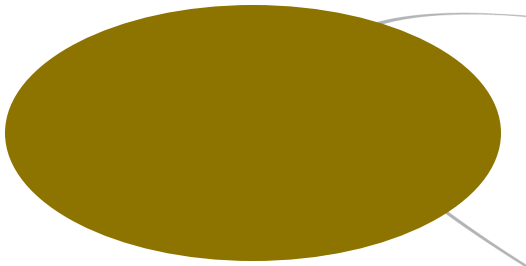
What is the problem?

- Expertise theories have been developed in non-visuals domains and paradigms
  - Problem solving in these studies departed from 'pre-digested' information, using terms taught to students
- Isolated facts about expertise effects in indicators of visual information processing
  - Nothing or little about processes of information extraction
- Hardly any examples of combined analysis of visual and verbal information processing data

Encapsulation



- Large numbers of detailed, biomedical concepts are ‘encapsulated’ under higher order concepts



- that link biomedical and applied sciences

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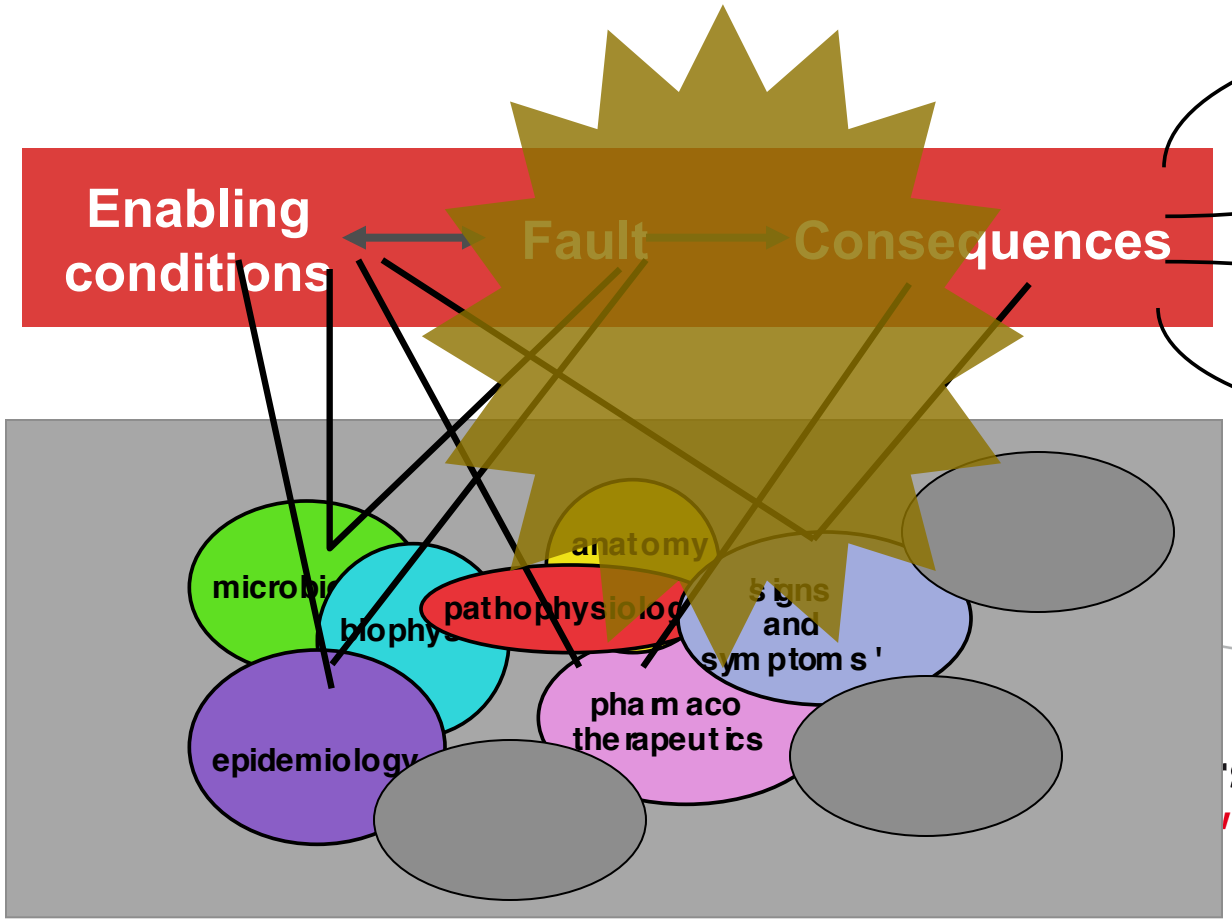
Structure of medical expert knowledge

Illness scripts

Integrated knowledge network



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Perception and expertise

- Decreased entry time
- Fewer fixations
- Longer fixation duration; larger visual span/larger functional visual field
- Anticipatory
- Increased eye-hand span

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  - But susceptible to many other influences as well (e.g., age-related) that are not fully documented so far

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Complications

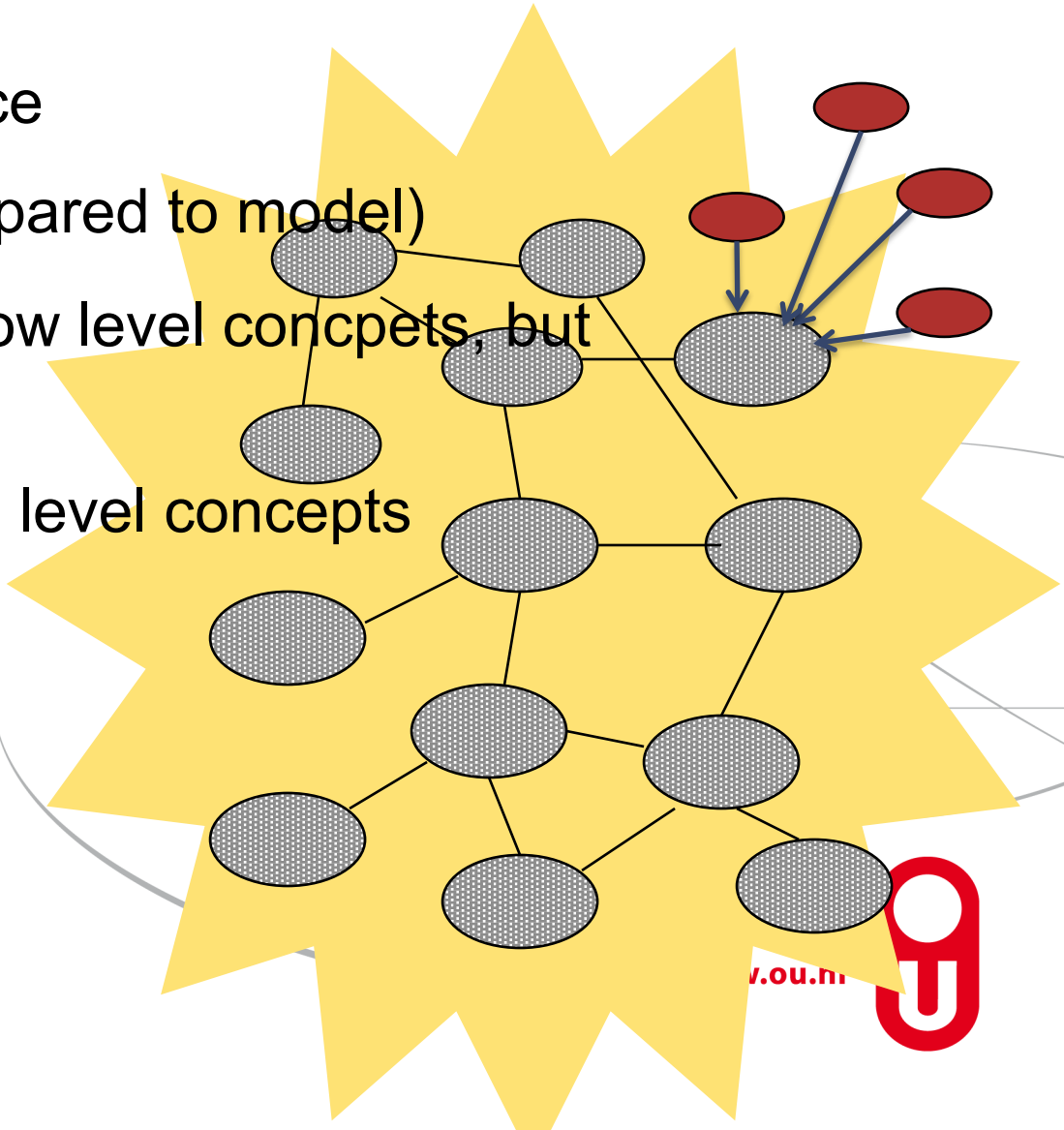
- Problem representation
  - Outcomes and explanation tasks
- Problem solving process
  - Perception & thinking

Toward a solution

- Reinvent encapsulations
- Develop visual-verbal coordination measures

Reinvent encapsulations

- Increased coherence
- Step skipping (compared to model)
- Disappearance of low level concpets, but which??
- Appearance of high level concepts
- Time



Novices	Intermediates	Intermediates & Experts	Experts
Chaos / chaotisch	Colonepitheel	Atypisch	Klierbuizen
Rustig	Coloncarcinoom	Atypie	Slijmvlies
Onrustig	Proliferatie	Groei	
Ingroei ???		Dysplasie	
Tubuli	Vergroting	Hyperchromasie	
Villi		(Kern)stapeling	
Cellen		Desmoplasie	
Weefsel		Cribriforme groei	
Structuur		(Desmoplastisch) Stroma	
Paars			
Rondjes		Crypt(en)	
		Epitheel	
Dus		Mucosa	
Daarom		Lamina propria	
Want			
Omdat		Architectuur	
Vandaar		Overzicht	
Maar			
		Diagnose	
Misschien		Passen/passend/past	
		Afwijkend(s)	
		Afwijkingen	
		Toename/toegenomen	
		Zeker	

Develop visual-verbal-manipulation coordination measures

- On scarfs and transition matrices

Daniel Richardson

Presented at ASC2012 Using eye tracking to design and evaluate education and training methods

http://tinyurl.com/CELSTEC-ASC2012

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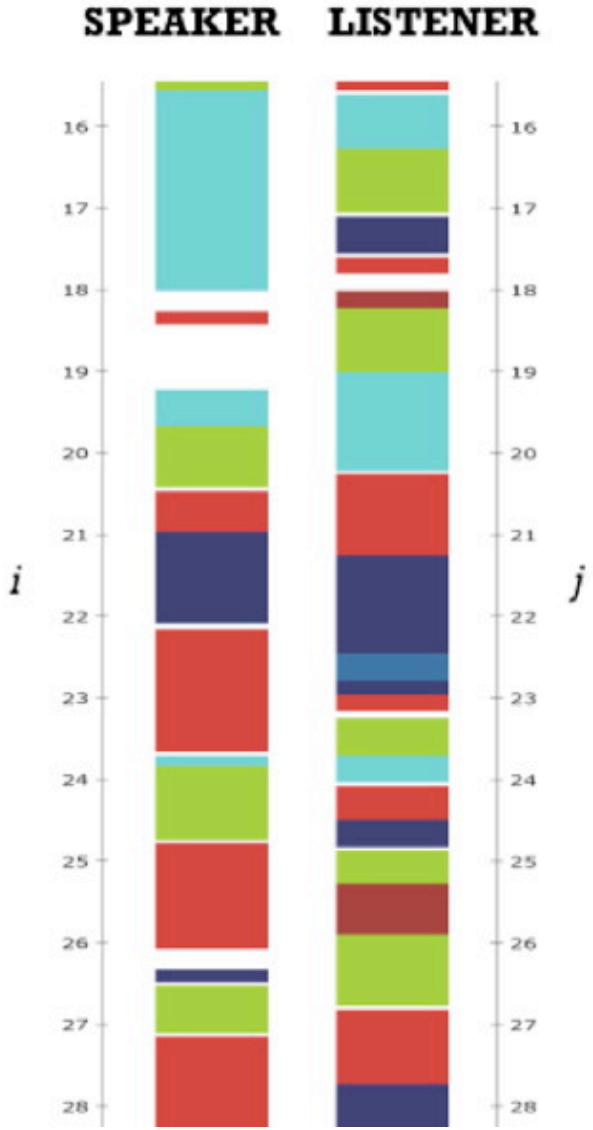
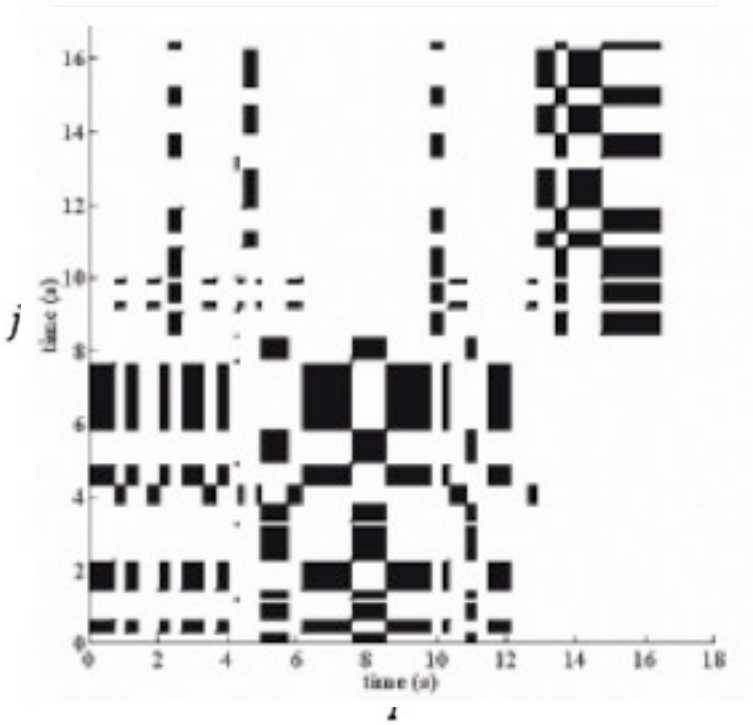
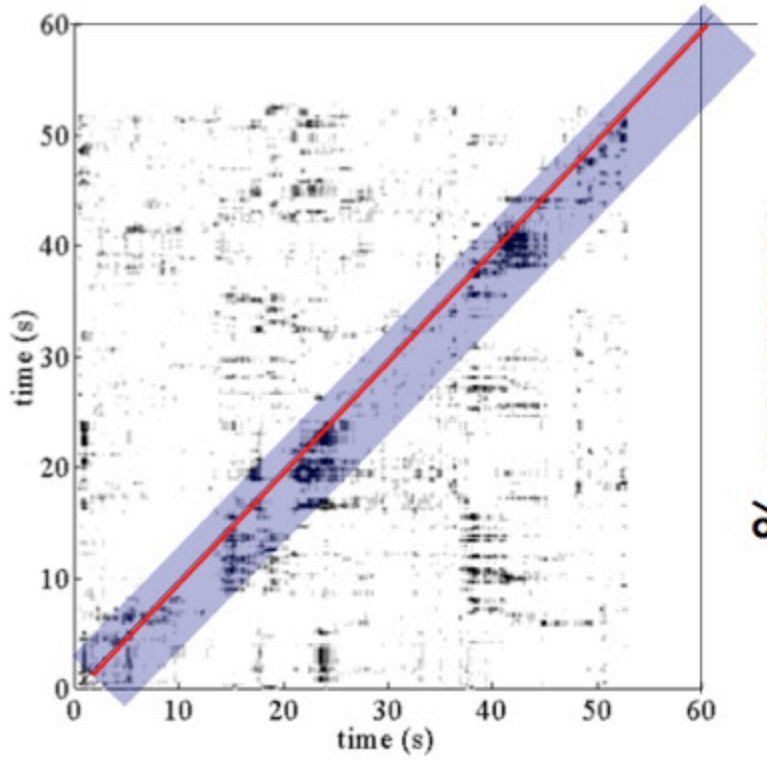
cross recurrence plots

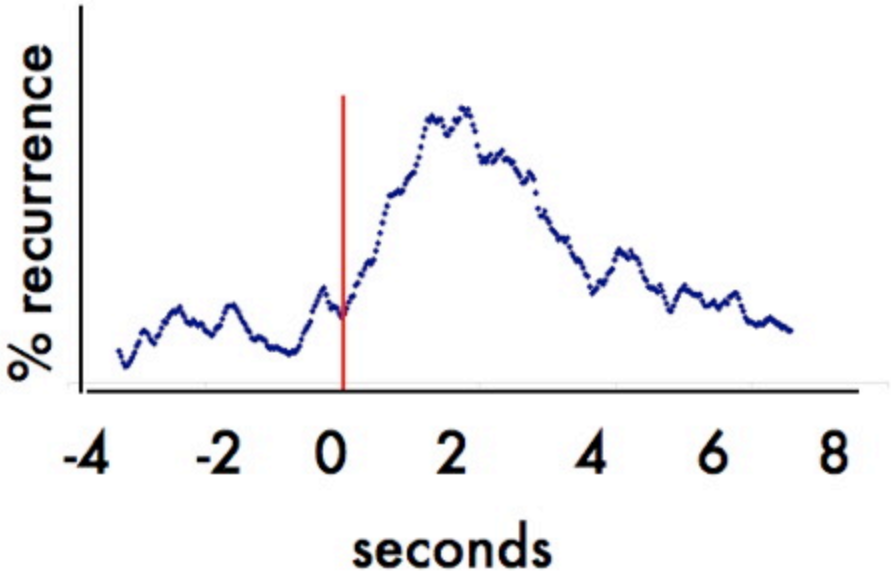




Recurrence

Recurrence at a particular time lag = density along a diagonal





49 Dyads - Superimposed CRP

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