

DRUST

Warsaw Division



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CogSys Warsaw

- <http://cognitivesystems.pl>
- a group of physicists, mathematicians and psychologists
 - problems from biology & neuroinformatics to cognitive science.
- Systemic approach, multiagent modeling, focus on communication
 - “theories for solutions”

Language

- System of social coordination
 - e.g. in categorization: Communicating populations as categorizing systems
 - in decision making in pairs/groups
- System of constraints imposed on existing interactivity

Interactivity

- Traditionally: “internal simulation”, forward model

vs

- Formation of coordinative structures
“global dynamical structures of the whole social process (...) are sufficient for keeping an interaction under way” (di Paolo et al., 2008)
- Global properties of the coordinative structures influence individual behaviour
- *“dyadic process is seen itself as formative of individual social capabilities”* (De Jaegher, 2006)

Sample project: „Conversation as a coordinative structure”

- Stability of linguistic interaction as a whole
- Consequences for subjective perception
 - Recorded conversations (Topic: neutral, engaging; Pairs: women, mixed)
 - Subjective evaluations of the quality of conversation

Was the conversation:

- natural?
- dynamic?
- harmonious?
- chaotic?
- fluent?
- verbose (long-winded)?

During the conversation you felt:

- safe
- that you both cooperate
- that you are leading the discussion
- that your partner is leading the discussion
- that you agree
- that you understand each other

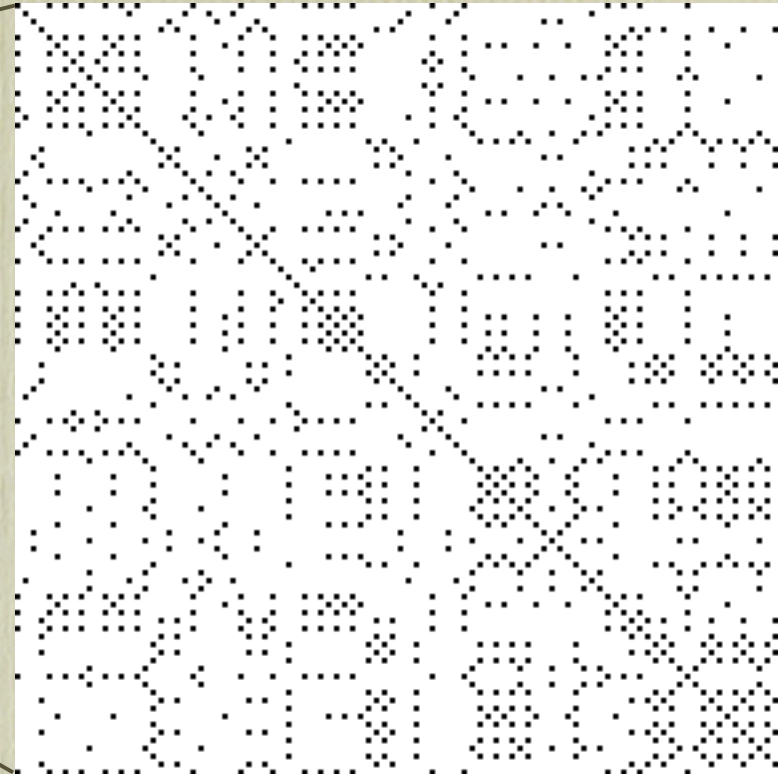
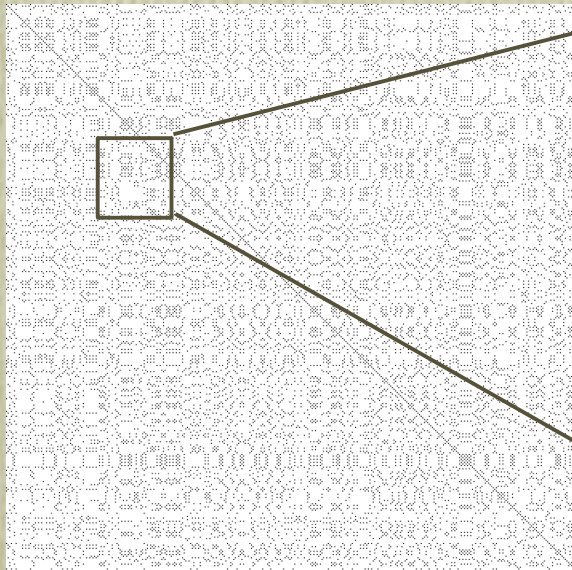
Dialog as a dynamical system.

- Selection of the methods for analyzing dynamical systems:
 - Recurrence Quantification Analysis - RQA
 - Information entropies
 - Others: Bayes analysis, dimensionality analysis, reaction to perturbation, ...

Appropriate description

- In order to discover an emergent properties of such a dynamical system one must use appropriate event coding system:
 - Turns of every person are coded.
 - We account for:
 - short, medium and long turns
 - silence and simultaneous talk

RQ - plots



RR ~ number of dots

DET ~ fraction of the dotted area which form a diagonal lines

Was the conversation:

- **natural**: RR (0.50), ENT (-0.41)
- dynamic?
- **harmonious**: DET (0.42) , ENT (-0.41)
- **verbose (long-winded)**: ENT (0.67), RR(-0.51), DET(-0.49)
- **safe**: DET (-0.47) ???

Entropy - unpredictability,

RR - how often a single event recurses,

DET - how often a sequence of events recurses during entire dialog.

Further research:

- Other methods of dynamical systems analysis
- Other variables: prosody (fundamental frequency contour)

Thank You for your attention.