Aalto University
School of Science

Systems Intelligence

Co-directors of the research group:

Profs. Raimo P. Hämäläinen and Esa Saarinen

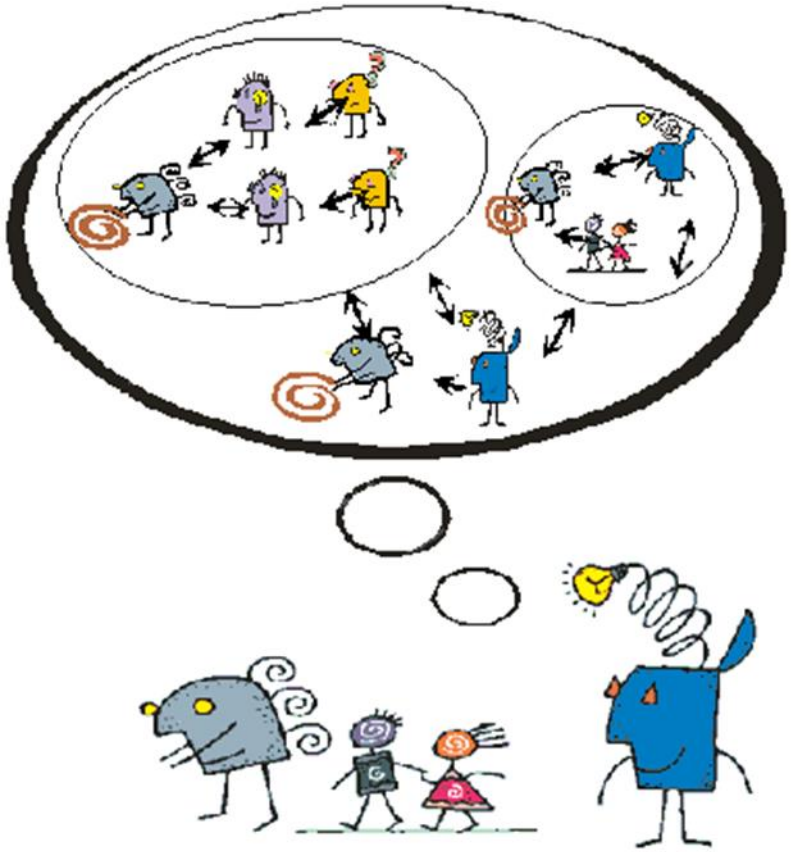
Aalto University

Systems Analysis Laboratory

http://systemsintelligence.aalto.fi/

Systems Analysis Laboratory

Starting point: Thinking about thinking



We live in systems

- **We always live and act as a part of a whole** with interactions **i.e. a system** (family, school, work, community, etc.)
- We cannot avoid the influence of the system on us and our influence on the systems and stay outside of it

As soon as there are two persons there is a system

The interactive brain works in a system

Observable variables and signals – inputs/outputs:
Actions, behavior, speech, bodily movements, etc.

Non-observable variables:
Intentions, expectations, beliefs, emotions, feelings etc.

Structural elements:
Context, organization, communication channels, feedback time, resources constraints

Systems intelligence

- Intelligent behaviour in the context of complex systems involving interaction,dynamics and feedback

- **Acting as part of the system trying to understand and look for constructive ways from within the system**

The brain is home to intelligence

The interactive brain is home to systems intelligence

Multiple intelligences
(Howard Gardner 1983)

- Linguistic Intelligence
- Musical Intelligence
- Logical-Mathematical Intelligence
- Spatial Intelligence
- Bodily-Kinesthetic Intelligence
- The Personal Intelligences – intra / inter
- **Gardner: These do not yet explain higher-level cognitive capacities e.g. common sense, metaphorical capacity or wisdom**

SI and multiple intelligences

Links intelligence with the concept of system

- Systems Intelligence is another important higher level cognitive capacity
- Embedds emotional and social intelligence

- Systems Intelligence is a survival asset we have as a species

5 Levels of SI

1. Seeing oneself in the System – Ability to see oneself and ones roles and behaviour in the system. Also through the eyes of other people and with different framings of the system. Systems thinking awareness.
2. Thinking about Systems Intelligence – Ability to envision and identify productive ways of behaviour for oneself in the system and understanding systemic possibilities.
3. Managing Systems Intelligence – Ability to personally excercise productive ways of behaviour in the system.
4. Sustaining Systems Intelligence – Ability to continue and foster systems intelligent behaviour in the long run .
5. Leadership with Systems Intelligence – Ability to initiate and create systems intelligent organizations

Measuring SI

- Self evaluation test, 50 questions
- Open to all:

  link on the page systemsintelligence.aalto.fi/

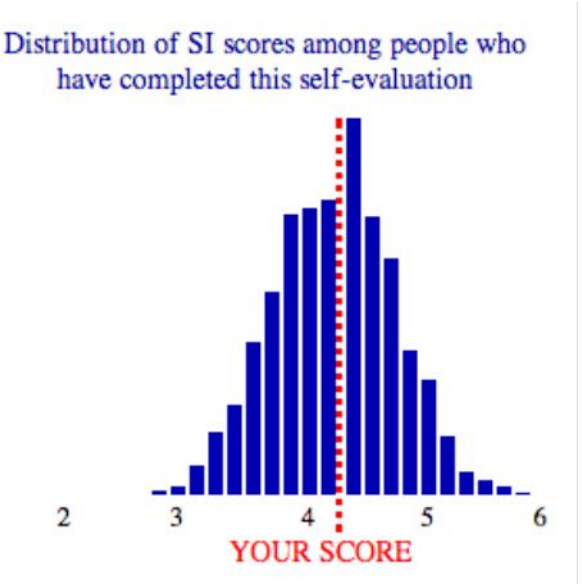
Your style

Based on your answers, it seems that your strengths include

- **Wisdom:** You can face things maturely and consider your actions.
- **Reflection:** You are able to analyze your own thinking and acting. This is a remarkable strength of yours.
- **Attunement:** You have an open mind. You listen and understand other people.

If you're interested in developing yourself, here are a couple of suggestions:

- **Engagement with People:** Show more interest towards people and their doings. Ask, listen, praise and cheer!
- **Effective Responsiveness:** Think what would be the real solution in difficult situations and take/seize the challenge.



Factors of systems intelligence

Psychometric analysis
(M.Sc. Juha Törmänen)

1. Systemic Perception
2. Attunement
3. Attitude
4. Spirited Discovery
5. Reflection
6. Wise Action
7. Positive Engagement
8. Active Responsiveness

Correlation with other psychological traits

1. Systemic Perception

+ Competence (0.59)
- Neuroticism (-0.56)
- Vulnerability (-0.56)

2. Attunement

+ Agreeableness (0.64)
+ Emotional intelligence (0.56)
+ Altruism (0.55)

3. Attitude

- Neuroticism (-0.76)
- Anxiety (-0.69)
- Depression (-0.67)

4. Spirited Discovery

+ Openness (0.73)
+ Openness to actions (0.68)
+ Excitement seeking (0.57)

5. Reflection

•+ Openness (0.55)
+ Emotional intelligence (0.55)
+ Openness to aesthetics (0.45)

6. Wise Action

•- Neuroticism (-0.61)
- Angry hostility (-0.59)
- Vulnerability (-0.50)

7. Positive Engagement

•+ Emotional intelligence (0.66)
•+ Warmth (0.64)
+ Extraversion (0.60)

8. Active Responsiveness

•+ Conscientiousness (0.59)
+ Self-discipline (0.54)
+ Dutifulness (0.47)

SI behavior in conversations

- **Conversations can get stuck**, if everyone just keeps **advocating** his/her own views

- **Inquiry of other person's views broadens the scope** of discussion

INQUIRY

ADVOCACY	Low	High
High	**Telling** Testing Asserting Explaining Dictating (Dysfunctional)	**Generating** Skilful discussion Dialogue Politicking (Dysfunctional)
Low	**Observing** Bystanding Sensing Withdrawing (Dysfunctional)	**Asking** Clarifying Interviewing Interregating (Dysfunctional)

Measuring reactions in SI thinking
(PhD Mikko Viinikainen)

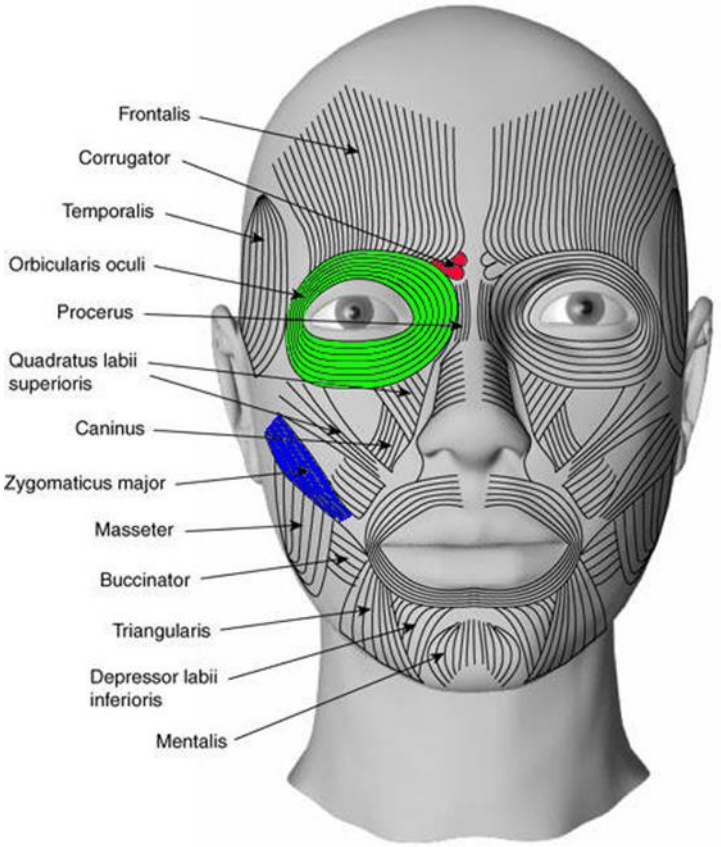
- **Inquiry:** asking and showing interest in others' views
- **Advocacy:** argumentation that promotes your own views

- In good dialogue, inquiry and advocacy are in balance
  = Systems intelligent behavior

Psychophysiological measurements

Facial muscle EMG

- **Zygomaticus major**
  ”Smile muscle”
- **Orbicularis oculi**
  Orbicular muscle around the eye
- **Corrugator supercilii**
  ”Wrinkle muscle” above the eye-brow



Experiment

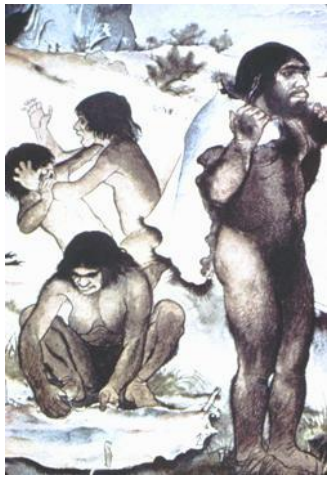
- Subjects are shown pictures of persons and their one-sentence expressions
- Subjects perform the task in their minds
- ***inquire more***
- ***counter-argue***
- ***be passive***

”Hunting is a great hobby”

Results

- **Inquiry** to increases activity in the zygomaticus and orbicularis **reflecting positive emotions**
- **Advocacy** to increases activity in the corrugator **reflecting negative emotions**
- Inquiry is a way to make conversations more positive

Games people play



In experimental games:

People do not take everything for themselves.

We have ongoing experiments on the evolution of co-operation in Stackelberg games

Ecological systems intelligence

- **Evolutionary processes exhibit a spontaneous emergence of co-operation generating superior overall behaviour for all the actors**
- **A manifestation of ecological Systems Intelligence?**

SI in different contexts

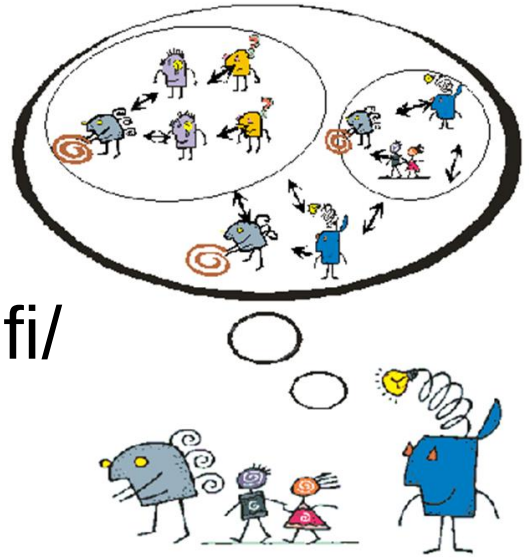
- Articles and theses
  - Systems Thinking
  - Communication
  - Leadership
  - Positive organizational scholarship
  - Psychoanalytic therapy
  - Mother – child interaction
  - SI in conflict resolution

SI resources

Articles, presentations, essays, theses, test

at

systemsintelligence.aalto.fi/



Final conclusion after this seminar

Sense making

Interaction

Common interest

Two-Person Neuroscience

and

Systems Intelligence

Embrace each other !