Notes for AGI-11 Slides

SLIDE 1. Title. Structural Emergence in Partially Ordered Sets is the Key to Intelligence.

SLIDE 2. Overview of my research 2005 – 2011. A new knowledge base: partially ordered sets. Explanation for emergence in complex dynamical systems. A new type of inference: Emergent Inference. Indications that EI is the principle that makes the brain work. The new method detects a signal coming from the brain, and analyzes it.

SLIDE 3. Computational Experiments. The brain is viewed as a black box. Only the input/output are relevant.

SLIDE 4. The first experiment. Here is the first experiment. Discuss: permutations, memory, arguments, codomains, flux lines, synaptic connections. The “program” is actually a stream of experience received by the canonical system. Refactoring is very easy for me, but automating it has proved to be very difficult. Presumably my brain has something like the flux lines, and tries to shorten them.

SLIDE 5. The result from the first experiment. This is emergent inference. Hermann von Helmholtz (1850) predicted “unconscious inference.” The “refactored program” is a self-programmed program. The organization and partition are side effects of resource preservation. EI is a rigorous mathematical solution obtained from first principles, not a phenomenological guess or an engineering compromise. Easy to use on computers.

SLIDE 6. Claim and Conjectures. The claim is a mathematical fact. The first conjecture is fundamental for CS and CSS. The second conjecture is fundamental in Neuroscience, AI and AGI. Conjectures can not be proved. However, it would not be correct to assume without proof that a structure observed in a complex system ***is not*** the natural structure of the system.

SLIDE 7. The representation of systems by partially ordered sets. It is easy to represent systems as partially ordered sets. Much easier than actually solving the equations.

SLIDE 8. EI is “the” key to intelligence vs. EI is “a” key to intelligence? Two of my reviewers objected to my use of “the” in the title. Still, I decided to keep that word. Why? The thinking is that intelligence needs several well-differentiated parts, or components. However, each of those parts can, in turn, be converted to partially ordered set format.

SLIDE 9. Traditional AI and AGI. A stage control program will not drive your car, and you cannot play chess with a car driving program. This slide demonstrates the limitations in input range and output range of all programs. It also demonstrates why integration or self-programming will not happen automatically. There is no refactoring. All programs involved have been manually refactored by an analyst.

SLIDE 10. The Brain. The brain is naturally integrated and does its own refactoring naturally.

SLIDE 11. Emergent Inference. This is fully feathered AGI. No limitations, no constraints. EI is the only type of inference not man-made. Man-made inference (by using probabilities, for example), always contains constraints imposed by humans, in the form of parameters, or procedures. The program cannot do anything outside these man-made parameters or procedures.

SLIDE 12. Do we need a principle for intelligence? They say we don’t need to study birds to build 747’s. That’s because there is a principle for flight: the lift force (George Cayley ~1800). It came from Newton laws, and made Aeronautical Engineering possible. But there is no principle in AI. The brain is the only known intelligent machine. We must study the brain and find the principle. Then AI will be possible.

SLIDE 13. There is no intelligence in what man makes. The intelligence is in the man who makes it.