

Kognitive Arkitekturer – Øving 1

Task 1.1: What is a symbol, from the perspective of Newell and Simon?

Newell and Simon argue that symbols lie at the root of intelligent action. The symbolic systems are significant in understanding information processing and achieving intelligence. A symbol is an object or an entity which has a significance or meaning to a system. Allen Newell and Herbert Simon formulated the physical symbol system hypothesis in which physical patterns are considered symbols, and these symbols combine into structures.

Task 1.2: What is a symbol structure?

A symbol structure or symbolic expression is the combination of elementary symbols. A physical symbol system contains multiple symbol structures, and these structures contain physical symbols which are related to each other in some physical way. A physical symbol system is a collection of symbol structures which evolve over time.

Task 1.3: What does the word 'physical' mean in this context?

In this context, the word 'physical' means that the systems clearly abide by the laws of physics, meaning they are realizable by engineered systems made of engineered components. Physical symbol systems are also not restricted to human symbol systems.

Task 1.4: Besides symbols, what is the second, equally important component of a symbol system?

The second, equally important component of a symbol system are processes that operate on the symbol structures or expressions. These processes produce other expressions. The article mentions the processes of creation, modification, reproduction and destruction.

Task 1.5: Explain what this second component does

The second component (processes) operates on the expressions and produce different expressions. These processes can produce new expressions, or modify existing expressions.

Task 1.6: What is, according to Newell and Simon, the relation between a physical symbol system (PSS) and intelligent behaviour?

The relation between a physical symbol system and intelligent behaviour consists of two parts. The first being the fact that Newell and Simon stated that physical symbol systems has the necessary means to perform intelligent behaviour and actions. They also imply that humans has the characteristics of a physical symbol system, and therefore their symbolic behaviour arises.

Task 1.9: If an intelligent system interacts with the world, can all the necessary processing be symbolic? Where would non-symbolic processing be useful (or necessary) in that situation?

If an intelligent system interacts with the world, all the necessary processing would not have to be symbolic. Non-symbolic processing would be useful in any situation that would require perception. Humans intelligence is based on our ability to make rapid perceptual judgements based on pattern recognition. Intelligent systems would use a combination of symbolic processing and non-symbolic processing.

Task 1.10: What does it mean if we say that the regarded system behaves in a rational manner?

It means that the system would behave in an "Optimal" manner. How it would define what the optimal manner would be, will vary on implementation. But the end goal of a rational agent would be to reach its goal while maximizing efficiency. Newell argued that if a rational agent knew one of its action would lead to its goal, the agent would pick that action as it was the rational action to make.