

Cognitive Systems 303

2.3: Intuition

“The only really valuable thing is intuition.” — Albert Einstein

Main point: The value of the nonconscious mind

Nonconscious mind plays a large role in doing research; usually involves patterns of behaviours or beliefs learned over years of study.

Different aspects of this; often lumped together under the term “intuition”:

1. Reflexive reaction — “instinct”, “know-how” (“knew what to do intuitively.”)
   - e.g., driving – intuitively give yourself more space from to car ahead
   - very fast, based on compiled knowledge (patterns)

   - often accompanied by an “aha” feeling — creativity
   - appearance is sudden, but is the result considerable processing over time
     - preceded by intensive conscious work
     - after conscious work, need to let go…

3. Feeling that appears out of nowhere [cf Claxton] — “gut feeling”, “taste”
   - interaction with nonconscious intelligence – helps co-ordinate it with conscious intelligence (“d-mode”)
   - preceded by intensive conscious work
   - two aspects involving feelings exist (neither under conscious control)
     1. sensing that a problem exists / that something can be done ("intimation")
        - vague tension or “gut feeling”; doesn’t always happen
     2. partial information about how to do this — control of process
        - “taste” (cf. Beveridge) - what to investigate first
        - may need to evolve – helped via conscious imagery
        - trained by reading about how discoveries have been made (ASI)

Nonconscious intelligence is often more discerning than conscious one (e.g., pattern detection)
- can often make a suggestion even when consciously the situation seems incomplete
- good for integrating different sources (non-analytical – cf Schooler example)

Meanwhile, can use conscious mind to
- lift problem out of embedding context (isolate important part of pattern)
  - critical thinking
- decompose into parts (handle combinatorics/systematization/rearrangements)
- carry out mental simulation / thought experiments (visualization)
- communicate with others
- evaluate via logic (rational)

Need to combine both of these (cf. combining symbol systems and neural nets)
- avoid doing both at the same time (cf. Schooler results)
- instead: toggle back and forth between the two
Specialization of systems
- simple problems (≤ 4 variables): use conscious reasoning (System 2)
- formalized problems: use conscious reasoning (System 2)
  o need to have precise control (symbolic systems)
- less well-defined problems: use nonconscious reasoning (System 1)
  o rely on patterns (neural networks)
- novel problems: use conscious reasoning (System 2)
  o need to break out of familiar patterns; pick out what might be relevant
- uncertainly: combination of both systems
  o use conscious mind to consider several alternatives
  o use nonconscious mind to get a “feeling” about each
    ▪ recruit knowledge you might not know you have

Discovery Process
1. Get some understanding of the issues
   - ideally, get some “feel” for what’s going on
2. Generate multiple possibilities
   - possible questions (or reformulations)
   - possible answers (or at least, approaches)
3. Evaluate these possibilities—determine the best
   - check logical consistency
   - check operationalization of terms
   - examine evidence for/against particular candidates
    - etc., etc.
4. Iterate

Structured Brainstorming
1. Orientation Phase
   - ideally, get some “feel” for what’s going on
2. Generative Phase
   - list all the possibilities that seem relevant
   - no criticism; don’t think too much
3. Evaluation Phase
   - rank each of these possibilities
   - see if each makes sense
   - do not hold onto something if there’s evidence against it
4. Iterate
REAL-WORLD SEGMENT: Writing IV – Composition

1. Start with old information; end with new.

   First part "sets the stage"; last part delivers the "punchline".
   **Goal**: New information is emphasized. (Information is emphasized when at the end.)
   **Goal**: A constant rate of incoming new information.

   E.g., introducing the main characters in a story:
   " We plan to investigate this issue, as mentioned."
      - NO. "investigate this issue" is the new info; needs to be set up.
   " As mentioned, we plan to investigate this issue."
      - YES.

2. Connect sentences by starting with information/terms contained in the previous one.

   A special case of point 1. First part continues to "set the stage".

   E.g.,
   " Scientists have raised some astonishing questions about black holes. The collapse of a dead star into a point no larger than a marble creates a black hole."
      - NO. "Black hole" in second sentence is not new; is isolated from previous sentence.
   " Scientists have raised some astonishing questions about black holes. A black hole is created by the collapse of a dead star into a point no larger than a marble."
      - YES. "Black hole" connects the two sentences; enables smooth transition between them (cohesion).