

Sloman (1996) The Empirical Case for Two Systems of Reasoning

Introduction to the Problem:

- There has been a longstanding debate as to whether information is processed in parallel through an associative system or serially, through a rule-based system.

Proposed Solution:

- Both systems exist and affect and guide different types of reasoning, each processing information in a different manner

Associative System and Processing of Information:

- Parallel processor of information
- Concepts are connected to multiple concepts and associations
- More information can be represented and processed than information processed through the rule-based system
- Information is processed at a faster rate than information processed through rule-based system
- Processing of information requires little effort
- Associations occur automatically
- Rules do not limit or constrain the type of associations that can be formed; hence, allowing for more creative and novel associations to be made
- Is less precise than the rule-based system

Rule-Based System and Processing of Information:

- Information is processed sequentially, in a serial manner
- Representations are strongly constrained by rules
- Processing and representing information is effortful
- Is much more limited in the amount of information it can process and represent at a given moment (relative to the associative system).
- Is more analytic than the associative system
- Is more precise than the associative system

Associative System and Inferences:

- Associations are implicit
- “constructs estimates based on underlying statistical structure” (p. 2)
- Detects similarities in the environment, frequencies, correlations, etc.
- Makes predictions and inferences based on detected “statistical regularities” (i.e., similarity, correlations, etc.) and temporal contiguity
- The computations for detecting similarities are not represented explicitly and cannot be verbalized
- Information and inferences are often communicated to explicit awareness in the form of intuitions

Rule-Based System and Inferences:

- The system is productive and generative (i.e., can combine rules to form new “propositions”)
- Rules are abstract
- People have explicit access to these rules and can manipulate them to form new representations
- Operates in a systematic manner
- Operates in more of a mechanistic or causal manner than the associative system
- Can lead to more logical and well-structured conclusions than the associative system
- Is responsible for theory-based reasoning

Interactions between Two Systems:

- Each system is effective for accomplishing different types of goals
- Both systems can interact with one another
- When the rule-based system is used in reasoning, people typically have explicit access to the processes involved and can usually provide a verbal account for their behavior and inferences
- People are not thought to have explicit, conscious access to the computational processes that drive behaviors and inferences that are made through the associative system
- Because both systems may attempt to solve a given problem, people may come to two separate, contradictory solutions

Empirical Findings and Two Systems

- Theory-based categorization seems to be governed by the rule-based system
- Feature or similarity-based categorization seems to be governed by the associative system
- Certain reasoning problems can lead people to concurrently hold “contradictory beliefs” about the corresponding solution or judgment
- The representative heuristic has been shown to override rule-based reasoning on various reasoning and judgment tasks
- Under the appropriate conditions, the rule-based system can override or inhibit reasoning or inferences made through the associative system
- Reasoning and judgments made through the rule-based system can be strongly affected by factors besides rules, such as the belief bias
- Rule-based processing should place more of strain on working memory than processing done with the associative system
- Sloman posits that the rule-based system precedes the associative system in development
- Rule-based inferences and processes can become associative with time and practice
- People tend to use associative inferences when they do not have enough information to use the rule-based system
- People can find one conclusion to be the most logical, but yet be compelled to reject the conclusion because it “feels” incorrect