REASONING

Dictionary of Cognitive Science, edited by Olivier Houdé \cite{engel_2003}

oxfordbibliographies.com \cite{CognitiveLinguistics}

Psychology

Neurocience

Philosophy

Cognitive Linguistics

Deduction

Dual Process Theories

Johnathan Evans

Reasoning Biases

reasoning biases rooted in heuristics (everyday reasoning)
deductive competence stems from analytic processes
2 forms of rationality

Peter Wason and Jonathan Evans suggested dual process theory in 1974. In Evans' later theory, there are two distinct types of process-es: heuristic processes and ana-lytic processes.

Kahneman - System1/System2

Martin Braine

Mental Logic (Inference rules)

Primary	Secondary
Universal everyday commonsense reasoning	learned, analytical/ mathematical and not universal

Patricia Cheng & Keith Holyoak

Pragmatic Schemas

(experience based - no rules)
permission schema
obligation schema
causality schema

Philip Johnson-Laird

Mental Models
(thought experiment - no rules)

1. Build a mental representing the semantic interpretation of the premises
2. draw a conclusion from the model
3. Look for counterexamples (memory capacity and belief-bias)

Cleeremans and Jiménez

Dynamic Graded Continuum (DGC)
Instead of Dual-Process, DGC uses a continuum of reasoning that moves from implicit, to explicit, to automatic.
Differences in **representation** generate variation in forms of reasoning.

Goal oriented

Reasoning involves many sub-systems perception, information retrieval, decision making, planning, contorlling, executing.

Plans for solving problems stored in memory

Working memory
Calculation
Pragmatics

Aristotle, Socrates
Logic has to be taught

Correct reasoning vs Utility

LOGIC - [Handbook of Philosophical Logic: Volume 18]

Willard Quine, Donald Davidson, Daniel Dennet
All humans are rational by the principle of “charity”.
Natural selection - agents must have a majority of true beliefs and correct reasoning schemas.

Stephen Stich
Many competing norms of rationality

Image Schema \cite{Johnson_1987}
Frame semantics - Charles J. Fillmore
Construction grammar - Fillmore

Advocates of construction grammar argue that language and culture are not designed by people, but are 'emergent' or automatically constructed in a process which is comparable to natural selection in species.

Construction grammar is associated with concepts from cognitive linguistics that aim to show in various ways how human rational and creative behaviour is automatic and not planned

Mental Spaces Theory -

The definitive statement on mental spaces theory is Faucon-nier 1994. Dinsmore 1987 argues for the role of mental spaces in reasoning.

A seminal paper that argues that mental spaces facilitate a process termed “simulative reasoning.” This provides a forerunner of the development of conceptual inte-gration theory (see Conceptual Integration Theory) by deploying the architecture of mental spaces theory. \cite{Dinsmore_1987}

Conceptual Integration Theory \cite{Oakley_1998} (rhetoric)

Induction

Connectionism
Reasoning is described as a propagation mechanism through a sub-symbolic network

Edward L. Thorndike
the theory of connectionism states that behavioral responses to specific stimuli are established through a process of trial and error that affects neural connections between the stimuli and the most satisfying responses.

McCulloch & Pitts
Connectionism, or neuronlike computing, developed out of attempts to understand how the human brain works at the neural level and, in particular, how people learn and remember. In 1943 the neurophysi-ologist Warren McCulloch of the University of Illinois and the mathematician Walter Pitts of the University of Chicago published an influential treatise on neural nets and automatons, according to which each neuron in the brain is a simple digital processor and the brain as a whole is a form of computing machine.

Abduction, Argumentation

Douglas Walton

Inference to the best explanation
Defeasable logic

Analogical Reasoning,

(CBR)
https://plato.stanford.edu/entries/reasoning-analogy/

Bounded Rationality

the notion that a behaviour can violate a rational precept or fail to conform to a norm of ideal rationality but nevertheless be consistent with the pursuit of an appropriate set of goals or objec-tives.

Practical reason (goal oriented reasoning)

In philosophy, practical reason is the use of reason to decide how to act.
Practical reason is understood by most philosophers as determining a plan of action.
Practical reasoning is basically goal-directed reasoning from an agent's goal, and from some action selected as a means to carry out the goal, to the agent's reasoned decision to carry out the action. The agent can be a person or a technical device, such as a robot or a software device for multi-agent communications. It is a type of reasoning used all the time in everyday life and all kinds of technology where autonomous reason-ing is required. Argumentation theorists have identified two kinds of practical reasoning: instrumental practical reasoning that does not explicitly take values into account,[2] and value-based practical reasoning.[3]

Noam Chomsky, Stephen Pinker, Richard Montague