

**What kind of cognitive
process is argumentation?**

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Plan of the talk

- Argumentation as a non-core cognitive process
- Role of argumentation in knowledge acquisition
- Minimally argumentative agents – not for passing Turing tests but for human/machine interaction and knowledge acquisition
- This is an exercise in android epistemology...

Argumentation is not a core cognitive process

- In Turing Test, and many speculations about AI, it's being assumed that ability to interact verbally, which includes ability to argue for a claim, is a **sufficient** condition for intelligence
- Some people even suggested it's **necessary** (as skeptics will stay unimpressed until they see verbal interaction with the system)
- But in reality...
 - It's not necessary, as intelligent creatures such as cats or babies don't argue and don't interact verbally
 - It could be insufficient, as chatterbots sometimes seem to be able to argue in a purely syntactical way

Argumentation is not a core cognitive process

- Verbal interaction is not a necessary nor sufficient condition for mentality, cognition, or intelligence,
 - And that includes argumentation
- Note: only philosophers and/or freaks care about passing the Turing Test
- But this doesn't mean that the role of verbal interaction, or reasoning in artificial systems should be underestimated!

Argumentation in knowledge acquisition

- Argumentation, as a specific kind of knowledge sharing, plays an important role in human knowledge acquisition
- Argumentation: verbal persuasion using arguments, supported by reasoning (a speech act intended to convince the audience, Walton 1990)

Argumentation in knowledge acquisition

- Argumentation, as a specific kind of knowledge sharing, plays an important role in human knowledge acquisition
- It's used as long as:
 - There is limited access to relevant information (true for all limited beings BUT not always)
 - It's not possible to directly test OR
 - Directly acquire claims under dispute
 - Multiple agents engage in knowledge acquisition and draw different conclusions (empirical under-determination)
 - Agents have different goals (not necessarily in cognitive domain)

Argumentation in knowledge acquisition

- Argumentation is specific for limited social cognitive agents that are not quite alike (in their access to information or goals)
- It's scope-limited to non-testable or indirectly testable claims, so the agents must be able to extrapolate from experience
 - The claims must be indirectly testable to the agents being persuaded, not necessarily for the persuader
 - The wilder the extrapolation, the more necessary argumentation becomes
- Examples:
 - Legal argumentation in courts
 - Scientific controversies about theoretical frameworks
 - Ethical argumentation
 - Rationalistic theology

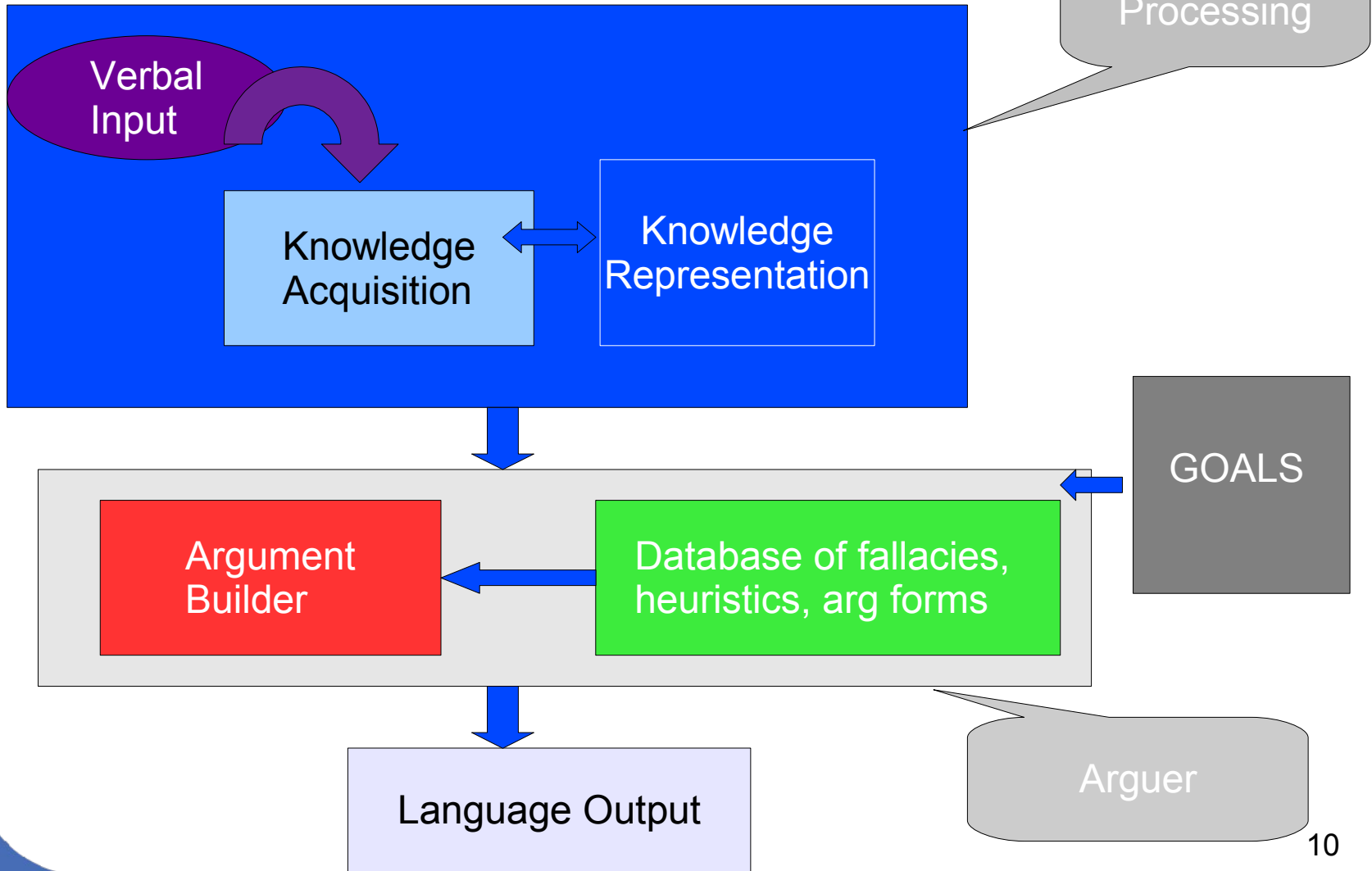
Argumentation in knowledge acquisition

- Artificial argumentative systems could be helpful in these domains as well, but not **generally**:
- It makes no sense to build an argumentative system for an online ticket reservation system
- General-purpose argumentative systems should not be implemented in **all** dialog-based human/machine interaction interfaces
- It's functionality is highly niche-dependent

Minimally argumentative agents

- Implemented as dialog systems but not general-purpose (due to usability/ergonomics, for example)
- Helpful in automating domains of indirectly testable knowledge, and need to contain expert systems to be able to justify claims
 - Modeling of juridical argumentation in court for lawyers developing a line of argument
 - Modeling the reasoning for new scientific theories (think of automating the peer-review systems)
 - Bioethics expert systems, already being built for hospitals to help in ethical judgments
 - Helping students to pass critical thinking courses
- Useful for testing the feasibility of formal models of argumentation ;)

Minimally argumentative agent – toy scheme

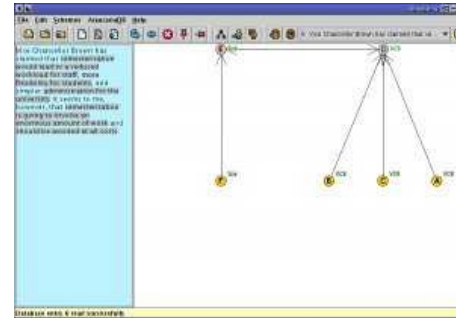


Minimally argumentative agents

- Attempt at specification of functional modules
 - Knowledge acquisition system (not necessarily perceptual, but necessarily verbal)
 - Language of argumentation can be simplified or purely formal in **minimal** agents but shouldn't be too simple
 - Knowledge representation system
 - Argumentation module, implementing a formal model of verbal reasoning and persuasion
 - This can include a database of common mistakes in human reasoning in non-minimal versions
 - Heuristics of argumentation
 - Language output module for interacting with other agents
 - Goals built into implementation of formal models of argument (e.g., 'seek the most plausible answer' or 'try to fix your argument as long as possible without contradicting the original claim')

Minimally argumentative agents

- Argumentation module (Arguer)
 - Can implement non-formal models as present in argumentation corpora (for comparison with purely formal ones)
 - Argumentation text corpora can be used as input for training the argumentation form detector (on a tagged corpus) – the best way could be non-statistical but a non-trivial use of sth like a Brill tagger
 - They can be used for training the common fallacy detector
 - To wit, not only logic but also *corpora linguistics*



Argumentation in cognition

- It's not a core cognitive process
- Requires a lot of other capabilities in the system
- Used in contexts when agents reach different conclusions because of the access to a limited (and not always completely overlapping) set of data