

# BDI Logic I

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- ▶ The reasoning about performing actions, such as the following example quoted from (Audi, 1995, p.729):

*Would that I exercise.*

*Jogging is exercise.*

*Therefore, I shall go jogging.*

- ▶ BDI logic a generic term of logics for practical reasoning and describes the mental attitudes of intelligent agents in terms of belief, desire, and intention.
- ▶ The idea is based on Bratman's philosophy.

- ▶ The role of belief and desire already had mentioned on behaviors of an intelligent agent (e.g., Dennett's intentional stance).
- ▶ Bratman claims that the notion of intention is necessary to understand practical reasoning.

*For instance, if I have an intention to give a lecture in Amsterdam tomorrow, it is not a mere wish to do so, but I'm really taking measures (making plans, e.g., cancelling other plans or making sure my laptop will be in my bag) to do it and unless something happens that seriously interferes with my intention to give that lecture tomorrow, I really will do so. (Meyer et al., 2015, p.454).*

- Future-oriented: It differs from present-directed intention.
- Commitment: An intention is not merely a desire but something to which an agent is committed.
- Pro-attitude: An agent's mental attitude directed toward an action.
- Conduct-controlling: Intentions control actions.
- Inertia: Intentions resist reconsideration.

- ▶ An intention is abandoned only under the following conditions:
  - The intention has been achieved.
  - The agent no longer believes it can be achieved.
  - The agent abandons another intention for which it is instrumental.

- ▶ Plans are intentions.
  - Hierarchical structure: A plan concerning an end embeds plans concerning preliminary steps (a general intention embeds more specific ones.).
  - Refinement: A high-level plan is refined into plans to do more specific actions.



- Belief: What an agent believes is true.
- Desire: It is pro-attitude and has potential influences of action (conduct-influencer).

## Example

*For instance, if I have an intention to give a lecture in Amsterdam tomorrow, it is not a mere wish to do so, but I'm really taking measures (making plans, e.g., cancelling other plans or making sure my laptop will be in my bag) to do it and unless something happens that seriously interferes with my intention to give that lecture tomorrow, I really will do so. (Meyer et al., 2015, p.454).*

- ▶ Next time, I will show BDI logic cast from Bratman's philosophy.
- $\text{INT}\varphi \rightarrow \text{DES}\varphi$ : An intention is a desire.
- $\text{INT}(\text{A}(\text{F}\varphi)) \rightarrow \text{A}((\text{INT}(\text{A}(\text{F}\varphi)))\mathcal{U}\psi)$ : If an agent intends to achieve  $\varphi$  sometime in all the futures, then this intention continues until  $\psi$  holds.

- Audi, R. (1995). *The Cambridge dictionary of philosophy*. Cambridge University Press.
- Meyer, J.-J. Ch., Broersen, J, and Herzig, A. (2015). BDI Logics. *Handbook of epistemic logic*, edited van Ditmarsch, H., van Der Hoek, W., Halpern, J. Y., and Kooi, B. College Publications.