

Dynamic turn in epistemic logic

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What is epistemic logic?

Epistemic logic – is a logic of knowledge and belief

Belief is a proposition which someone believes to be true /doxa/

Knowledge – is a limited case of belief /episteme/

Sorts of epistemic sentences

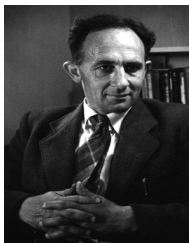
- somebody knows something
- somebody believes something
- somebody suggests something
- somebody thinks something
- somebody doubts something
- nobody knows something etc

Brief history

Epistemology



R. Carnap



A. Prior



N. Rescher

Epistemic logic



G.H. von Wright



J. Hintikka



R. Stalnaker

Features of epistemic modalities

K — knowledge

- If someone knows A, then A is true
- If someone knows A, then he/she knows that he/she knows A
- If someone doesn't know A, then he/she knows that he/she doesn't know A

B — belief

- If someone believes A, then he/she believes that he/she believes A
- If someone doesn't belief A, then he/she believes that he/she doesn't belief A

K and B

- If someone knows A, then he/she believes A

Belief revision



C. Alchourron



P. Gardenfors



D. Makinson

Dynamic epistemic logic



K. Segerberg

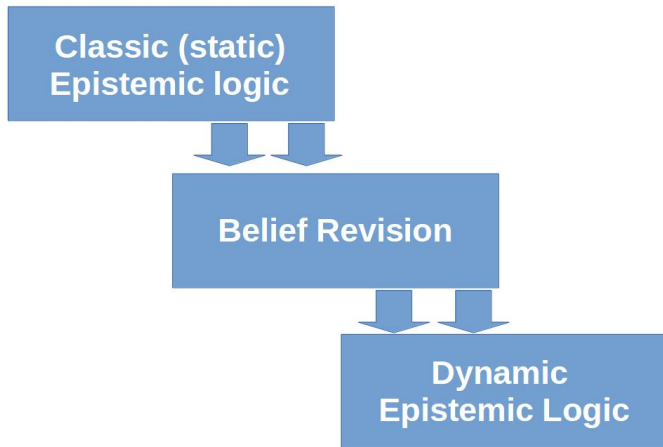


J. van Benthem



H. van Ditmarsch

Stages of epistemic dynamic



Causes of dynamic turn

- Modeling of scientific knowledge development
- Formal investigation of real communication
- Development of social education theory
- Investigation in AI, development self-education and self-diagnosis systems

Goals of dynamic direction in epistemic logic

To be rational is to act intelligently

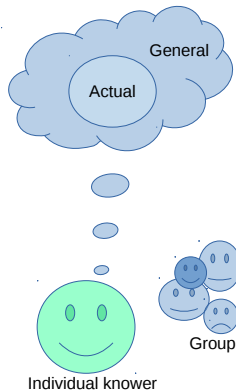
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- Formal investigation of belief changes
- Reconstruction of cognitive actions, their triggers and outputs
- General clarification of belief change mechanism
- Real communication analysis within the framework of logic

Epistemic objects

Epistemic objects

- Epistemic agent
 - individual
 - group
- Belief set
 - Epistemic state

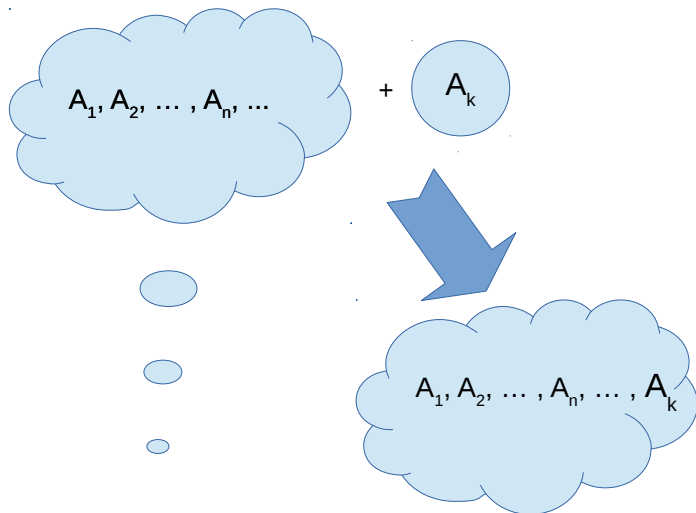


Cognitive actions

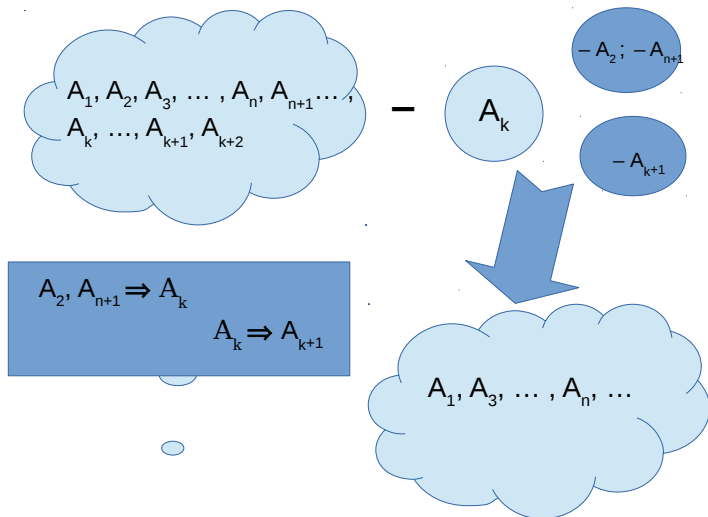
- Elementary:
 - expansion,
 - contraction.

- Complex:
 - revision,
 - consolidation
 - update
 - public announcement etc.

Primary cognitive action: EXPANSION



Primary cognitive action: CONTRACTION



Epistemic triggers

- External
- Internal

- Primary
- Secondary

Features of dynamic epistemic analysis

Features of dynamic epistemic logic

- Multi-subjects
- Multi-triggers
- Multi-actions

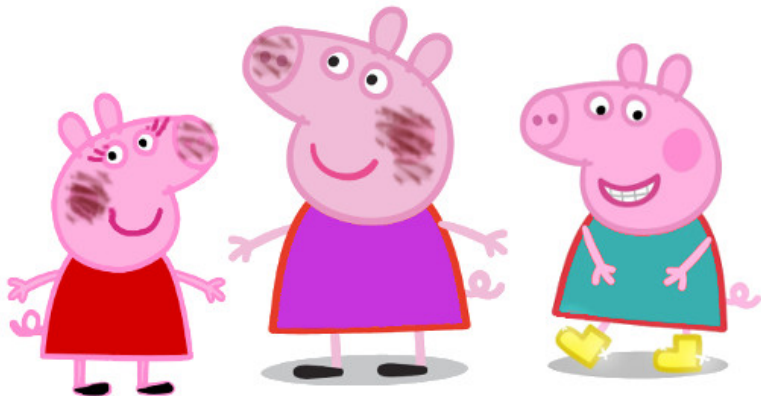
Features of dynamic epistemic logic

- Knowledge and belief / strong and soft facts
- Rational / real subject
- Indetermined output of cognitive action

DEL analysis

- Defining basic notions
- Defining triggers
- Defining cognitive actions
- Analysis of situation before and after each actions
- Deducing consequences and result estimation
- Clarification of analysis (by perforce)

The muddy children puzzle



Common results of epistemic logic

- More explicit understanding of cognitive mechanism
- Understanding of variety of cognitive actions and their effects
- Conscious and responsible attitude to own belief system
- Increasing criticality of reasoning