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Current Research and Advanced Topics

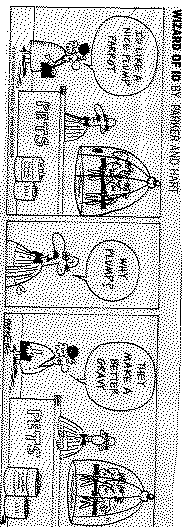
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Overview

Current areas of study in belief change
 Belief bases vs. belief sets
 Iterated revision
 The big picture!
 Nonprioritised belief change
 Abductive belief change
 Reasoning about action (update)
 Spohnian belief change
 Summary
 Morals
 Where to next?

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Current Research and Advanced Topics

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Areas of study in belief change

Belief bases and computational approaches
 Coherence (how do beliefs 'cohere')
 Contraction proposals (Lecture 3)
 Iterated revision
 Relationships between belief change, nonmonotonic reasoning, conditionals, rational choice, ...
 Non-prioritised belief change
 Abductive belief change
 Reasoning about action and belief change
 Dealing with uncertainty (Spohn, Bayesian networks, ...)

Belief Bases

Not necessarily closed under logical consequence C_n
 Epistemic entrenchment over sentences only in belief base
 'Compatible' with many *full* epistemic entrenchments over all sentences in the language

However, we know:
 $\phi \wedge \psi = \min\{\phi, \psi\}$
 $\phi \vee \psi \geq \max\{\phi, \psi\}$

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Iterated Revision

Suppose we start with an epistemic entrenchment over K and revise K (using condition (C^*) say)
 What do we end up with?
 $K * \phi$ but no epistemic entrenchment!
 How do we revise subsequently?
 Need an account of how structure (epistemic entrenchment) changes

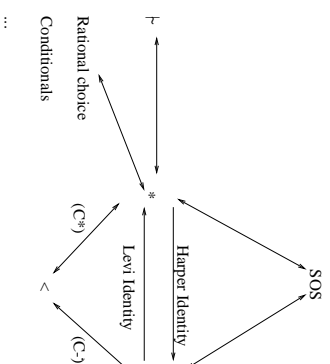
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Therefore, given the entrenchment of sentences ϕ and ψ we can determine the entrenchment of $\phi \wedge \psi$.
 If we don't know the entrenchment of $\phi \vee \psi$, then we assume $\phi \vee \psi = \max\{\phi, \psi\}$
 What effect does this have?
 Compare with $(C-)$ condition.
 Note that in belief base approaches, Recovery does not usually hold

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The big picture!



Nonprioritised Belief Change

(K^*2) says $\phi \in K * \phi$
 $(K \dot{-} 2)$ says if $\Vdash \phi$, then $\phi \notin K \dot{-} \phi$
 Why should we take ϕ so seriously?
 Have assumed that decision regarding whether to consider input has been made
 If we do not make this assumption, then we are in an area known as nonprioritised belief change

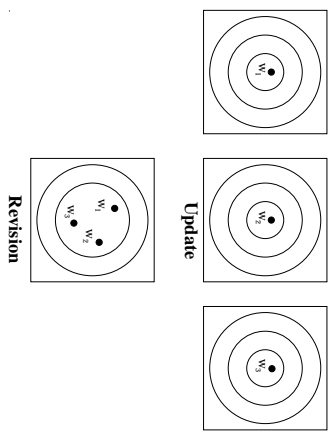
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Abductive Belief Change

Abduction is an attempt to formalise the notion of explanation
 ϕ is an abduction for ψ with respect to K iff:
 (i) $K \cup \{\phi\} \Vdash \psi$; (ii) $K \cup \{\phi\} \Vdash \perp$
 What if we don't simply accept input ϕ but seek an abduction (explanation) first?
 More complex type of belief change
 Require more structure —
 EE over sentences outside K
 SOS over $[K]$ worlds (inside 'innermost' sphere!)

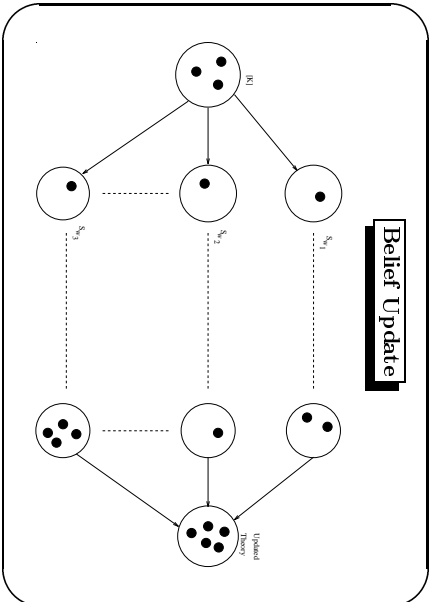
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Belief Update



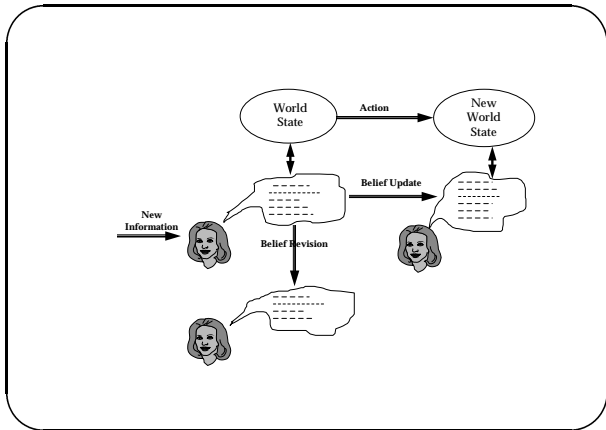
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Belief Update



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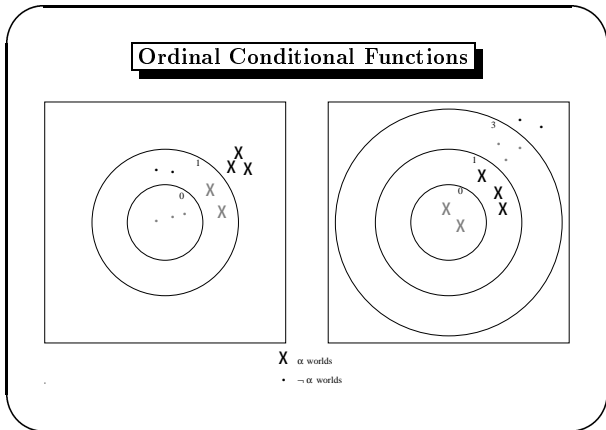


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Some morals?

The way you use a logic is important. It can lead to more complex behaviour.
Structure is important.

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Summary

Many belief change areas still to explore
Can have richer structure than AGM (e.g., Spohn, probabilistic approaches)
How practical is it to implement belief change? (To use?)
Many interconnections with other areas in reasoning
Belief change provides but one way of viewing reasoning

Where next?

AGM: [12], [13], [22]

Technical development of AGM: [1], [12]

Epistemic Entrenchment: [14]

Systems of spheres [19]

Nonmonotonic consequence and belief change: [15]

Belief bases: [24]

Update: [27]