Reasoning and the Open World Assumption

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Reasoning

The fundamental reasoning service is logical implication:

Logical implication

$\mathcal{O}$ logically implies and assertion α, written $\mathcal{O} \models \alpha$, if α is satisfied by all models of $\mathcal{O}$.

The main methods to perform reasoning are **resolution** and **semantic tableau**.

Since Description Logics is a subset of FOL, we can use the usual methods to perform logical implication on FOL.

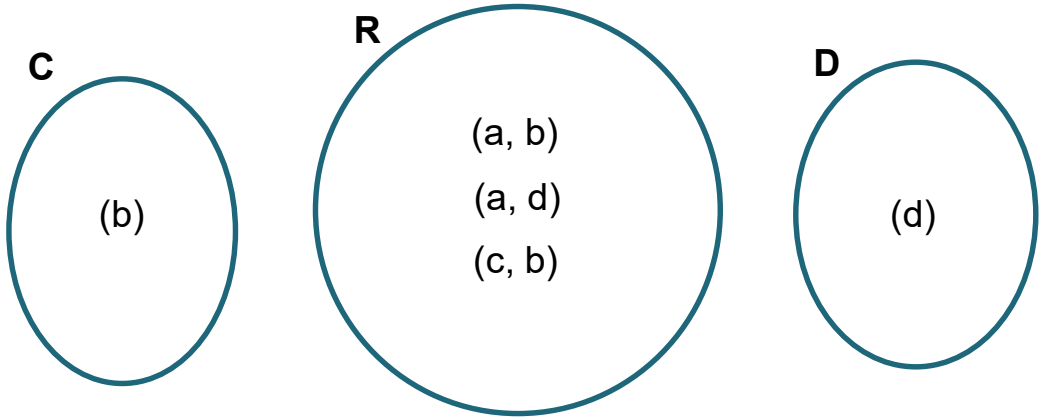
- Resolution: Logic for computer scientists - Schöning, U, Birkhäuser, 2008. ISBN: 9780817647636
- Semantic Tableau: Automated reasoning – Harald Ganzinger, Viorica Sofronie and Uwe Waldmann, 2004.

Closed Vs. Open World Assumption

TBOX

$C_1 \sqsubseteq \forall R.C$ $C \sqsubseteq \neg D$

ABOX



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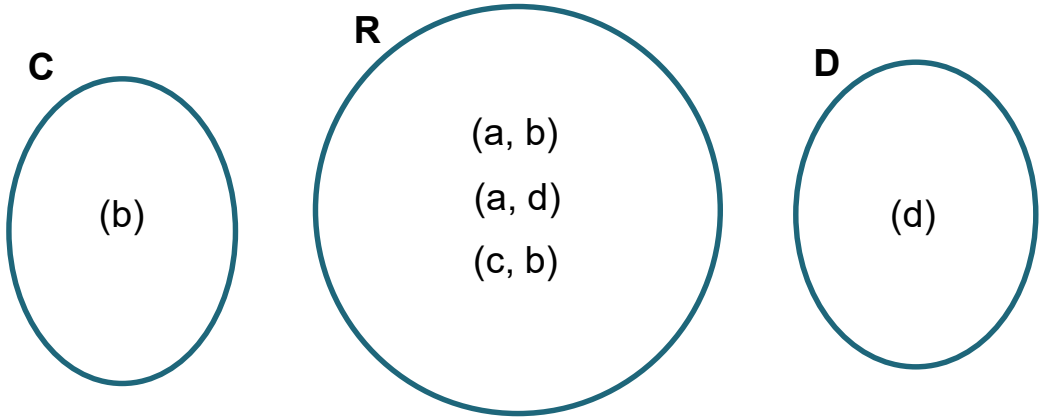

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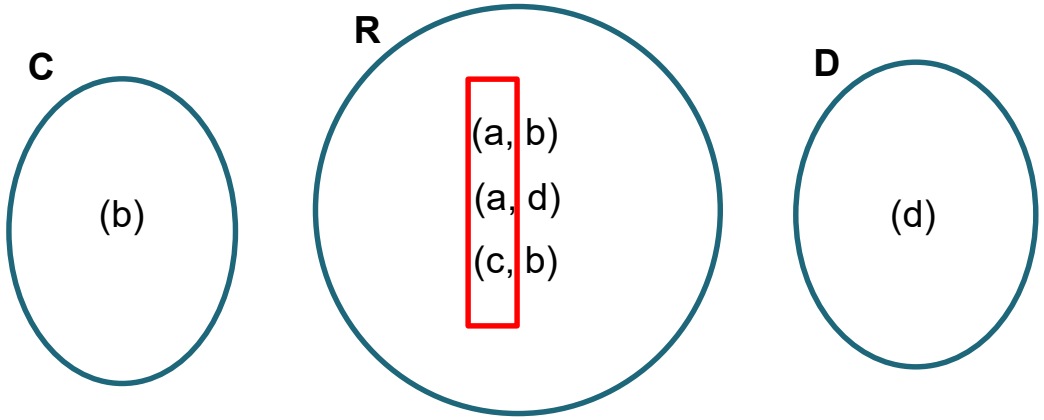

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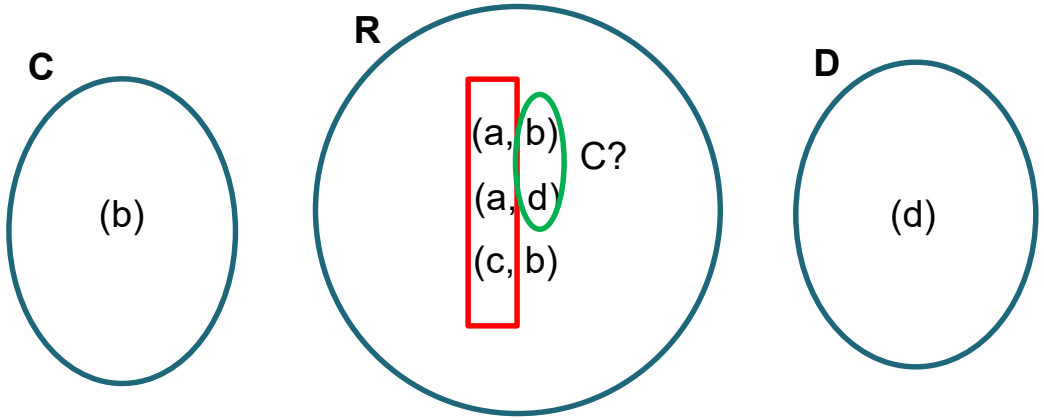

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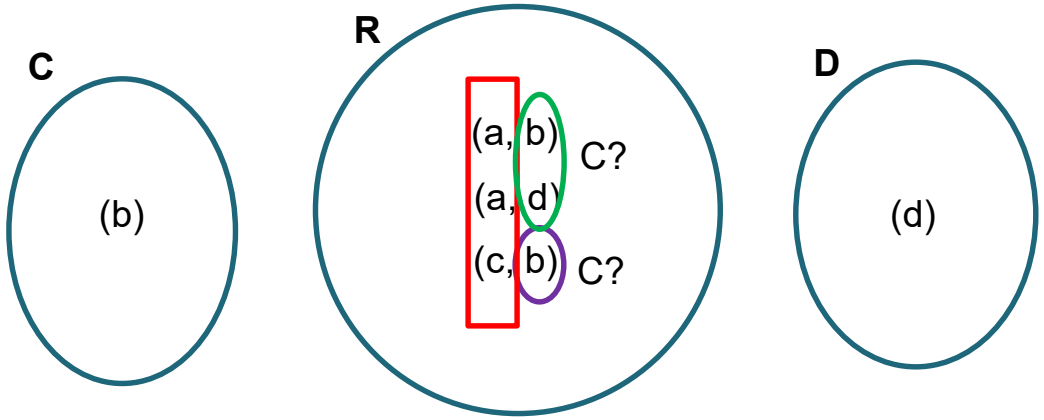

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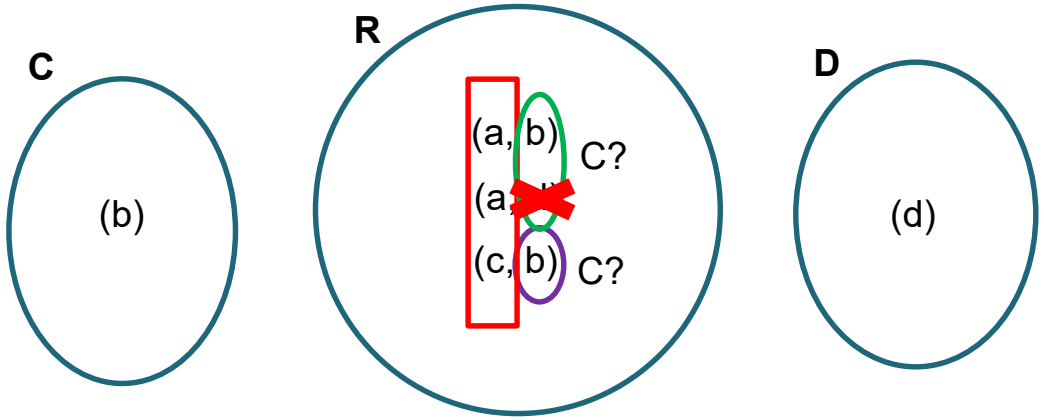

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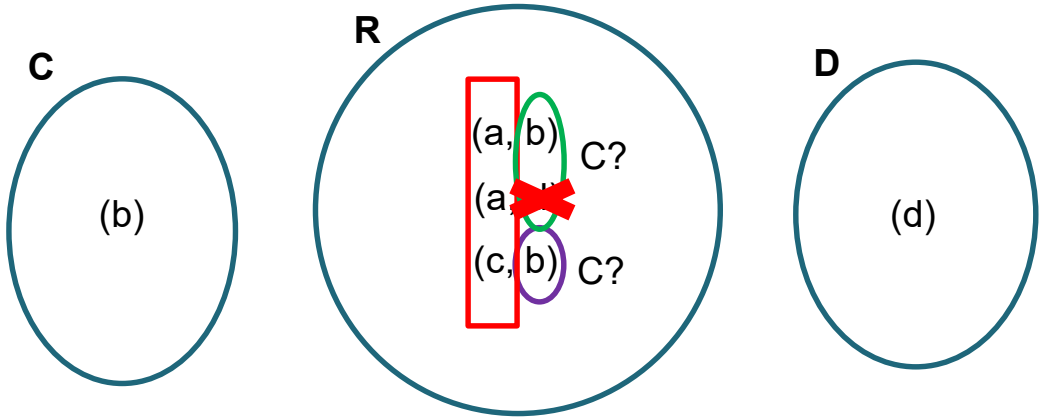

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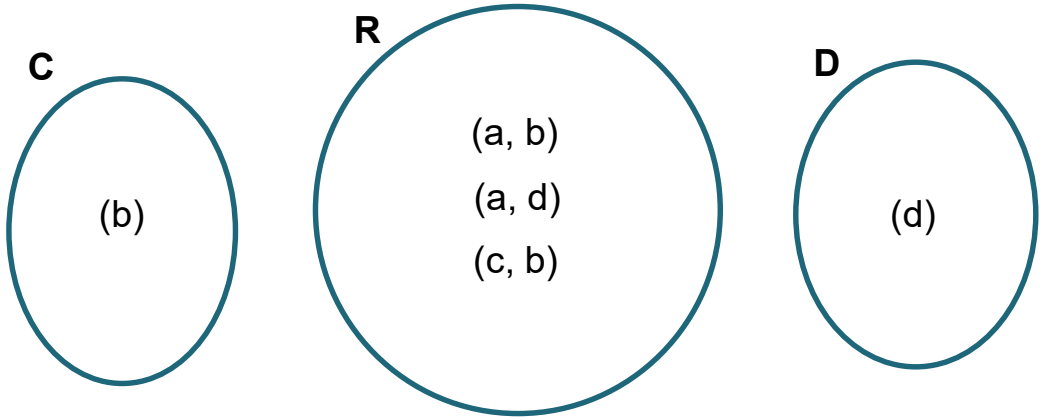

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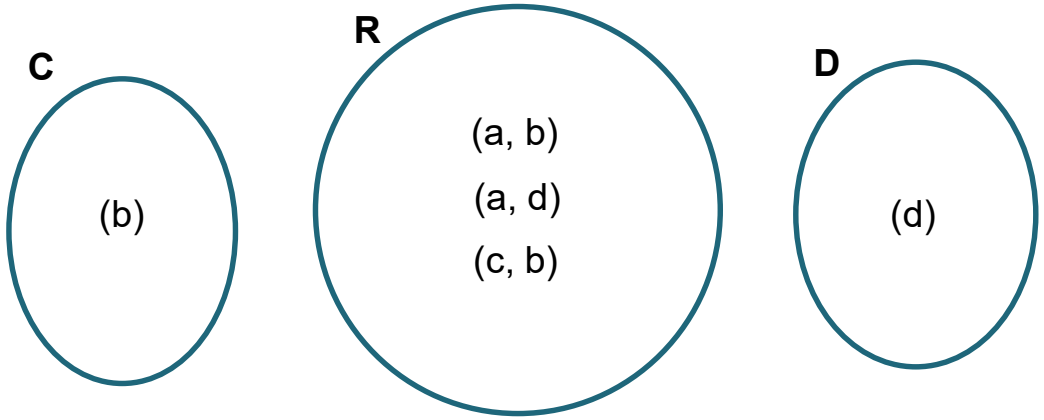

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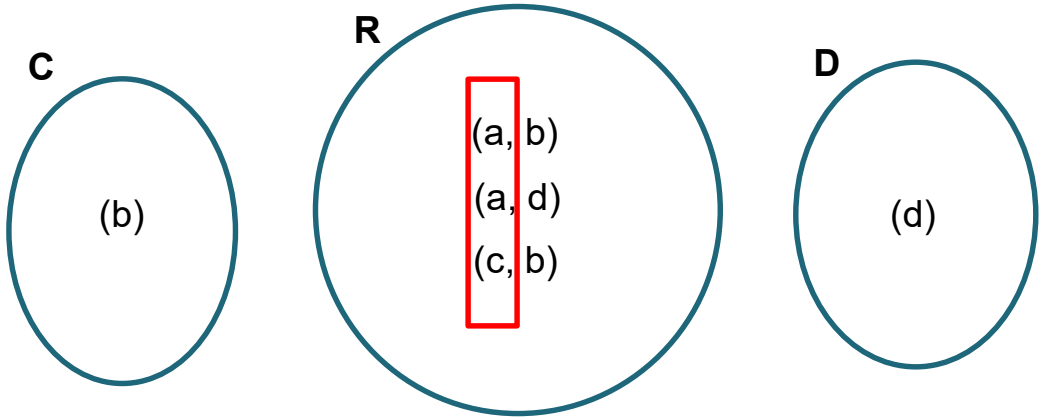

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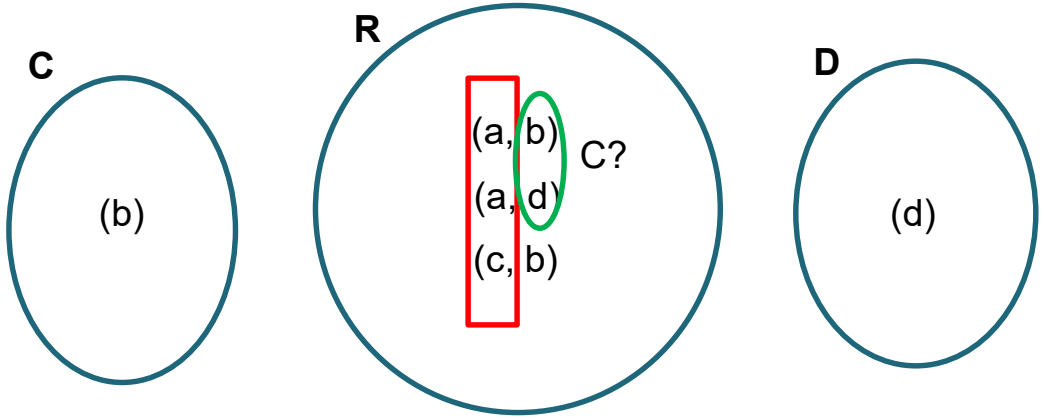

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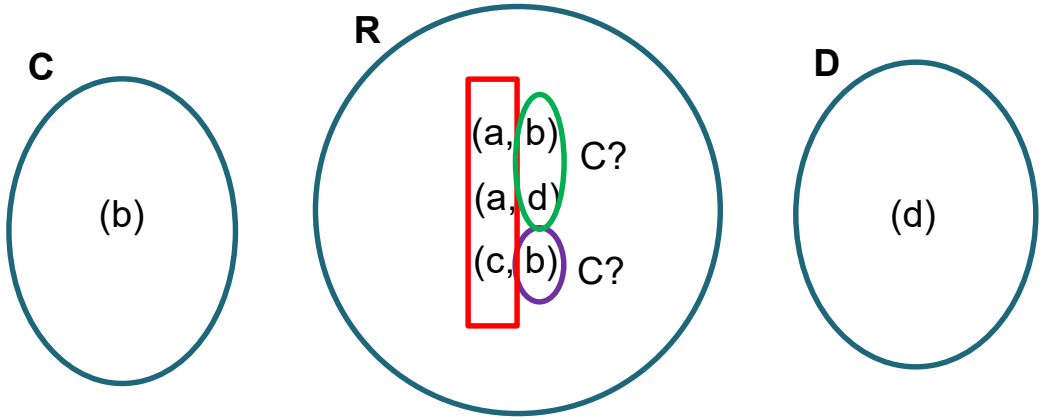

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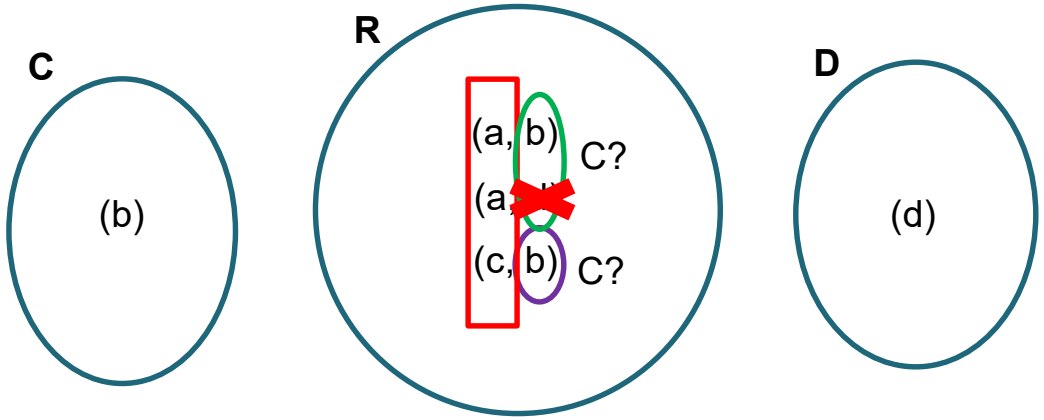

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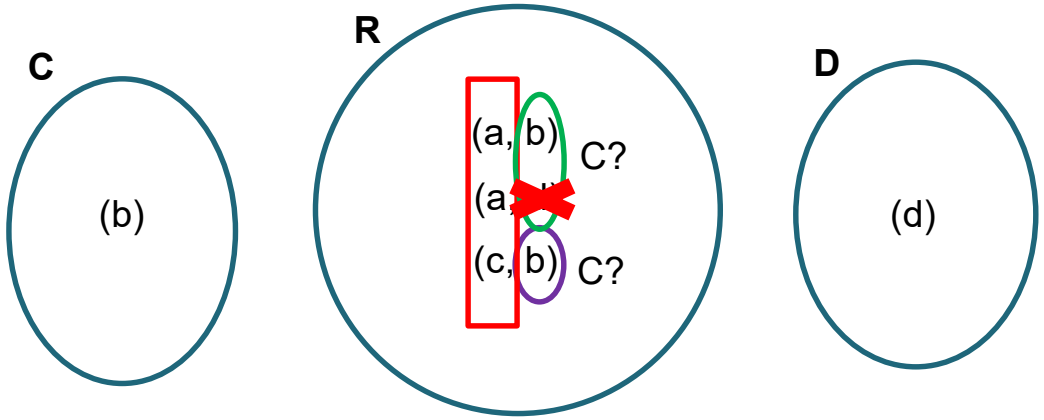

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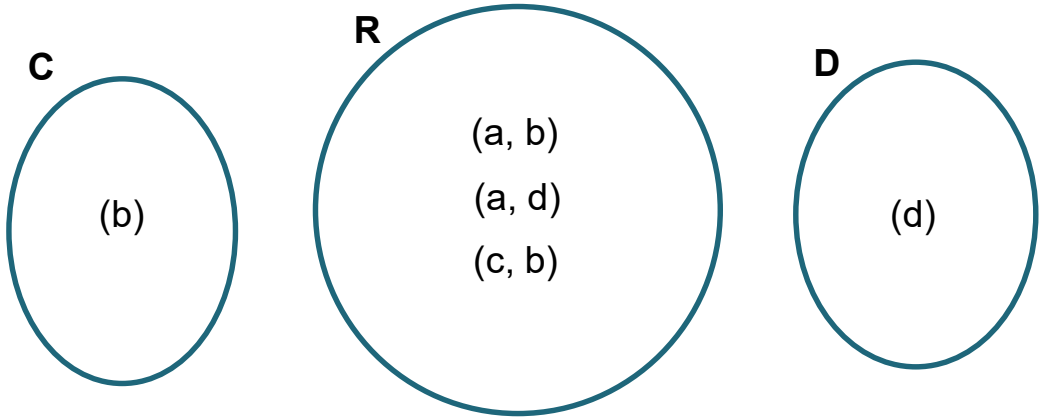

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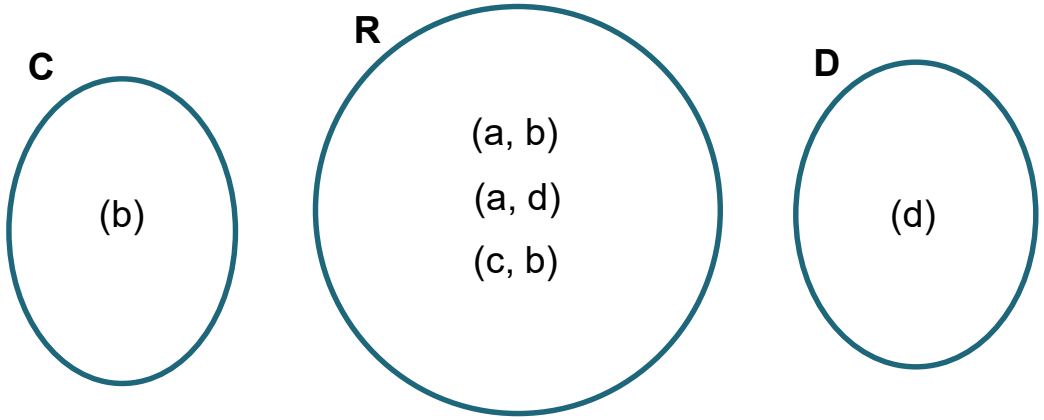

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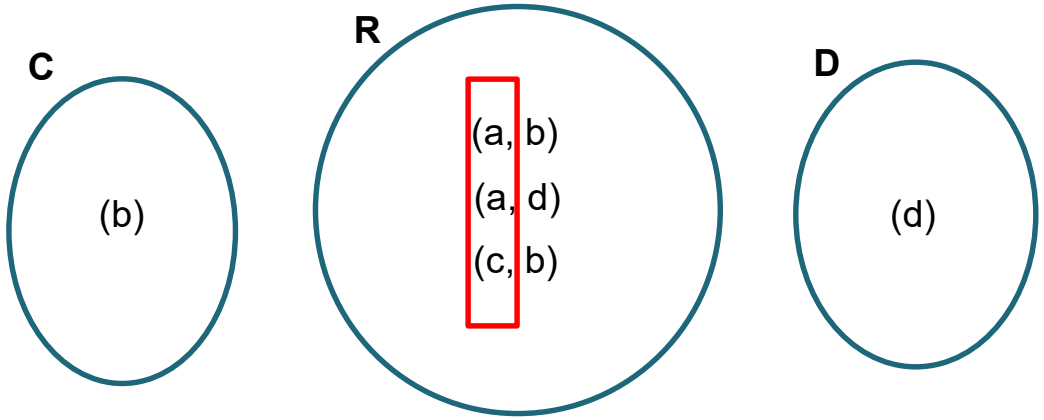

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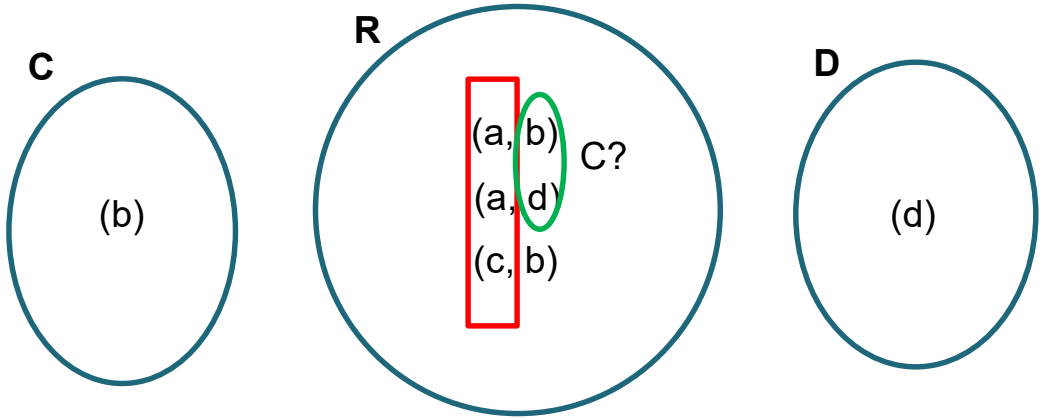

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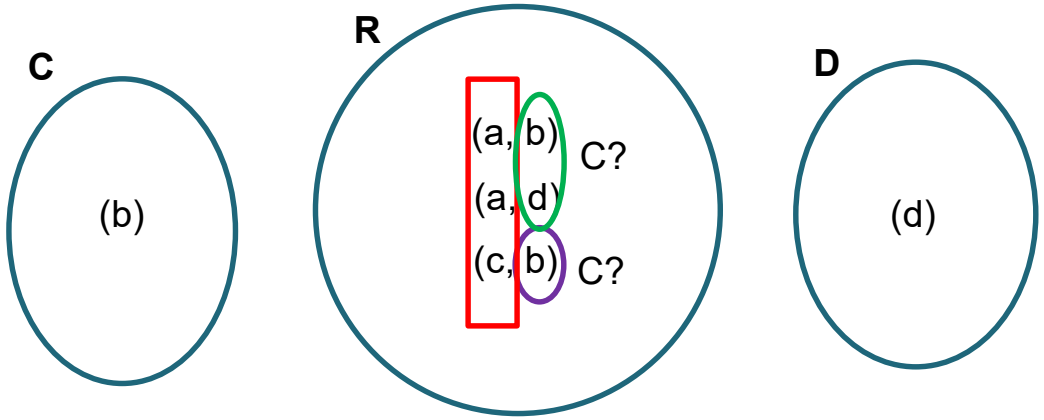

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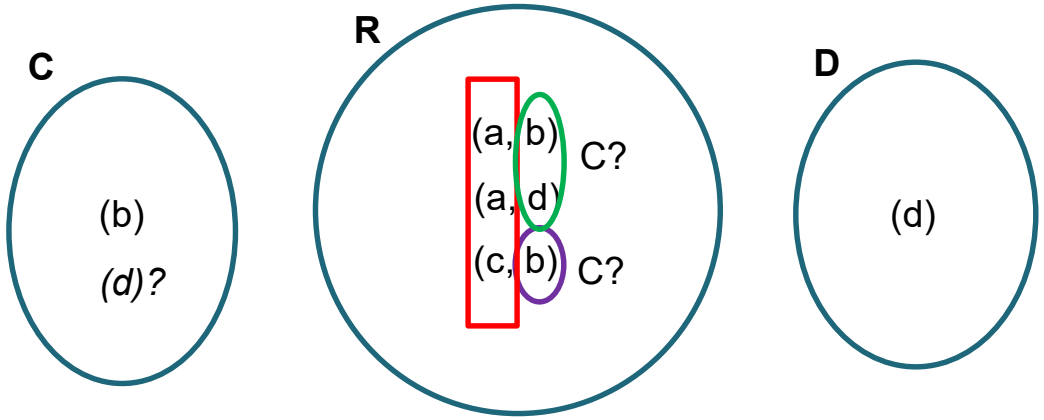

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{a, c}

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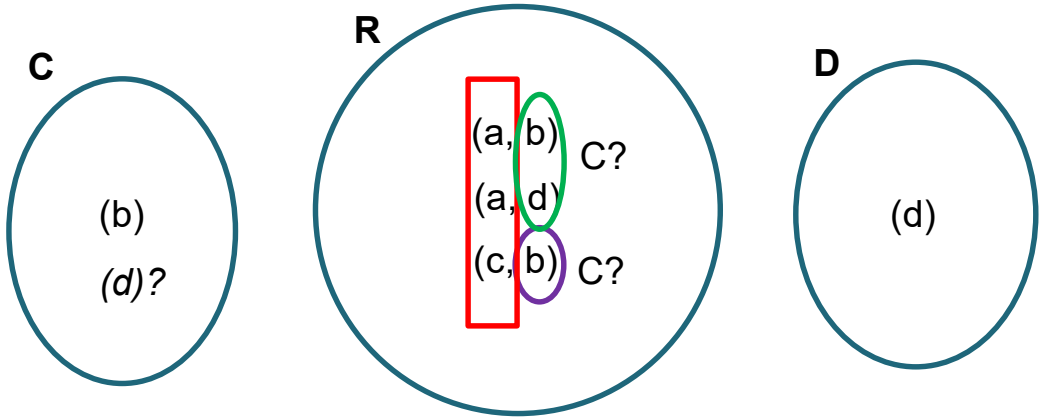

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Back to the first example...

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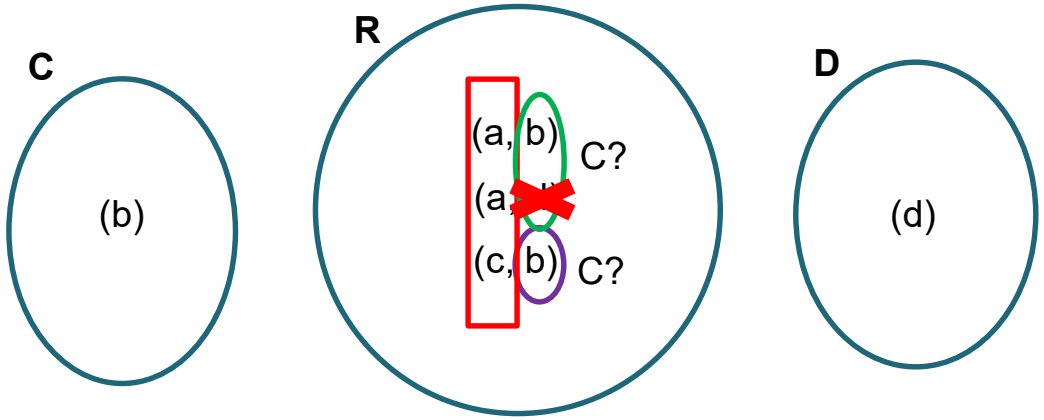

Both, the closed and open world assumption reach the same conclusion, but the rationale is different.

- The closed world assumption relies on the state (where according to it, I do not know *C(d)* and therefore we do not consider it.
- The open world assumption relies on the TBOX saying that *C* and *D* are disjoint and, therefore, *C(d)* is no longer possible