

An interesting example of an incoherent program (Ch 1)

Consider the following program Π :

$$\begin{aligned} q(a) &\leftarrow. \\ p(X) &\leftarrow p(f(X)). \\ p(X) &\leftarrow \mathbf{not} p(f(X)). \end{aligned}$$

We will argue that this program does not have an answer set. Suppose this program has an answer set. Then since answer sets are models of the theory obtained by replacing \leftarrow by the classical connective \Leftarrow and replacing **not** by \neg , then any answer set will have $p(a), p(f(a)), \dots$. But if we take this answer set S and construct the transformation Π^S we will have rules of the following form:

$$\begin{aligned} q(a) &\leftarrow. \\ p(a) &\leftarrow p(f(a)). \\ p(f(a)) &\leftarrow p(f(f(a))). \\ &\vdots \end{aligned}$$

Its easy to see that the answer set of Π^S is $\{q(a)\} \neq S$.

Acknowledgement: The above program was discussed by P. Bonatti during the Dagstuhl meeting in September 2002.