Miners puzzle in Suppositional Inquisitive Semantics (InqS)
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Introduction  Kratzer’s seminal work on modality [5, 6, 4] was recently challenged by the miners puzzle by Kolodny and MacFarlane [3]. To solve the puzzle, we will introduce a novel treatment of modals in InqS, developed jointly with Jeroen Groenendijk and Floris Roelofsen.

The puzzle  There are miners trapped in one of two shafts, with water levels rising. It is possible to block one of the two mine shafts, but not both. If you block the correct mine shaft, everyone survives; if you block the wrong one, the water will flood the other, killing all miners; and if you block neither shaft, the water will kill one miner.

Kolodny and MacFarlane conclude that, intuitively, (1) holds. (Obligation is represented by $\Box \varphi$ and necessity by $\square \varphi$.)

(1)  We ought to block neither shaft.  

$\Box (\neg p' \land \neg q')$

Kolodny and MacFarlane posit that the following premises hold.

(2)  a. The miners are in in shaft A or B.  

$p \lor q$

b. If the miners are in shaft A, we ought to block shaft A.  

$p \rightarrow \Box p'$

c. If the miners are in shaft B, we ought to block shaft B.  

$q \rightarrow \Box q'$

From these premises we cannot conclude (1), instead, (2-a), (2-b) and (2-c) entail (3).

(3)  Either we ought to block shaft A or we ought to block shaft B.  

$\Box p' \lor \Box q'$

Hidden premises  Blocking the wrong shaft will kill everyone, but this is not captured by the premises. So we add (4-a) and (4-b) to say that gambling with the lives of all the miners ought to be avoided.

(4)  a. If it is possible that the miners are in shaft A, then we ought not to block shaft B.  

$\Diamond p \rightarrow \Box \neg q'$

b. If it is possible that the miners are in shaft B, then we ought not to block shaft A.  

$\Diamond q \rightarrow \Box \neg p'$

(2-a) together with (4-a) and (4-b), entails (1).

Intuitively, (2-b) and (2-c) are too weak. We do should not block the shaft unless we are certain that the miners are in the right shaft. So we replace (2-b) and (2-c) with the premises (5-a) and (5-b).

(5)  a. If the miners must be in shaft A, we ought to block shaft A.  

$\Diamond p \rightarrow \Box p'$

b. If the miners must be in shaft B, we ought to block shaft B.  

$\Diamond q \rightarrow \Box q'$

In Kratzer semantics, (5-a) and (5-b) together with (2-a), still entail (3).

InqS  We will introduce InqS [2, 1] which adds suppositional content to its notion of meaning. According to the story, $\neg p$ and $\neg q$ are possible, so one cannot suppose that $\Box p$ and $\Box q$ hold, causing supposition failure in (5-a) and (5-b). In other words, we ought to block shafts only if we know where the miners are. From the new premises, InqS correctly predicts that (1) holds and (3) does not, which solves the puzzle.

References


