

Mgr. Michal Peliš - *Logic of Questions*

PhD. Thesis Review

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The thesis is devoted to *i*) the exposition of erotetic logic, *ii*) merging erotetic logic with epistemic logic, *iii*) presenting a dynamic variant of epistemic erotetic logic. It is structured accordingly. Chapter 1 motivates the study of erotetic logic and discusses several known approaches. Chapter 2 studies various inferential relations within Wiśniewski's Inferential erotetic logic. Chapter 3 incorporates questions into epistemic logic. Chapter 4 extends the approach of Chapter 3 to S5 with group notions of knowledge. The chapter also sketches a combination of the approach with Public announcement logic. Chapter 5 concludes the thesis, mentions related work as well as several topics of future research.

The thesis contributes to current research in the area of erotetic logic. Peliš' results in Chapters 2-4 are original and a promising starting point of further research. Especially the erotetic interpretation of epistemic logic (Chapters 3,4) seems to be an interesting and fruitful project. The author utilises the apparatus of propositional epistemic logic to model askability conditions of questions. This, along with the chosen set-of-answers methodology, allows him to apply the techniques of modal logic to study various aspects of questions. This is a novel contribution to the area. Thus, various parts of the thesis should be published. However, this is possible only after a careful revision of the English.

The thesis is mathematically sound and I have not been able to find any substantial errors. The author has also clearly expressed his intention not to go into philosophical debates about the nature of questions. Hence, my comments are limited to hints at possibly interesting points of discussion.

Askability and belief Peliš' epistemic erotetic logic is an erotetic interpretation of epistemic logic. Askability of questions at (M, s) is defined as satisfaction of an epistemic formula at (M, s) . Consequently, certain peculiar traits of epistemic logic are transferred to epistemic erotetic logic. Specifically, certain natural questions are not askable.

Suppose Ann truthfully claims: "Bill, one of your beliefs is false". It is natural for Bill to ask "Which one of my beliefs is it, Ann?". However, the present framework has it that this is not possible. According to the set-of-answers methodology, if $[b]\phi_1, \dots, [b]\phi_n$, then Bill's question is $?_b\{\neg\phi_1, \dots, \neg\phi_n\}$. The definition of askability (p. 53) implies $\neg[b]\phi_i$ for all $1 \leq i \leq n$, a contradiction.

Similarly, suppose Ann has devised a scientific theory that has been falsified by observation. Thus, Ann believes that the conjunction of her postulates is false. Nevertheless, she is hopeful and believes that at least some of the postulates are true (she believes that the disjunction is true). Yet the question "Which of my postulates are false?" is not askable for her until she abandones all of them.

These examples demonstrate that the present framework cannot treat important kinds of questions, namely questions aiming at revision of one's beliefs in face of communication or observation.

Awareness It would be interesting to see a combination of the present approach to epistemic erotetic logic with the logics of awareness. It seems to be plain that awareness plays an important role in questions. Agents often ask questions without being aware of all the possible direct answers. For example, I can ask "Where is Bill?" without being aware of all his possible whereabouts. This is related to the notion of a weakly presupposed question (p. 62). Unfortunately, the notion plays only a minor role in the thesis.

Apart from this, the possibility of distinguishig between explicit and implicit knowledge would perhaps lead to a more sensitive notion of askability. It is possible that this would solve the problems I mentioned earlier.

Miscellaneous questions The author mentions the fact that there are no questions askable in all Kripke models ("no 'tautological' questions in K", p. 53). Is there a question Q and a class of frames $F(Q)$ such that Q is askable in all models based on $F(Q)$? In other words, are there classes of frames definable by questions?

As the author points out on p. 80, within S5 it is the case that $Q^i \leftrightarrow [i]Q^i$. Thus, if Q is askable for i , then the question "Is Q askable?" is not askable. (This is interesting, for here we have a formula ϕ such that ϕ is

true, yet $?\phi$ is unaskable.) Suppose we have a unaskable question Q and our system is weaker than S5. Is the question "Is Q askable?" askable?

Suppose we have a group of agents G such that $(M, s) \models D_G\phi$. Is the question $? \phi$ solvable only by successive asking by agents in G ? In other words, is

$$D_G\phi \rightarrow \langle Q^{j_1} \rangle \dots \langle Q^{j_n} \rangle C_G\phi$$

valid, where $\langle Q^{j_1} \rangle \dots \langle Q^{j_n} \rangle$ is some sequence of public 'askings' such that every $j_i \in G$? (Shouldn't the last line in the two items of Definition 34, p. 78-9, contain $C_G\alpha$ instead of α ?)

In conclusion, the thesis meets the standards of rigour and originality. Hence, I recommend the author to be promoted to *philosophiae doctor*.