CORRECTION TO A PAPER ON MODAL LOGIC

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In a recent paper (here referred to as «DA») [1] the writer formulated a monadic first order functional calculus MQ based on von Wright's system M, and constructed a decision algorithm for it. One of the axioms of MQ requires amendment. Axiom A7 (2.5) should read as follows:

A7. $B \supset (\exists x)A$, where B results from the substitution of y for all free occurrences of x in A, provided no free occurrence of x in A is in a wf'd part of A of the form $(\exists y)C$ or of the form $\Diamond C$.

Unless this change is made, the proof given in 4.16 of Metatheorem 4.15 will not be correct. Specifically, the change guarantees that every instance of A7 has as an associate a theorem of PQ; if the change is not made, then

(☆) $\sim(\exists y) \sim (\sim\Diamond(fy \,.\sim fy) \supset (\exists x) \sim\Diamond (fx.\sim fy))$ [2]

will be an instance of A7, and so associate of (☆) is a theorem of PQ.

The amendment does not destroy the validity of any arguments in DA based on the unamended version of A7, since A7 was used only to guarantee such results as that PQ is a subsystem of MQ (2.7), and was therefore employed only in its amended form.

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[1] «Decision algorithms for some functional calculi with modality», this Journal, No. 15-16 (1961), pp. 138-153.

[2] This counterexample is due essentially to Saul A. Kripke, to whom I am indebted for his construction of the following (valid) argument, which brings out the necessity for emendation of DA:

(1)	$\sim\Diamond(fy.\sim fy) \; \varepsilon \; MQ$	
(2)	$(\exists x)\sim\Diamond(fx.\sim fy) \; \varepsilon \; MQ$	(1), A7 (unamended)
(3)	$\sim\Diamond(\exists x)(fx.\sim fy) \; \varepsilon \; MQ$	(2), A10
(4)	$\sim(\exists x)(fx.\sim fy) \; \varepsilon \; MQ$	
(5)	$(x)(fx \supset fy) \; \varepsilon \; MQ$	
(6)	$(y)(x)(fx \supset fy) \; \varepsilon \; MQ$	
(7)	$(x)(y)(fx \supset fy) \; \varepsilon \; MQ$	
(8)	$(x)(fx \supset (y)fy) \; \varepsilon \; MQ$	
(9)	$(\exists x)fx \supset (y)fy \; \varepsilon \; MQ$,	

in contradiction to the assertion in 5.3 that, by the decision algorithm, it is not the case that $(\exists x)fx \supset (y)fy \in MQ$

Of course, the amendment precludes passage from (1) to (2), as does the decision algorithm: A normal form of (*) is

$$(*') \qquad \sim(\sim\Diamond(\exists z)(fz.\sim fz).\Diamond((\exists z)fz.(\exists z)\sim fz)),$$

and the following is an unsatisfactory F-row of $\mathfrak{J}(*')$:

$(\exists z)fz$	$(\exists z)\sim fz$	$\Diamond((\exists z)fz.(\exists z)\sim fz)$	$(\exists z)(fz.\sim fz)$	$\Diamond(\exists z)(fz.\sim fz)$
T	T	T	F	F