

Meth8 logic model checker

on the proof of God
of Karl Popper

Colin James III
info@cec-services.com
ersatz-systems.com

ESMC
Colorado Springs,
Colorado, USA

What is logic model checker (LMC).

- Jan Łukasiewicz invented logic Ł4 but did *not*:
 - Find all combinations of the logical models; or
 - Find academic acceptance of his 4-valued system.
- Garry Goodwin (UK) and Colin James (USA) fixed Ł4:
 - Variant Ł4 (VŁ4) uses 5 logical models; and
 - 4-valued logic system of <F,N,C,T> and <U,I,P,E>.
- Meth8 logic model checker implements this.
 - We claim this *recent advance* in mathematical logic.

Truth values of system variant VŁ4

- Truth values are the 2-tuple set {11, 10, 01, 00}.

- Model 1 list:

< **F** 00, **N** 01, **C** 10, **T** 11 >

< **False**, **Non contingent**, **Contingent**, **True** >

The designated truth value for Model 1 is **True**.

- Models 2.1, 2.2, 2.3.1, 2.3.2 list:

< **U** 00, **I** 01, **P** 10, **E** 11 >

< **Unevaluated**, **Improper**, **Proper**, **Evaluated** >

The designated truth value for Models 2 is **Evaluated**.

Connectives and operators of VŁ4

- The 8-standard connectives are single symbols.

And & Imply > Or + Equiv =

Not and \ Not imply < Not or - Not equiv @

- These 3-operators are single symbols.

Not tilde ~

Modal necessity box, Quantifier universal #

Modal possibility lozenge, Quantifier existential %

We claim recent advances in rationale of equivalence for modal operators and predicate quantifiers in Appendix.

Modal lookup tables for VŁ4 models

VŁ4 accommodates the combinations of the modal operators.

Model 1			Models 2							
M1			M21		M22		M231		M232	
#	%		#	%	#	%	#	%	#	%
F	F	C	U	U	U	E	U	P	U	I
C	F	C	I	I	U	E	I	E	U	I
N	N	T	P	P	U	E	U	P	P	E
T	N	T	E	E	U	E	I	E	P	E

Connective truth tables VŁ4

Model 1 connectives are table rows 1-4 horizontally from left.

1	&	.	F	F	F	F	.	F	C	F	C	.	F	F	N	N	.	F	C	N	T
1	\	.	T	T	T	T	.	T	N	T	N	.	T	T	C	C	.	T	N	C	F
1	+	.	F	C	N	T	.	C	C	T	T	.	N	T	N	T	.	T	T	T	T
1	-	.	T	N	C	F	.	N	N	F	F	.	C	F	C	F	.	F	F	F	F
1	<	.	F	F	F	F	.	C	F	C	F	.	N	N	F	F	.	T	N	C	F
1	=	.	T	N	C	F	.	N	T	F	C	.	C	F	T	N	.	F	C	N	T
1	>	.	T	T	T	T	.	N	T	N	T	.	C	C	T	T	.	F	C	N	T
1	@	.	F	C	N	T	.	C	F	T	N	.	N	T	F	C	.	T	N	C	F

Model 2 replaces < F, C, N, T > above with list < U, I, P, E >.

Eg:

1	>	.	F	C	N	T
F	.	T	T	T	T	
C	.	N	T	N	T	
N	.	C	C	T	T	
T	.	F	C	N	T	

$T > F = F$; Falsity cannot follow from truth.

Contrast of $\forall\exists$ to ordinary logic

- Modal operators and quantifiers are distributive in $\forall\exists$.

Consider Schrödinger's Cat:

If possibly the Cat is alive and possibly the Cat is dead,
then possibly both the Cat is alive, and the Cat is dead.

Not proved by Prover9, but validated as a theorem by Meth8.

A fix-up for ordinary logic casts into *one* variable, such as:

If possibly the Cat is alive and not possibly the Cat is alive,
then possibly both the Cat is alive, and the Cat is not alive.

Assumption: $((\exists p) \ \& \ \neg \exists p)$; Goal: $(\exists p \ \& \ \neg p)$: P9.
 $(\%p\&\sim\%p)\>\%(p\&\sim p) ; vt ; Meth8$

- For more than one variable, the vector space for arity of ordinary logic diverges from the bivalence of $\forall\exists$.

Meth8 on Karl Popper proof Ex(Gx)

Demarcation between science and metaphysics (1972)

- “Science is testable and falsifiable, but metaphysics is not.”
- So, there is motivation to test the *arch-metaphysical assertion*:
“There is a personal spirit named God who is omnipresent, omnipotent, and omniscient.”
[with attendant qualities of being *truthful and unfathomable**].
- Also per Carnap, if proved (Fisher P=1), the assertion cannot be dis-asserted.

* The Kurt Gödel proof of God, as reworked by Dana Scott et al, ignores these practical qualities of *veracity* and *ineffability* as they are not theologians in the Historic Church. Meth8 evaluates that family of Gödel proofs, including the axiom(s) of regularity, as not validated true. For example, the Meth8 script for Scott's trick is:
(#x&(x@(x-x))) > ((#x&(%y<x))&((y&x)=((y&x)-(y&x)))); CCCC TTTT CCCC TTTT

Meth8 scripts: Popper predicates 1

Meth8 scripts for a,b,c,d as p,q,r,s	Predicates	Descriptions
1: $p \& q$	1: Pos(a,b)	1: <i>a occupies a position in region b</i>
2: $(p \& q) > r$	2: Put(a,b,c)	2: <i>a can put thing b into position c</i>
3: $p \& q$	3: Utt(a,b)	3: <i>a makes the utterance b</i>
4: $p \& q$	4: Ask(a,b)	4: <i>a is asked the truth of b</i>
5: $(\%p \& \#q) > (p \& \#q)$	5: Opos(a)=((Ea)(b)Pos(a,b)>(b)Pos(a,b))	5: <i>a is omnipresent</i>
6: $((\%p \& \#q) > \#r) > ((p \& \#q) > \#r)$	6: Oput(a)=((Ea)(b)(c)Put(a,b,c)>(b)(c)Put(a,b,c))	6: <i>a is omnipotent</i>
7: $(p \& q) > (p \& q)$	7: Th(a,b)=(Ask(a,b)>Utt(a,b))	7: <i>a thinks b</i>
8: $(p \& \%q) > (p \& \%q)$	8: Thp(a)=(Eb)Th(a,b)	8: <i>a is a thinking person</i>
9: $(((p \& \%q) > (p \& \%q)) \& \sim (p \& \#q)) + (p \& \#q)$	9: Sp(a)=(Thp(a)&((b)~Pos(a,b))vOpos(a))	9: <i>a is a (personal) spirit</i>
10: $(q \& r) > ((p \& (q \& r)) > (p \& (q \& r)))$	10: Knpos(a,b,c)=(Pos(b,c)>Th(a,"Pos(b,c)"))	10: <i>a knows that b is in position c</i>
11: $(q \& r) > s > ((p \& ((q \& r) > s)) > (p \& ((q \& r) > s)))$	11: Knput(a,b,c,d)=(Put(b,c,d)>Th(a,"Put(b,c,d)"))	11: <i>a knows that b can put c into position d</i>
12: $(((q \& r) > (q \& r)) \& ((p \& ((q \& r) > (q \& r))) > (p \& ((q \& r) > (q \& r))))$	12: Knth(a,b,c)=(Th(b,c)&Th(a,"Th(b,c)"))	12: <i>a knows that b thinks c</i>

Meth8 scripts: Popper predicates 2

Meth8 scripts for a,b,c,d as p, q, r, s	Predicates	Descriptions
13: $((((p \& q) > (p \& q)) \& (p @ r)) \& (\sim ((r \& q) > (r \& q)))) = \sim (((p \& q) > (p \& q)) \& ((r \& ((p \& q) > (p \& q))) > (r \& ((p \& q) > (p \& q)))))$	13: $Unkn(a) = Th(a,b) \& (a \neq c) \& \sim Th(c,b) = \sim Knth(c,a,b)$	13: a is unfathomable: a thinks b and a is not c and c does not think b is equivalent to c does not know that a thinks b .
14: $((p \& q) > (p \& q)) \& (q = q)$	14: $Kn(a,b) = Th(a,b) \& T(b)$, where $T(b)$ means b is true	14: a knows the fact b
15: $((p \& \#q) > (p \& \#q)) > (q = q)$	15: $Verax(a) = ((b) Th(a,b) > T(b))$	15: a is truthful
16: $(\#q = \#q) > (((p \& q) > (p \& q)) \& (q = q))$	16: $Okn(a) = (b) T(b) > Kn(a,b)$	16: a is omniscient
17: $((p \& \#q) \& ((p \& \#q) > \#r) = (((\#q = \#q) > (((p \& q) > (p \& q)) \& (q = q)))) \& (((p \& \#q) > (p \& \#q)) > (q = q)))$	17: $(Opos(a) \& Oput(a)) = (Okn(a) \& Verax(a))$	17: a as omnipresent and a as omnipotent is equivalent to a as omniscient and a as truthful
18: $(((((\#p \& \#q) > (p \& \#q)) \& (((\#p \& \#q) > \#r) > ((p \& \#q) > \#r))) > ((\#q = \#q) > (((p \& q) > (p \& q)) \& (q = q)))) \& (((((p \& \#q) > (p \& \#q)) > (q = q)) \& ((((p \& \#q) > (p \& \#q)) \& \sim (p \& \#q)) + (p \& \#q))) \& (((((p \& q) > (p \& q)) \& (p @ r)) \& (\sim ((r \& q) > (r \& q))))) = \sim (((p \& q) > (p \& q)) \& ((r \& ((p \& q) > (p \& q))) > (r \& ((p \& q) > (p \& q)))))))$	18: $Ex(Gx) = (((Opos(a) \& Oput(a)) > Okn(a)) \& ((Verax(a) \& Unkn(a)) \& Sp(a)))$	18: There exists a personal spirit named God whose omnipresence and omnipotence implies omniscience, and who is truthful and unfathomable.

Meth8 corrects definitions: Popper 3

Some of Popper's definitions are rewritten for logical validity as 5, 6, 9, 10, 11, 13:

5. $Opos(a) = (b)Pos(a,b)$ [False] = $((Ea)(b)Pos(a,b) > (b)Pos(a,b))$ [True]; "a is omnipresent"
6. $Oput(a) = (b)(c)Put(a,b,c)$ [False] = $((Ea)(b)(c)Put(a,b,c) > (b)(c)Put(a,b,c))$ [True]; "a is omnipotent"
9. $Sp(a) = (Thp(a) \& ((b) \sim Pos(a,b)) \vee Opos(a))$ [True] alternative = $((Thp(a) \& ((b) \sim Utt(a,b)))$ [False] ;
"a is a (personal) spirit": The alternative published was false.
10. $Knpos(a,b,c) = (Pos(b,c) \& Th(a, "Pos(b,c)))$ [False] = $(Pos(b,c) > Th(a, "Pos(b,c)))$ [True];
"a knows that b is in position c": The & connective is an apparent misprint for imply.
11. $Knput(a,b,c,d) = (Put(b,c,d) \& Th(a, "Put(b,c,d)))$ [False] = $(Put(b,c,d) > Th(a, "Put(b,c,d)))$ [True] ;
"a knows that b can put c into position d": The & And connective is an apparent misprint for > Imply.
13. $Unkn(a) Typo$ [False] = $((Eb) (c) (Th(a,b) \& ([a \neq c] > \sim Knth(c,a,b))))$; "a is unfathomable":

Without quantifiers: [True] = $(Th(a,b) \& (a \neq c) \& \sim Th(c,b)) = \sim Knth(c,a,b)$

The > is a typo for &.

We rewrite the expression without quantifiers because it could not be reconstructed.
This is important because we know an outstanding characteristic of God is ineffability.

Meth8 validation tables: Popper 3

The table is read from the bottom up.

Table fragments for two of the four rows

(The designated truth values are **T** and **E**.)

Expression	Model 1		Model 2.1		Model 2.2		Model 2.3.1		Model 2.3.2	
5-18. Validated	TTTT	TTTT	EEEE	EEEE	EEEE	EEEE	EEEE	EEEE	EEEE	EEEE
4. (p&q);	FFFT	FFFT	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE
3. (p&q);	FFFT	FFFT	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE
2. (p&q)>r;	TTTF	TTTF	EEEU	EEEU	EEEU	EEEU	EEEU	EEEU	EEEU	EEEU
1. (p&q);	FFFT	FFFT	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE	UUUE

Remarks about the proof

- We tabulate the number of steps Popper used to process these classes of assertions:
 - Omnipresence 2: (1,5)
 - Omnipotence 2: (2,6)
 - Omniscience 10: (3, 7-14, 16)
 - Truthful 2: (4, 15)
 - Unfathomable 1: (13)
- Popper uses about 65% of the steps to prove Omniscience.

Theological implications of the proof

- If morality is non physicalistic, then the proof is not for that of the moral God of the Historic Church.
- However, this counter example demonstrates that morality *is* physicalistic:

When the existentialist utters “I ought to” conscience is invoked, and the moral imperative is asserted. Thus Ex(Gx) becomes a moral God.

- What follows then is to examine the forms of monotheism other than Christianity. These are: Baha'i, Judaism, and Muhammadanism.
- We ask: By what reasons if any do these admit they are not truthful?
- We answer, in order: No current avatar is featured; Revelation ceased after the last great prophet Malachi; and Impersonal rules and factual assertions in the Muhammadanist text are found self-contradictory.

Appendix:

Rationale of operators as quantifiers

Rationale of operators as quantifiers

- Meth8 evaluates *revised modern* Square of Opposition: edges A\E, A>I, A\O, E\I, E>O, I+O; Contrary, Contradictory \ Nand, Subaltern > Imply, Subcontrary + Or; and modal operators, quantifiers # \forall , % \exists .

A #(s=p)	A\E #(s=p)\#(s=~p)	#(s=~p) E
	A\O #(s=p)\%(s=~p)	
A>I #(s=p)>%(s=p)		#(s=~p)>%(s=~p) E>O
	#(s=~p)\%(s=p) E\I	
I %(s=p)	I+O %(s=p)+%(s=~p)	%(s=~p) O

- From 256 syllogisms possible from the Square, the 24 deemed usable are validated as true by Meth8 with *two* corrections:

EAE-2 Modus Cesare: $((\sim r \& q) \& (\#s \& q)) \& \%r > (\sim s \& r)$; *fixed up*
 AEO-2 Modus Camestros: $((\#r \& q) \& (\sim s \& q)) \& \%s > (\%s \& \sim r)$; *required*

- Modal operators of Necessity # and Possibility % are useful to map exactly the quantifiers of All \forall and Exists \exists in this limited fragment.

Rationale of operators as quantifiers

- Stephen Kuhn (1979) finds $\exists x \exists y Pxy \& \neg \exists x \exists y Pyx$ as satisfiable and $\exists x \exists y (Pxy \& \neg Pyx)$ as unsatisfiable:

“One x, y, predicate x, y, Not one x, y, predicate y, x” is satisfiable (1)

“One x,y, predicate x,y, Not predicate y,x” is unsatisfiable” (2)

Neither Eq. 1 nor 2 is validated true by Meth8;

But both Eq. 1 and 2 as equivalents are validated true by Meth8.

- Meth8 renders this as a counter example to the **non** equivalence of modal and quantifier operators.
- What follows is that there is *no* reason to rely on:
"variable-free formulations of logic by Tarski, Bernays, Halmos, Nolin and Quine ... [for] the effect of arbitrary permutations and identifications of the variables occurring in a formula."

Concluding remarks

From V4 and Meth8:

- Goodwin found the 32 minimal expressions in the primary set for the binary fragment of S5.
- James found for 92 well known items of 295 assertions, 193 validated not true and 102 true ($\approx 2:1$).
- Meth8 invalidated 65% or about 2/3 of items tested.

Other religious items also evaluated

- Gettier “justified true belief”, conjecture validated;
- Gödel-Scott on God, theorem schema not validated;
- Ignorance of first choice, system not validated;
- E.J. Lowe modal ontology, system validated;
 - Let: p , q , r , s , t , u , v
God, concrete, abstract, being, dependent, independent, contingent
 - $(((((p \supset q) \wedge (r \supset s)) \wedge ((r \supset (t \wedge s)) \wedge (u \wedge s) \supset (t \wedge s)))) \wedge ((\sim(v \wedge s) \supset \#s) \wedge ((\#t \wedge s) \supset (t \wedge s)))) \wedge (((\#t \wedge \#s) \supset (t \wedge s)) \wedge ((\#t \wedge \#s) \supset (t \wedge s)))) \supset \#q ; vt ;$
- Benz Müller-Fuenmayor ontology, formalization not validated;
- Modified divine command, theory not validated; and
- Time as God, conjecture validated.