Deontic Logic in Search of Reflective Equilibrium

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WORKSHOP

Reflective Equilibrium in Logic and Philosophy of Science

Bern, November 16, 2017

Structure of the presentation

1) Few words about the RE methodology.

2) Few words about the place of deontic logic within logical studies.

3) Brief demonstration of the processes through which logicians aim at building a system of deontic logic which would withstand the tests stemming from the reflective equilibrium method.

4) Brief analysis of the sources of the problems which have affected deontic logic for many decades and an outline of the way out (through RE considerations).

The picture of logic outlined in

Peregrin, J. & Svoboda, V.: *Reflective Equilibrium and the Principles of Logical Analysis: Understanding the Laws of Logic* (Routledge 2017)

roughly suggests that a formal theory of inference is adopted as a plausible *logical* theory if it successfully balances requirements which can be divided into three categories

- requirements concerning internal properties of individual theories
- requirements concerning relationship between arguments articulated in natural languages and arguments articulated in artificial languages
- requirements (expectations) concerning relationship to existing theories

Requirements relevant from the viewpoint of the RE methodology

a) internal consistency (nearly *sine qua non*)

b) adequateness/faithfulness (the better representation of natural language arguments the better)

c) ambitiousness (generally the more ambitious a theory is the better)

d) simplicity (generally the simpler a theory is the better)

e) purposefulness (the more useful the theory is the better)

f) conservativeness (the more similar to those theories which are widely known and adopted the better)

Deontic logic

From the perspective of those who adopt the view that logic is essentially a theoretical discipline capturing the objective formal structure of the world or of the thought deontic logic is likely to be seen as a suspicious discipline (perhaps not fully deserving the name "logic").

Problems for deontic logic are like:

You have been told

Don't eat any citruses!

and

Eat the banana, or the orange and the apple!

and it is true

All oranges are citruses

have you been implicitly asked

Eat the banana! ?

Deontic logic

Problems for deontic logic are also like:

Is the argument:

Tom shouldn't eat any citruses.

Tom should eat the banana, or the orange and the apple.

All oranges are citruses.

Tom should eat the banana.

correct?

The beginnings of deontic logic

Ernst Mally (1879-1944) *Grundgesetze des Sollens. Elemente der Logik des Willens* - 1926

Russell & Whitehead's system from *Principia mathematica* + axioms:

MA1 $((A\ f\ B) \wedge (B \rightarrow C)) \rightarrow (A\ f\ C)$

MA2 $((A\ f\ B) \wedge (A\ f\ C)) \rightarrow (A\ f\ (B \wedge C))$

MA3 $(A\ f\ B) \leftrightarrow !(A \rightarrow B)$

MA4 $\exists U!U$

MA5 $\neg(\ U\ f \cap)$

Mally's system in a more perspicuous notation:

MA1 $((A \rightarrow !B) \,\&\, (B \rightarrow C)) \rightarrow (A \rightarrow !C)$

MA2 $((A \rightarrow !B) \,\&\, (A \rightarrow !C)) \rightarrow (A \rightarrow !(B \,\&\, C))$

MA3 $(A \rightarrow !B) \leftrightarrow !(A \rightarrow B)$

MA4 $\exists U!U$

MA5 $\neg(U \rightarrow !\cap)$

!A is read as *It should be the case that A* (*A soll sein*) or *Let A is the case!*

U designates a state of affairs which is by definition (unconditionally) desirable

∩ then designates a state of affairs which is undesirable (i.e. a state that ought not to be actual/take place)

Some theorems of Mally's system

MT1 $!\top$

MT2 $\cap \rightarrow !U$

MT3 $U \leftrightarrow \top$

MT4 $\cap \rightarrow !\bot$

Karl Menger (1939)

MT5 $A \rightarrow !A$

MT6 $!A \rightarrow A$

Mally 'deontic logic' fails due to complete lack of adequateness.

Albert Hofstadter and J. C. C. McKinsey **– logic of imperatives (fiats)**

specific language with connectives allowing to connect imperatives and imperatives with indicatives: ~, +, ×, > , $\Rightarrow$, $\equiv$

PSI12	$\overline{!S_1} = !\sim S_1$
PSI13	$!S_1 + !S_2 = !(S_1 \vee S_2)$
PSI14	$!S_1 \times !S_2 = !(S_1 \cdot S_2)$
PSI15	$S_1 \rightarrow C_1 = !\bar{S}_1 + C_1$
PSI16	$(!S_1 > !S_2) \equiv (S_1 \supset S_2)$
PSI17	$(!S_1 = !S_2) \equiv (S_1 \equiv S_2)$
PSI18	$(z_1)Z_1(!S_1) = !(z_1)Z_1(S_1)$
PSI19	$(\exists z_1)Z_1(!S_1) = !(\exists z_1)Z_1(S_1)$
PSI20	$(C_1 = C_2) \cdot (C_2 = C_3) \supset (C_1 = C_3)$
PSI21	$(C_1 = C_2) \supset (C_2 = C_1)$
PSI22	$(C_1 = C_2) \supset (\bar{C}_1 = \bar{C}_2)$
PSI23	$(C_1 = C_2) \cdot (C_3 = C_4) \supset (C_1 + C_3 = C_2 + C_4)$
PSI24	$(C_1 = C_2) \cdot (C_3 = C_4) \supset (C_1 \times C_3 = C_2 \times C_4)$
PSI25	$(C_1 = C_2) \cdot (C_3 = C_4) \supset (C_1 > C_3 \equiv C_2 > C_4)$
PSI26	$(C_1 = C_2) \supset [(z_1)Z_1(C_1) = (z_1)Z_1(C_2)]$
PSI27	$(C_1 = C_2) \supset [(\exists z_1)Z_1(C_1) = (\exists z_1)Z_1(C_2)]$

Provisos against Hofstadter & McKinsey's system

a) it classifies as valid inferences

!A and A

A !A

b) unnecessarily complex articulation of Dubislav's thesis/convention

(DT) An imperative I is derivable from the imperatives I_1, ..., I_n if the statements representing the propositional core of I is derivable by traditional methods from the statements representing propositional cores of I_1, ..., I_n.

level of premises $!A_1, ..., !A_n$ **----------->** $A_1, ..., A_n$

$\Downarrow_i$ $\Downarrow_c$

level of conclusions !A **<-----------** A

A challenge to Dubislav's thesis - Ross' paradox

$\frac{!A}{!(A \vee B)}$ should be a valid inference form as $\frac{A}{A \vee B}$ is classically valid

But inference (presented by Alf Ross):

Mail this letter!
Mail this letter or burn it!

Doesn't seem to be intuitively correct. Why?

Mail this letter or burn it!
You may burn this letter

seems quite clearly correct.

Hence it seems that Hofstadter & McKinsey's system (and systems which respect Dubislav's thesis) struggles with adequateness (also with simplicity and conservativeness).

G.H. von Wright 1951 *Deontic Logic* in *Mind* - **the Old System**

introduces deontic modifiers P, F, O which are attached to parameters representing kinds of actions (generic acts) like smoking, car driving or praying.

P - permitted

F - forbidden

O - obligatory

Smoking is permitted	Pa
It is forbidden to drink alcohol and drive a car	$F(a \wedge b)$
It is obligatory to learn to swim or to buy a life jacket	$O(a \vee b)$

$Pa \leftrightarrow \neg O \neg a$ $Fa \leftrightarrow O \neg a$ $Fa \rightarrow \neg Pa$

Old System - decision procedure determining which formulas of the language of the system are tautologies (which argument forms are valid) based on three principles:

Principle of Deontic Distribution

W1 $P(a \vee b) \leftrightarrow (Pa \vee Pb)$

Principle of Permission

W2 $Pa \vee P\neg a$

Principle of Deontic Contingency

W3 A tautologous act is not necessarily obligatory, and a contradictory act is not necessarily forbidden.

von Wright's Old System – huge success though it was not accepted by anyone

Why?

1) The language which employs parameters for generic acts is not handy and introduces unnecessary problems. It, for example, requires a "double interpretation" of the connectives $\neg$, $\wedge$, $\vee$ - they connect a) deontic sentences, b) generic acts.

2) The language doesn't allow to express common mixed deontic inferences

If you are under 15, your are forbidden to smoke
You are under 15
You are forbidden to smoke

neither a nor $a \rightarrow Ob$ are well formed formulas of OS

Von Wright's Old system was rejected/surpassed on the basis of RE considerations taking into account requirements of *simplicity* and *ambitiousness* (and perhaps also due to lack of *conservativeness*).

Standard Deontic Logic (SDL)

Deontic modifiers modify sentences/propositions, i.e. allows for formulation of mixed inferences like *If you are under 15, ...*

Axioms:

SA1 $\neg(OA \wedge O\neg A)$

SA2 $O(A \wedge B) \leftrightarrow (OA \wedge OB)$,

SA3 $O(A \vee \neg A)$ (vs *Principle of Deontic Contingency*)

Rules of inference

R1 For any variable in an axiom or theorem of the system may be substituted (throughout) another variable or molecular compound of variables.

R2 *Modus ponens.*

R3 A variable or molecular compound of variables in an axiom or theorem may become replaced by a tautologically equivalent compound of variables.

R4 The O-expression which is obtained from a tautology of propositional logic by replacing its propositional variables by O-expressions is a theorem.

Provisos against the Old System and Standard Deontic Logic

R. Chisholm pointed out the problem of contrary to duty (CTD) ought statements

It is obligatory not to hurt your mom's feelings $O\neg A$

It is obligatory that if you hurt your mom's feelings you apologize $O(A \rightarrow B)$

OS and SDL theorem $O\neg A \rightarrow O(A \rightarrow B)$

SDL theorem $\neg A \rightarrow (A \rightarrow OB)$

(*If you don't smoke then if you smoke you should commit suicide*)

von Wright: neither OS nor SDL are not rich enough to allow for adequate articulation of CTD ought statements (shortcoming with respect to *adequateness* and *ambitiousness*)

von Wright's solution: **New System** (which allows for articulation of non-trivial CTD statements):

It is obligatory that if you hurt your mom's feelings you apologize $O(B/A)$

von Wright's New System was criticized for lack of adequateness:

NS theorem $O(A/B) \rightarrow \neg O(\neg A/C)$

If the window should be open given that the weather is nice weather then it is not the case that it should be closed given that the weather is bad.

the weakened New System was criticized for lack of ambitiousness

etc., etc. .....

There is no system of deontic logic which would be broadly accepted as standard (a system which would successfully balance the RE requirements).

What is the reason?

My suggestion: deontic logic as an identity problem – the discipline has not properly sorted out its ambitions and preferences – logicians don't take enough into account the purposes which theories of deontic logic should serve.

DL should be divided into several subareas with limited ambitions. For example:

DL1 Logical studies focused on the prescriptive/imperative language viewed as static (non-dynamic).

DL2 Logical studies focused on the language of deontic statements viewed as static (non-dynamic).

DL3 Logical studies focused on the language of the prescriptive/imperative language viewed as dynamic.

DL4 Logical studies focused on the language of deontic statements viewed as dynamic

A suitable framework - Lewisian language games.

For details see *A Lewisian Taxonomy for Deontic Logic* (forthcoming in *Synthese*)

THE END

Players of the normative language game

the Prescriber (the Master)

the Doer (the Slave)

the Kibitzer

StLoPr The logical study aimed at recognizing which prescriptions are (implicitly) laid down (in a given factual state-of-affairs) if a Prescriber issues a *set* of prescriptions within a static language game.

DyLoPr The logical study aimed at recognizing which prescriptions are (implicitly) laid down (in a given factual state-of-affairs) if a Prescriber issues a *sequence* of prescriptions within a dynamic language game.

StLoDo The logical study aimed at recognizing how a *set* of prescriptions laid down by the Prescriber (in a given factual state-of-affairs) shapes the SP described in the Kibitzer's language.

DyLoDo The logical study aimed at recognizing how a *sequence* of prescriptions laid down by the Prescriber (in a given factual state-of-affairs) shapes the SP described in the Kibitzer's language.

StLoKi The logical study aiming at recognizing which sentences belonging to the Kibitzer's language are entailed by a *set* of sentences of the Kibitzer's language (in a given factual state-of-affairs).

DyLoKi The logical study aiming at recognizing which sentences belonging to the Kibitzer's language are entailed by a *sequence* of sentences of the Kibitzer's language (in a given factual state-of-affairs).

1. *Walk the dog!* [!w]

What the Doer is supposed to do?

Alternative variants of the possible answers given by the Kibitzer:

a) *You are obliged to clean the kitchen,* [Oc]

b) *You are obliged to walk the dog,* [Ow]

c) *You are obliged to clean the kitchen or you are obliged to walk the dog*, [O$c \vee$ Ow]

d) *You are obliged to clean the kitchen or walk the dog*. [O($c \vee w$)]

1. *Clean the kitchen or walk the dog!* [!w]

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