A Conditional Logic for Deontic Dilemmas Allowing for Detachment

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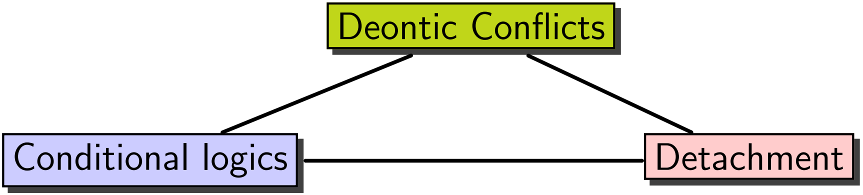
February 18, 2009

Overview

Points of Interest



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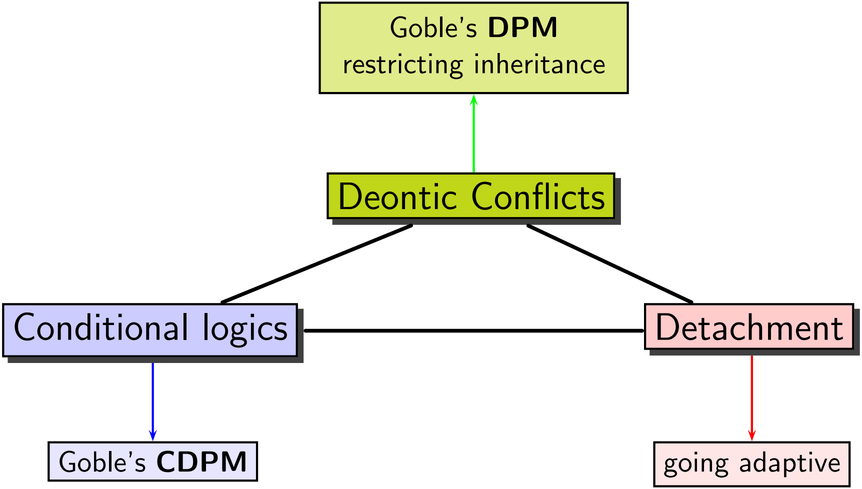

Deontic Conflicts

Example: The dilemma of Sartre's pupil

- Obligation A: stay with the ill mother
- Obligation B: join the forces to fight the Nazis

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Formal definition

- Two obligations: OA, OB
- both are possible: $\Diamond A$, $\Diamond B$
- they cannot jointly be realized: $\neg\Diamond(A \wedge B)$

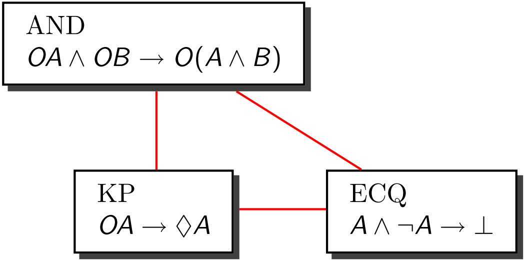
They are often characterized by

- obligations with equal force
- incommensurable obligations

Deontic Explosion

$$\mathrm{Conflict}(A, B) \vdash \begin{cases} \bullet \ \text{anything} \\ \bullet \ \text{any obligation} \end{cases}$$

Deontic Explosions



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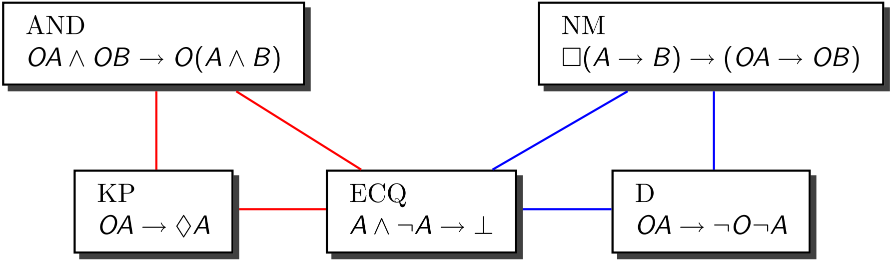

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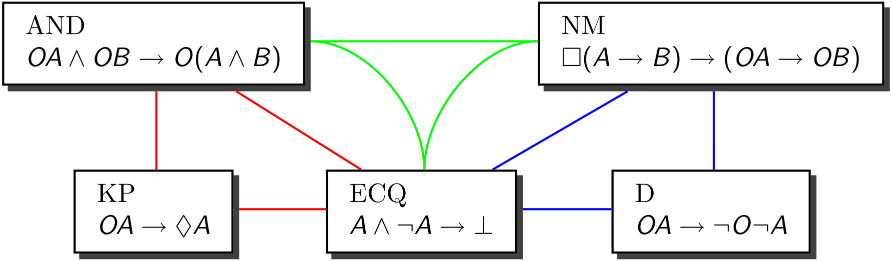

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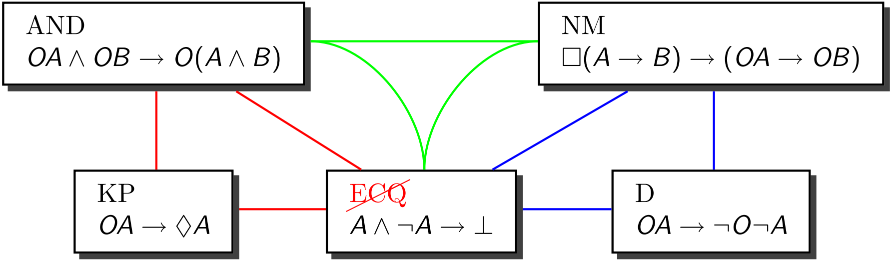

Approaches for logics dealing with deontic explosions:

- Restricting/Rejecting ECQ – going paraconsistent
- Restricting AND: Goble's logic $\mathcal{P}$
- Restricting RM: Goble's logics DPM

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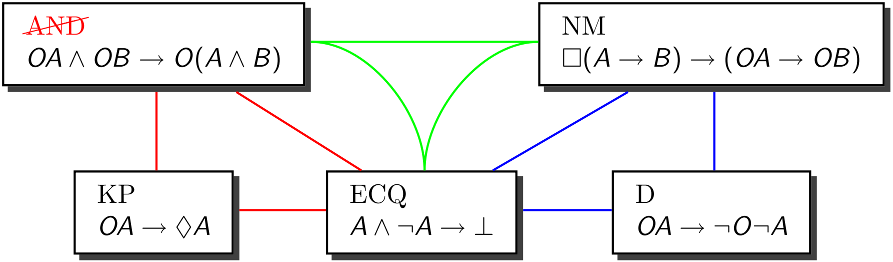

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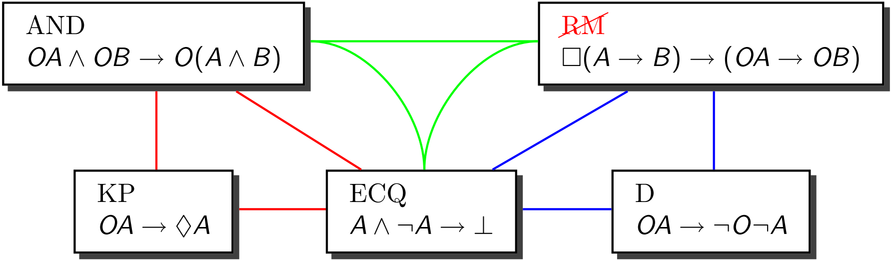

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Dealing with Deontic Dilemmas - The Basic Idea underlying DPM

Replace the inheritance principle

RM if $\vdash A \to B$ then $\vdash OA \to OB$

by a restricted version:

RPM if $\vdash A \to B$ then $\vdash PA \to (OA \to OB)$

Some reasons to go dyadic

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! many of our obligations and permissions are of conditional nature

? But why not modelling "Under condition A we're committed to bring about B" by e.g.

- $A \rightarrow OB$, or
- $O(A \rightarrow B)$?

Some reasons to go dyadic - Strengthening of the Antecedent

The problem of strengthening the antecendent

$$\frac{A \text{ commits to do } B}{\therefore \quad A \text{ and } C \text{ commits to do } B}$$

- it is fully valid in the (standard) monadic modellings,

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  - We do not want to derive, that we're obliged not to eat with fingers being served asparagus.
- this can be handled easier in dyadic approach

Some reasons to go dyadic - Prima facie obligations

Paradoxes such as the Gentle Murderer, or Chisholm's paradox are very hard to handle in monadic approaches.

Gentle Murderer Paradox

- If you kill, you should kill gently.
- You should not kill.
- If you kill gently then you kill.
- You kill.

Dyadic approaches score here much better.

Going conditional

$$\boxed{\mathrm{O}\left(A/B\right)}$$

- "Under condition B it ought to be that A."
- Define: $\mathrm{P}\left(A/B\right) =_{\mathrm{df}} \neg\mathrm{O}\left(\neg A/B\right)$.

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Example

(1) $\mathrm{O}\,(\neg f/\top)$

(2) $\mathrm{P}\,(f/a)$

(1) In general we're supposed not to eat with fingers.

(2) Eating asparagus we're allowed to eat with fingers.

The logic **CDPM.1c′**

CDPM.1c′

$$\text{If } \vdash A \leftrightarrow B \text{ then } \vdash \mathrm{O}(C/A) \leftrightarrow \mathrm{O}(C/B) \quad \text{(RCE)}$$

$$\text{If } \vdash B \leftrightarrow C \text{ then } \vdash \mathrm{O}(B/A) \leftrightarrow \mathrm{O}(C/A) \quad \text{(CRE)}$$

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$$\vdash \mathrm{O}(B/A) \rightarrow \mathrm{O}(A/A) \quad \text{(QR)}$$

$$\vdash \mathrm{O}(C/A \wedge B) \rightarrow \mathrm{O}(B \rightarrow C/A) \quad \text{(S)}$$

$$\vdash (\mathrm{O}(B/A) \wedge \mathrm{P}(B \wedge C/A) \wedge \neg\mathrm{P}(\neg B \wedge A/C)) \rightarrow \mathrm{O}(B/A \wedge C) \quad \text{(WRM')}$$

CDPM.1c′ is non-explosive

None of Goble's "deontic explosion principles" is valid in **CDPM.1c′**:

DEX-1

$$\text{If } \nvdash B \text{ then } \vdash (\mathrm{O}(A/C) \wedge \mathrm{O}(\neg A/C)) \rightarrow \mathrm{O}(B/C)$$

DEX-2

$$\vdash (\mathrm{O}(A/C) \wedge \mathrm{O}(\neg A/C)) \rightarrow (\mathrm{P}(B/C) \rightarrow \mathrm{O}(B/C))$$

DEX-3

$$\vdash (\mathrm{O}(D/C) \wedge \mathrm{P}(D/C)) \rightarrow ((\mathrm{O}(A/C) \wedge \mathrm{O}(\neg A/C)) \rightarrow (\mathrm{P}(B/C) \rightarrow \mathrm{O}(B/C)))$$

Writing conventions

Actual obligations

OA

Note

- $\boxed{\mathrm{O}(A/B)}$ is the defeasible commitment to do B under condition A
- "You are normally obliged to bring about A under condition B"
- $OA \neq \mathrm{O}(A/\top)$

Detachment Types

Factual Detachment

$$\frac{A, \quad \mathrm{O}(B/A)}{OB}$$

Deontic Detachment - Version a

$$\frac{OA, \quad \mathrm{O}(B/A)}{OB}$$

Deontic Detachment - Version b

$$\frac{\mathrm{O}(A/\top), \quad \mathrm{O}(B/A)}{\mathrm{O}(B/\top)}$$

Deontic Detachment – Version b

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$$\frac{\mathrm{O}(A/\top), \quad \mathrm{O}(B/A)}{\mathrm{O}(B/\top)}$$

In CDPM.1c′ we have

$$\frac{\mathrm{O}(A/\top), \quad \mathrm{P}(A/\top), \quad \mathrm{O}(B/A)}{\mathrm{O}(B/\top)}$$

Conditional logics and Detachment – a dilemma

"We seem to feel that detachment should be possible after all. But we cannot have things both ways, can we? This is the dilemma on commitment and detachment." (Lennart Åqvis in Handbook of Philosophical Logic, Gabbay, D. and Guenthner, F., 1984, p. 658)

A problem with Detachment – Conflicting Detachment Instances

- In general we're obliged not to eat with fingers,—$\mathrm{O}(\neg f / \top)$.
- Being served asparagus we're obliged to eat with fingers,—$\mathrm{O}(f / a)$.
- We're being served asparagus,—a.

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There are the following possible (FD) instances:

$$\frac{a, \quad \mathrm{O}(f/a)}{Of} \qquad \frac{\top, \quad \mathrm{O}(\neg f/\top)}{O\neg f}$$

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↑ more specific ✓

↑ less specific ✗

How to deal with such cases?

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- But, $\mathrm{O}(\neg f/\top)$ is *overridden*, as we also have $\mathrm{O}(f/a)$ and a.
- It is not available for actualizing.
- We model this by a weak paraconsistent negation $\sim$:
  - $\sim\mathrm{O}(\neg f/\top)$ — $\mathrm{O}(\neg f/\top)$ is not available for actualizing.
  - $\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)$ — $\mathrm{O}(\neg f/\top)$ has been overridden.
- $\sim$ is characterized by: $A \vee \sim A$

Modelling Detachment

Detachment for obligations

$$\frac{B \quad \mathrm{O}(A/B) \quad \neg{\sim}\mathrm{O}(A/B)}{OA} \quad \text{(DO)}$$

- commitment to do A under condition B
- B is the case
- ! the commitment is not overridden

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Detachment for permissions

$$\frac{B \quad \mathrm{P}(A/B) \quad \neg{\sim}\mathrm{P}(A/B)}{PA} \quad \text{(DP)}$$

Overriding obligations

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$$\frac{B \quad \mathrm{P}(D/B) \quad \mathrm{O}(C/A) \quad B \vdash A, \quad D \vdash \neg C}{\sim\mathrm{O}(C/A)} \qquad \text{(RO)}$$

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Example

- We're in general obliged not to eat with fingers,—$\mathrm{O}(\neg f/\top)$.
- Being served asparagus we're allowed to eat with fingers,—$\mathrm{P}(f/a)$.
- We're being served asparagus,—a.

All conditions are met, hence: $\boxed{\sim\mathrm{O}(\neg f/\top)}$

Overriding permissions

Overriding permissions — analogous

$$\frac{B \quad \mathrm{O}\,(D/B) \quad \mathrm{P}\,(C/A) \quad B \vdash A, \quad D \vdash \neg C}{\sim\mathrm{P}\,(C/A)} \qquad \text{(RO)}$$

Putting our framework into action

The asparagus example

1	$\mathrm{O}(\neg f/\top)$	PREM
2	$\mathrm{O}(f/a)$	PREM
3	$\mathrm{P}(f/a)$	PREM
4	a	PREM
5	$\sim\mathrm{O}(\neg f/\top)$	$1,3,4;\ RO$

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- But: $\dfrac{a, \quad \mathrm{O}(f/a), \quad \neg\sim\mathrm{O}(f/a)}{Of}$ (OD)
- Hence: we would need to derive $\neg\sim\mathrm{O}(f/a)$

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Idea

- Apply $\dfrac{B, \quad \mathrm{O}(A/B)}{OA}$ (FD) as much as possible
- apply it on the condition that $\sim\mathrm{O}(A/B)$ is not derivable

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- Apply $\dfrac{B, \quad \mathrm{O}(A/B)}{OA}$ (FD) as much as possible
- apply it on the condition that $\sim\mathrm{O}(A/B)$ is not derivable
- that's where the adaptive logic comes in

Detachment and Deontic Conflicts

Consider the following situation: $\mathrm{O}(a/b)$, $\mathrm{O}(\neg a/b)$ and b

? What obligation should be considered as being overridden?

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- This way nothing is overridden.
- $\rightsquigarrow OA \wedge O\neg A$

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- $\leadsto OA \wedge O\neg A$

$$\frac{B, \quad \mathrm{O}(\neg C/B), \quad B \vdash A}{\sim\mathrm{O}(C/A)} \qquad \text{(ROO)}$$

- Valid in logics with (D), $\mathrm{O}(A/B) \vdash \mathrm{P}(A/B)$
- $\leadsto \sim\mathrm{O}(a/b) \wedge \sim\mathrm{O}(\neg a/b)$
- $\leadsto$ no actual obligations

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$$\frac{\mathrm{O}(B/A), \quad \mathrm{O}(\neg B/A), \quad A}{\sim\mathrm{O}(B/A) \vee \sim\mathrm{O}(\neg B/A)} \quad \text{(RO}\vee\text{)}$$

- $\rightsquigarrow \sim\mathrm{O}(a/b) \vee \sim\mathrm{O}(\neg a/b)$
- $\rightsquigarrow Oa \vee O\neg a$

Adaptive Logics

Basic Motivation

- Apply certain rules *as much as possible*,
- ... *as much as the premises allow for*

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- abnormalities Ω
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Conditional application of rules

If $A \vdash_{\mathbf{LLL}} B \vee \bigvee_I C_i$, then

l_1	A		γ_1
l_2	B	l_1; RC	$\gamma_1 \cup \{C_i : i \in I\}$

An adaptive logic for detachment

$\mathbf{CDPM.1d}^{\mathbf{m}}$

- **LLL**: **CDPM.1d**, i.e. **CDPM.1c′** extended by the rules for overriding and detachment
- abnormalities:

$$\Omega = \{\mathrm{O}(A/B) \wedge \sim\mathrm{O}(A/B) \mid A, B \text{ are propositional formulas}\} \cup \{\mathrm{P}(A/B) \wedge \sim\mathrm{P}(A/B) \mid A, B \text{ are propositional formulas}\}$$

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Applying detachment conditionally

- in $\mathbf{LLL}$: $B \wedge \mathrm{O}(A/B) \vdash_{\mathbf{LLL}} OA \vee (\mathrm{O}(A/B) \wedge {\sim}\mathrm{O}(A/B))$
- hence we derive in the adaptive logic OA from $B \wedge \mathrm{O}(A/B)$ on the condition $\mathrm{O}(A/B) \wedge {\sim}\mathrm{O}(A/B)$

Example

Minimal abnormality – in semantic terms

choose the **LLL**-models M of a given premise set Γ such that

there is no **LLL**-model N of Γ such that $\mathrm{Ab}(N) \subset \mathrm{Ab}(M)$

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4	Oa	1, 3; DO	$\{!\mathrm{O}(a/b)\}$

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1	$\mathrm{O}(a/b)$	PREM	$\emptyset$
2	$\mathrm{O}(\neg a/b)$	PREM	$\emptyset$
3	b	PREM	$\emptyset$
4	Oa	$1, 3; DO$	$\{!\mathrm{O}(a/b)\}$
5	$O\neg a$	$2, 3; DO$	$\{!\mathrm{O}(\neg a/b)\}$

Example

Minimal abnormality – in semantic terms

choose the $\mathbf{LLL}$-models M of a given premise set Γ such that

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6	$Oa \vee O\neg a$	4; CL	$\{!\mathrm{O}(a/b)\}$
7	$Oa \vee O\neg a$	5; CL	$\{!\mathrm{O}(\neg a/b)\}$

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[8]4	Oa	1, 3; DO	$\{!\mathrm{O}(a/b)\}$
[8]5	$O\neg a$	2, 3; DO	$\{!\mathrm{O}(\neg a/b)\}$
6	$Oa \vee O\neg a$	4; CL	$\{!\mathrm{O}(a/b)\}$
7	$Oa \vee O\neg a$	5; CL	$\{!\mathrm{O}(\neg a/b)\}$
8	$!\mathrm{O}(a/b) \vee !\mathrm{O}(\neg a/b)$	1, 2, 3; CL	$\emptyset$

Further examples

1	$\mathrm{O}(\neg f/\top)$	PREM	$\emptyset$
2	$\mathrm{O}(f/a)$	PREM	$\emptyset$
3	$O\neg f$	1; RC	$\{\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)\}$

Further examples

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4	$\mathrm{P}(\neg f/\top)$	PREM	$\emptyset$
5	$\mathrm{P}(f/a)$	PREM	$\emptyset$
6	$P\neg f$	4; RC	$\{\mathrm{P}(\neg f/\top) \wedge \sim\mathrm{P}(\neg f/\top)\}$

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Further examples

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2	$\mathrm{O}(f/a)$	PREM	$\emptyset$
3	$O\neg f$	1; RC	$\{\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)\}$
4	$\mathrm{P}(\neg f/\top)$	PREM	$\emptyset$
5	$\mathrm{P}(f/a)$	PREM	$\emptyset$
6	$P\neg f$	4; RC	$\{\mathrm{P}(\neg f/\top) \wedge \sim\mathrm{P}(\neg f/\top)\}$
7	a	PREM	$\emptyset$
8	$\sim\mathrm{O}(\neg f/\top)$	1, 5, 7; *RO*	$\emptyset$

Further examples

1	$\mathrm{O}(\neg f/\top)$	PREM	$\emptyset$
2	$\mathrm{O}(f/a)$	PREM	$\emptyset$
9 3	$O\neg f$	1; RC	$\{\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)\}$
4	$\mathrm{P}(\neg f/\top)$	PREM	$\emptyset$
5	$\mathrm{P}(f/a)$	PREM	$\emptyset$
6	$P\neg f$	4; RC	$\{\mathrm{P}(\neg f/\top) \wedge \sim\mathrm{P}(\neg f/\top)\}$
7	a	PREM	$\emptyset$
8	$\sim\mathrm{O}(\neg f/\top)$	1, 5, 7; *RO*	$\emptyset$
9	$\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)$	1, 8; *CL*	$\emptyset$

Further examples

1	$\mathrm{O}(\neg f / \top)$	PREM	$\emptyset$
2	$\mathrm{O}(f / a)$	PREM	$\emptyset$
[9]3	$O\neg f$	1; RC	$\{\mathrm{O}(\neg f / \top) \wedge \sim\mathrm{O}(\neg f / \top)\}$
4	$\mathrm{P}(\neg f / \top)$	PREM	$\emptyset$
5	$\mathrm{P}(f / a)$	PREM	$\emptyset$
6	$P\neg f$	4; RC	$\{\mathrm{P}(\neg f / \top) \wedge \sim\mathrm{P}(\neg f / \top)\}$
7	a	PREM	$\emptyset$
8	$\sim\mathrm{O}(\neg f / \top)$	1, 5, 7; *RO*	$\emptyset$
9	$\mathrm{O}(\neg f / \top) \wedge \sim\mathrm{O}(\neg f / \top)$	1, 8; *CL*	$\emptyset$
10	Of	2, 7; *DO*	$\{\mathrm{O}(f / a) \wedge \sim\mathrm{O}(f / a)\}$

Further examples

1	$\mathrm{O}(\neg f/\top)$	PREM	$\emptyset$
2	$\mathrm{O}(f/a)$	PREM	$\emptyset$
$^{9}3$	$O\neg f$	1; RC	$\{\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)\}$
4	$\mathrm{P}(\neg f/\top)$	PREM	$\emptyset$
5	$\mathrm{P}(f/a)$	PREM	$\emptyset$
$^{12}6$	$P\neg f$	4; RC	$\{\mathrm{P}(\neg f/\top) \wedge \sim\mathrm{P}(\neg f/\top)\}$
7	a	PREM	$\emptyset$
8	$\sim\mathrm{O}(\neg f/\top)$	1, 5, 7; *RO*	$\emptyset$
9	$\mathrm{O}(\neg f/\top) \wedge \sim\mathrm{O}(\neg f/\top)$	1, 8; *CL*	$\emptyset$
10	Of	2, 7; *DO*	$\{\mathrm{O}(f/a) \wedge \sim\mathrm{O}(f/a)\}$
11	$\sim\mathrm{P}(\neg f/\top)$	4, 2, 7; *RP*	$\emptyset$
12	$\mathrm{P}(\neg f/\top) \wedge \sim\mathrm{P}(\neg f/\top)$	4, 11; *CL*	$\emptyset$

Outlook

An adaptive deontic logic has been presented, that ...

- is conditional,
- can deal with deontic conflicts,
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Further Remarks

- there is an adaptive improvement of **CDPM.1c** that can be combined with the adaptive logic for detachment
- the way of modelling adaptively detachment via a paraconsistent negation can be generalized for other conditional deontic logics