Free Choice in Deontic Inquisitive Semantics (DIS)

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Workshop: Questions in Discourse

Free Choice

An example of free choice

(1) A country may establish a research center or a laboratory.

Ross's Paradox

An example of standard disjunction

(2) a. A country established a research center.
b. A country established a research center or a laboratory.

An example of Ross's paradox

(3) a. A country may establish a research center.
b. A country may establish a research center or invade its neighbour.

Non-monotonicity

Cariani [2011]

The problem is inheritance:

$$p \models p \vee q$$
$$\Diamond p \not\models \Diamond (p \vee q)$$

Proposed solution: non-monotonicity

Negation

An example of negated permission

(4) A country may not establish a research center or a laboratory.

Ignorance reading

An example of the ignorance reading

(5) A country may establish a research center or a laboratory, but I do not know which.

Summary of the data

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- Free choice
- Negation
- Ignorance reading
- Ross's paradox

Pragmatic Mechanism

Zimmermann [2000]

Reinterpret deontic disjunction as a conjunction

- $\Diamond(\varphi \vee \psi) \equiv \Box\Diamond\varphi \wedge \Box\Diamond\psi$

Does not correctly predict negation

- $\overline{\Box\Diamond\varphi} \wedge \overline{\Box\Diamond\psi}$
- $\overline{\Box\Diamond\varphi \wedge \Box\Diamond\psi} \equiv \overline{\Box\Diamond\varphi} \vee \overline{\Box\Diamond\psi}$

Implicatures

Eckardt [2007]

Implicature-based account

1. Informed speaker uses disjunction: $\Diamond(\varphi \vee \psi)$.
2. Either disjunct would be more economical.
3. Infer that permissions are best described by disjunction because either disjunct would be false.
4. Free choice effect: There must be some worlds where $\Diamond\varphi \wedge \overline{\Diamond\psi}$ and others where $\overline{\Diamond\varphi} \wedge \Diamond\psi$

Problems with Implicature-based Accounts

What is being said and what is being implicated?

(6) X is meeting a woman this evening.

(7) A country may establish a research center or a laboratory.

Cancellation

(8) X is meeting a woman this evening but it's only his mother.

(9) A country may establish a research center or a laboratory, although in fact a country may not establish a laboratory.

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Cancellations Explored Further

Both

(10) A country may establish a research center or a laboratory, but not both.

Reduction

Barker [2010]

- $\Diamond\varphi := \varphi \rightarrow \delta$
- $\Diamond(\varphi \vee \psi) \models (\varphi \vee \psi) \rightarrow \delta \models \varphi \rightarrow \delta \wedge \psi \rightarrow \delta$

Issues

1. Different violations and permissions
2. Negation: $\overline{\Diamond\varphi} \vee \overline{\Diamond\psi}$

Atoms and negation

Atoms

$\sigma \models^+ p$ iff $\forall w \in \sigma : w(p) = 1$
$\sigma \models^- p$ iff $\forall w \in \sigma : w(p) = 0$

Negation

$\sigma \models^+ \overline{\varphi}$ iff $\sigma \models^- \varphi$
$\sigma \models^- \overline{\varphi}$ iff $\sigma \models^+ \varphi$

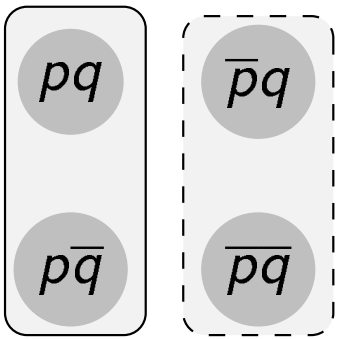

Figure 1: p

Informativeness and inquisitiveness

Informative and inquisitive

φ is informative iff $\bigcup[\varphi]^+ \neq W$.
φ is inquisitive iff $\bigcup[\varphi]^+ \notin [\varphi]^+$.

Assertions, questions, hybrids and radical assertions

- φ is an assertion iff φ is not inquisitive.
- φ is a question iff φ is not informative.
- φ is a hybrid iff φ is inquisitive and informative.
- φ is a radical assertion iff both φ and $\overline{\varphi}$ are not inquisitive.

Disjunction

Disjunction

$\sigma \models^+ \varphi \vee \psi$ iff $\sigma \models^+ \varphi$ or $\sigma \models^+ \psi$
$\sigma \models^- \varphi \vee \psi$ iff $\sigma \models^- \varphi$ and $\sigma \models^- \psi$

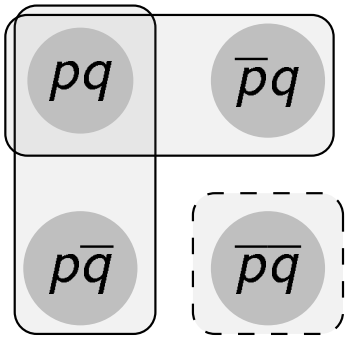

Figure 2: $p \vee q$

Conditionals

Conditionals

$\sigma \models^+ \varphi \to \psi$ iff $\forall \tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^+ \psi)$
$\sigma \models^- \varphi \to \psi$ iff $\exists \tau.(\tau \models^+ \varphi$ and $\forall \tau' \supseteq \tau.(\tau' \models^+ \varphi$ implies $\sigma \cap \tau' \models^- \psi))$

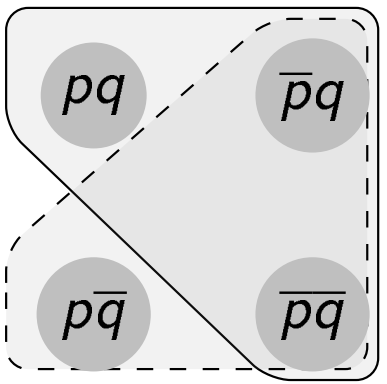

Figure 3: $p \to q$

Conditionals Continued

False tautology rectified

$(p \to q) \vee (q \to p)$

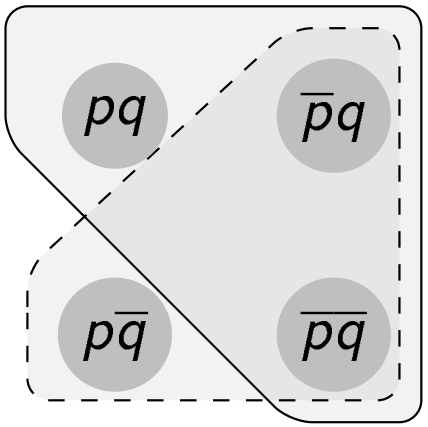

Figure 4: $p \to q$

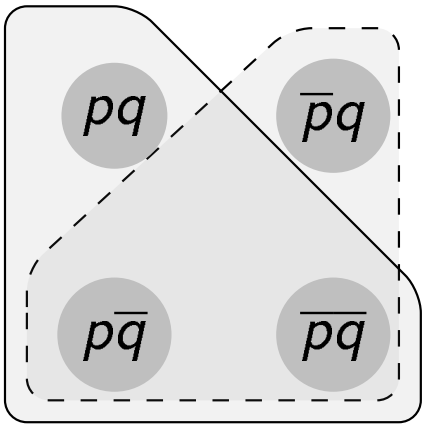

Figure 5: $q \to p$

Conditionals Continued

Conditionals

$\sigma \models^+ \varphi \rightarrow \psi$ iff $\forall \tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^+ \psi)$
$\sigma \models^- \varphi \rightarrow \psi$ iff $\exists \tau.(\tau \models^+ \varphi$ and $\forall \tau' \supseteq \tau.(\tau' \models^+ \varphi$ implies $\sigma \cap \tau' \models^- \psi))$

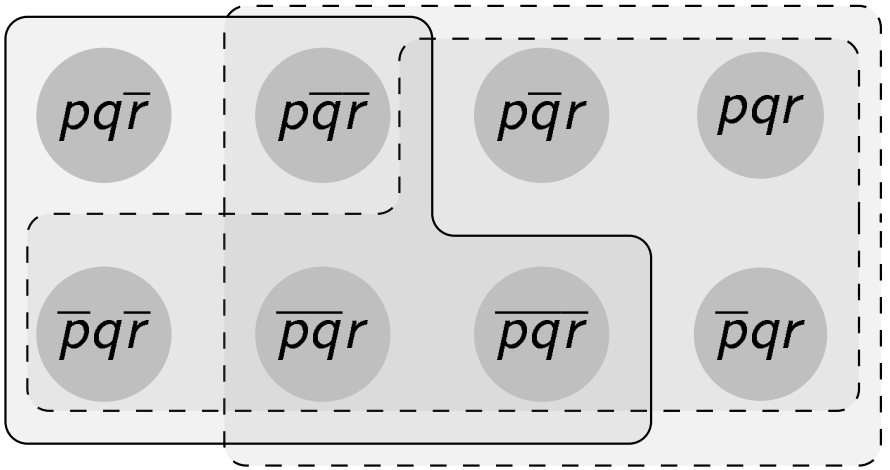

Figure 6: $p \vee q \rightarrow r$

Conditionals Continued

Conditionals

$\sigma \models^+ \varphi \to \psi$ iff $\forall \tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^+ \psi)$
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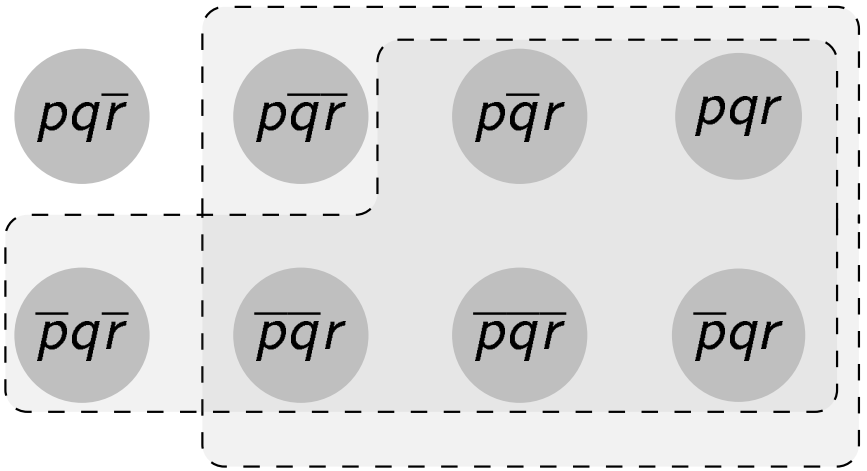

Figure 7: $[p \vee q \to r]^-$

Conjunction in Inquisitive Semantics

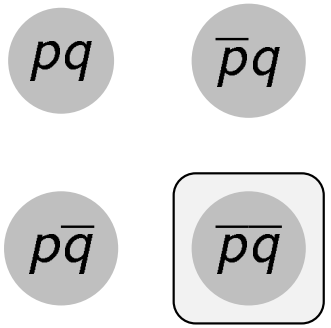

Figure 8: $\overline{p \vee q}$

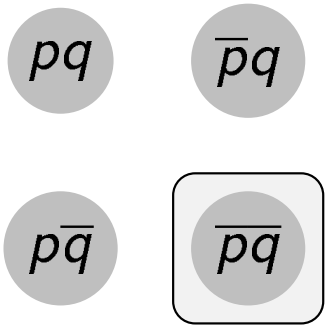

Figure 10: $\overline{p} \wedge \overline{q}$

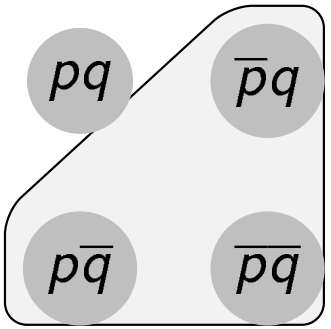

Figure 9: $\overline{p \wedge q}$

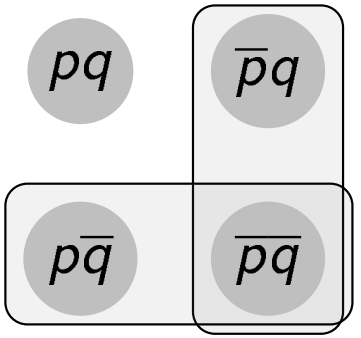

Figure 11: $\overline{p} \vee \overline{q}$

Conjunction in DIS

Conjunction

$\sigma \models^+ \varphi \wedge \psi$ iff $\sigma \models^+ \varphi$ and $\sigma \models^+ \psi$
$\sigma \models^- \varphi \wedge \psi$ iff $\sigma \models^- \varphi$ or $\sigma \models^- \psi$

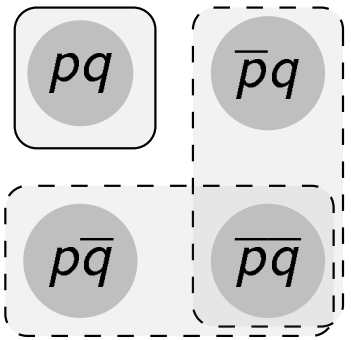

Figure 12: $p \wedge q$

Entailment

Standard inquisitive entailment

$\varphi \models \psi$ iff $\forall \alpha \in \lfloor \varphi \rfloor : \exists \beta \in \lfloor \psi \rfloor : \alpha \subseteq \beta$

Entailment test [Lewis and Langford 1932]

If φ entails ψ then it's impossible that $\varphi \wedge \overline{\psi}$.

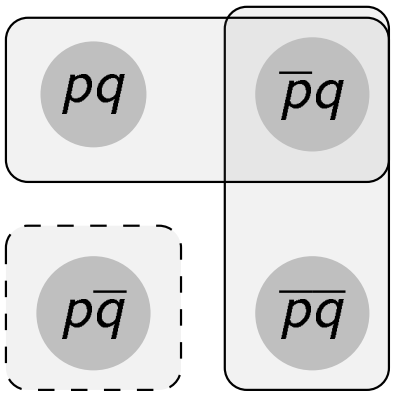

Figure 13: $\overline{p} \vee q$

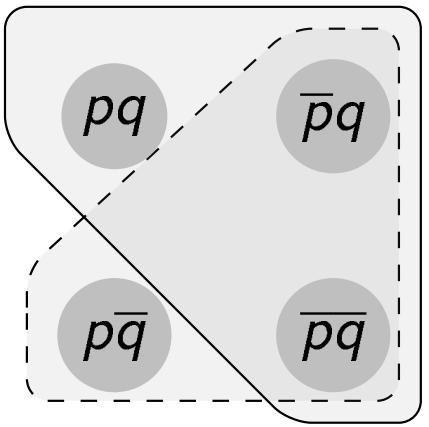

Figure 14: $p \rightarrow q$

Radical Entailment

Standardly

If $\varphi \models \psi$ then $\overline{\psi} \models \overline{\varphi}$.

Radical Entailment

$\varphi \models \psi$ iff
$\forall \sigma$ if $\sigma \models^{+} \varphi$ then $\sigma \models^{+} \psi$ and if $\sigma \models^{-} \psi$ then $\sigma \models^{-} \varphi$.

Deontics

Violations

Atom v.

Definition of deontic "may"

$\sigma \models^+ \Diamond\varphi$ iff $\forall\tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^- v)$
$\sigma \models^- \Diamond\varphi$ iff $\forall\tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^+ v)$

Figure 15: $\Diamond p$

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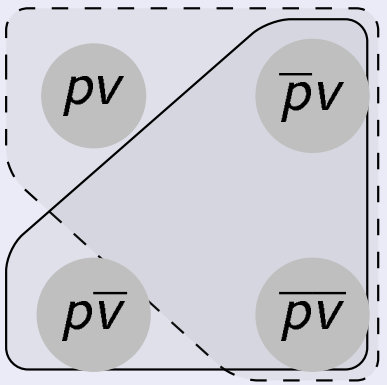

Figure 15: $\Diamond p$

Free Choice

Disjunctive permission

(11) A country may establish a research center or a laboratory.

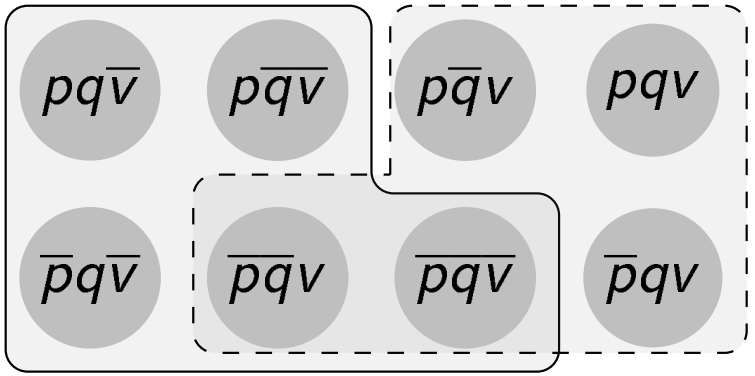

Figure 16: $\Diamond(p \vee q)$

FREE CHOICE CONTINUED

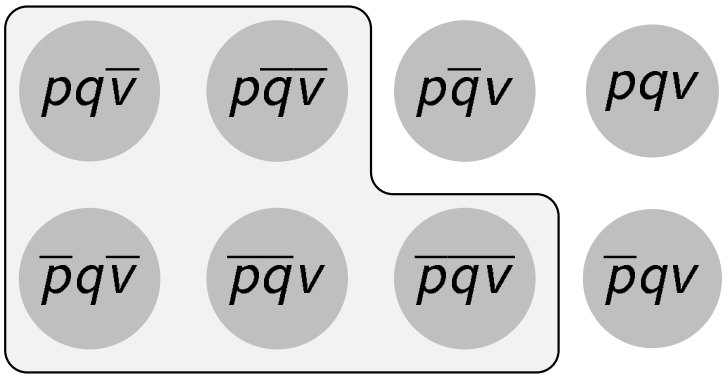

FIGURE 17: $[\Diamond(p \vee q)]^+$

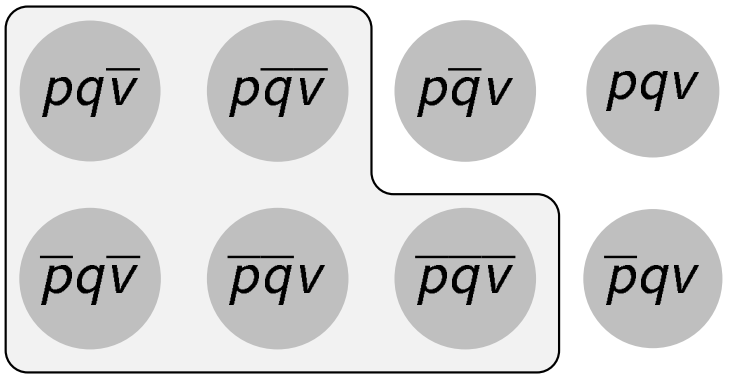

FIGURE 18: $[\Diamond p \wedge \Diamond q]^+$

Negation

Negation

(12) A country may not establish a research center or a laboratory.

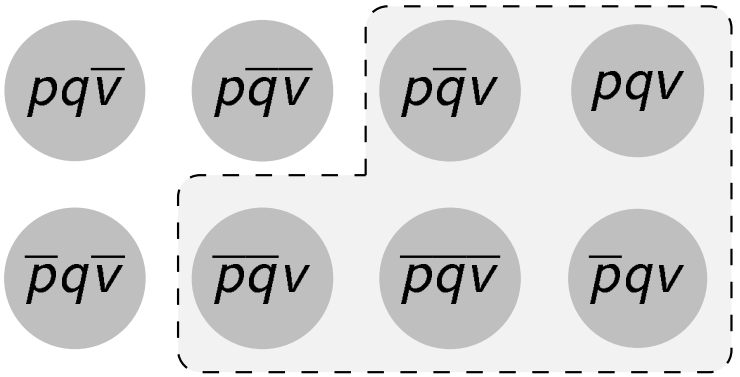

Figure 19: $[\Diamond(p \vee q)]^{-}$

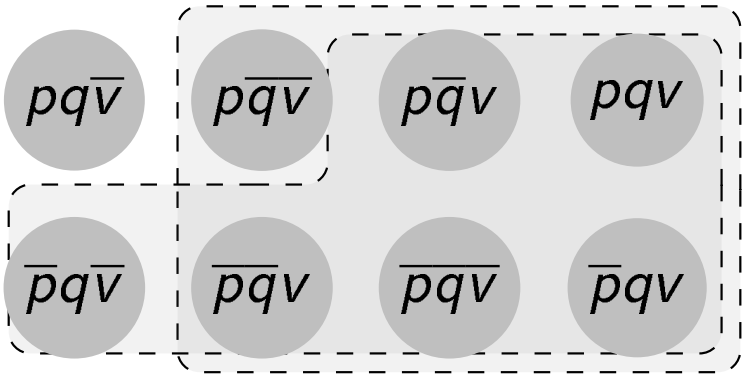

Figure 20: $[\Diamond p \wedge \Diamond q]^{-}$

Ignorance Reading

Disjunction scoping over "may"

(13) A country may establish a research center or a laboratory but I don't know which.

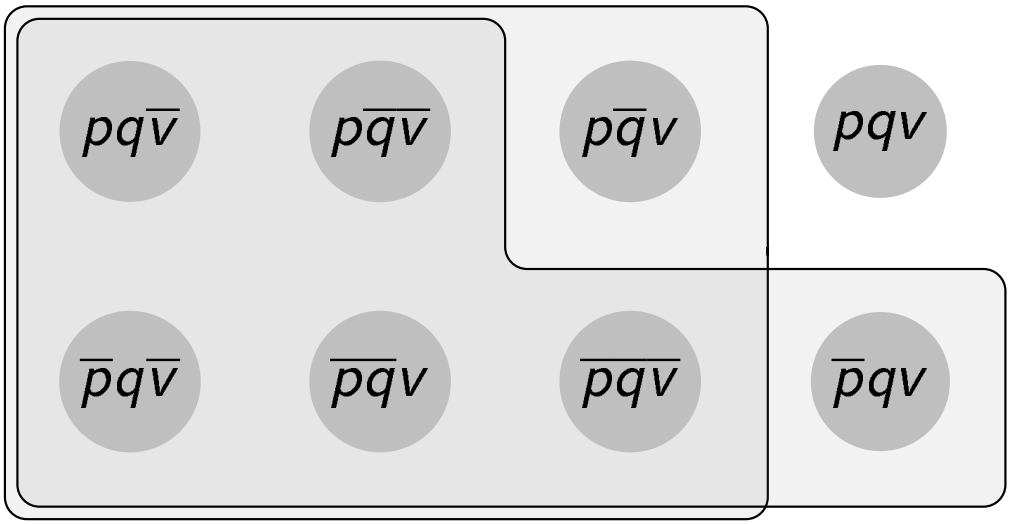

Figure 21: $[\Diamond p \vee \Diamond q]^{+}$

Ross's paradox

Ross's paradox

(14) a. A country may establish a research center.
b. A country may establish a research center or invade its neighbour.

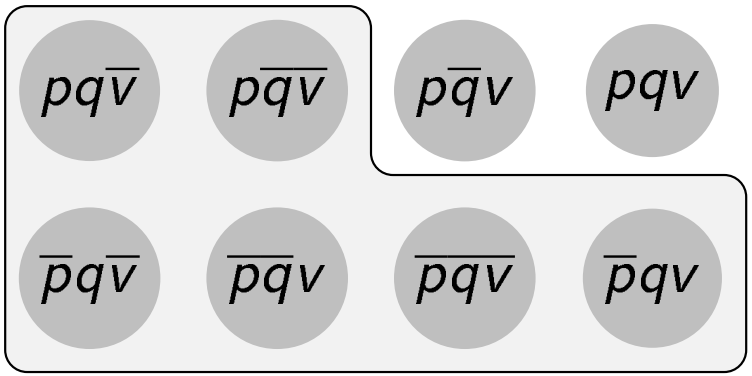

Figure 22: $[\Diamond p]^+$

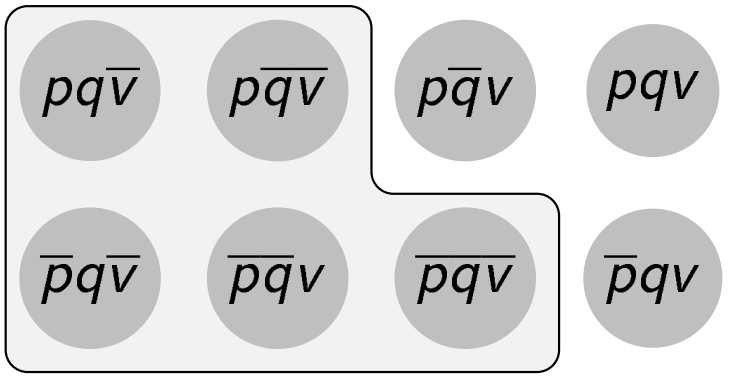

Figure 23: $[\Diamond(p \vee q)]^+$

Strengthening the Antecedent

Strengthening the antecedent

(15) a. You may walk a dog.
b. You may walk a dog and kill the president.

Strengthening the Antecedent

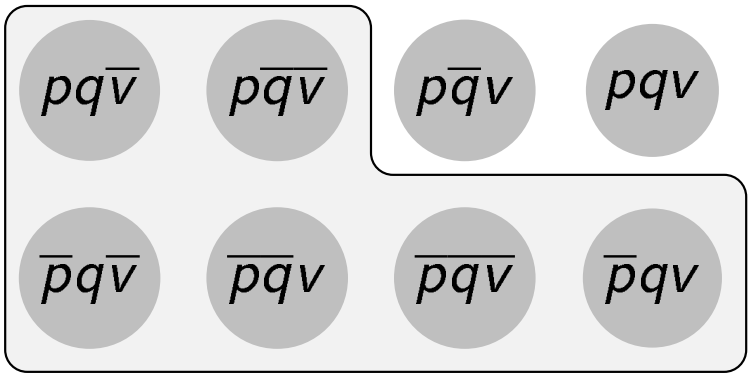

Figure 24: $[\Diamond p]^+$

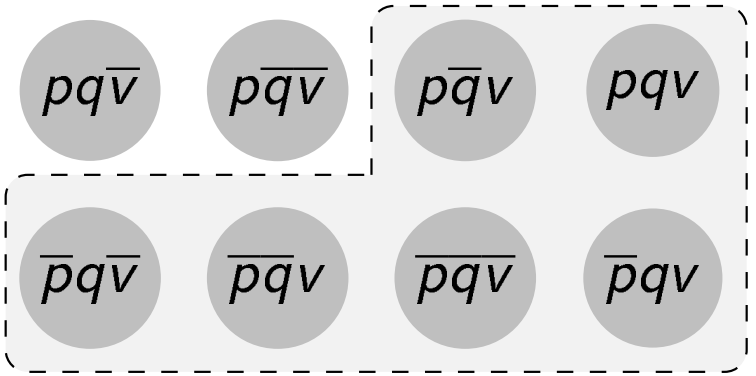

Figure 25: $[\Diamond p]^-$

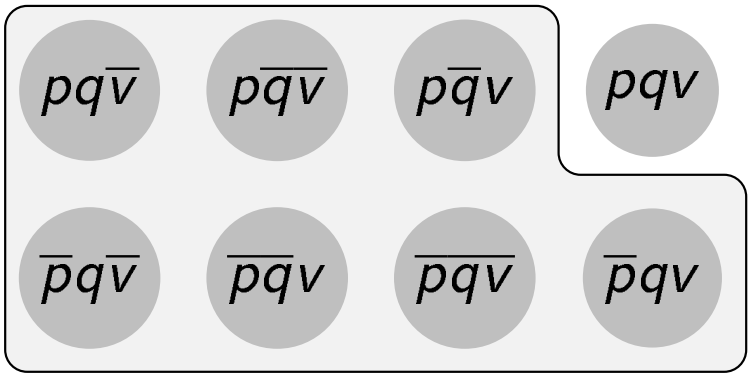

Figure 26: $[\Diamond(p \wedge q)]^+$

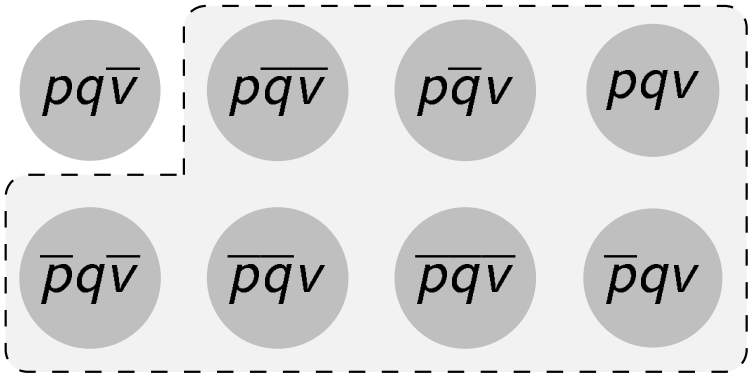

Figure 27: $[\Diamond(p \wedge q)]^-$

Counterargument Countered

Anderson [1967]

1. $\Box p := \overline{p} \rightarrow v$
2. p
3. $\overline{\overline{p}}$
4. $\overline{\overline{p}} \vee v$
5. $\overline{p} \rightarrow v$
6. $p \rightarrow \Box p$

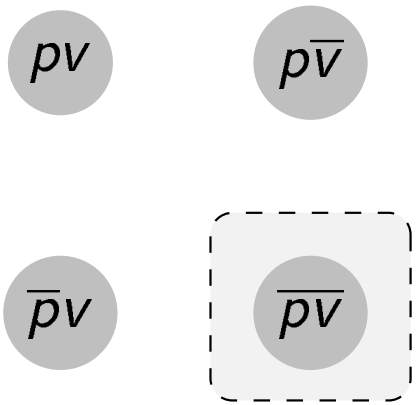

Figure 28: $[\overline{\overline{p}} \vee v]^-$

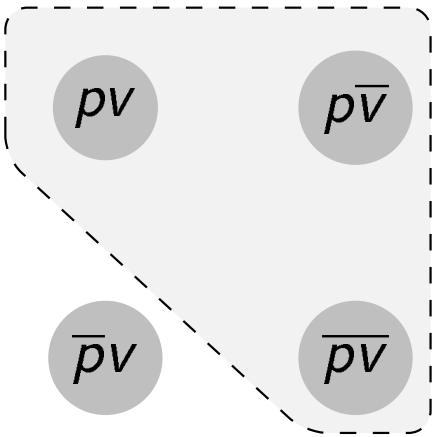

Figure 29: $[\overline{p} \rightarrow v]^-$

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$\sigma \models^- \Diamond\varphi$ iff $\forall\tau \subseteq \sigma.(\ \tau \models^+ \varphi$ implies $\tau \models^+ v)$

Figure 30: $\Diamond p$

Deontics

Violations

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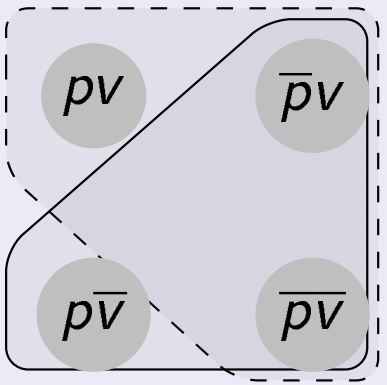

Figure 30: $\Diamond p$