Argumentation and rules with exceptions

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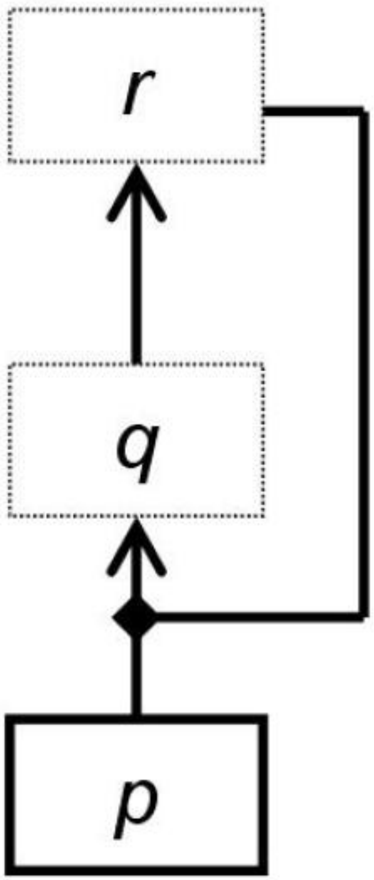
An example by Pollock



p	p
$p \Rightarrow q$	p is a prima facie reason for q
$q \Rightarrow r$	q is a prima facie reason for r
$r \Rightarrow \neg(p \Rightarrow q)$	r is an exception that undercuts the support of q by p

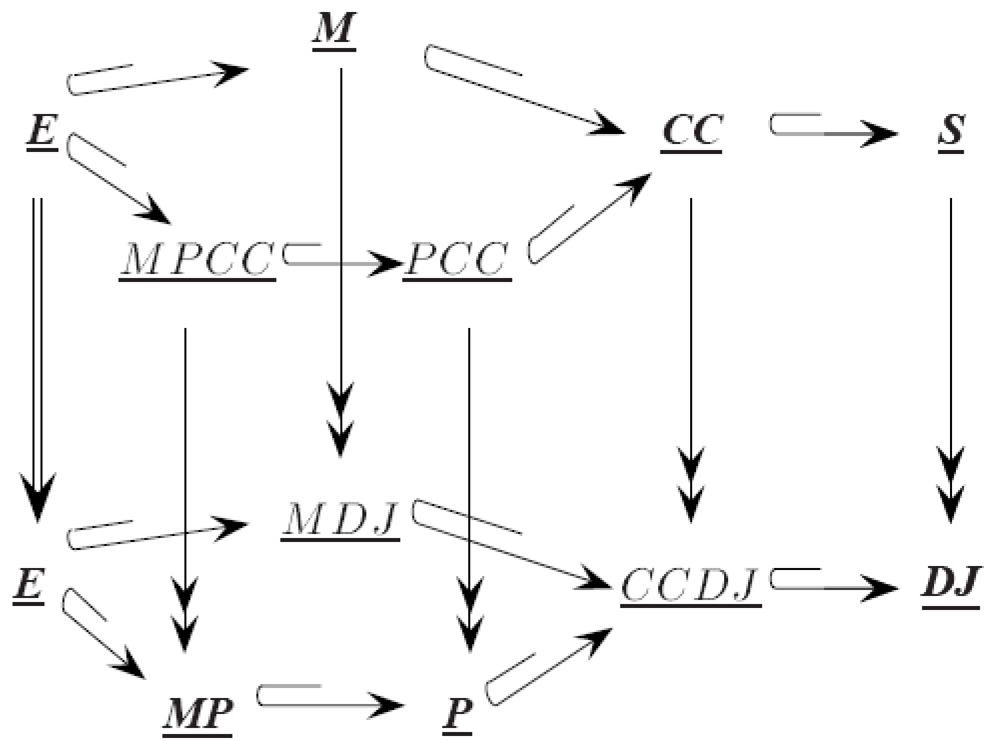
Responses

Type I: the way in which we construct and evaluate arguments must be reconsidered.

Pollock adapts his approach to the determination of defeat status

A forest of extension types

Compatibility types



Dialectical justification types

1996 NAIC conference, 2003 Journal of Logic and Computation

Responses

Type I: the way in which we construct and evaluate arguments must be reconsidered.

Pollock adapts his approach to the determination of defeat status

Type II: the meaning of the building blocks provides constraints.

'Incomplete'? 'Inconsistent'?

Properties

1. (Logical equivalence)
   If $\phi \mathrel{|\!\sim} \psi$, $\vdash \phi \leftrightarrow \phi'$ and $\vdash \psi \leftrightarrow \psi'$, then $\phi' \mathrel{|\!\sim} \psi'$.
2. (Restricted reflexivity)
   If $\phi \mathrel{|\!\sim} \psi$, then $\phi \mathrel{|\!\sim} \phi$.
3. (Antecedence)
   If $\phi \mathrel{|\!\sim} \psi$, then $\phi \mathrel{|\!\sim} \phi \wedge \psi$.
4. (Right weakening)[1]
   If $\phi \mathrel{|\!\sim} \psi \wedge \chi$, then $\phi \mathrel{|\!\sim} \psi$.
5. (Conjunctive cautious monotony)
   If $\phi \mathrel{|\!\sim} \psi \wedge \chi$, then $\phi \wedge \psi \mathrel{|\!\sim} \chi$.
6. (Mutual attack)
   If $\phi \mathrel{|\!\sim} \psi$, $\phi \mathrel{|\!\sim} \chi$ and $\phi \wedge \psi \not\mathrel{|\!\sim} \chi$, then $\phi \wedge \chi \not\mathrel{|\!\sim} \psi$.
7. (Conjunctive cumulative transitivity, Conjunctive cut)
   If $\phi \mathrel{|\!\sim} \psi$ and $\phi \wedge \psi \mathrel{|\!\sim} \chi$, then $\phi \mathrel{|\!\sim} \psi \wedge \chi$.

Starting points

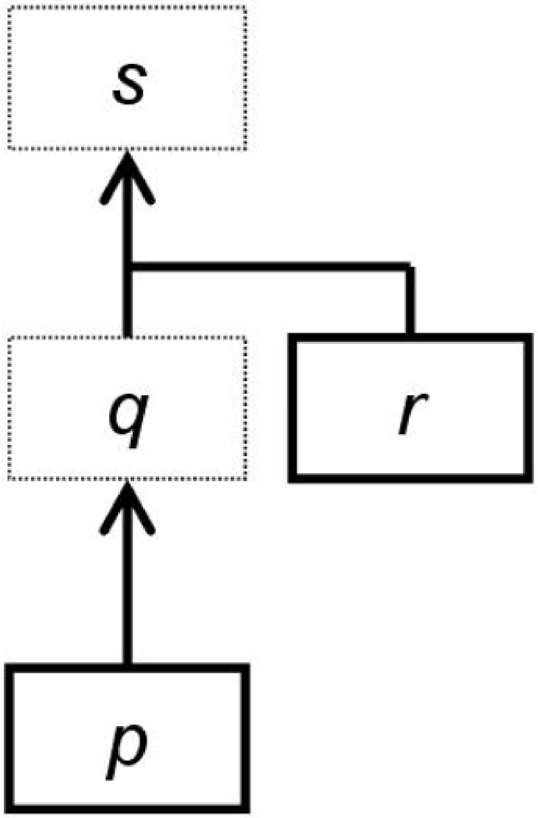
1. Premises, conclusions and exceptions are expressed in a standard propositional language.
2. Argument construction and evaluation lead to an inference relation

   $\phi \mid\sim \psi$ means that there is a 'good' argument with premises ϕ and conclusion ψ
3. Rules are a subset of the inference relation

   When $\phi \Rightarrow \psi$ is a rule, then $\phi \mid\sim \psi$
4. Exceptions are a subset of the complement of the inference relation

   When $\neg(\phi \Rightarrow \psi)$ is an exception, then $\phi \not\mid\sim \psi$

Example of an argument



Argument:

$[p\ ,\ p \Rightarrow q,\ q \wedge r \Rightarrow s]$

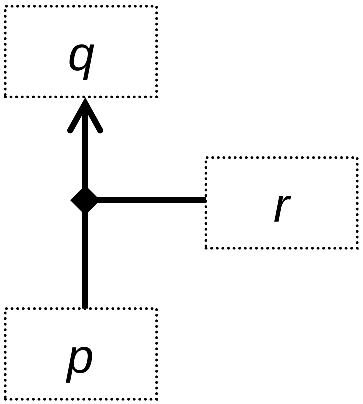
Premises: *p, r*

Conclusions (final and intermediate): *p, q, r, s*

Case made by the argument:

$p \wedge q \wedge r \wedge s$

Argument attack



Defined in terms of exception rules:

$$r \Rightarrow \neg(p \Rightarrow q)$$

Treated as equivalent to

$$\neg(p \wedge r \Rightarrow q)$$

Coherent argumentation:

Properties (1-5)

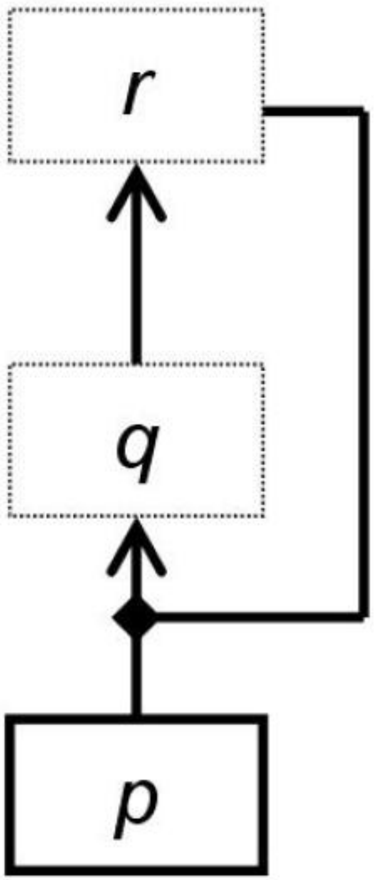
Defensible argumentation:

Properties (1-6)

Reason-based argumentation:

Properties (1-7)

Pollock's example again



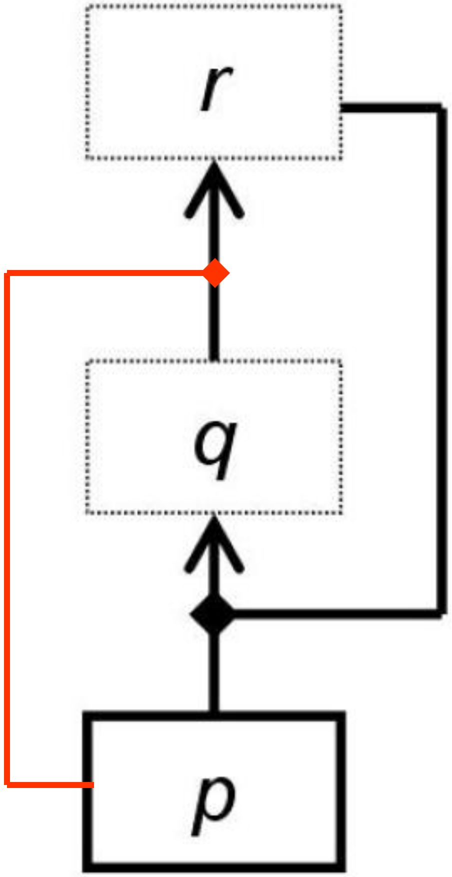
Assume that $p \wedge q \mid\!\sim r$. Then (CCT) gives $p \mid\!\sim q \wedge r$. Then (CCM, LE) gives $p \wedge r \mid\!\sim$ q; contradiction since *r* undercuts *p*'s support of *q*.

Conclusion:

assuming (LE), (CCM), (CCT),

$p \wedge q \mid\!\not\sim r$

Pollock's example again



In other words:

Either *p* undercuts *q*'s support of *r*, or there exists an argument that is defeated by sequential weakening.

Conclusion

Arguments that are constructed using rules with exceptions can be fruitfully analyzed from the perspective of nonmonotonic consequence relations.

It is possible to characterize

- coherent argumentation

  no self attack

- defensible argumentation

  defense against attack

- reason-based argumentation

  rules are applicable or excluded (no sequential weakening)