# Towards Ordering Sets of Arguments

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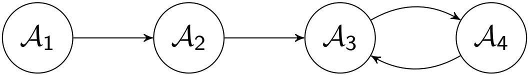
# Abstract Argumentation




- $AF = (Arg, R)$

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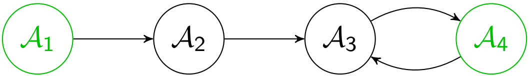


- $AF = (Arg, R)$
- $E \subseteq Arg$ is *admissible* (AD) iff
  1. $E$ is *conflict-free*, i. e., there are no arguments $\mathcal{A}, \mathcal{B} \in E$ with $(\mathcal{A}, \mathcal{B}) \in R$ and
  2. $E$ *defends* every $\mathcal{A} \in E$,

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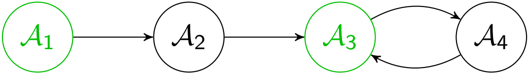


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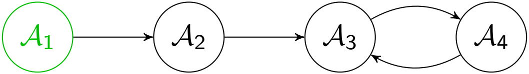


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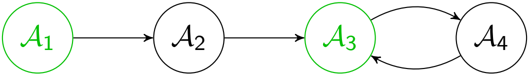


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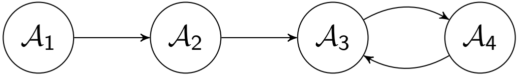
- a complete extension $E$
  - is *grounded* (GR) if and only if $E$ is minimal,
  - is *preferred* (PR) if and only if $E$ is maximal, and
  - is *stable* (ST) if and only if $Arg = E \cup \{\mathcal{B} \mid \exists \mathcal{A} \in E : (\mathcal{A}, \mathcal{B}) \in R\}$.

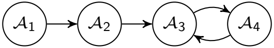
# Ranking-based Semantics




*Ranking-based semantics* $\sigma$ is a preorder $\preceq^{\sigma}_{AF}$ on $Arg$.

$$\mathcal{A}_1 \preceq^{\sigma}_{AF} \mathcal{A}_4 \preceq^{\sigma}_{AF} \mathcal{A}_2 \preceq^{\sigma}_{AF} \mathcal{A}_3$$

# Example



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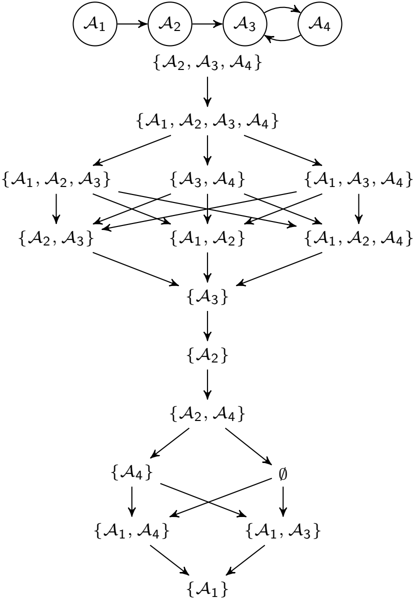
$\mathcal{A}_1$
$\mathcal{A}_2$
$\mathcal{A}_3$
$\mathcal{A}_4$
$\{\mathcal{A}_2, \mathcal{A}_3, \mathcal{A}_4\}$
$\{\mathcal{A}_1, \mathcal{A}_2, \mathcal{A}_3, \mathcal{A}_4\}$
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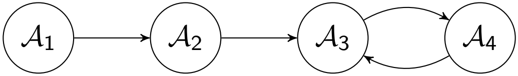
$\{\mathcal{A}_3\}$
$\{\mathcal{A}_2\}$
$\{\mathcal{A}_2, \mathcal{A}_4\}$
$\{\mathcal{A}_4\}$
$\emptyset$
$\{\mathcal{A}_1, \mathcal{A}_4\}$
$\{\mathcal{A}_1, \mathcal{A}_3\}$
$\{\mathcal{A}_1\}$

# Using classical semantics




$E_1 = \{\mathcal{A}_1\}$ $E_2 = \{\mathcal{A}_2, \mathcal{A}_3\}$

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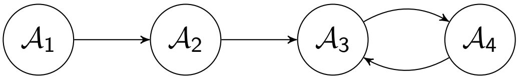


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$$E_1 \preceq^{GR}_{AF} E_2$$

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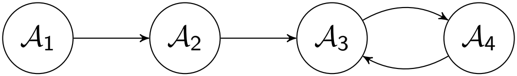


$E_1 = \{\mathcal{A}_1\}$

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$$E_1 \simeq^{PR}_{AF} E_2$$

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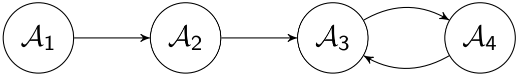


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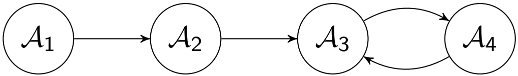
$$E_1 \simeq^{PR}_{AF} E_2$$

Order is correct but not intuitive

# Using classical semantics




$E_1 = \{\mathcal{A}_1\}$ $\qquad$ $E_2 = \{\mathcal{A}_1, \mathcal{A}_3\}$

$E_3 = \{\mathcal{A}_1, \mathcal{A}_4\}$ $\qquad$ $E_4 = \{\mathcal{A}_3, \mathcal{A}_4\}$

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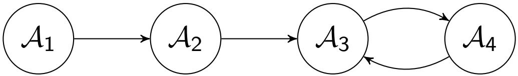


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$$E_2 \simeq^{ST}_{AF} E_3 \preceq^{ST}_{AF} E_1 \simeq^{ST}_{AF} E_4$$

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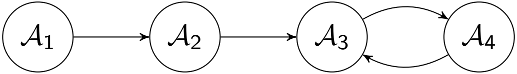


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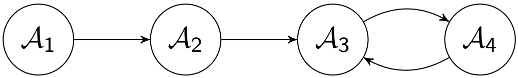
Order is correct but has only two levels.

# Aims

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1. If a classical semantics gives multiple extensions for an argumentation framework, we can differentiate those with different levels of plausibility.

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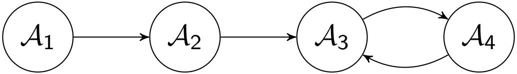
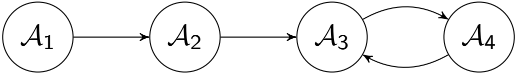



$$E_2 \simeq^{ST}_{AF} E_3 \preceq^{ST}_{AF} E_1 \simeq^{ST}_{AF} E_4$$

1. If a classical semantics gives multiple extensions for an argumentation framework, we can differentiate those with different levels of plausibility.
2. For two sets of arguments that are no extensions wrt. the classical semantics, we can differentiate those with different levels of plausibility.

# First (simple) idea




$$E_1 = \{\mathcal{A}_1, \mathcal{A}_3\} \qquad E_2 = \{\mathcal{A}_2, \mathcal{A}_3\} \qquad E_3 = \{\mathcal{A}_2, \mathcal{A}_3, \mathcal{A}_4\}$$

$$E_1 \preceq_{AF}^{\#Conflicts} E_2 \preceq_{AF}^{\#Conflicts} E_3$$

# Conclusion

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## Future work idea

- Properties
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  - Classical semantics
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Thanks for your attention!