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Hunt for the Collapse of Semantics in Infinite Abstract Argumentation Frameworks[1]

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FWF Der Wissenschaftsfonds.

UNIVERSITY OF LIVERPOOL

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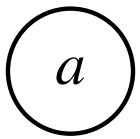
Fact Check I

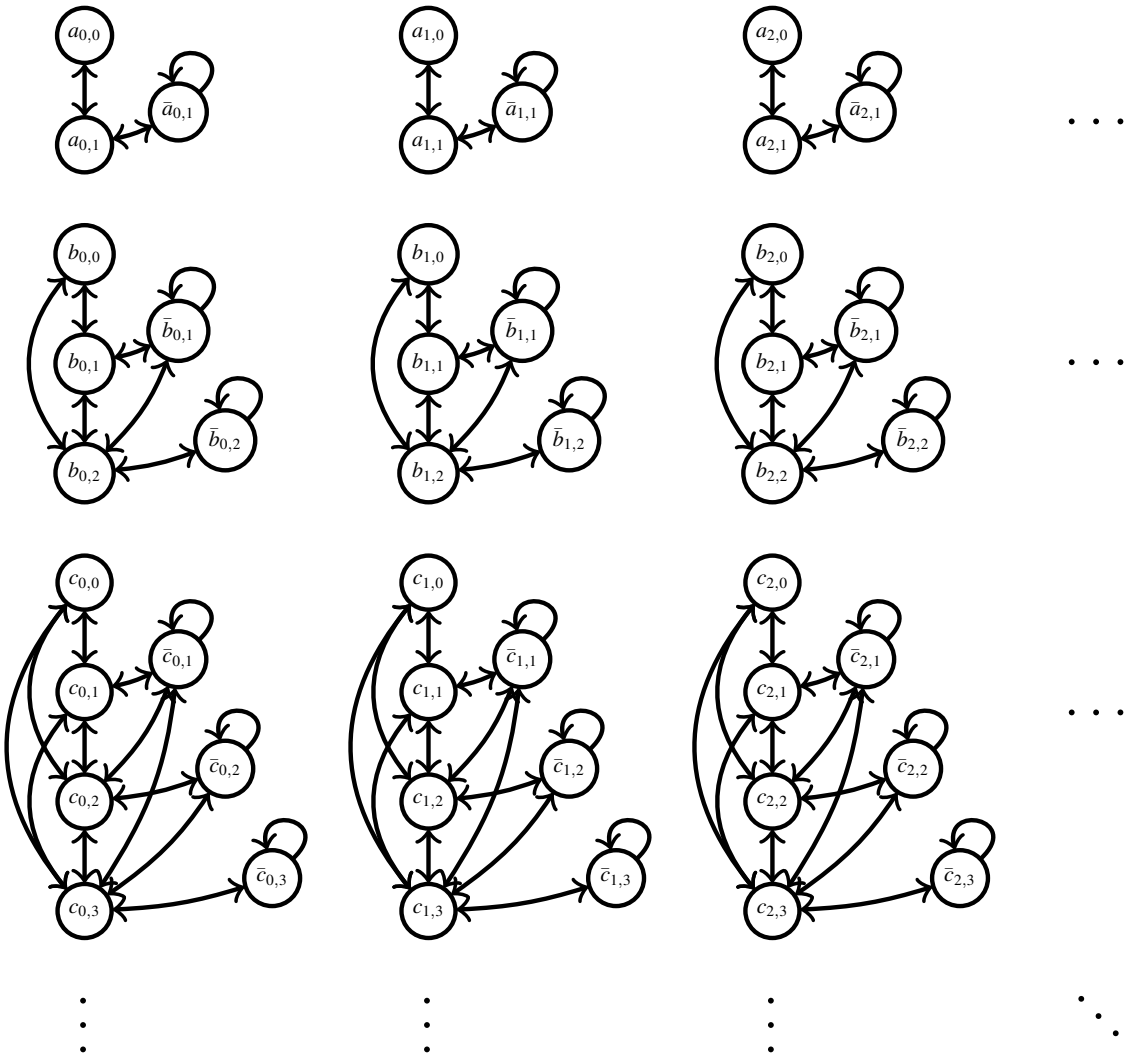


some argument

Fact Check II

some attack

Fact Check III



some infinite argumentation framework

Let's get to the real stuff

Theorem ([Baumann and Spanring, 2015, Weydert, 2011])

Any finitary (no argument with infinitely many attackers) argumentation framework provides semi-stable and stage extensions.

Theorem (Not yet published)

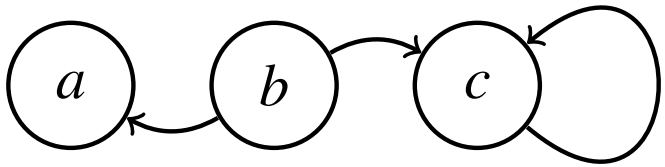
For any framework-property that is subframework-valid and guarantees existence of stage extensions, we can have any finite amount of arguments violating this property without loosing the guarantee for the existence of stage extensions.

Corollary (Conjecture from this paper)

If for some argumentation framework there is no stage extension, then there is an infinite amount of arguments with infinitely many attackers.

Outline

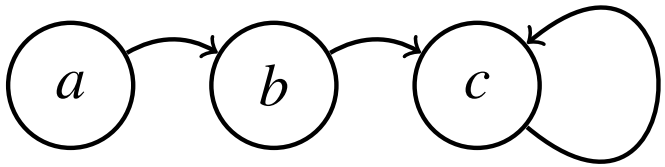
Stable, Stage and Semi-Stable Semantics



$stb : \{\{b\}\}$

$sem : \{\{b\}\}$

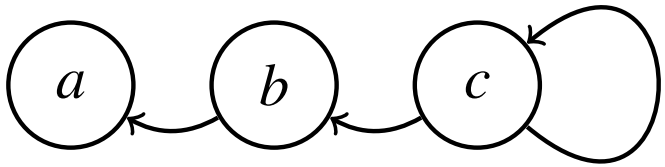
$stg : \{\{b\}\}$



$stb : \emptyset$

$sem : \{\{a\}\}$

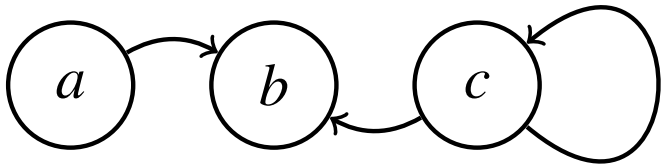
$stg : \{\{a\}, \{b\}\}$



$stb : \emptyset$

$sem : \{\emptyset\}$

$stg : \{\{b\}\}$

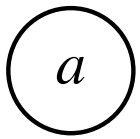


$stb : \emptyset$

$sem : \{\{a\}\}$

$stg : \{\{a\}\}$

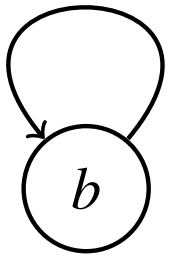
Stable, Stage and Semi-Stable Semantics ctd.



$stb : \{\{a\}\}$

$sem : \{\{a\}\}$

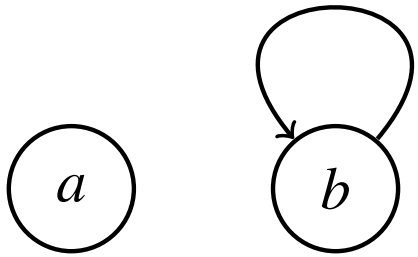
$stg : \{\{a\}\}$



$stb : \emptyset$

$sem : \{\emptyset\}$

$stg : \{\emptyset\}$

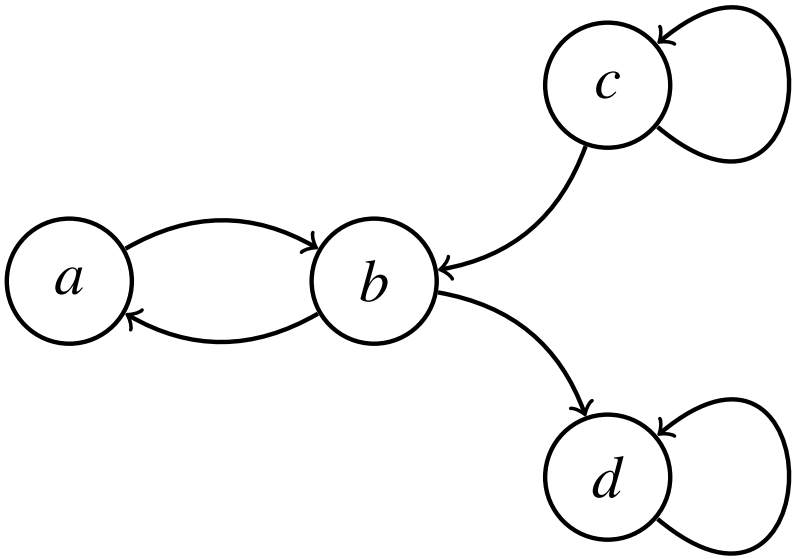


$stb : \emptyset$

$sem : \{\{a\}\}$

$stg : \{\{a\}\}$

Stage and Semi-Stable Semantics



$$sem : \{\{a\}\}$$
$$stg : \{\{b\}\}$$

Definitions

Definition ([Dung, 1995])

An argumentation framework is a pair $F = (A, R)$ of arguments A and attacks $R \subseteq A \times A$. The range of a set of arguments S is given as $S^+ = S \cup \{a \in A, S \rightarrowtail a\}$.

Definition ([Verheij, 2003, Caminada and Verheij, 2010])

A set $S \subseteq A$ is called conflict conflict-free, $S \in cf(F)$, if $S \times S \cap R = \emptyset$.
$S \in cf(F)$ is called

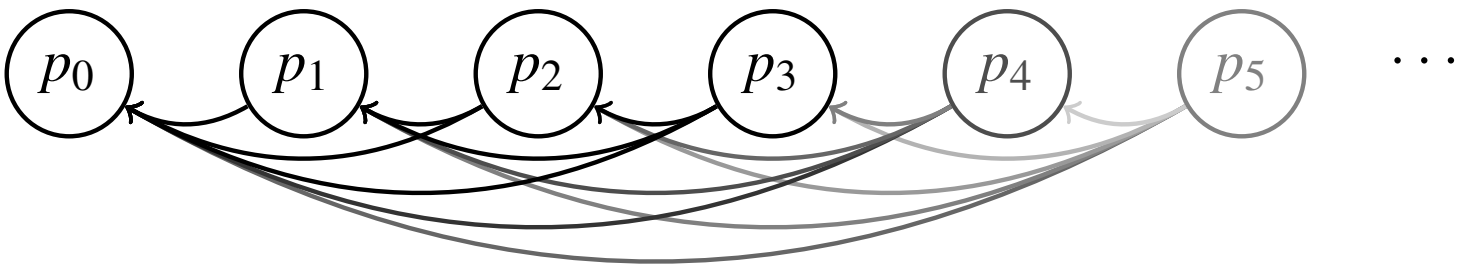
- admissible, $S \in adm(F)$, if $a \rightarrowtail S$ implies $S \rightarrowtail a$;
- a stable extension, $S \in stb(F)$, if $S^+ = A$;
- a stage extension, $S \in stg(F)$, if it is maximal in range.

An set $S \in adm(A)$ is called

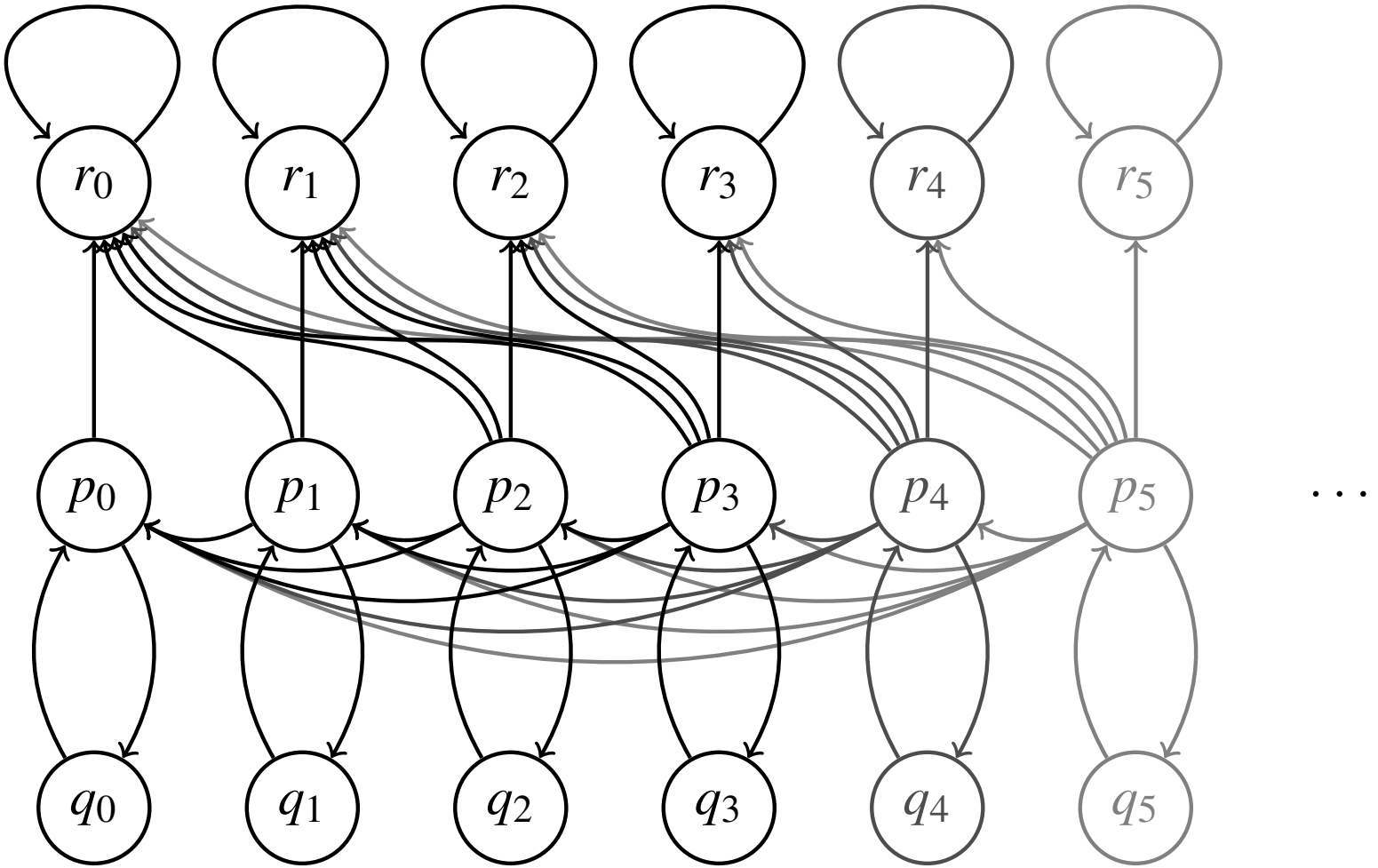
- a semi-stable extension, $S \in sem(F)$, if it is maximal in range.

Outline

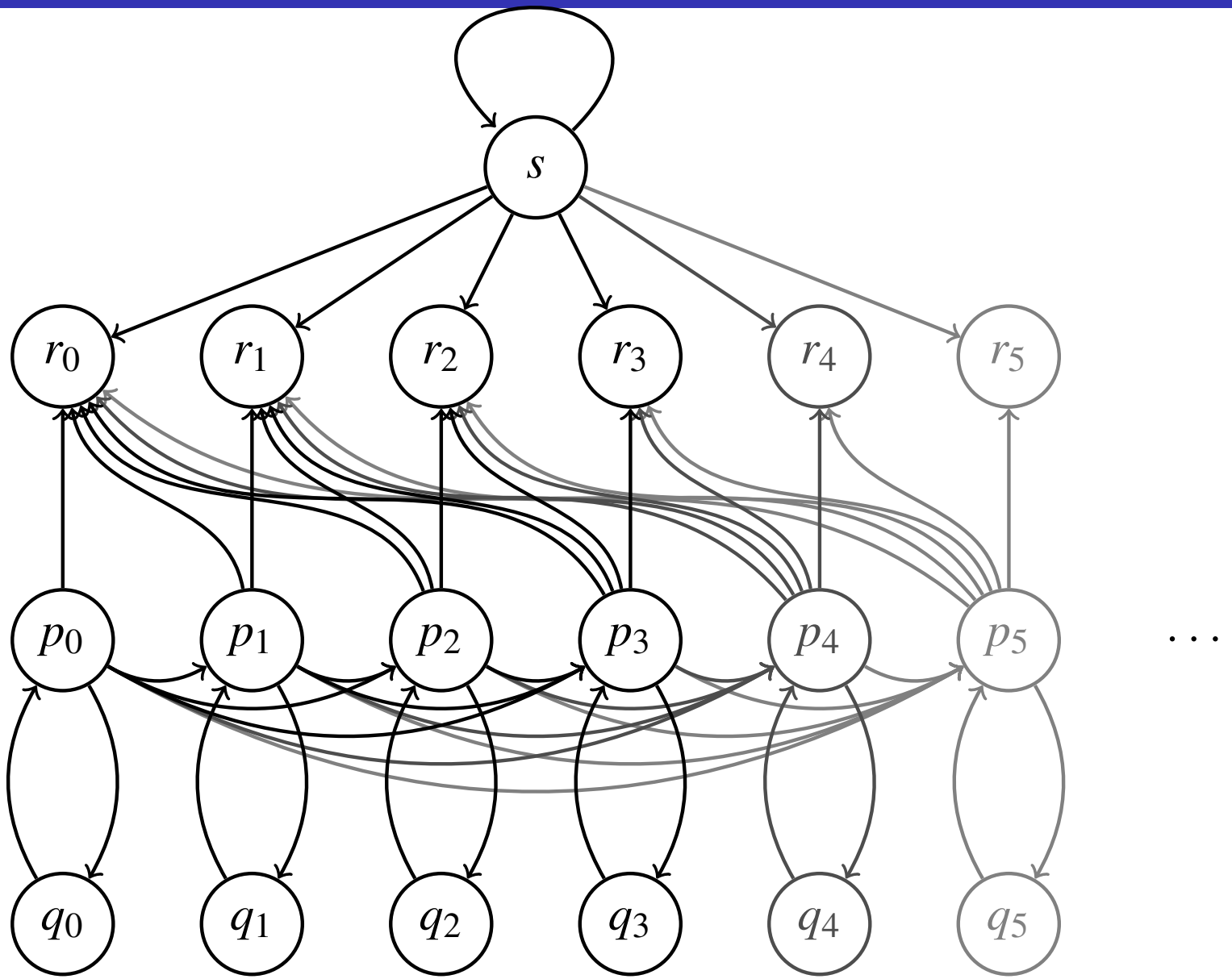
Collapse of Stage Semantics [Verheij, 2003]



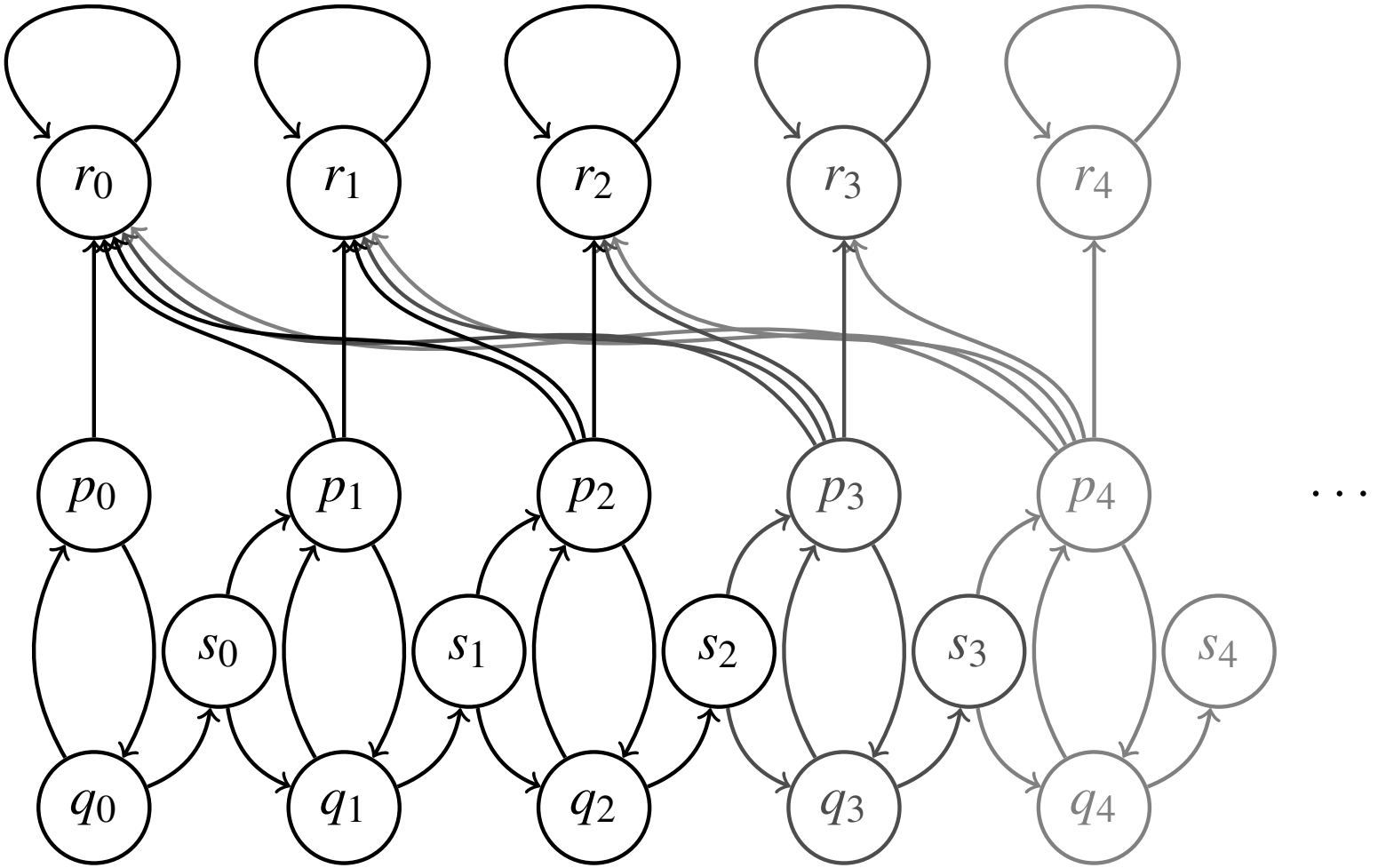
Collapse of Semi-Stable and Stage Semantics [Verheij, 2003]



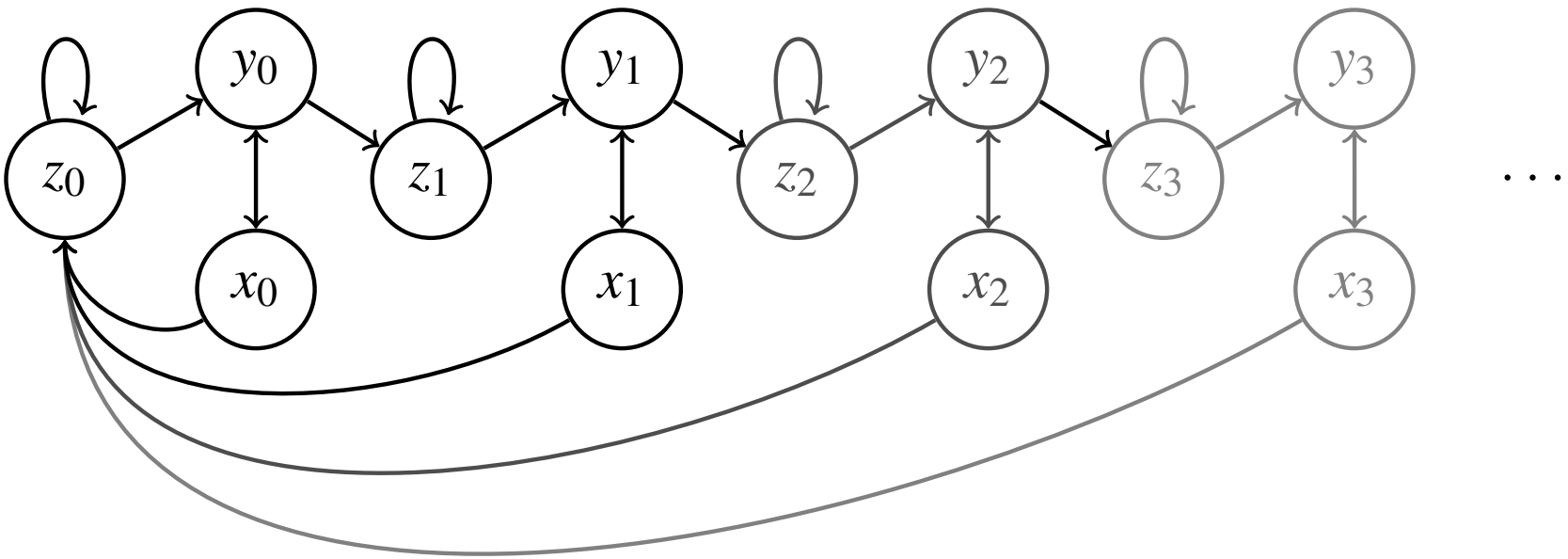
Collapse of Semi-Stable Semantics



Collapse of Semi-Stable and Stage Semantics



Collapse of Semi-Stable Semantics



Insights

Theorem ([Baumann and Spanring, 2015, Weydert, 2011])

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For any framework-property that is subframework-valid and guarantees existence of stage extensions, we can have any finite amount of arguments violating this property without loosing the guarantee for the existence of stage extensions.

Corollary (Conjecture from this paper)

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