

(a) a fragment of concrete causal relations

rule	ruleParas	inv	CR	f'
r	[1, 2]	cf	CR ₃	inv ₁₇ (2)
r	[2, 1]	cf	CR ₃	inv ₁₇ (1)
r	[1, 3]	cf	CR ₂	inv ₁₇ (2)
r	[3, 1]	cf	CR ₂	
r	[2, 3]	cf	CR ₂	inv ₁₇ (1)
r	[3, 2]	cf	CR ₂	
r	[3, 4]	cf	CR ₂	

(b) The generalized causal relations from (a)

rule	cases	inv	CR	f'
r	$iR_1 = i_1 \wedge iR_2 = i_2$	f	CR ₃	inv ₁₇ (i ₂)
r	$iR_1 = i_2 \wedge iR_2 = i_1$	f	CR ₃	inv ₁₇ (i ₁)
r	$iR_1 = i_1 \wedge \bigwedge_{j=1}^2 iR_2 \neq i_j$	f	CR ₃	inv ₁₇ (i ₂)
r	$\bigwedge_{j=1}^2 iR_1 \neq i_j \wedge iR_2 = i_1$	f	CR ₂	
r	$iR_1 = i_2 \wedge \bigwedge_{j=1}^2 iR_2 \neq i_j$	f	CR ₃	inv ₁₇ (i ₁)
r	$\bigwedge_{j=1}^2 iR_1 \neq i_j \wedge iR_2 = i_2$	f	CR ₂	
r	$\bigwedge_{j=1}^2 iR_1 \neq i_j \wedge \bigwedge_{j=1}^2 iR_2 \neq i_j$	f	CR ₂	