Important concepts expressed with simple graphical representations – examples

Spurious dependence: ignoring an important intermediate variable

Discrimination against women on the German labour market?

A, successful	C, gender		
job placement	female	male	
yes	19	97	
	(4.4%)	(19.2%)	
no	416	408	
sum	435	505	

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The data after including field of qualification

A, suc-	B, field of qualification				
cessful	home economics		mechan. e	mechan. engineering	
job	C, gender		C, g	C, gender	
placem.	female	male	female	male	
yes	15	2	4	95	
	(3.61%)	(3.64%)	(20.0%)	(21.1%)	
no	400	53	16	355	
sum	415	55	20	450	

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A dependence



explained away by including a relevant intermediate variable



Spurious asscociation

Ignoring the common source node

Example (Y. Yule 1890)



Unrelated Y and X having a common explanatory variable Z appear associated when Z is ignored

Selection bias

Selecting levels of the common sink node

Example (H. Wainer 1980)

Y, income, American X, years of formal banks, about 1980 Schooling ХQ A, gender А

Two unrelated sources of explanation, variables A and X, having a common response Y, appear associated when levels of the response are selected, i.e. fixed

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