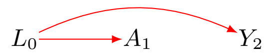
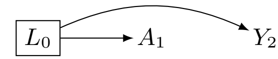
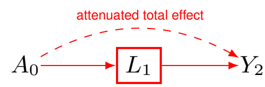
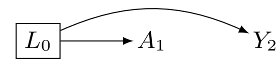
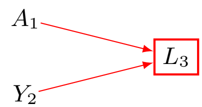
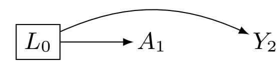
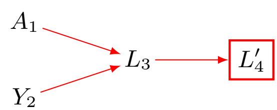
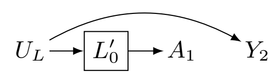
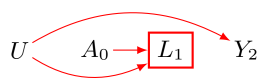
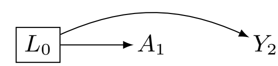
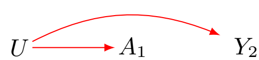
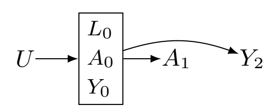
	Bias	Problem	Sequential data solution
1	**Confounding by common cause**: the confounding we have in mind: an unmeasured variable is assumed to cause both A and Y.		
2	**Reverse causation**: $A_{\phi 1}$ and $Y_{\phi 2}$ incorrectly asserted: in truth Y_1 causes association with A_2.	$Y_1 \rightarrow A_2$	A_1 Y_2
3	**Mediator bias**: timing asserted by L_ϕ is wrong, leading to controlling for a mediator, which can distort the true causal effect.		
4	**Collider bias**: timing asserted by $L_{\phi 1}$ is wrong, leading to controlling for collider, leading to a non-causal association between A and Y.		
5	**Collider proxy bias**: conditioning on a descendant of a collider can introduce bias.		
6	**Post-exposure collider stratification bias**: conditioning on a variable that is affected by exposure but does not have a direct causal effect on outcome.		
7	**Unmeasured common cause** conditioning on baseline exposure and baseline outcome exerts powerful confounding control and recovers incident exposure effect.		

Key:
A denotes the treatment;
Y denotes the outcome;
U denotes an unmeasured confounder;
L denotes a confounder;
L' denotes a proxy for an unmeasured confounder;
V denotes a mediator of the $A \rightarrow M$ that is also a confounder of $M \rightarrow Y$;
$\rightarrow$ (red) indicates a pathway for bias linking A to Y absent causation.
$\boxed{X}$ indicates conditioning on variable X eliminates or reduces;
$\boxed{X}$ (red) indicates that conditioning on X introduces bias.
To denote relative timing we place subscripts on nodes (e.g., L_0, A_1, Y_2).
Examples 2 reverse-causation: ϕ timing in the exposure and outcome is wrong.
Examples 3-6 ϕ timing of confounder is wrong: $L_{\phi 0} \neq L_0$
Example 7 shows how we can reduce unmeasured confounding by conditioning on baseline values of the exposure and outcome.