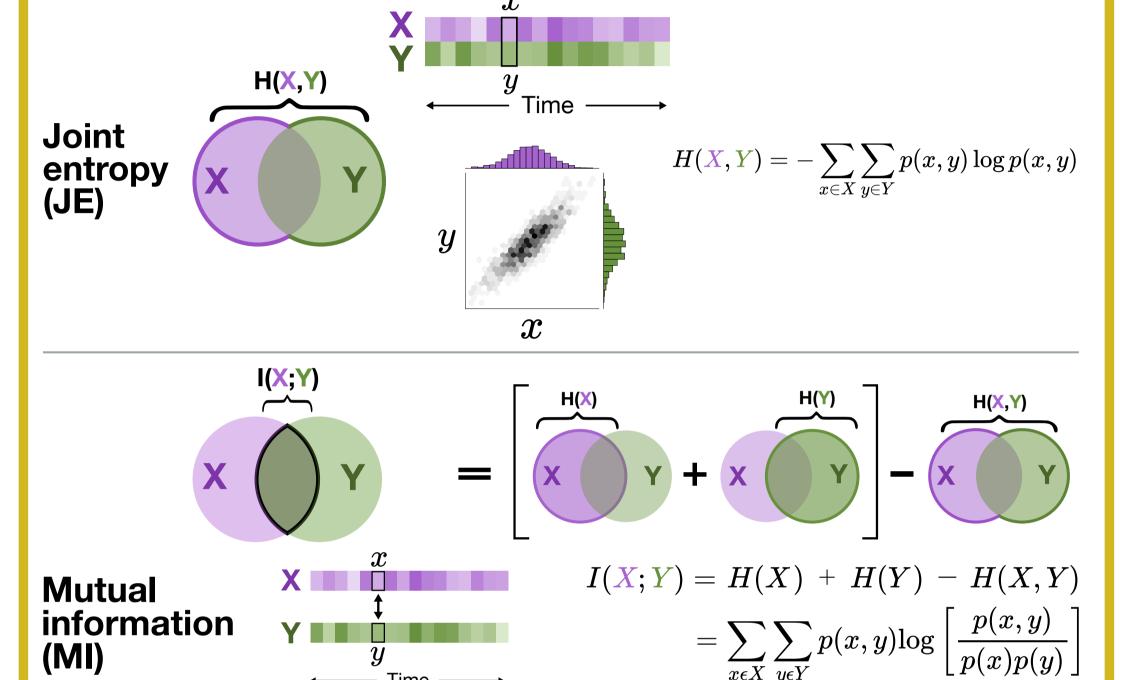
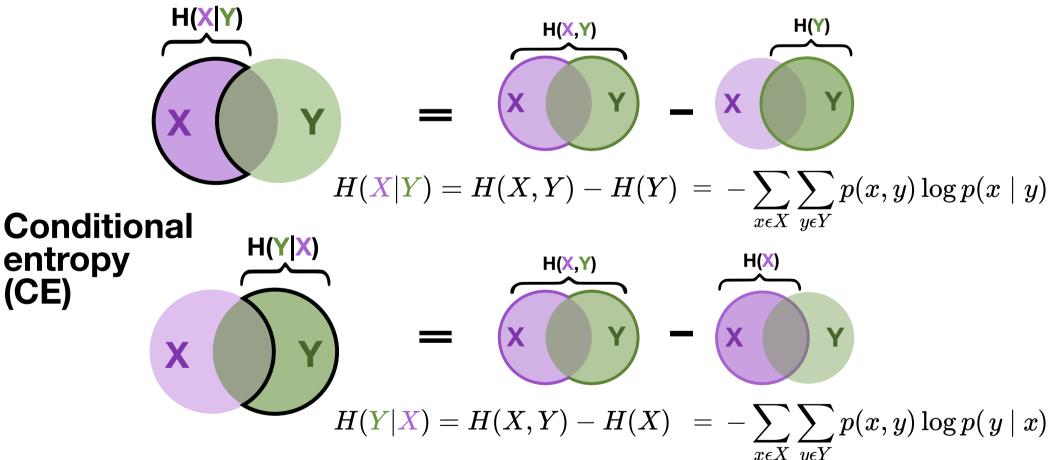


2. Bivariate order-independent measures, undirected

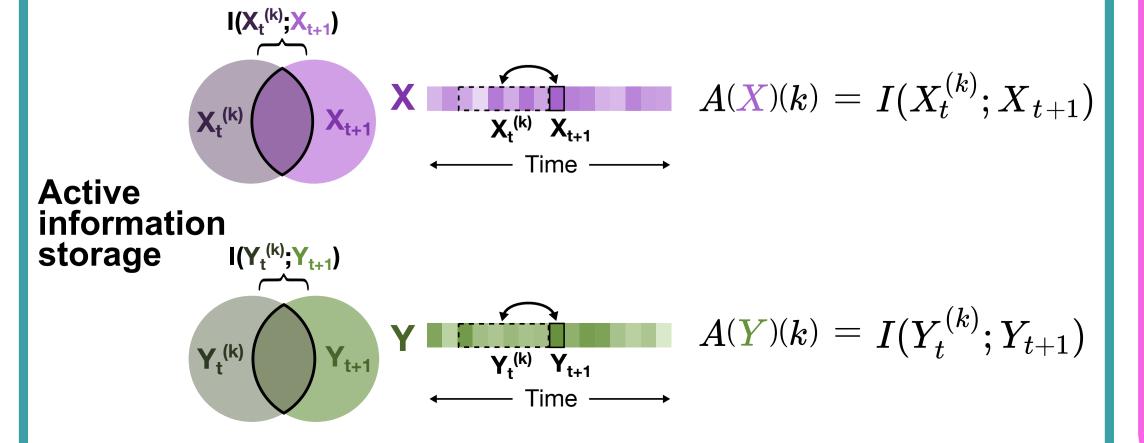


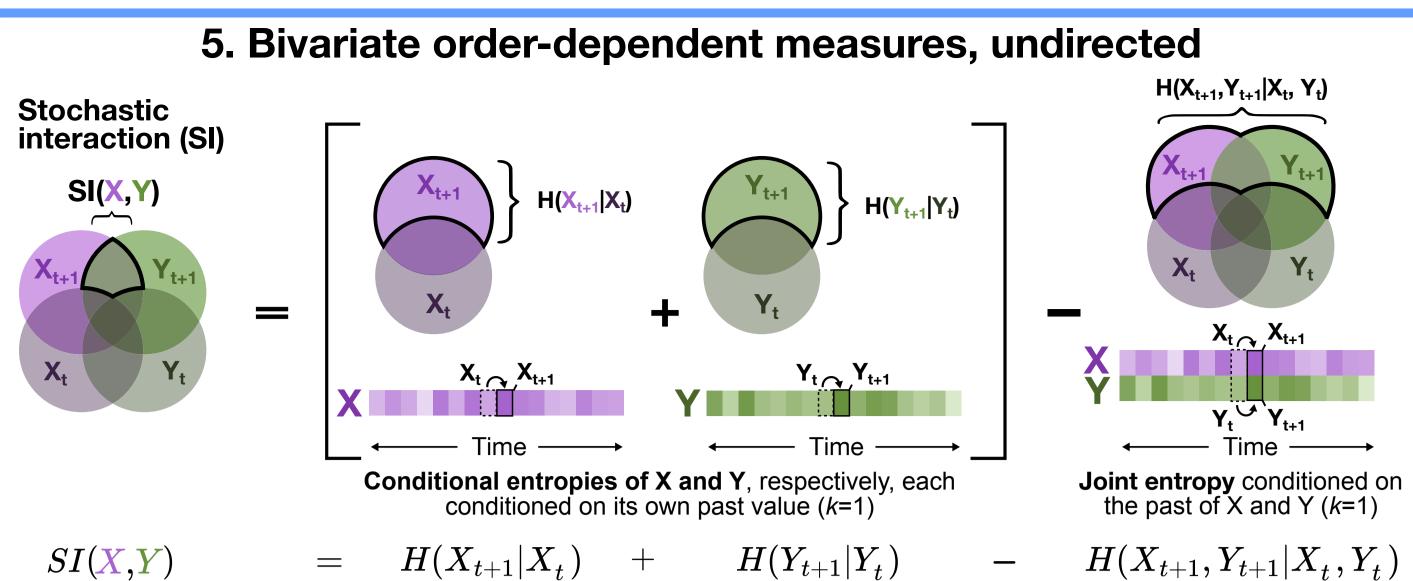
3. Bivariate order-independent measures, directed



4. Univariate order-dependent measures

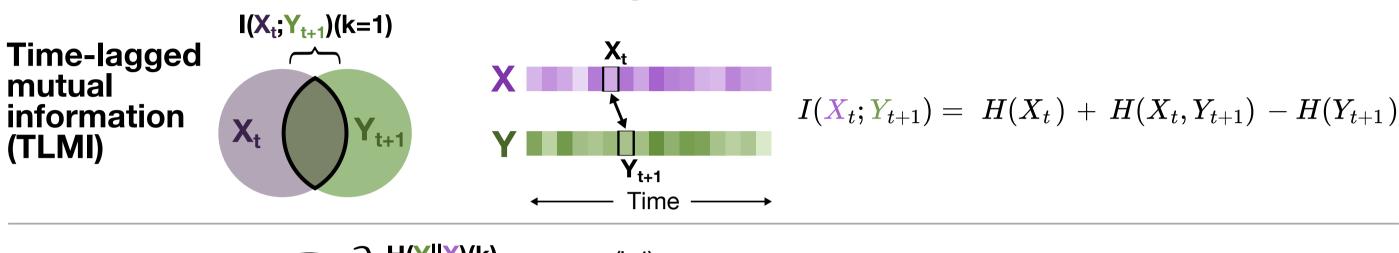
(CE)

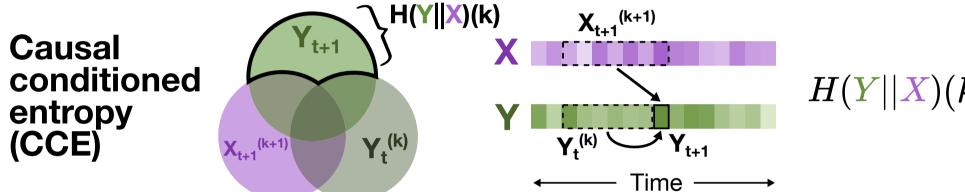




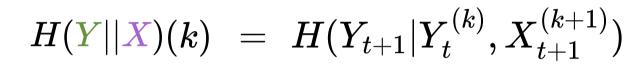
6. Bivariate order-dependent measures, directed

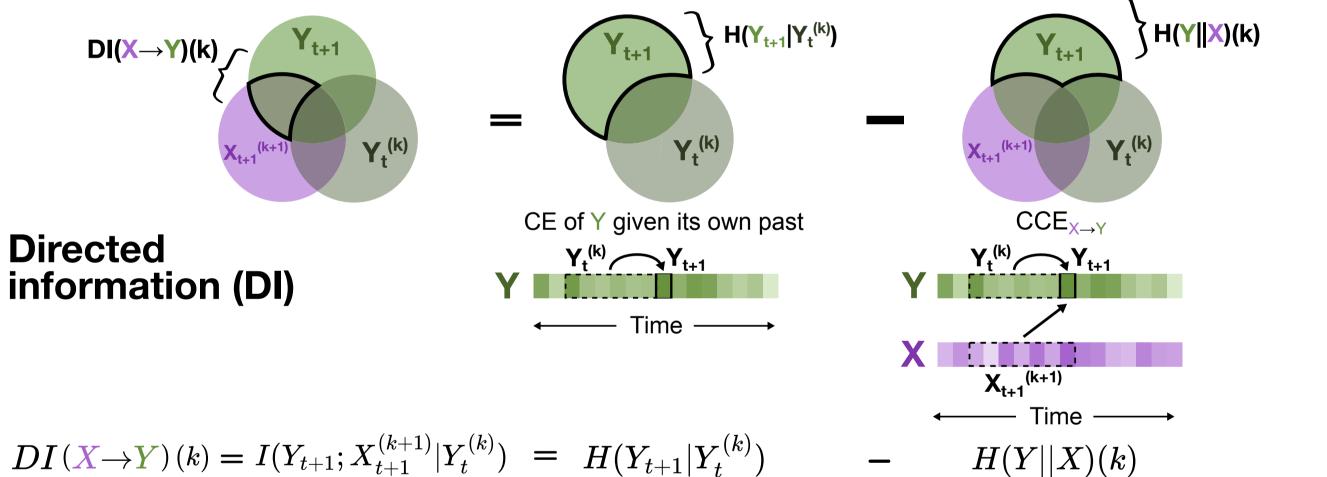
 $H(Y_{t+1}|Y_t)$

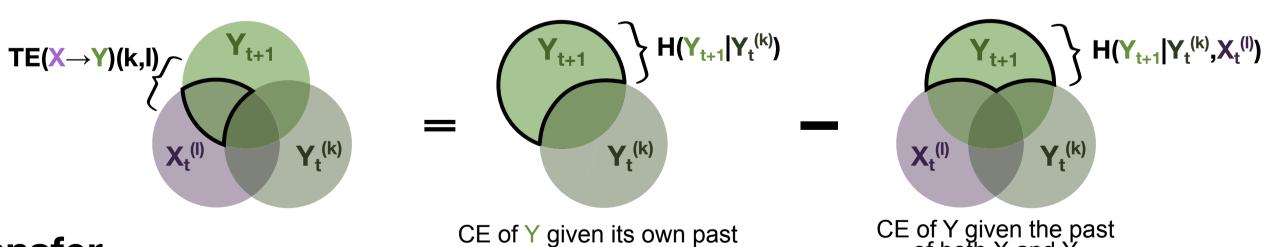




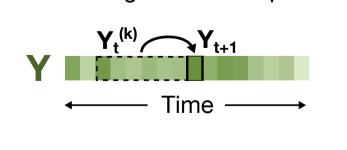
 $H(X_{t+1}|X_t)$

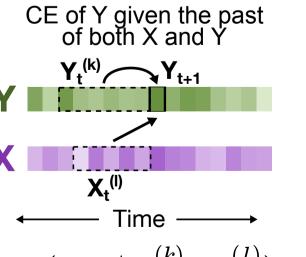




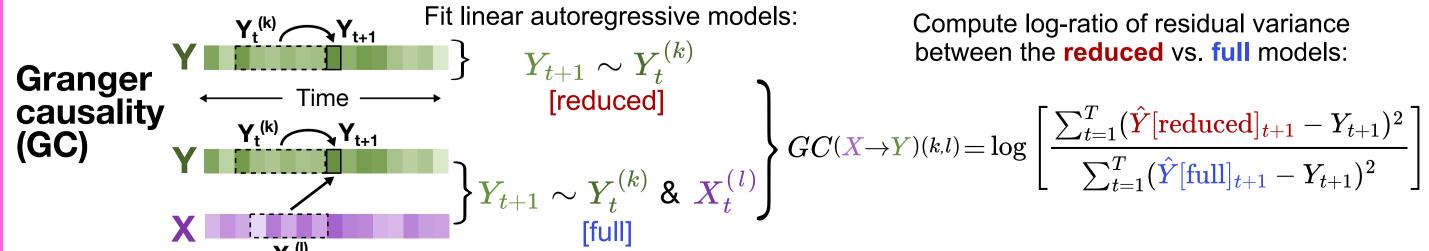


Transfer entropy (TE)





$$TE(X \rightarrow Y)(k,l) = I(Y_{t+1}; X_t^{(l)} | Y_t^{(k)}) = H(Y_{t+1} | Y_t^{(k)}) - H(Y_{t+1} | Y_t^{(k)}, X_t^{(l)})$$



*Note: Granger causality is equivalent to transfer entropy with a Gaussian density estimator.