Causal queries and causal types.

Examples of models, queries, and the collection of types that satisfy the queries.

Model	Query	Given	Interpretation	Types
$X \rightarrow Y$	$Y[X=1] > Y[X=0]$		Probability that X has a positive effect on Y	`X0.Y01, X1.Y01`
$X \rightarrow Y$	$Y[X=1] < Y[X=0]$	$X=1$	Probability that X has a negative effect on Y among those for whom X=1	`X1.Y10`
$X \rightarrow Y$	$Y[X=1] > Y[X=0]$	$X=1, Y=1$	Probability that Y=1 is due to X=1 (Attribution)	`X1.Y01`
$X \rightarrow Y \leftarrow W$	$Y[X=1] > Y[X=0]$	$W=1$	Probability that X has a positive effect on Y for a case in which W = 1 (where W is possibly defined post treatment)	`W1.X0.Y0001, W1.X1.Y0001, W1.X0.Y1001, W1.X1.Y1001, W1.X0.Y0011, W1.X1.Y0011, W1.X0.Y1011, W1.X1.Y1011`
$X \rightarrow Y \leftarrow W$	$Y[X=1, W=1] > Y[X=0, W=1]$	$W=0$	Probability that X has a positive effect on Y if W were set to 1 for cases for which in fact W=0	`W0.X0.Y0001, W0.X1.Y0001, W0.X0.Y1001, W0.X1.Y1001, W0.X0.Y0011, W0.X1.Y0011, W0.X0.Y1011, W0.X1.Y1011`
$X \rightarrow Y \leftarrow W$	$Y[X=1] > Y[X=0]$	$Y[W=1] > Y[W=0]$	Probability that X has a positive effect on Y for a case in which W has a positive effect on Y	`W0.X0.Y0110, W1.X1.Y0001, W1.X1.Y1001, W0.X0.Y0111`
$X \rightarrow Y \leftarrow W$	$(Y[X=1, W=1] > Y[X=0, W=1]) > (Y[X=1, W=0] > Y[X=0, W=0])$	$W=1, X=1$	Probability of a positive interaction between W and X for Y; the probability that the effect of X on Y is stronger when W is larger	`W1.X1.Y0001, W1.X1.Y1001, W1.X1.Y1011`
$X \rightarrow M \rightarrow Y \leftarrow X$	$Y[X=1, M=M[X=1]] > Y[X=0, M=M[X=1]]$	$X=1, M=1, Y=1$	The probability X would have a positive effct on Y if M were controlled to be at the level it would take if X were 1 for units for which in fact M==1	`X1.M01.Y0001, X1.M11.Y0001, X1.M01.Y1001, X1.M11.Y1001, X1.M01.Y0101, X1.M11.Y0101, X1.M01.Y1101, X1.M11.Y1101`
$X \rightarrow M \rightarrow Y \leftarrow X$	$(Y[M=1] > Y[M=0]), (M[X=1] > M[X=0])$	$Y[X=1] > Y[X=0], M=1$	The probability that X causes M and M causes Y among units for which M = 1 and X causes Y	`X1.M01.Y0001, X1.M01.Y0011`