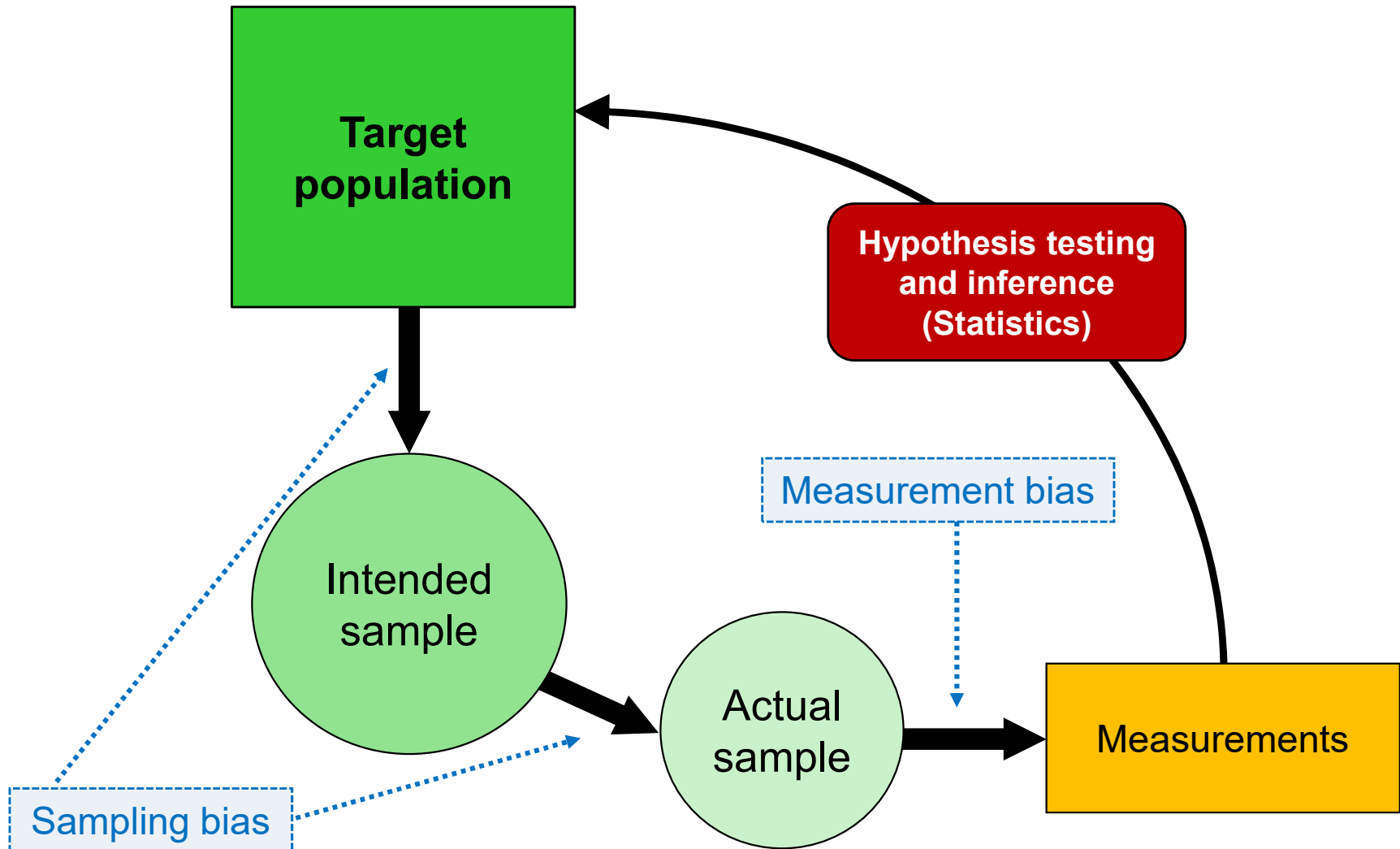
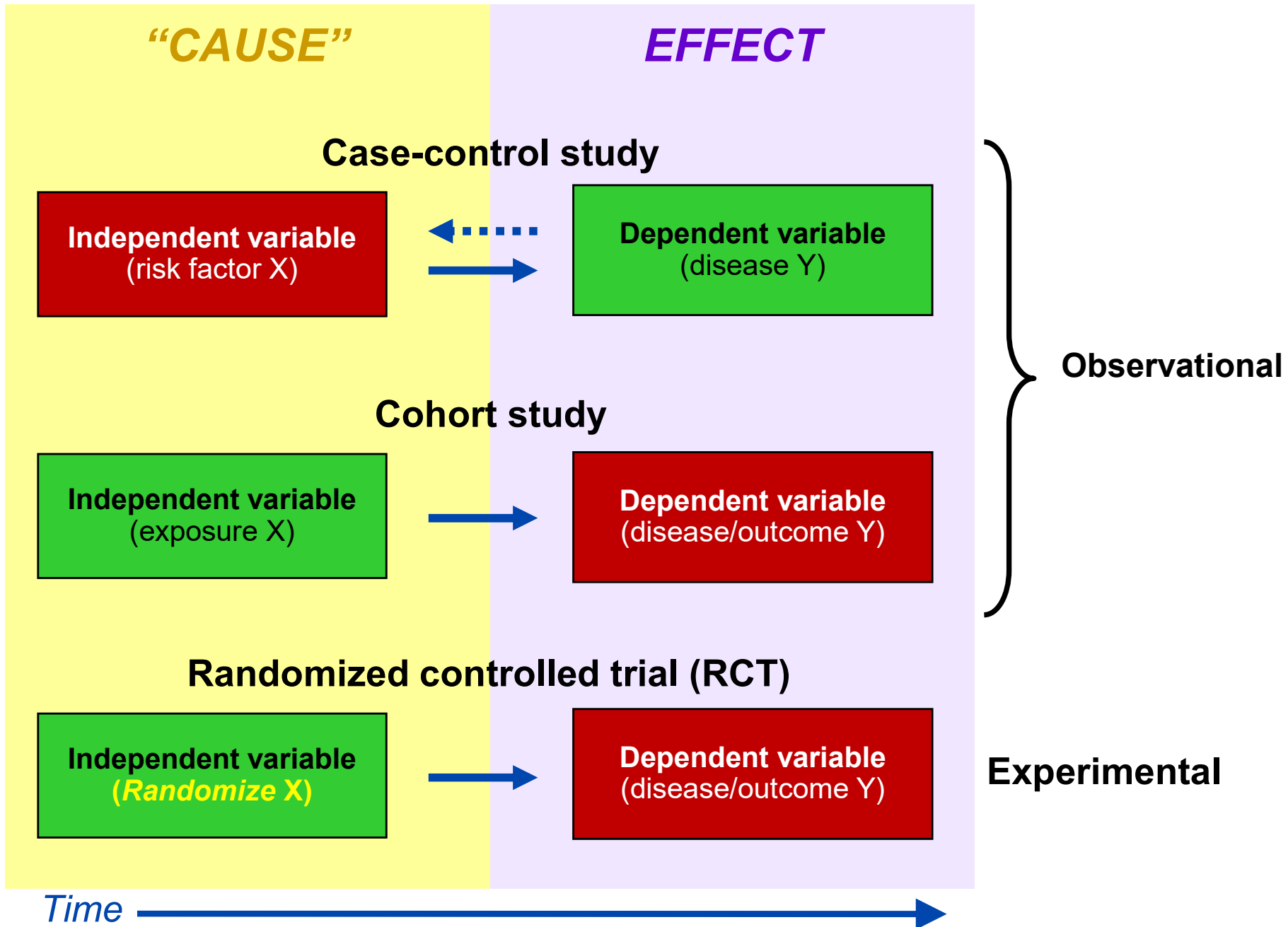


Study design goal



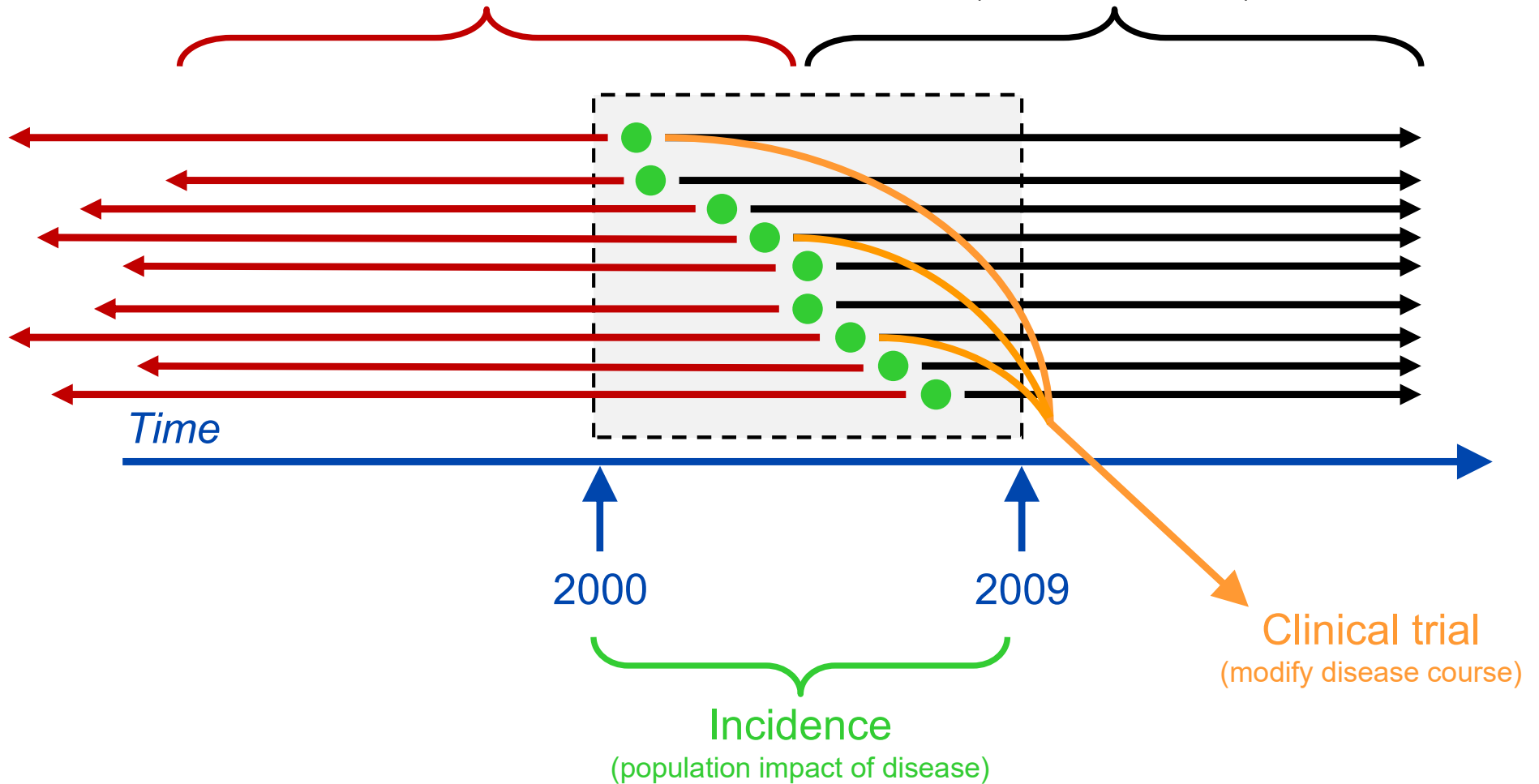
Basic study types



Multiple study types

Case-control
(risk factors for disease)

Cohort
(outcomes of disease)



Summary of basic statistical techniques in research

Study type	Dependent variable (Y)	Independent variable (X)	Basic analysis method	Other methods
Case-control study	Case status 0 = control 1 = case	Risk factors Binary factors 0 = not present 1 = present Continuous factors Make it a meaningful comparison (e.g., a change of 10 mmHg systolic BP instead of 1 mmHg change).	Logistic regression Hypothesis: $H_0: OR = 1.0$ $H_A: OR \neq 1.0$ If condition is rare, then the $OR \approx$ Relative risk. Interpretation: The odds of <risk factor> in the <case> group are <OR> times that of the <control>	Conditional-logistic regression (matched)
Cohort study	Outcome 0 = no event 1 = event Time to outcome Is generally time from exposure or time from birth.	Exposure Binary/categorical exposure 0 = unexposed 1 = exposed Continuous exposure Make it a meaningful comparison (e.g., a change of 10 mmHg systolic BP instead of 1 mmHg change).	Cox proportional hazards models Hypothesis: $H_0: HR = 1.0$ $H_A: HR \neq 1.0$ Interpretation: The risk of <outcome> for <exposed> is <HR> times that of <unexposed>.	Kaplan-Meier curves Log-rank test Person-years models Poisson regression
Prediction/ Correlation	Standard measurement Continuous value (e.g., blood pressure, bio-marker like C-reactive protein or creatinine clearance).	Predictors Categorical Create indicator variables Continuous Make meaningful units (e.g., clinically significant changes in a variable).	Linear regression One or more variables <i>predict</i> another variable (dependent). You can not <i>exchange</i> the dependent and independent values and still make sense of your findings (i.e., causal relationship). Correlation analysis You are investigating the relationship of measurements, where no single measurement is being predicted (e.g., how are C-reactive protein and interleukin-1 values related as measured in blood serum).	T-test Wilcoxon rank-sum test ANOVA Polynomial regression Non-linear regression Quantile regression Spearman correlation Pearson correlation