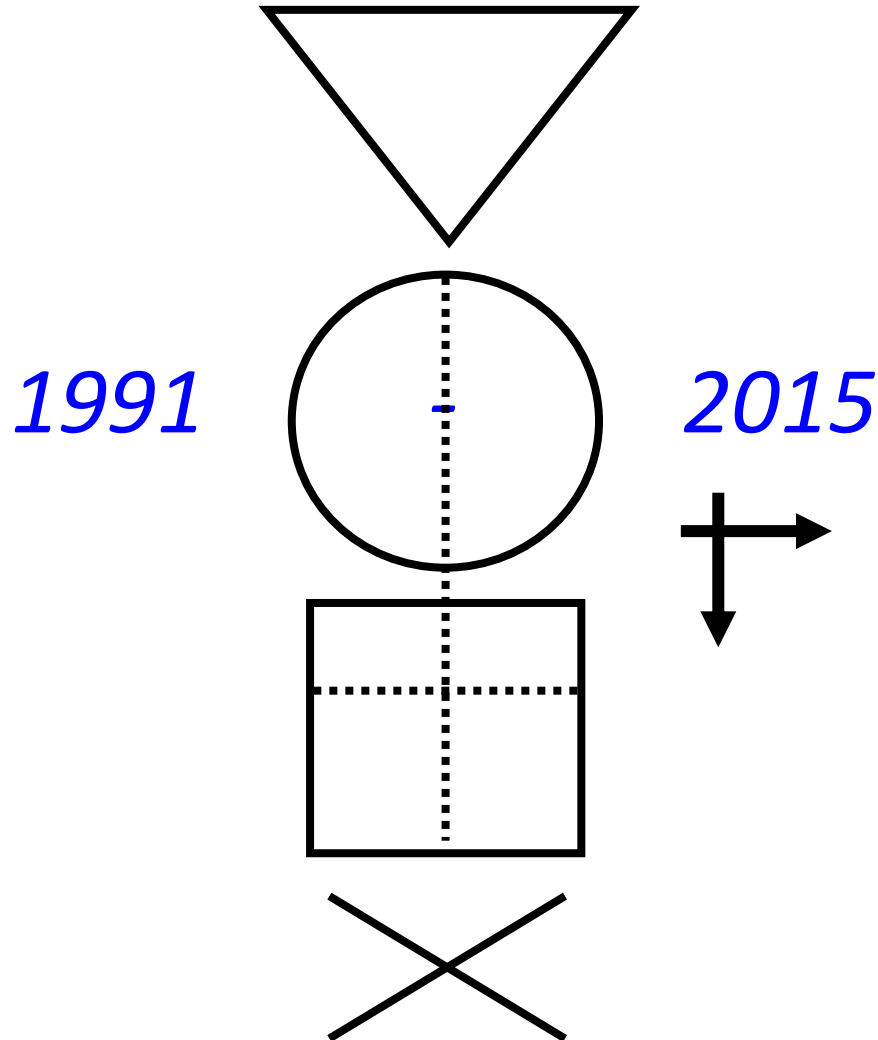
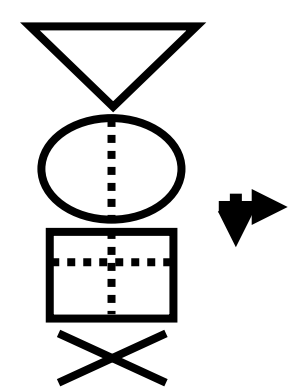


GATE:

Graphic Appraisal Tool for Epidemiology



1 picture, 2 formulas & 3 acronyms



GATE:

Graphic Appraisal Tool for Epidemiology

Graphic Architectural Tool for Epidemiology

Graphic Approach To Epidemiology

making epidemiology accessible

presentation outline

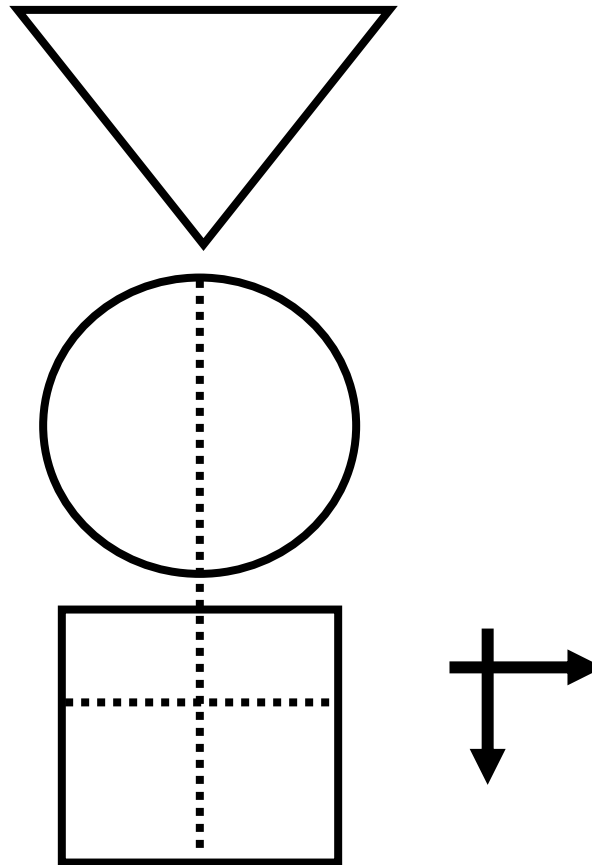
GATE is a framework for:

1. study design
2. study analysis
3. study error
4. practicing EBM

1

GATE: a framework for study design

1 picture

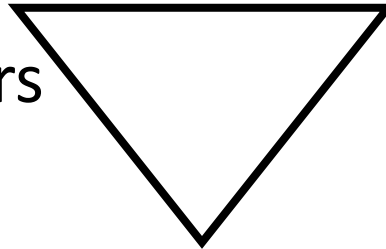


every epidemiological study can be hung on the GATE frame

1 picture, 2 formulas & 3 acronyms

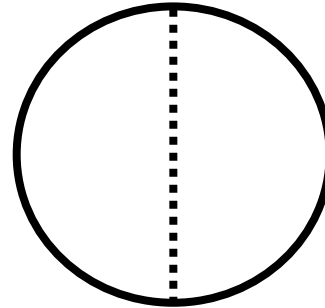
1 picture: GATE frame

cohort of British doctors



smoking status allocated by measurement (observation)

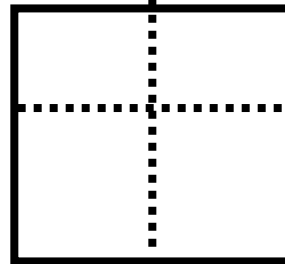
smokers



non-smokers

lung cancer
events counted

yes
no

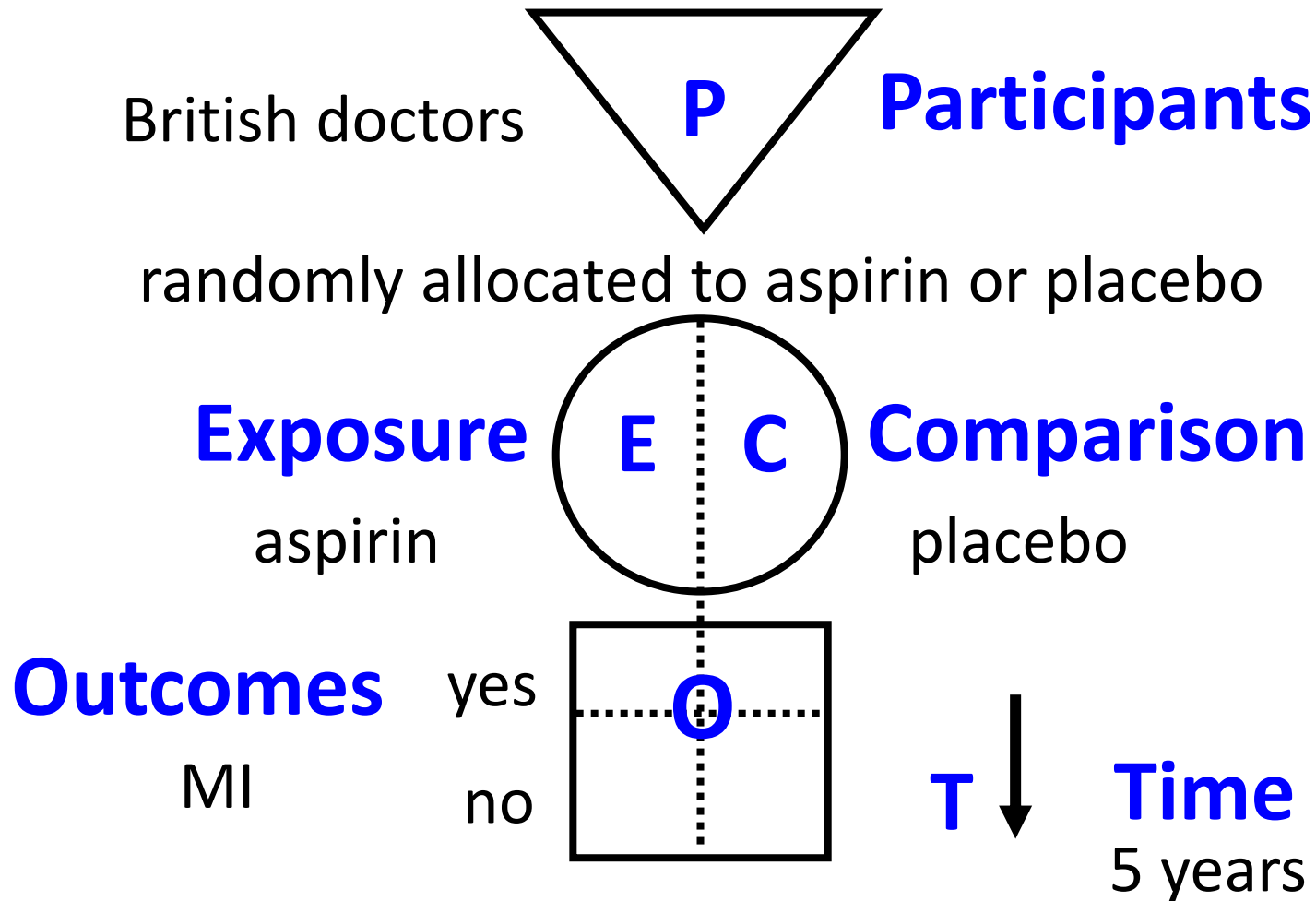


↓ followed for 10
years

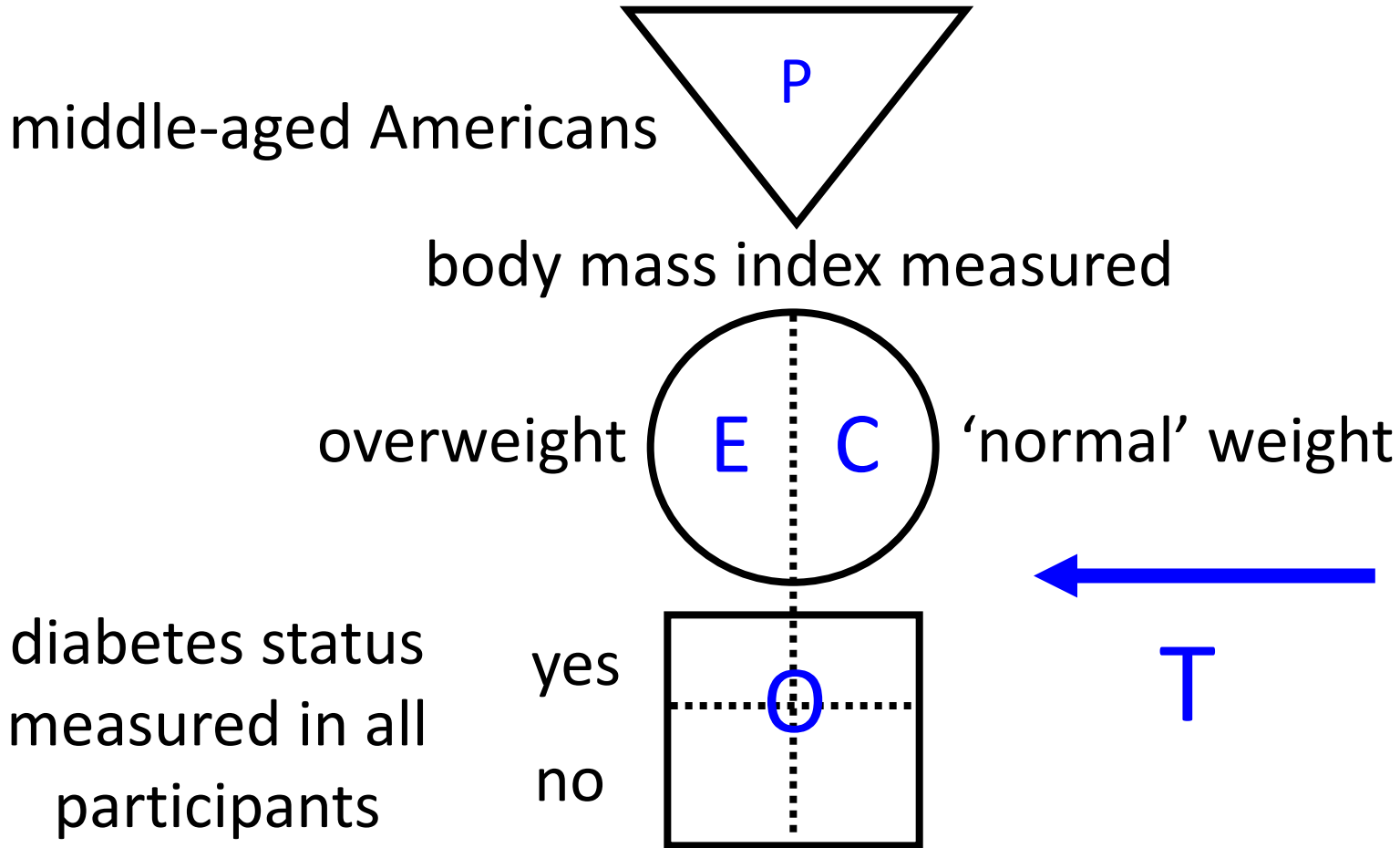
cohort / ↓ longitudinal / follow-up study

1 picture, 2 formulas & 3 acronyms

1st acronym: PECOT

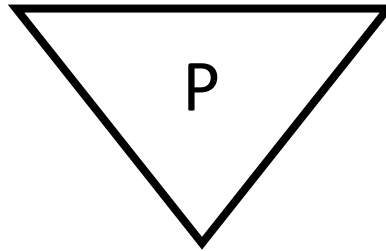


randomised controlled trial



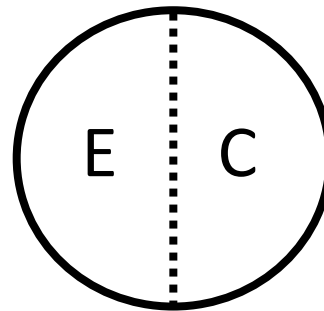
cross-sectional (prevalence) study

middle-aged American women



receive mammogram screening test

mammogram positive

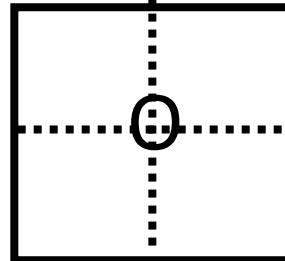


mammogram negative

breast cancer

yes

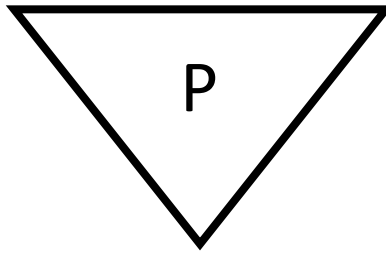
no



T

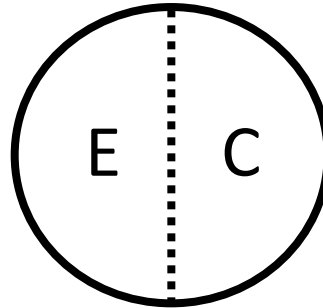
diagnostic test (prediction) study

middle-aged American women



Gold Standard

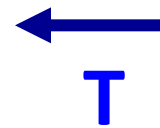
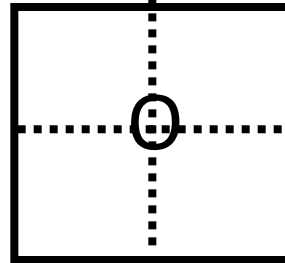
breast cancer



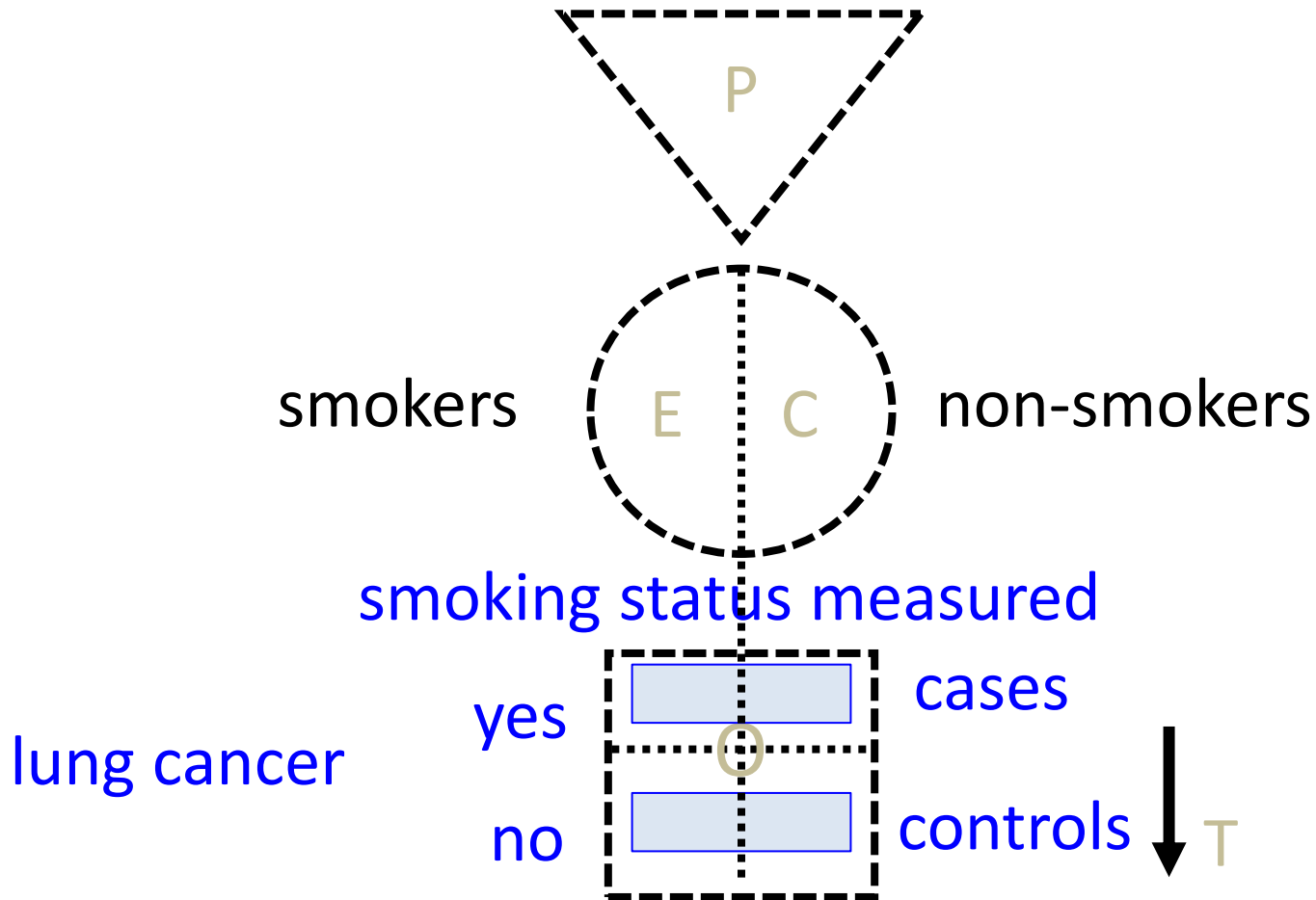
no breast cancer

mammogram test

positive
negative



diagnostic (test accuracy) study



case-control study

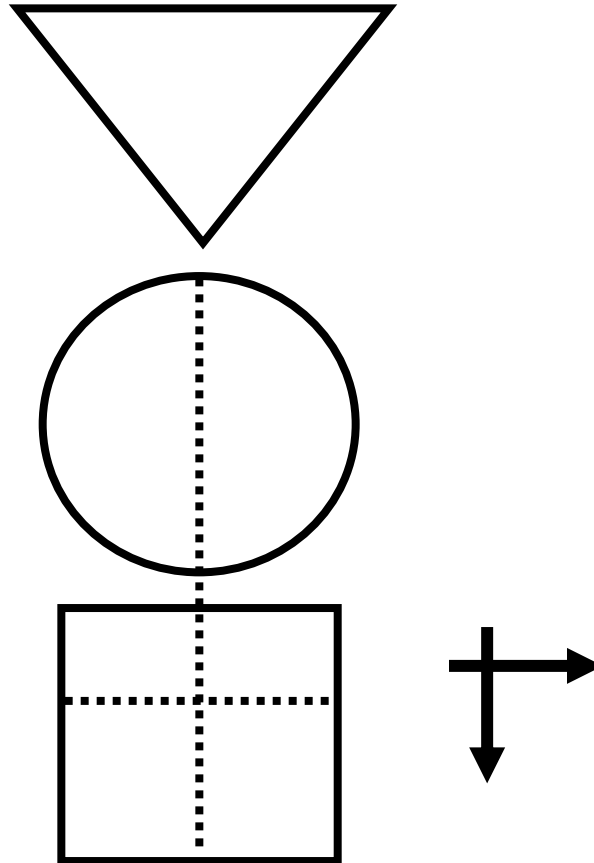
(all nested in virtual cohort studies)

\$ 10,000

2

GATE: a framework for study analysis:

1st formula: occurrence = outcomes ÷ population

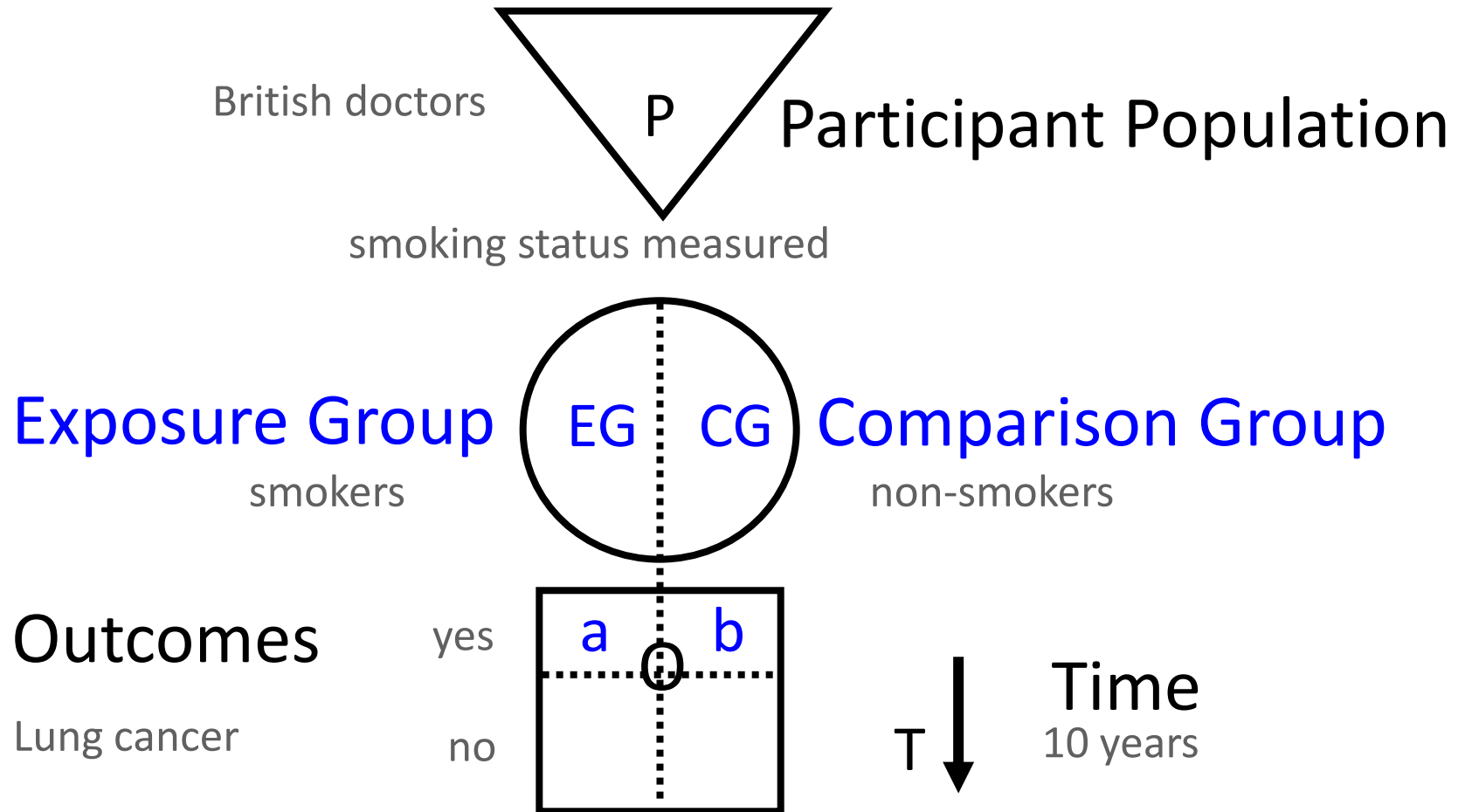


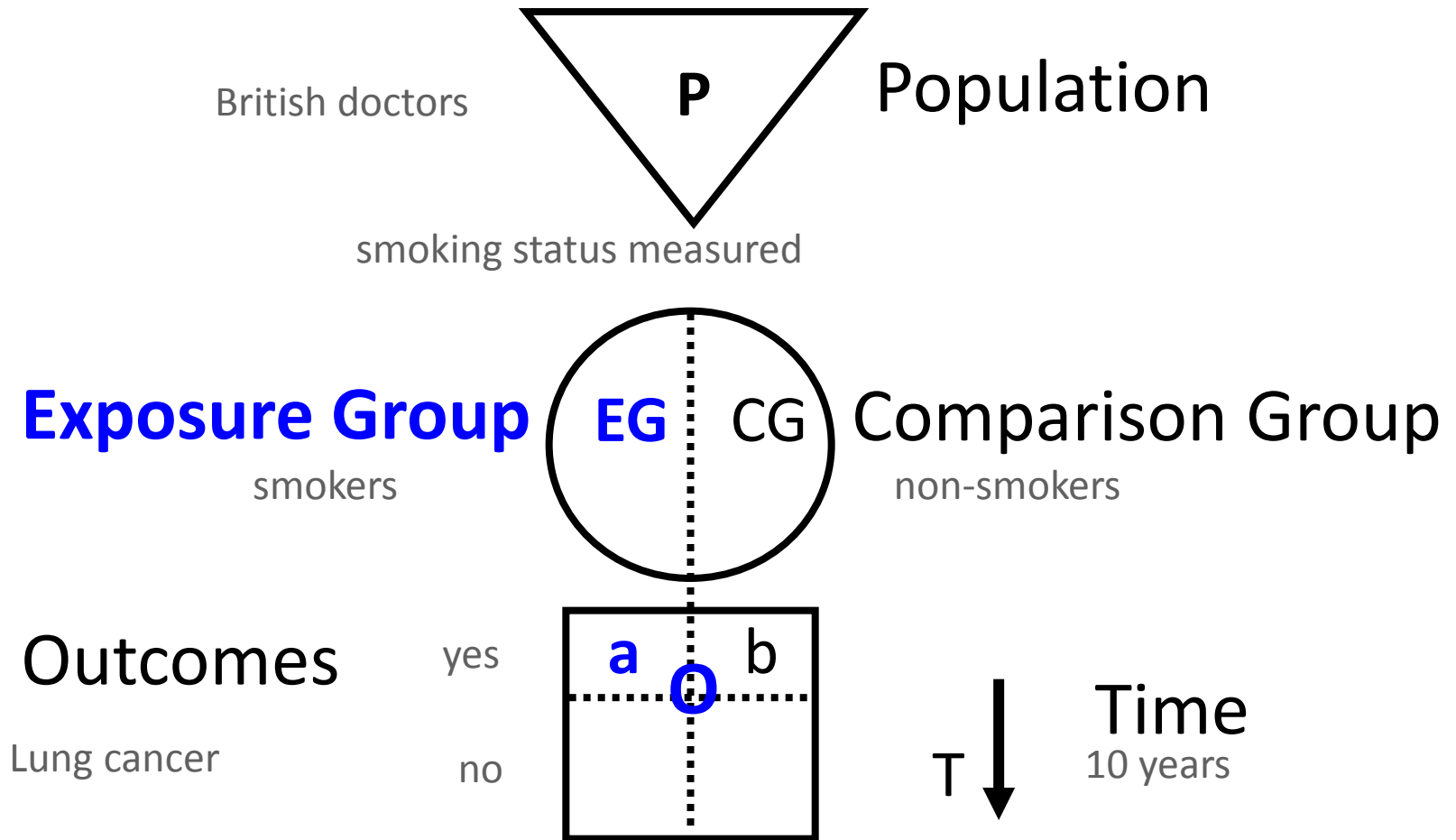
the numbers in epidemiological studies can be hung on the GATE frame

1 picture, 2 formulas & 3 acronyms

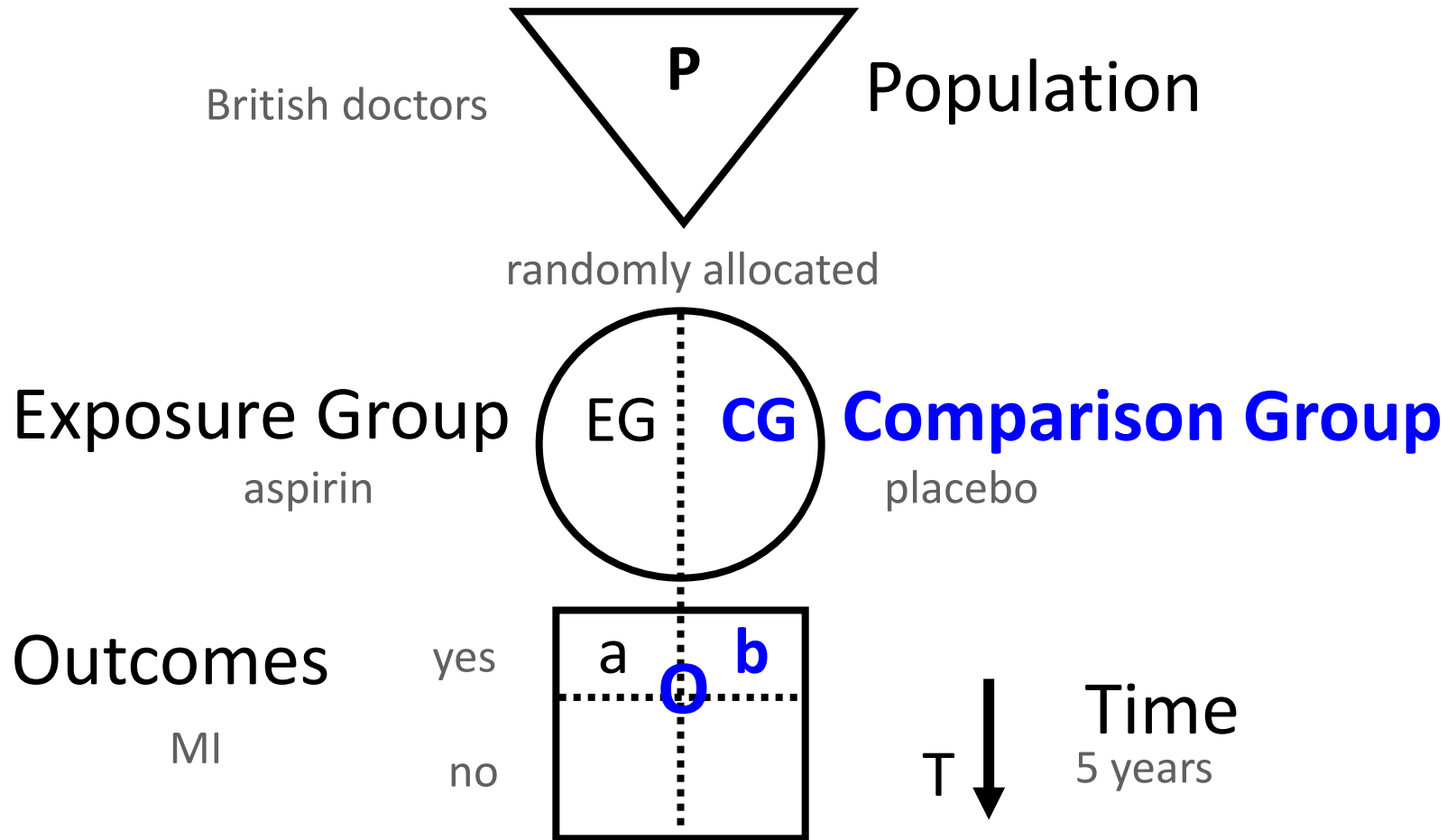
1st formula: occurrence of outcomes =

number of outcomes ÷ number in population/group



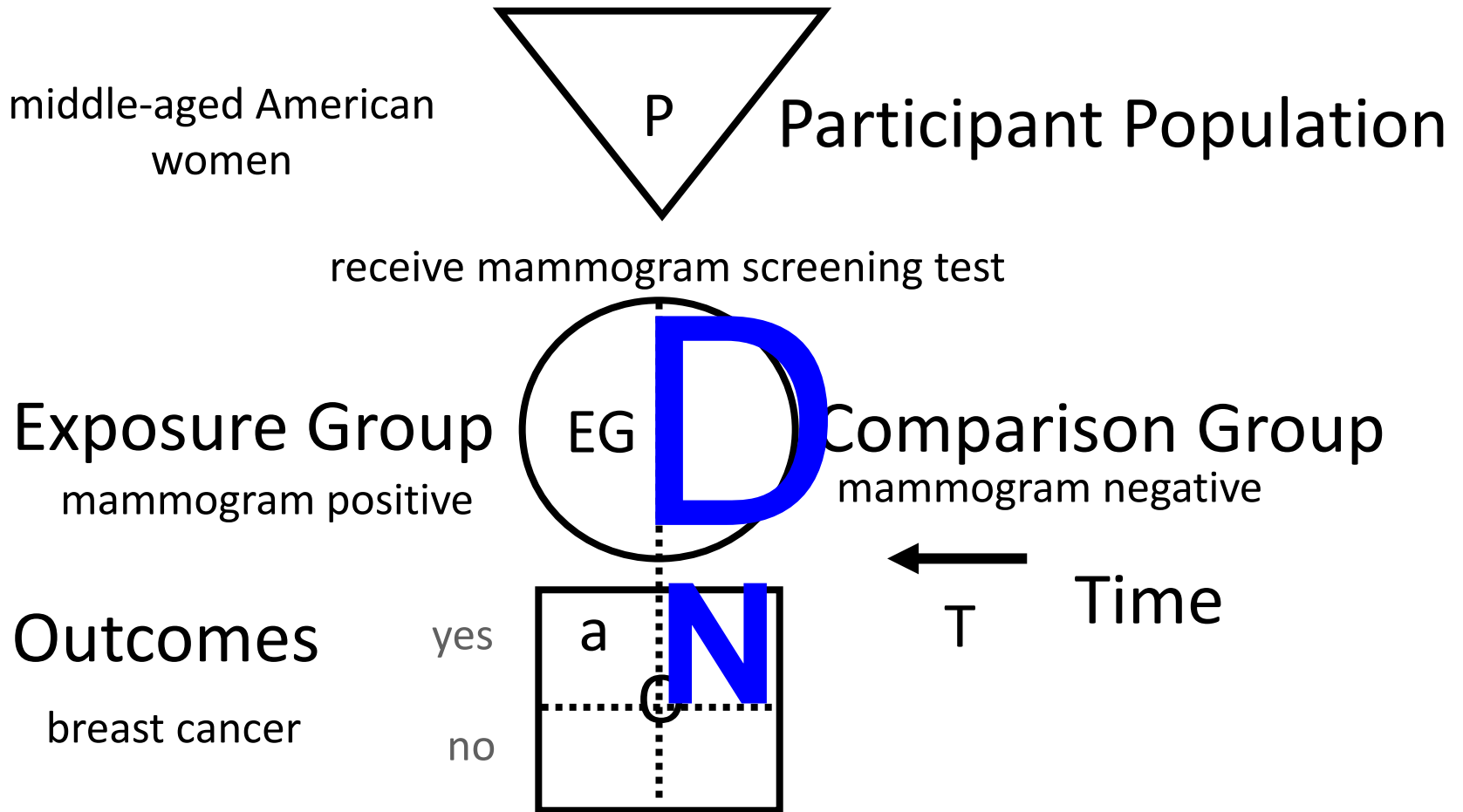


Exposure Group Occurrence (EGO) = $a \div EG$
= number of outcomes (a) \div number in exposed population (EG)

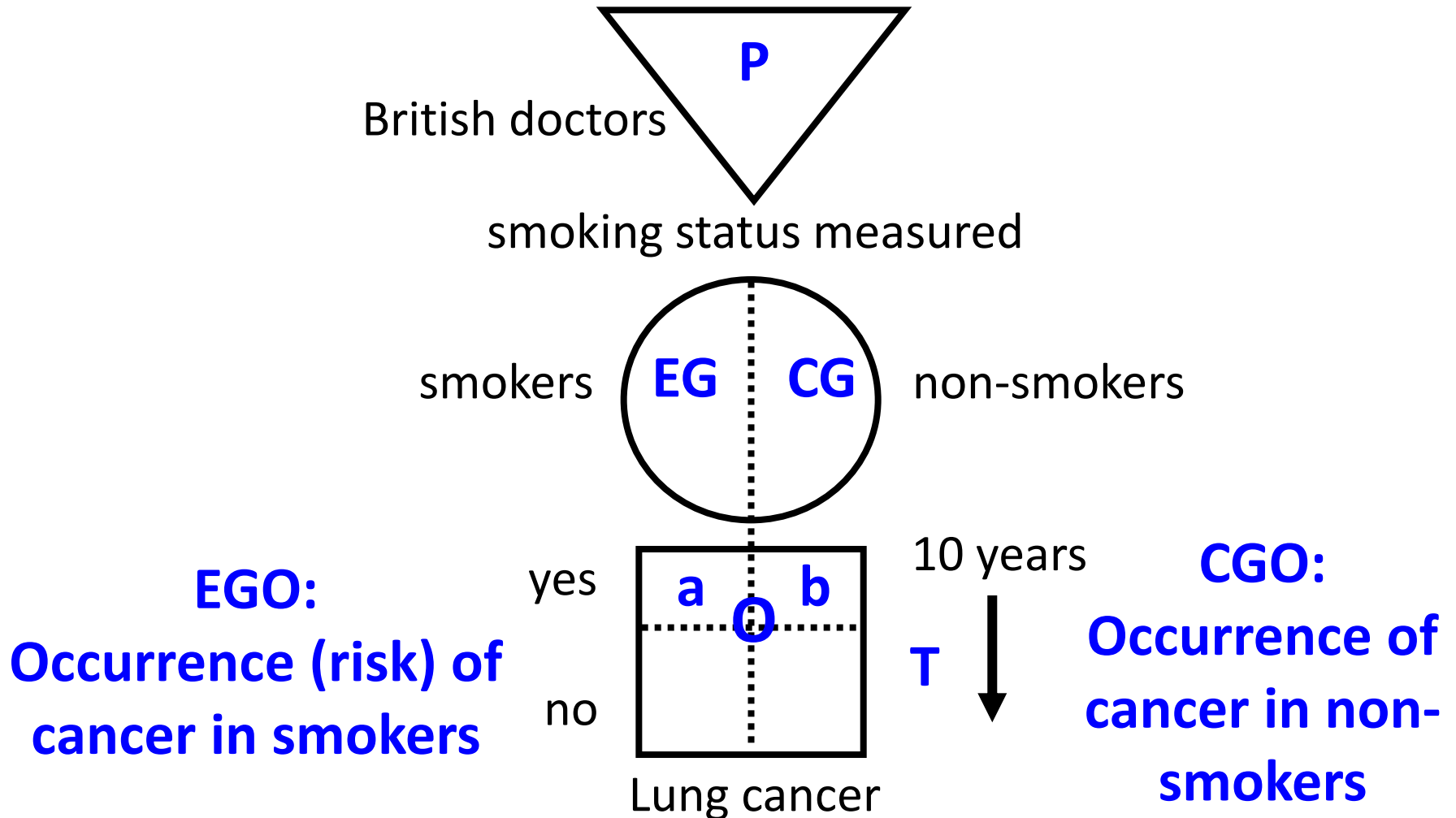


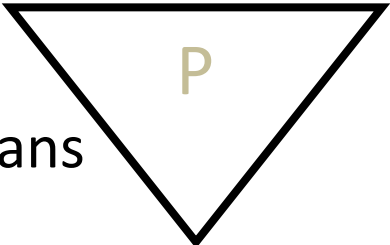
Comparison Group Occurrence (CGO) = $b \div CG$
= number of outcomes (b) \div number in comparison population (CG)

Epidemiology = Numerator ÷ Denominator



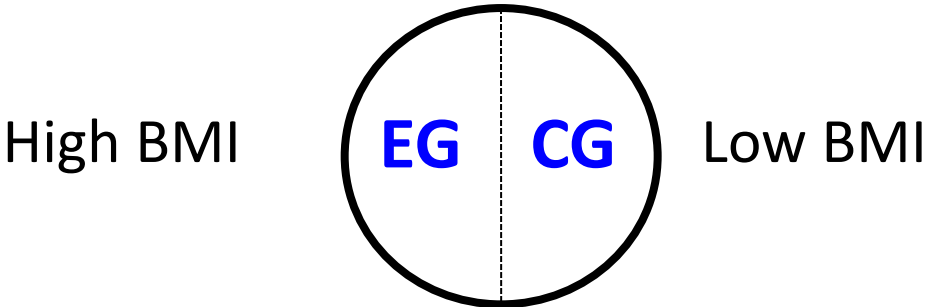
*the goal of all epidemiological studies is to calculate **EGO** and **CGO***





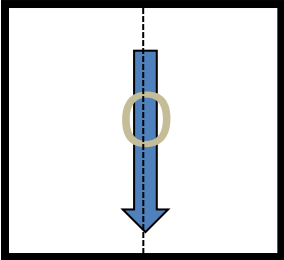
Middle-aged Americans

Body Mass Index (BMI) measured



high

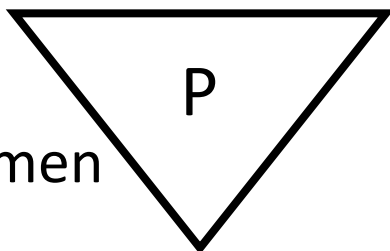
low



EGO:
Average blood
glucose in EG

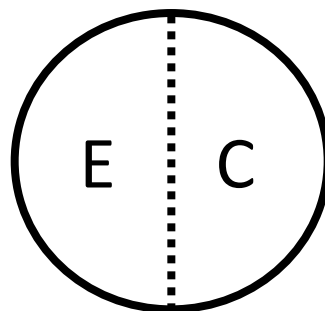
CGO:
Average blood
glucose in CG

Middle-aged American women



Gold Standard

Breast cancer

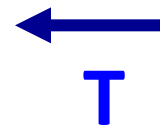
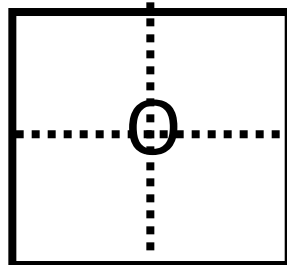


no Breast cancer

mammogram

positive

negative



EGO:

**likelihood of a positive
mammogram if breast
cancer**

CGO:

**likelihood of a positive
mammogram if no
breast cancer**

1st formula:

occurrence = outcomes ÷ population

its all about EGO and CGO

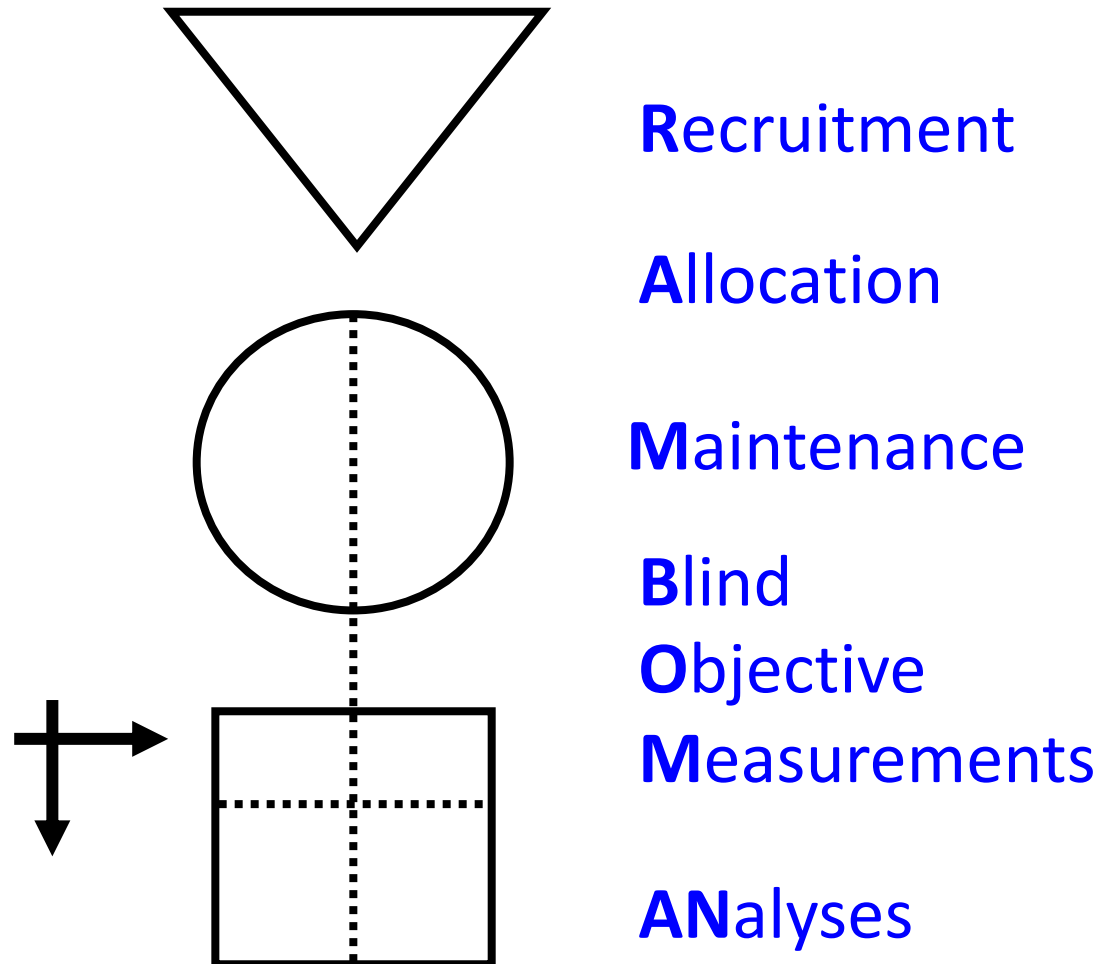
- **EGO ÷ CGO = Relative Risk (RR)**
- **EGO – CGO = Risk Difference (RD)**

measures of occurrence: risk; rate; likelihood; probability;
average; incidence; prevalence

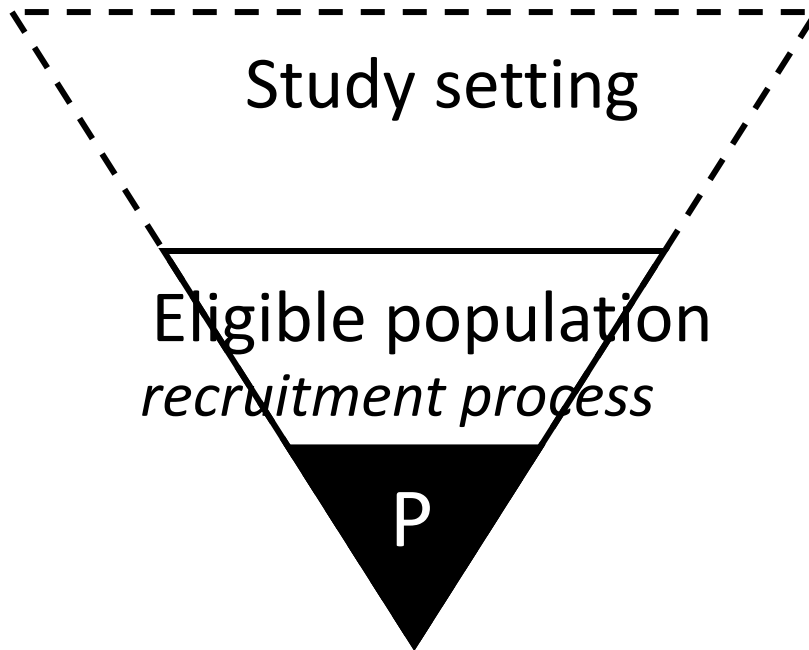
3

GATE: framework for nonrandom error

2nd acronym: RAMBOMAN



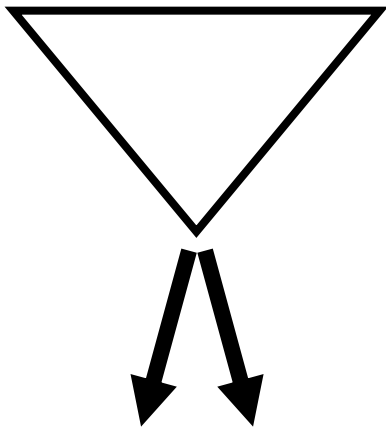
1 picture, 2 formulas & 3 acronyms



RAMBOMAN

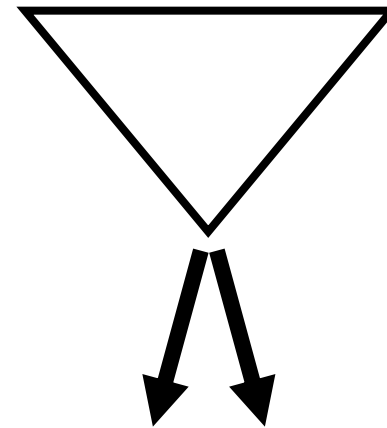
Recruitment of participants
‘who are the findings applicable to?’

RAMBOMAN: 'were participants well **Allocated** to exposure & comparison groups?'



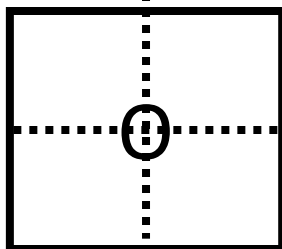
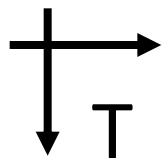
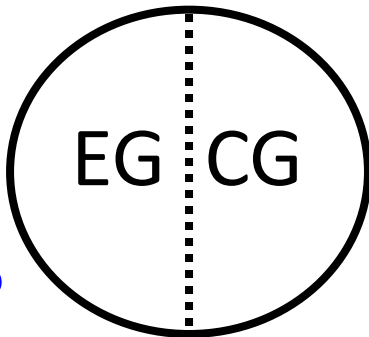
was **Allocation**
to EG & CG
successful?

RCT: allocated by **randomisation**
(e.g to drugs)

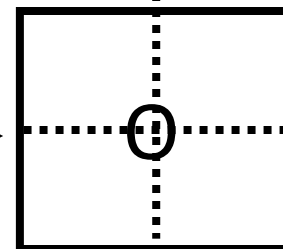
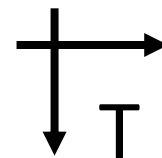
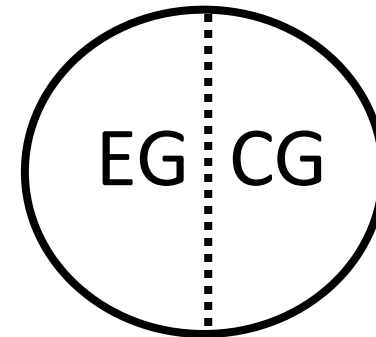


Cohort: allocated **by measurement** (e.g. smoking)

EG & CG
similar at
baseline?

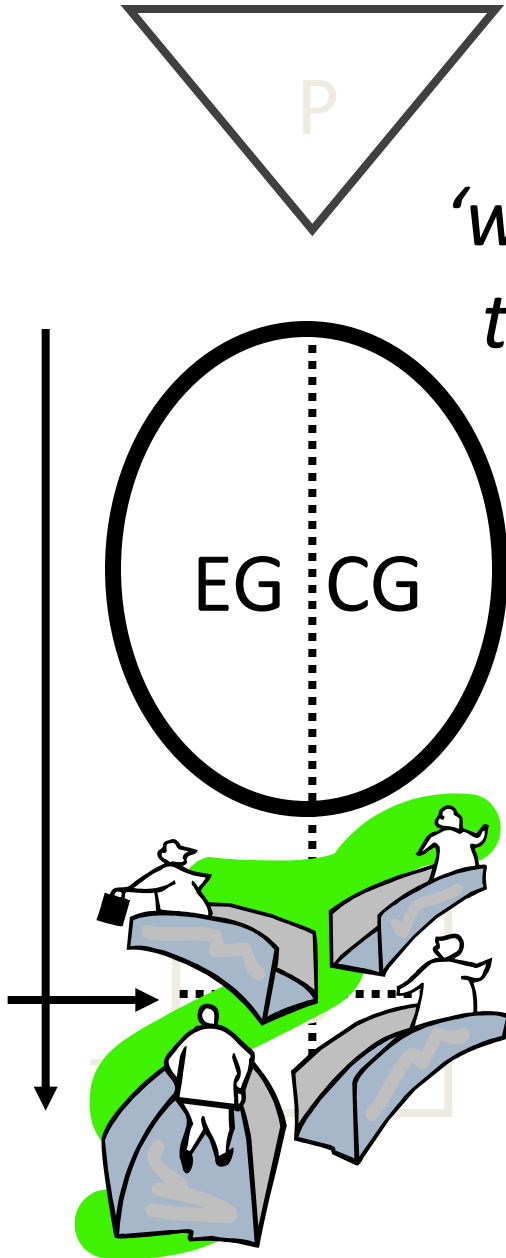


E & C
measures
accurate?



RAMBOMAN

*'were Participants well **Maintained** in the groups they were allocated to?'*

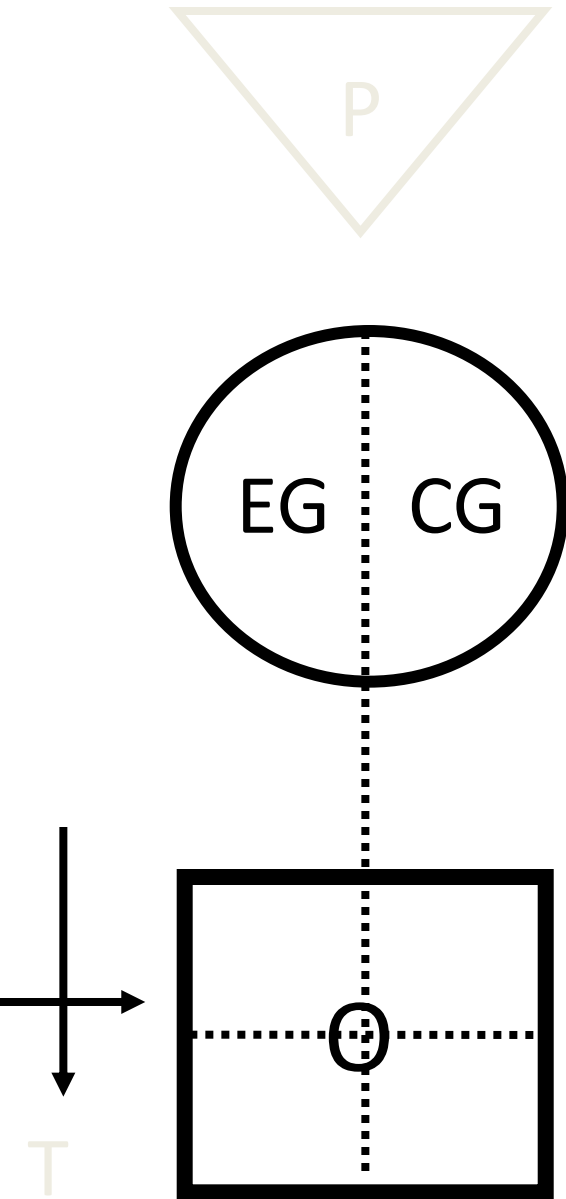


completeness of follow-up
compliance
contamination
co-interventions

RAMBOMAN

*'were outcomes well **Measured?**'*

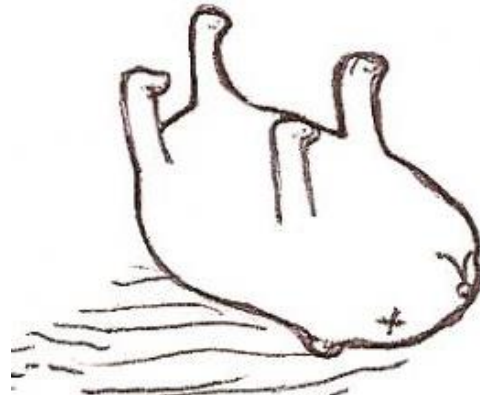
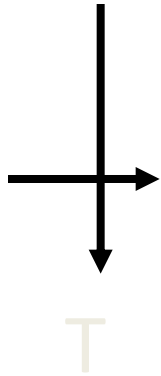
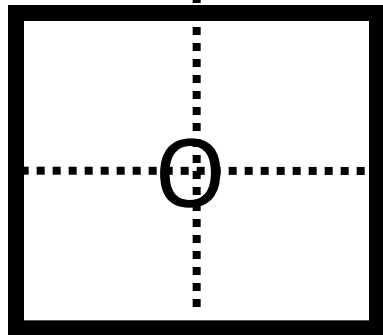
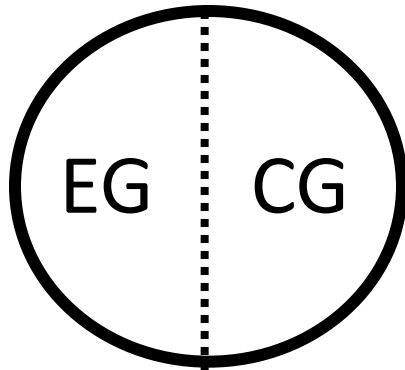
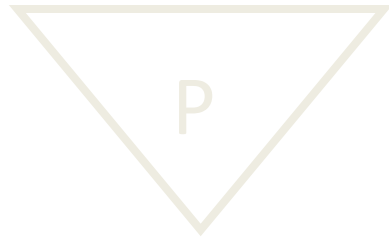
were they measured **Blind** to whether participant was in EG or CG ?



RAMBOMAN

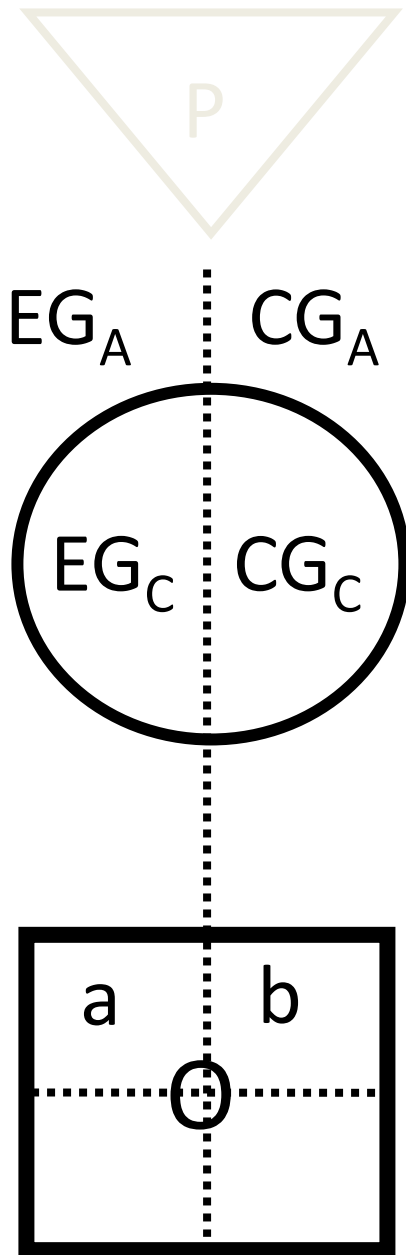
*'were outcomes well **Measured?**'*

were they measured **Objectively?**



RAMBOMAN

*'were the **ANalyses** done well?'*

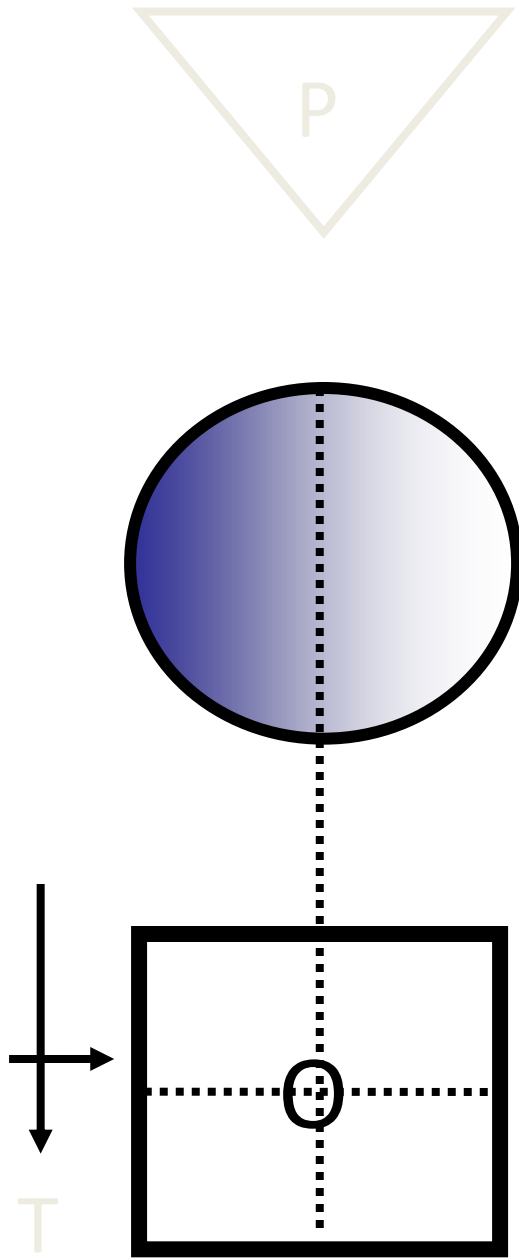


If RCT were **Intention To Treat (ITT)** analyses done?

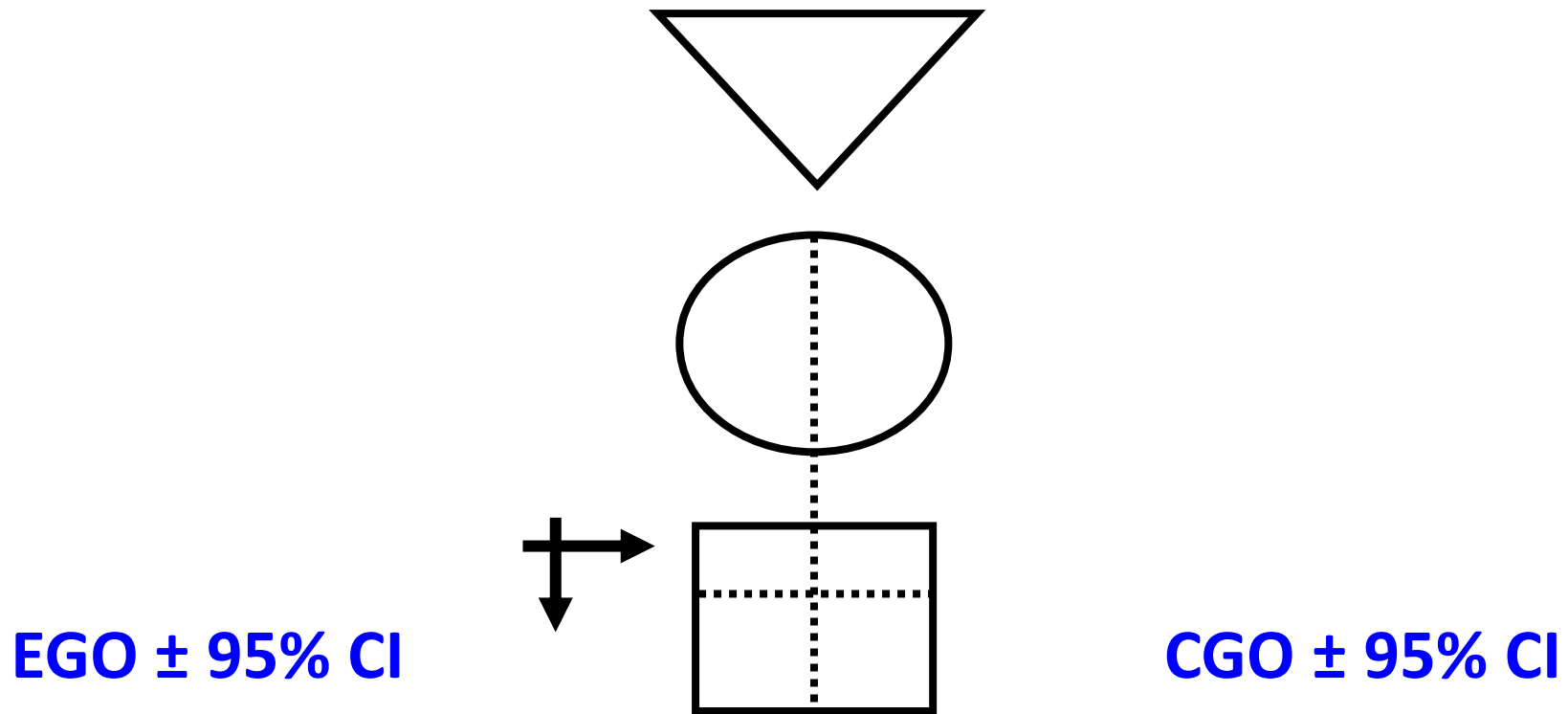
RAMBOMAN

*'were the **ANalyses** done well?'*

**adjustment for baseline differences /
confounding?**



GATE: random error: **2nd formula:**
random error = 95% confidence interval

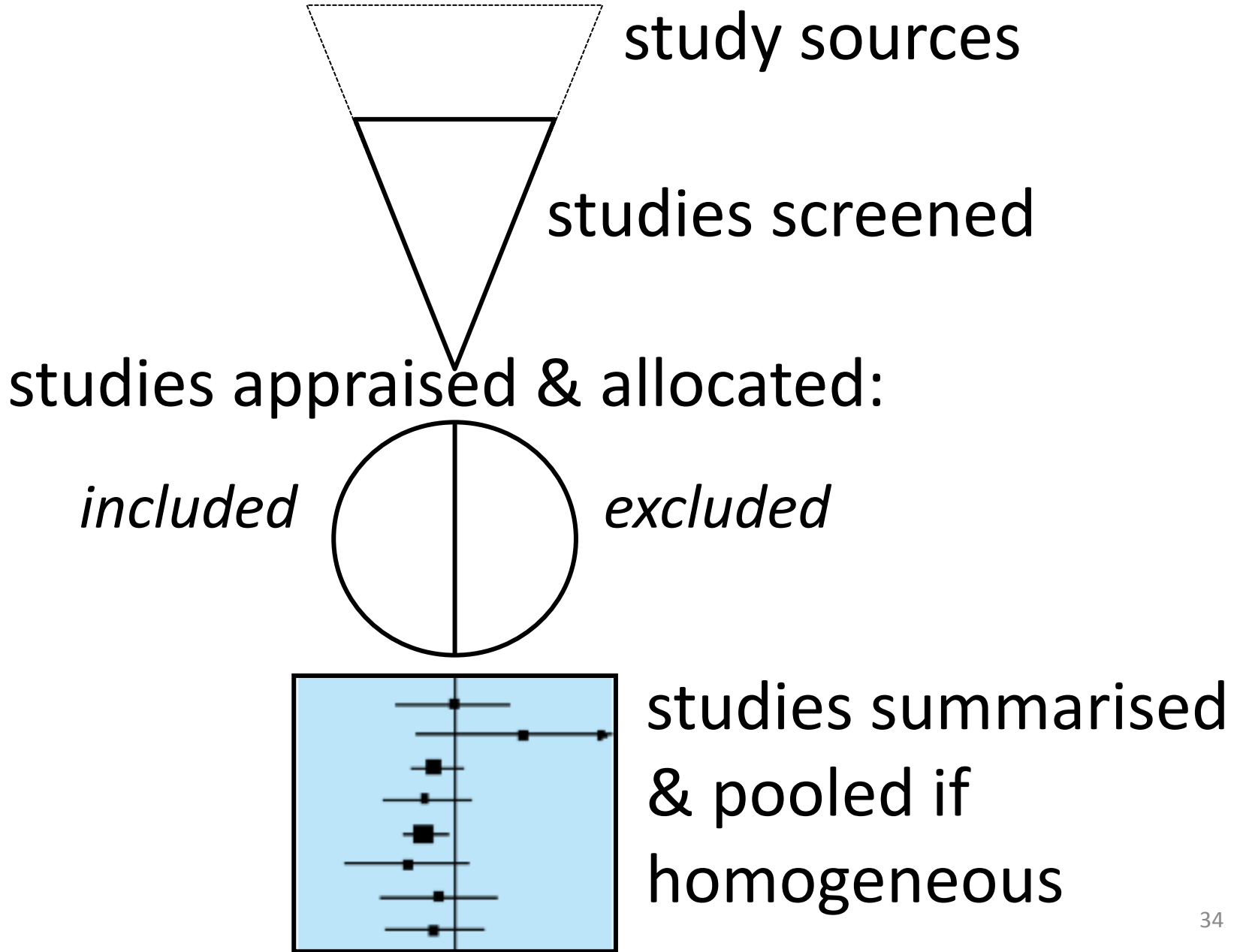


There is about a 95% chance that the true value in the underlying population lies within the 95% CI (assuming no non-random error)

GATE: a framework for error in
systematic reviews & meta-analyses:

3rd acronym: FAITH

systematic review: a study of studies



critical appraisal of SR: **FAITH**

Find

study sources

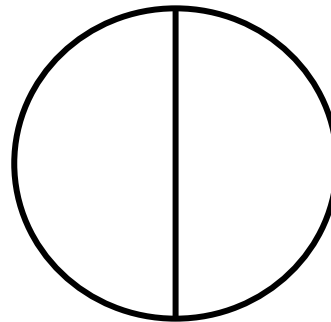
Appraise

studies screened

studies appraised & allocated:

Include

included



excluded

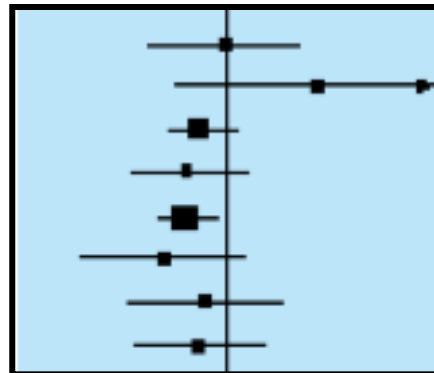
Total

studies summarised

Heterogeneity?

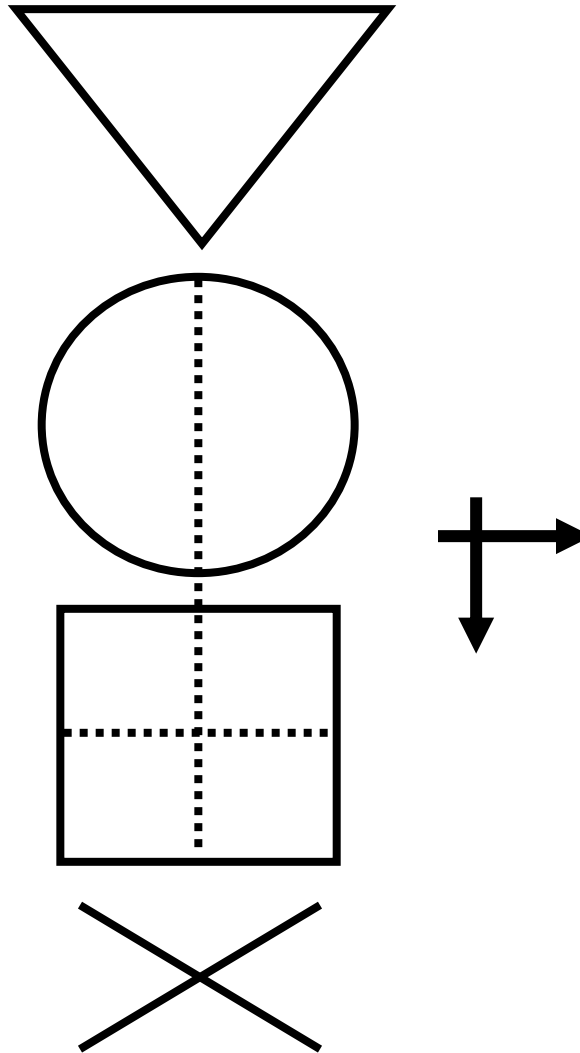
& pooled if

homogeneous



4

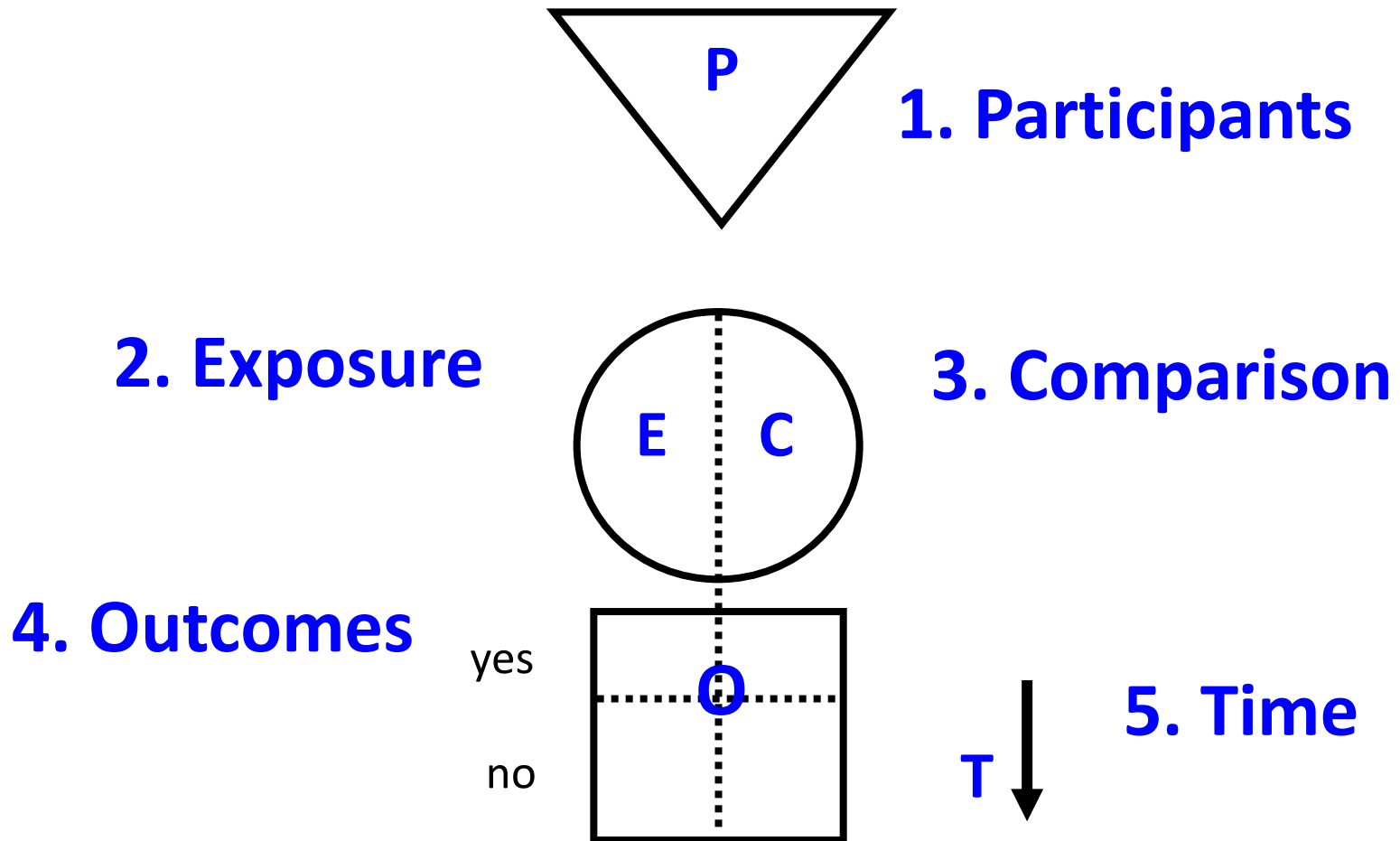
GATE: framework for the 4 steps of Evidence Based Practice (EBP)



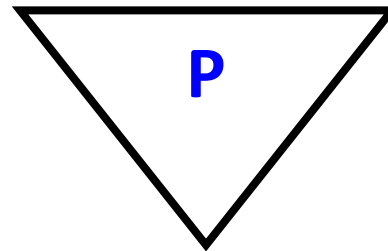
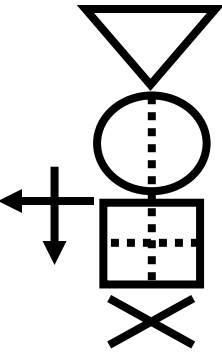
the steps of EBP:

- 1. Ask**
- 2. Access**
- 3. Appraise**
- 4. Apply & Act**

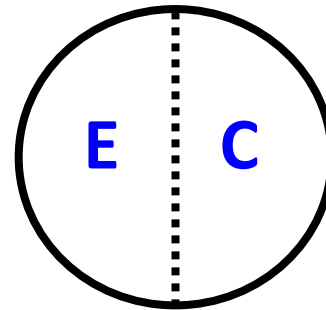
EBP Step 1: **ASK** - turn your question into a focused 5-part PECOT question



EBP Step 2: **ACCESS** the evidence – use **PECOT** to help choose search terms



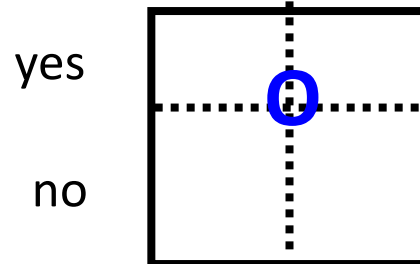
Participants



Exposure

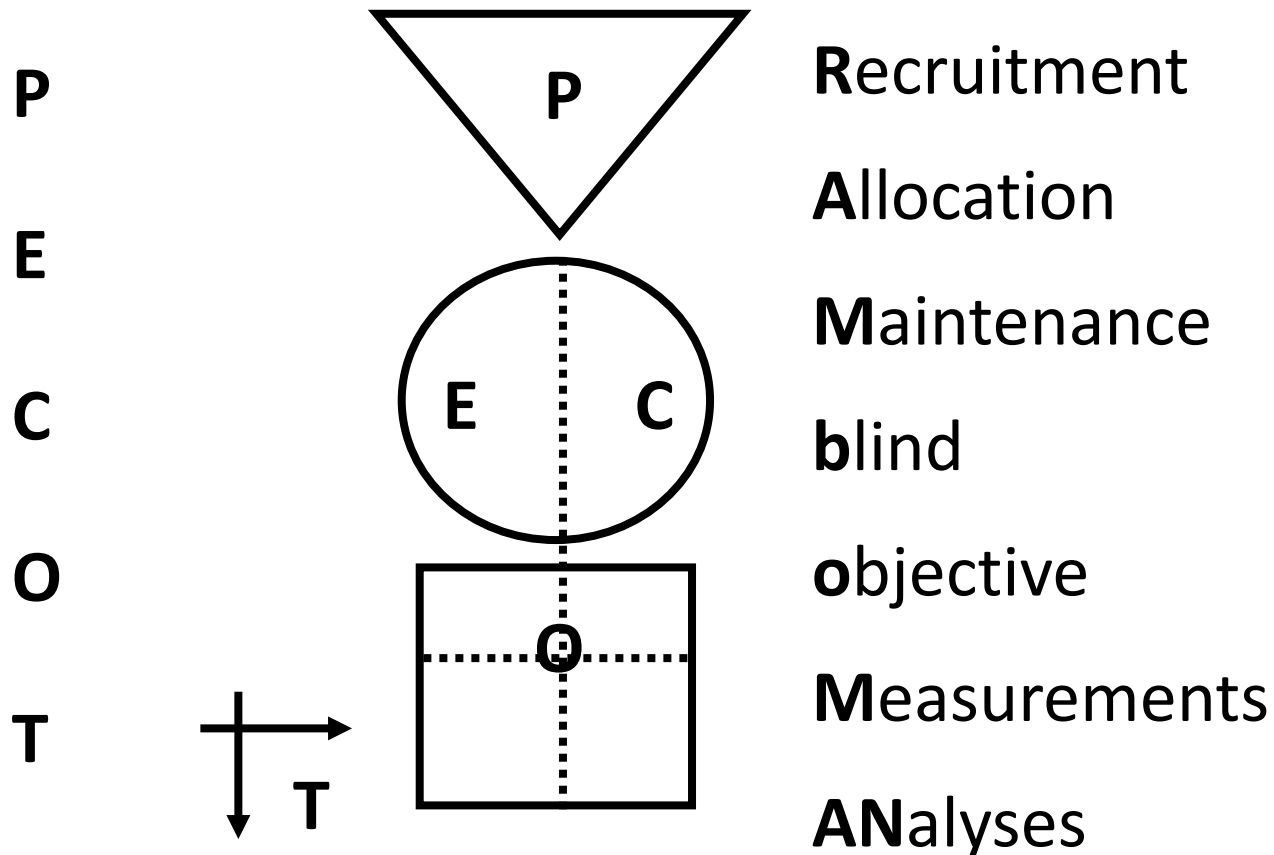
Comparison

Outcomes



Time

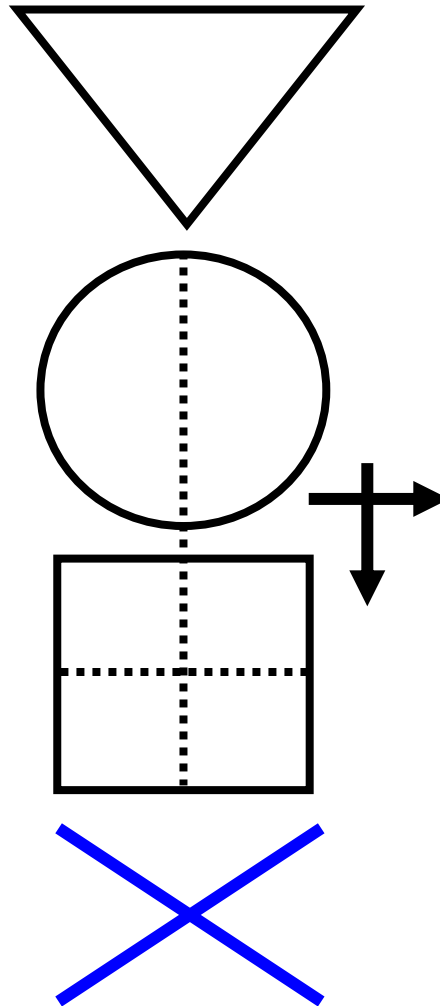
EBP Step 3: **APPRAISE** the evidence – with the picture, acronyms & formulas



Occurrence = outcomes ÷ population

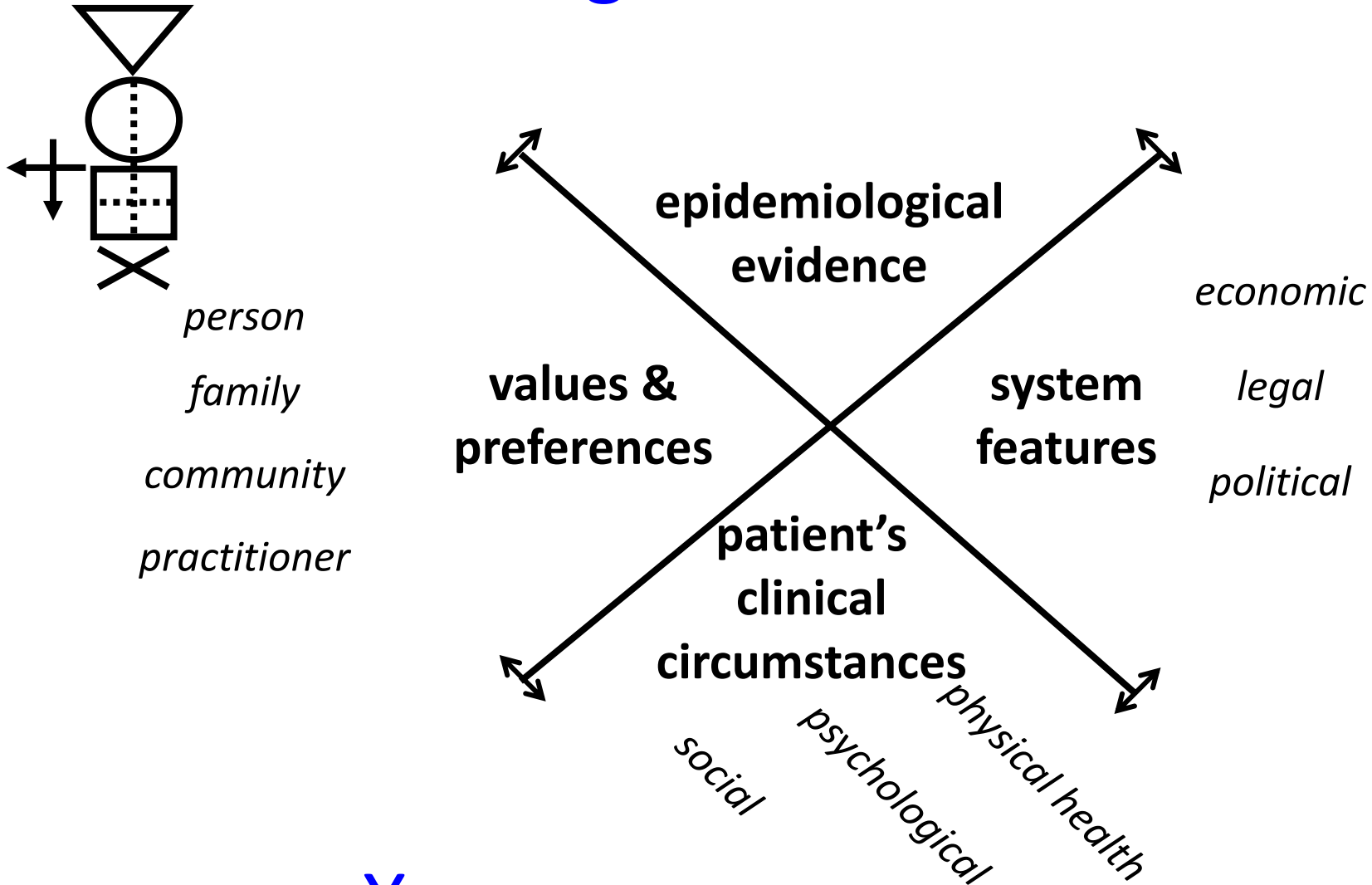
Random error = 95% Confidence Interval

APPLY the evidence by AMALGAMATING the relevant information & making an evidence-based decision: **the X-factor**





X-factor: making evidence-based decisions



Practitioner eXpertise: 'putting it all together' - the art of practice

GATE critically appraised topic
(CATs) forms

GATE CAT – 3-sheet workbook (in Excel)

sheet 1: GATE-Ask & Access

GATE Ask & Access - for all study types						
Notes for use: Enter text in yellow areas, replacing current text. Help notes appear in movable boxes						
Assessed by:					Date:	
Problem						
Describe the problem that led you to seek an answer from the literature						
Step 1: Ask a focused 5-part question using PECOT framework (EITHER 'your question' OR 'the study's question') note: question doesn't need to be grammatically correct sentence; main aim is to identify key terms for search (Step 2)						
Population / patient / client		Specify the relevant patient/client/population group (be reasonably specific about: medical condition, age group, sex, etc.)				
Exposure (intervention/ target disorder/risk or prognostic factor)		Specify: the intervention(s) you want to find out about for RCTs & other intervention studies; OR the Target disease/condition to be diagnosed for diagnostic test accuracy studies ; OR the risk/intervention factor for case-control studies ; OR the risk/prognostic factor for cohort studies . Be reasonably specific				
Comparison (Control)		Specify the alternative intervention (e.g. nothing or usual care); the typical health status of those without the target disease/condition (e.g. disease free or other comorbidities) for diagnostic test accuracy studies ; the comparison factor you want to compare it with for case-control studies and cohort studies ? Be reasonably specific				
Outcomes		Specify: the relevant health/disease-related outcomes you would like to prevent/reduce for RCTs ; the relevant test for diagnostic test accuracy studies ; the relevant health/disease related outcome/s for case-control studies and cohort studies				
Time		if appropriate, specify a relevant time period over which outcomes likely to occur				
Step 2: Access (Search) for the best evidence using the PECOT framework						
PECOT item	Primary Search term		Synonym 1		Synonym 2	
Population / Participants / patients / clients	Enter key search terms Use MESH terms (from PubMed) if available, then text words.	OR	Include relevant synonym	OR	Include relevant synonym	AND
Exposure (Interventions)	As above	OR	As above	OR	As above	AND
Comparison (Control)	As above	OR	As above	OR	As above	AND
Outcomes	As above	OR	As above	OR	As above	AND
Time	Entry generally not required for search					
Limits & Filters:						
PubMed has Limits (e.g. age, English language, years) & PubMed Clinical Queries has Filters (e.g. study type) to help focus your search. List if used.						
Databases searched:						
List data bases searched						
Evidence Selected						
Enter full citation of publication you have selected/or been given to evaluate						
Justification for selection						
State main objectives of the study.						
Explain why you chose this publication for evaluation.						
Please contribute your comments and suggestions on this form to: t.jackson@eucfhs.usfz						

GATE CAT – 3-sheet workbook (in Excel)

sheet 2: GATE-Appraise (with calculator)

GATE Appraise - Intervention Studies RCT/Cohort & Risk/Cross-sectional Studies								
Notes for use: Enter study numbers in yellow areas. Help notes appear in movable boxes. Enter study descriptions in orange areas. The form calculates results and displays them in the green areas. Use the overflow tab to provide more detail if allocated space is insufficient.								
Assessed by:		Assessed when:		Publication details:				
STUDY DESIGN (PECOT)		STUDY NUMBERS - hang on GATE frame		STUDY ERRORS (RAMBOMAN)				
Population	Study type:	Study Setting		Recruitment: able to define who findings applicable to?				
	Describe Setting:	Eligible population		Setting & eligible population appropriate?				
	Describe Eligibility:	Participant population		Participants similar to all Eligibles?				
	Describe Recruitment:			Risk/prognostic profiles sufficiently described to determine who findings applicable to?				
Exposure & Comparison	% eligibles participated:							
	Describe Exposure / Intervention	(EG) EG allocated	(CG) CG allocated	Allocation to EG & CG allocated randomly or by done well?				
	Describe Comparison / Control	dropped pre-intervention (RCT only) completed follow-up prior intervention drop-outs / lost during/post-intervention Percentage lost to follow-up		if randomised, done well? concealed? EG & CG similar at baseline? if allocated by measurement: done well? done before outcomes? differences between EG & CG documented?				
				Maintenance in allocated groups & on allocated interventions/exposures during study sufficient? Completeness of follow-up high & similar in EG & CG?				
Outcomes & Time	Describe Outcomes & Time:	Categorical outcomes		Compliance high enough? Contamination low enough? Co-interventions similar enough in EG & CG? Participants/Investigators blind to EG/CG status?				
		Numerical outcomes		Blind & Objective Outcome measures? Outcomes measured accurately enough? Follow-up time similar in EG & CG and sufficient to be meaningful?				
Report results per (e.g. per 100): .../1000 persons								
Calculated Results (unadjusted) as % confidence intervals								
Classified in GATE type	Outcome	Occurrence per 1000 persons	in exposure group (EG)	in comparison group (CG)	Relative effect (EG/CG)	Absolute effect (EG-CG)	Z-score: 1.96	Number needed to treat (NNT) to prevent/cure 1 event
	Categorical outcome							
	Intention to treat analysis							
	95% CIs							
Categorical outcome								
OR-treatment								
95% CIs								
Numerical outcome								
Analysis of mean								
95% CIs								
Reported Results								
Analysis								
intention to treat if RCT?		Adjusted if EG & CG different?		95% CIs or p-values given?				
Summary								
1. Study design (AMBOM): non-random error/bias sufficiently low for study to be valid? - consider amount & direction of bias.								
2. Study analyses (AN): analytical error sufficiently low for results to be valid? - were ITT analyses done? were adjusted analyses done if EG & CG different at baseline?								
3. Study numbers: random error sufficiently low (95% CI narrow) for results to be meaningful? if no statistically significant effects, was study power/sample size sufficiently high?								
4. Study effect size: RD +/- or RR sufficiently large to be real and meaningful?								
5. Applicability (R): if 1-4 ok, are findings likely to be applicable in practice?								

GATE CAT – 3-sheet workbook (in Excel)

sheet 3: GATE-Apply

GATE Apply - for all study types	
Notes for use: Enter text in yellow areas	
Assessed by:	Date:
Step 4: Apply. Consider/weigh up all factors & make (shared) decision(s) to act	
<p>The X-Factor</p>	
<p>Epidemiological evidence: are the results of this study consistent with other epidemiological evidence relevant to the decision(s) (e.g. ideally from systematic reviews)?</p>	<p>What Case circumstances (e.g. disease process/ co-morbidities /social situation) specifically related to the problem may impact on the decision(s)?</p>
<p>System features: are there any system constraints or enablers that may impact on the decision(s)?</p>	<p>What Values & Preferences may need to be considered in making the decision(s)?</p>
<p>Decision(s): taking into account all the factors above what is the best decision(s) for this problem?</p>	
Step 5: What are the implications of this decision(s) for practice?	
<p>What are the wider considerations of this decision(s) for usual practice? Should it change usual practice in any way?</p>	
<p>Please contribute your comments and suggestions on this form to: t.jackson@stard.ac.nz</p>	