LAB: JUDGMENT AND CREDIBILITY IN THE EVALUATION OF BUG REPORTS

Version 1.0

Fall 2011

UNDERLYING PROBLEM

- Project manager gets a steady stream of bug reports
- Must decide which bugs to fix

IDEAL DECISION RULE

Fix the bug IF

- value of the changed product
- exceeds value of the unchanged product
- by more than the cost of the change.

Remember: Quality is "value to some person"

PROBLEMS WITH THE IDEAL DECISION RULE

1. We have to estimate the likely change in value
   - Value to who?
     - His boss?
     - Internal stakeholders?
     - Cumulated across the market?
   - What if the value of the change varies and is negative for some people?
2. We have to estimate likely cost
3. Resources are finite
   - The cost of fixing all "worthy" bugs might exceed resources, therefore we must prioritize

DECISIONS ARE MADE UNDER UNCERTAINTY

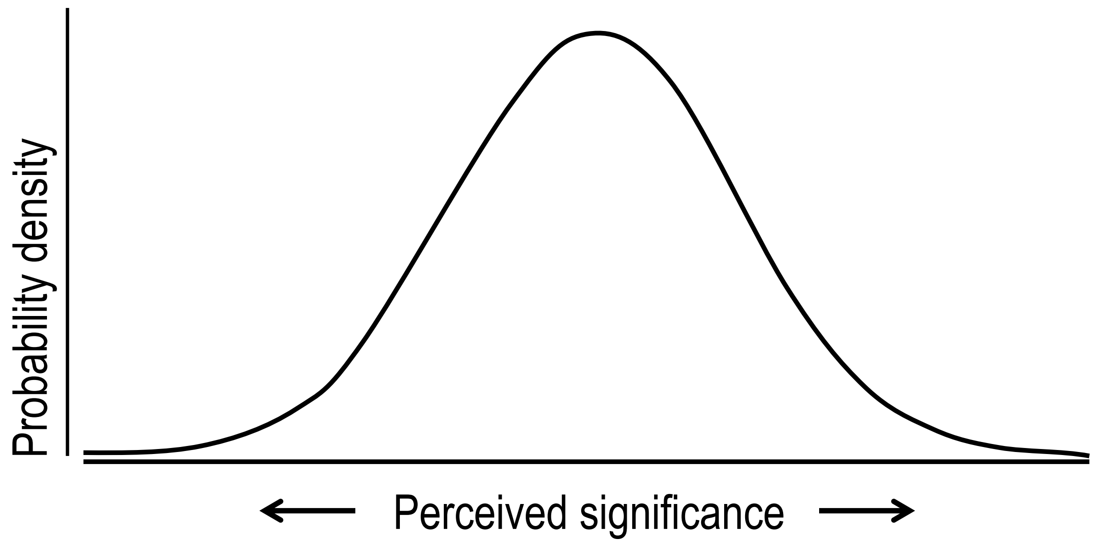
- Value is uncertain
- Cost is uncertain
- Resource availability is uncertain
- Opportunity cost is uncertain

- Therefore, priority is uncertain

MODIFIED DECISION RULE

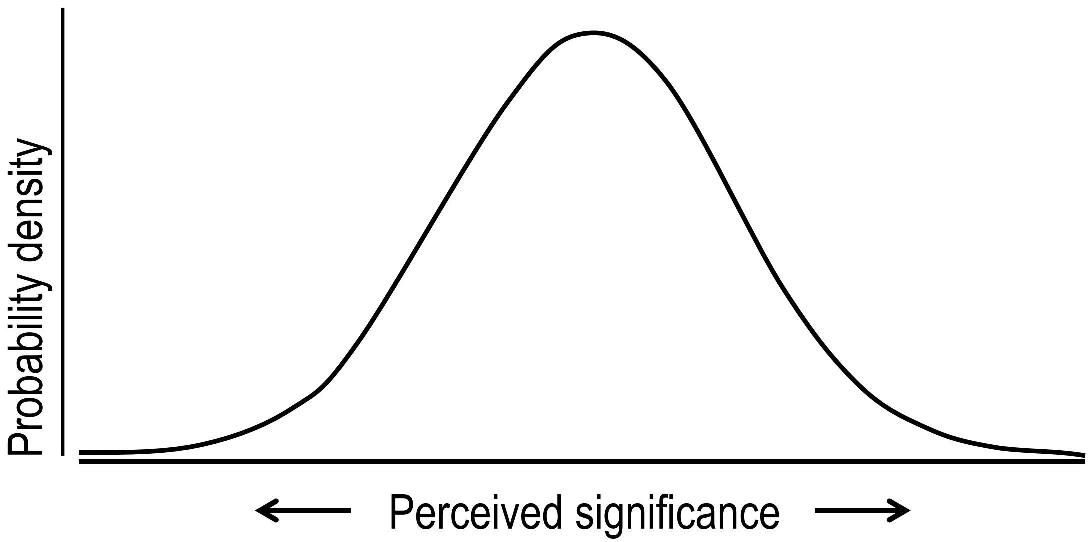
- Perceived significance of a bug:
  - Based on estimated value, cost, urgency, etc.
- RULE:
  - Fix High-Significance bugs
- RULE (same rule, restated):
  - **Fix bugs whose Significance > C**
    - where C is a Constant (criterion value)

"SIGNIFICANCE" IS A RANDOM VARIABLE



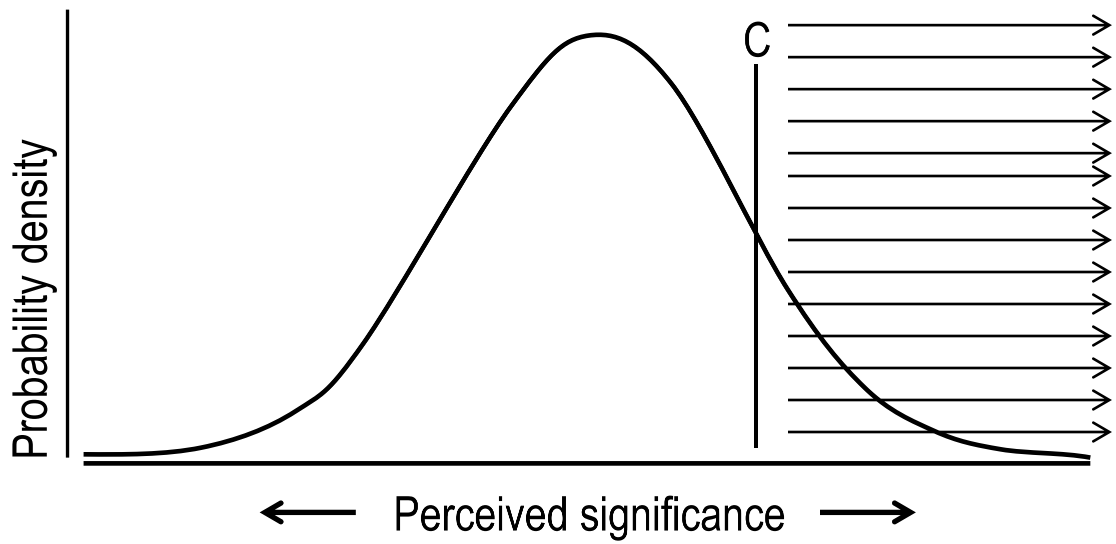
Significance is a function of value, cost (and other variables), but we can only estimate value and cost (and the other variables). There are estimation errors.

SHOULD WE FIX IT?



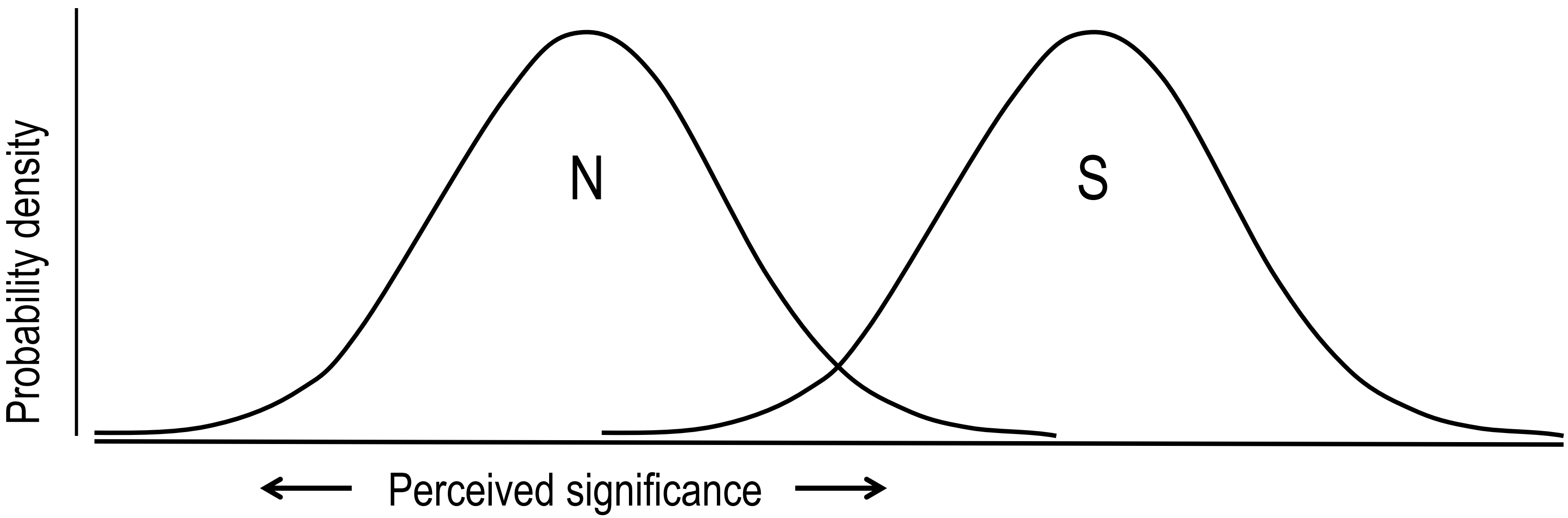
Should this bug be fixed or not?
How can we tell?

THE DECISION RULE



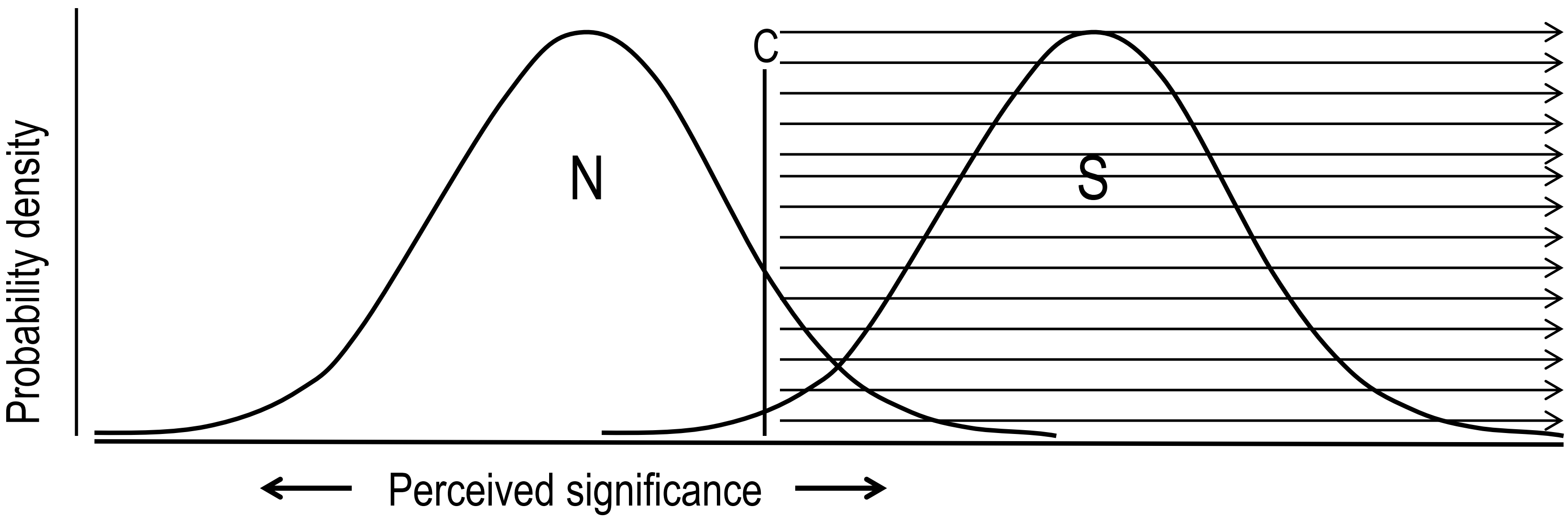
Fix the bug if perceived significance > C

WHICH BUG TO FIX?



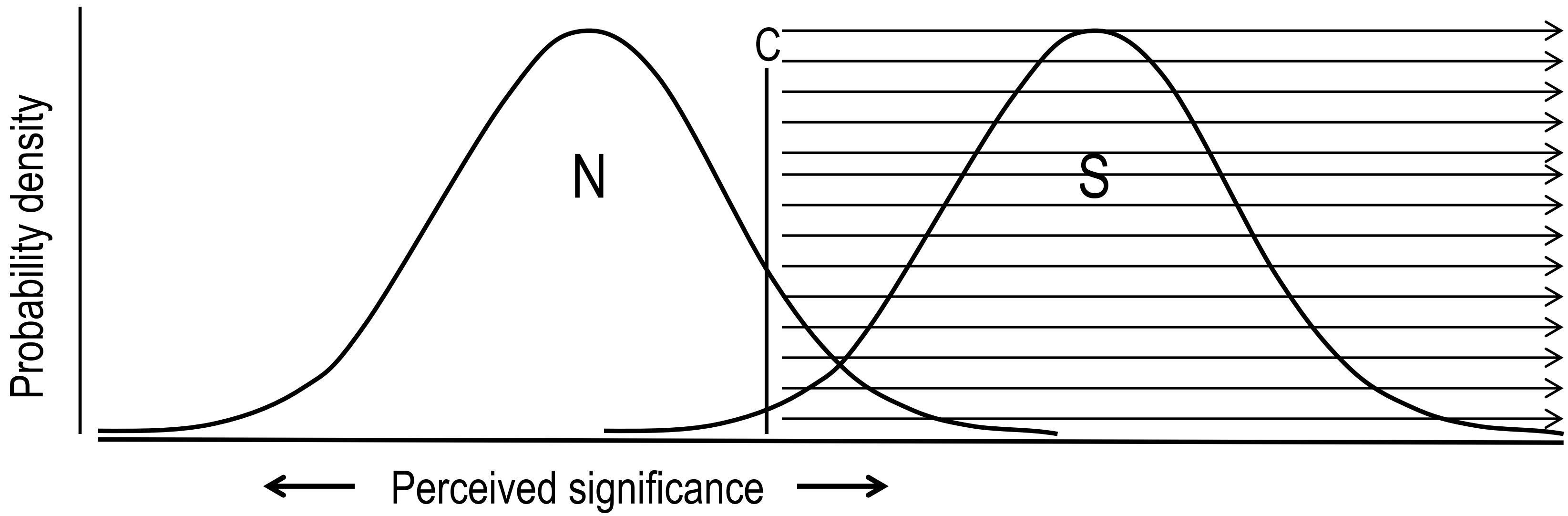
We want to fix the significant bugs (S) and not fix the not-significant (N) bugs

THE DECISION RULE



Fix any bug whose perceived significance exceeds C

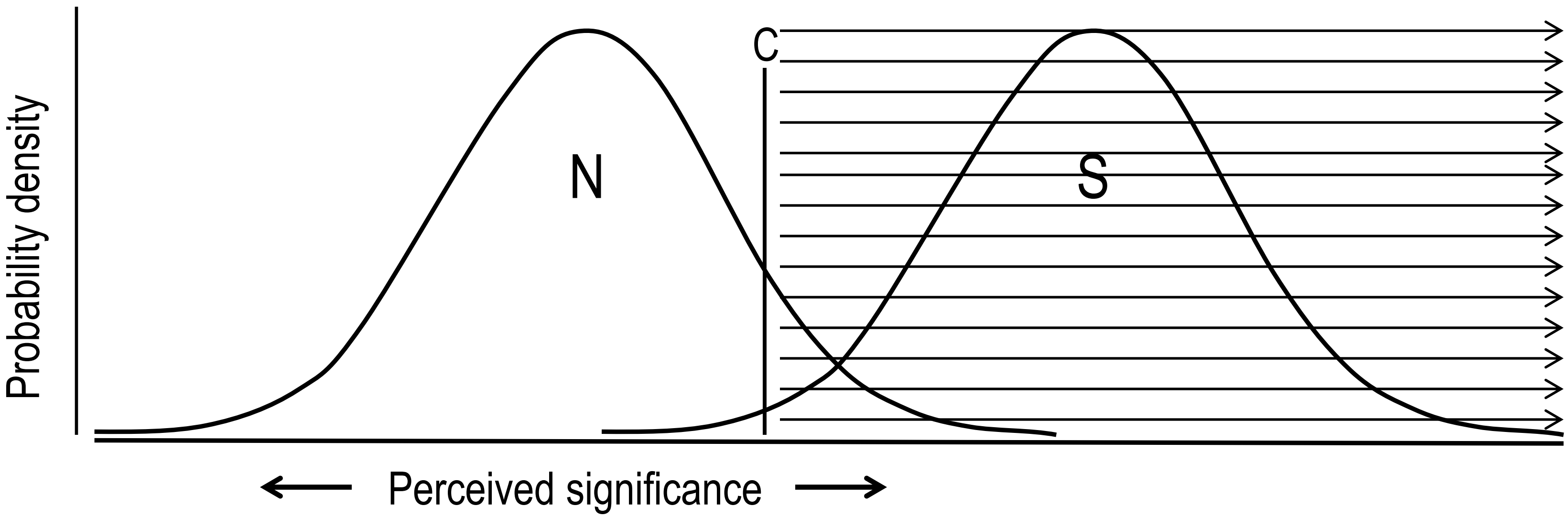
BUT THIS RESULTS IN ERRORS



Fix any bug whose perceived significance exceeds C

- We fix some N's
- We don't fix some S's

Errors are inevitable



For EVERY POSSIBLE value of C

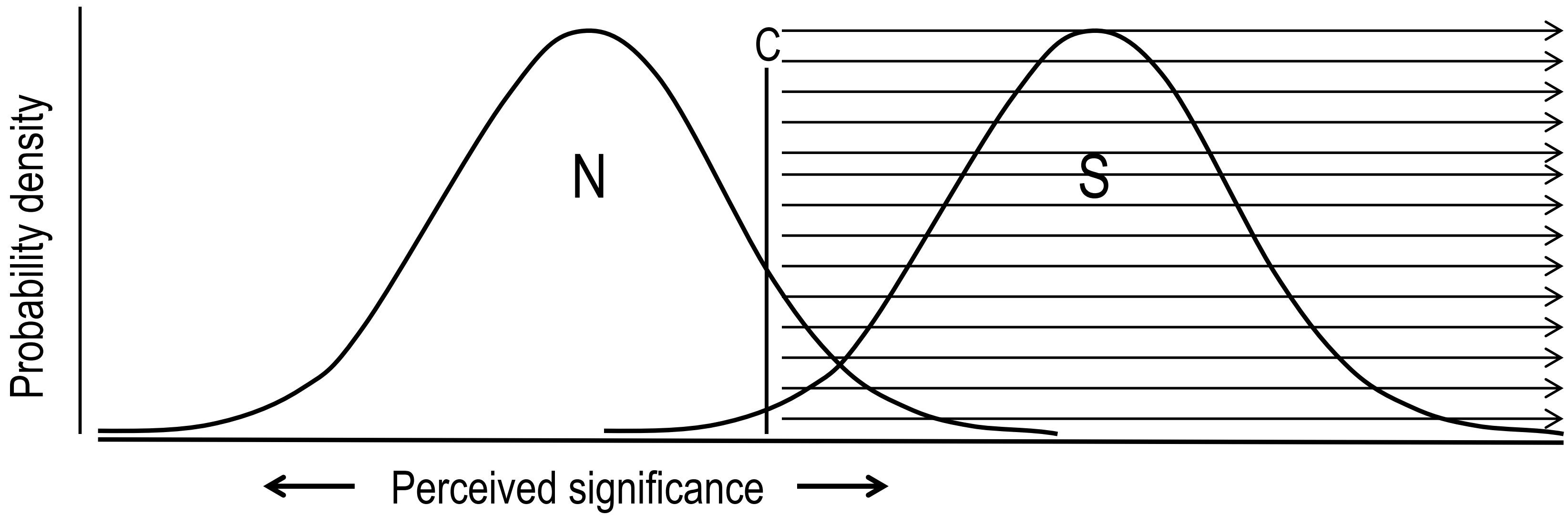
- We will fix some N's
- We won't fix some S's

Because the tails of the distributions go to ± infinity

DECISION TABLE

	Don't Fix	**Fix**
Significant (S curve)	MISS	HIT
Not Significant (N curve)	CORRECT REJECTION	FALSE ALARM

MAPPING THE TABLE TO THE PICTURE…



Rule: Fix any bug with a Perceived Significance > C

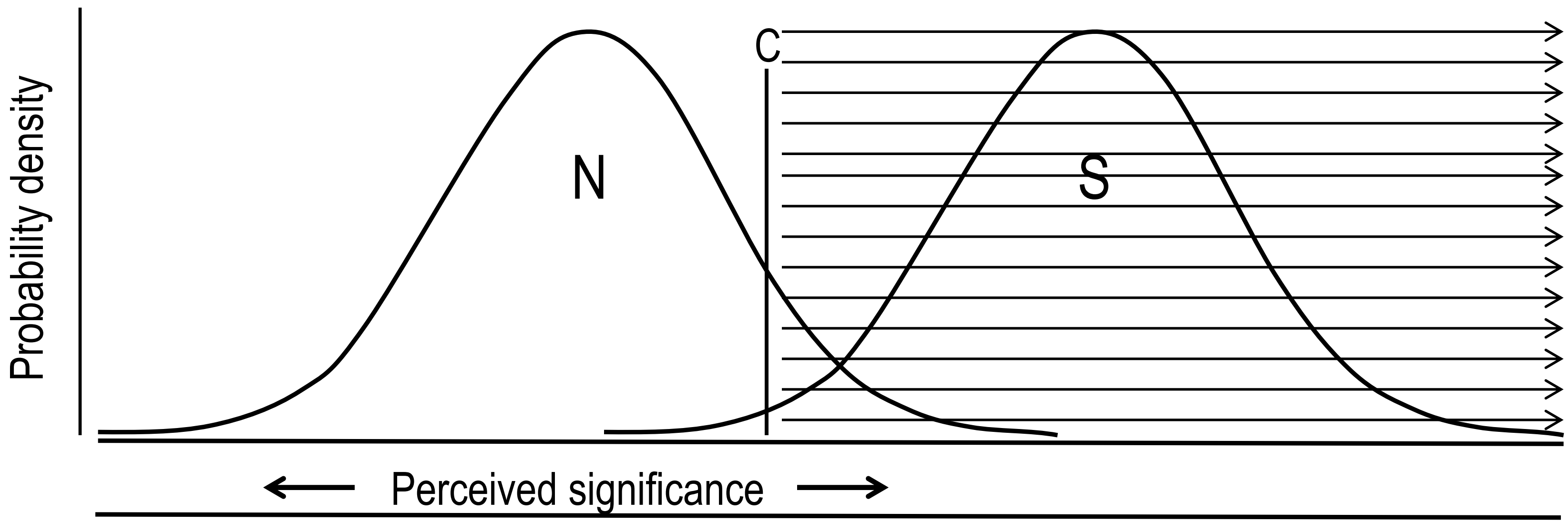
Perceived Significance < C

- Misses (S)
- Correct rejections (N)

Perceived Significance > C

- Hits (S)
- False alarms (N)

PARAMETERS



- **C: the decision criterion**
- **Mean_Of_N: Underlying "average" perceived severity for the Not-Significant bug**
- **Mean_Of_S: Underlying "average" perceived severity for the Significant bug**
- **SIGMA: Standard deviation of the curves (assume they are the same)**
- **d' (pronounced "d-prime"): Difference between Mean_Of_S and Mean_Of_N**
  - **d' = Mean_Of_S – Mean_Of_N in units of SIGMA**
  - **e.g. d' = 3 sigma.**

Implications of the model

1. What is the impact on the error rates (Miss and False Alarm) if you reduce SIGMA?
   – Why?
   – What could reduce SIGMA?

Implications of the model

2. What is the impact on the error rates (Miss and False Alarm) if you increase d' ?
   – Why?
   – What could increase d' ?

IMPLICATIONS OF THE MODEL

3. What is the impact on the error rates (Miss and False Alarm) if you increase C?
   – Why?
   – What could cause an increase in C?
   – Why?

For this exercise, pretend that the owner of C is the project manager.

IMPLICATIONS OF THE MODEL

4. What is the impact on the error rates (Miss and False Alarm) if you decrease C?
   - Why?
   - What could cause a decrease in C?
   - Why?

For this exercise, pretend that the owner of C is the project manager.