

Rare threats pose cognitive challenges

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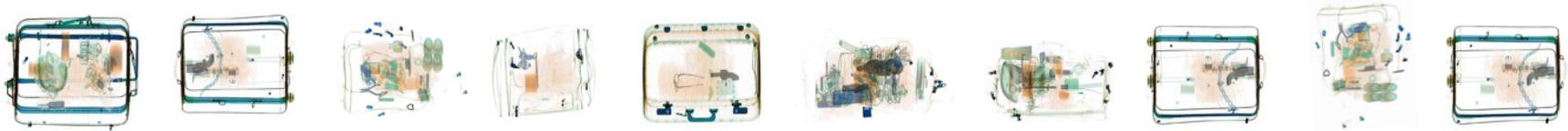


So What? Who Cares?

- Mission: *Find and identify threats*
 - *In Intelligence, Surveillance, Screening, etc*
- Problems needing solutions
 - *Most of these threats are rare*
 - *Rare targets are missed more frequently*
 - *Need to reduce Misses without too many False Alarms*
 - *Today: I will tell you something new about prevalence effects.*
- Possible solutions include
 - *Intermittent high-prevalence retraining*
 - *Inserting cases with known truth as quality control (e.g. TIPS)*
- What is needed to make progress
 - *Access to experts to identify the problems*
 - *Basic research to identify candidate solutions*
 - *Access to experts to test solutions*

Prevalence matters in search

Let's take 20 bags with guns and knives



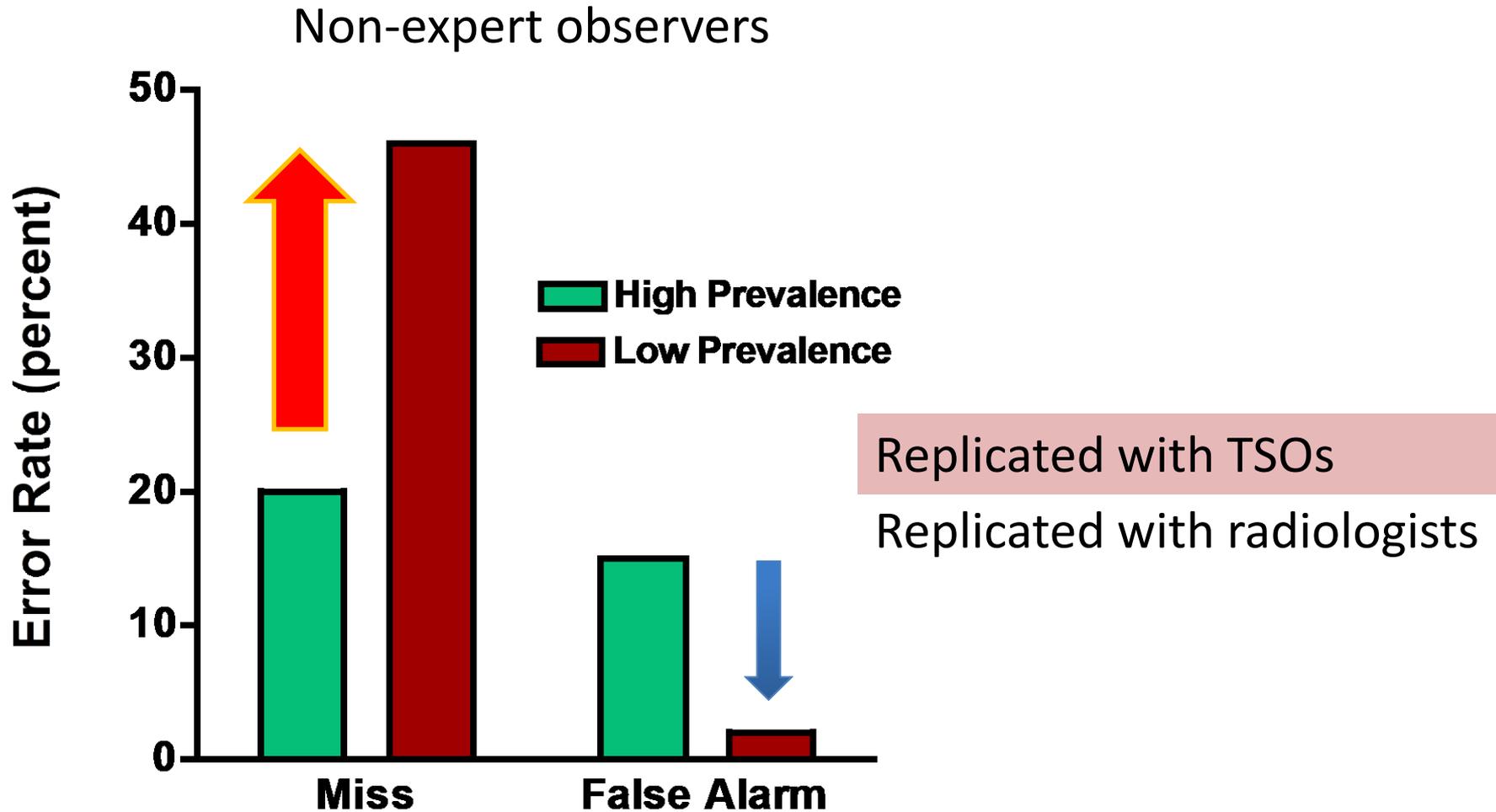
And put them in a stack of 40 bags
50% Prevalence



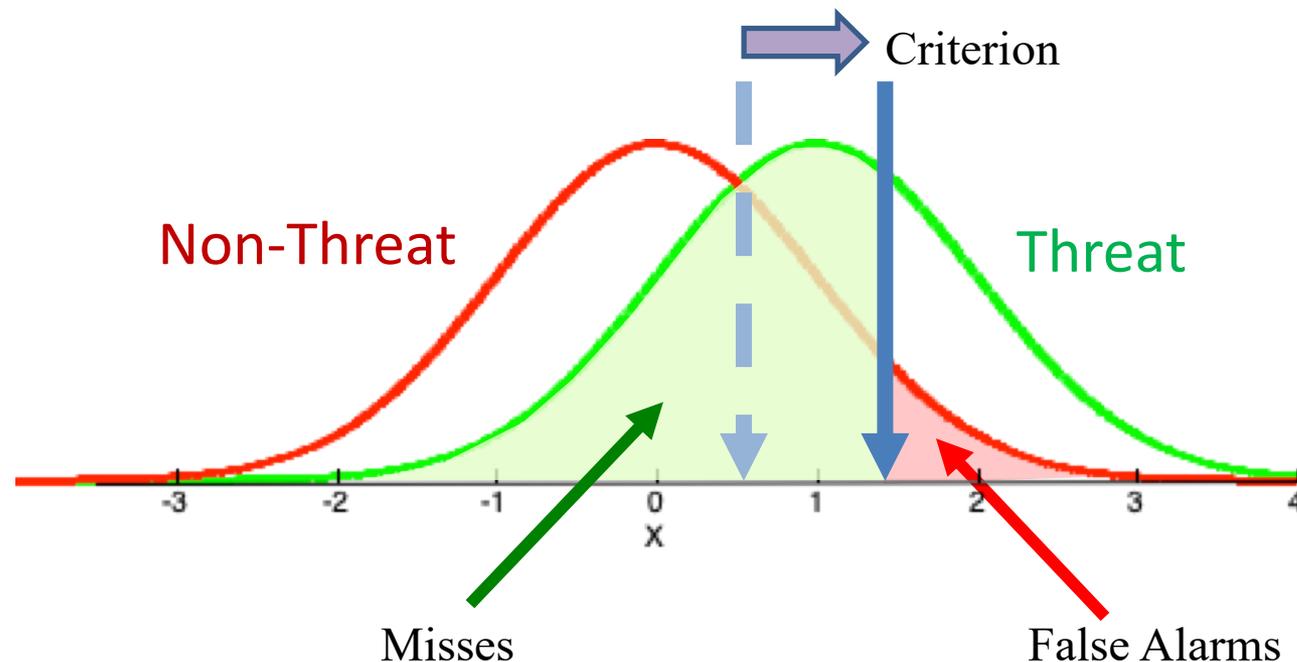
Or 1000
bags
2%
Prevalence



Miss error rates can double at low prevalence



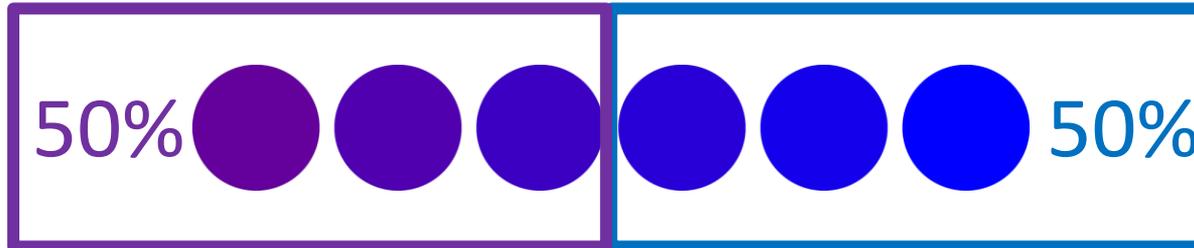
A neutral item is *less likely* to be called a target at low prevalence



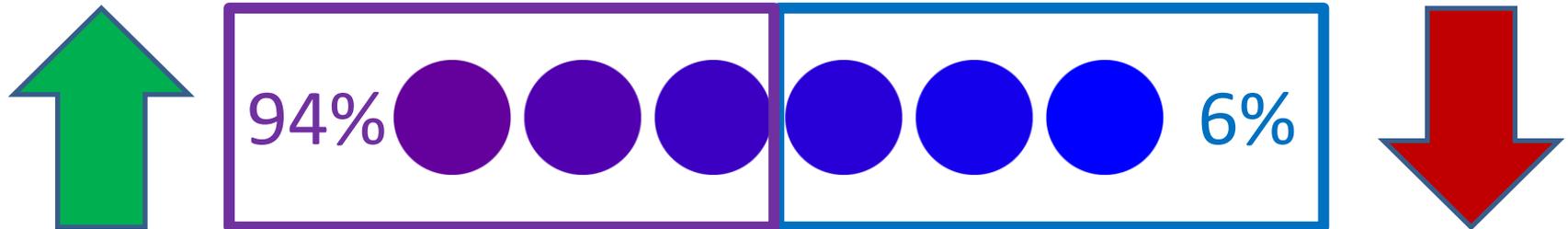
Wolfe, J. M., & Van Wert, M. J. (2010). Varying Target Prevalence Reveals Two Dissociable Decision Criteria in Visual Search. *Curr Biol*, 20(2), 121-124.

New research: Just say if the dot is blue

Block 1 is high prevalence



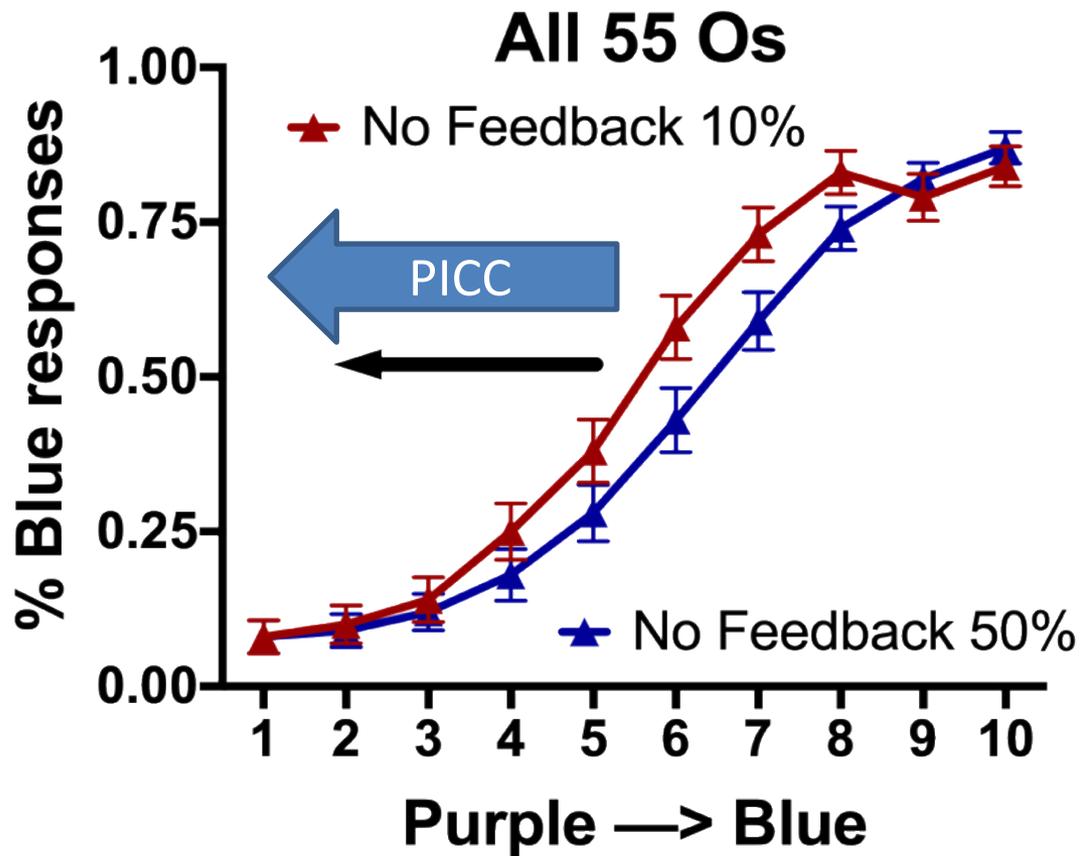
Block 2 is low prevalence



The classic result would be fewer dots would be called blue at low prevalence

Levari, D. E., Gilbert, D. T., Wilson, T. D., Sievers, B., Amodio, D. M., & Wheatley, T. (2018). Prevalence-induced concept change in human judgment. *Science*, 360(6396), 1465-1467.

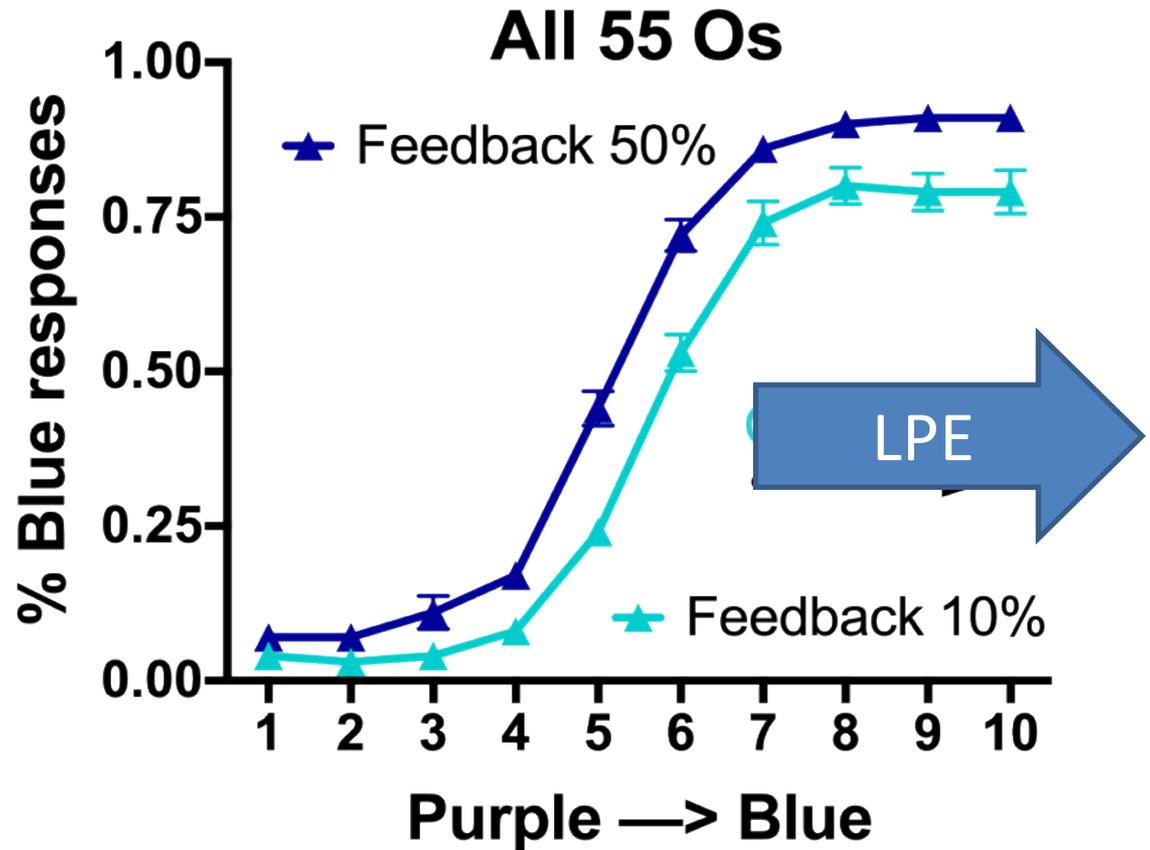
But without feedback, the result is opposite



An ambiguous item is more likely to be called “blue” at low prevalence

With feedback, we get the classic result

An ambiguous item is less likely to be called “blue” at low prevalence



So What? Who Cares?

- We had thought low prevalence was all about missing targets
 - *If you don't find it often, you often don't find it.*
- But there are also situations where you find too much
 - *If you don't see it often, you may broaden your definition.*
- Could be an opportunity
 - *We might be able to control the effect better.*
- Could be a problem
 - *Are there situations where searchers MISS targets and generate excess FALSE ALARMS?*