Assessment of Pixel Randomization

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Bayseians get it right again....

To Randomize or Not?

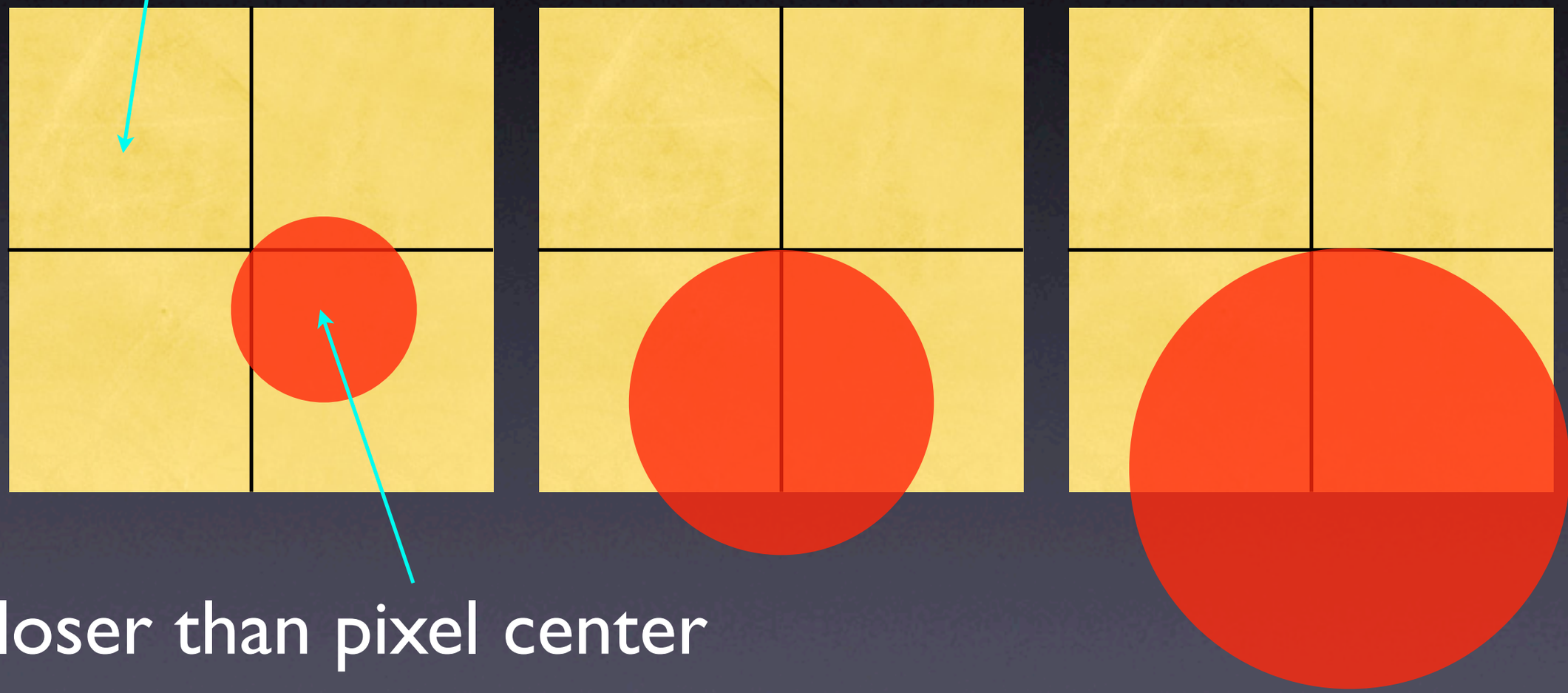
- If no (prior) knowledge of where event should be: randomization is OK
  - example: diffuse source >> pixel size
  - removes "picket fencing" and aliasing
  - dither & "drizzle" have ~ same effect
- Use prior knowledge
  - Assume point source...
  - bias and broadening are introduced if randomizing!

Randomization Broadens the PSF

- Events are placed systematically farther from the source than if placed at pixel center
- Doesn't matter where the source centroid is
- Best: weighted event placement (based on source location estimate)
- Can also bias centroid position

Proximity to Source Centroid

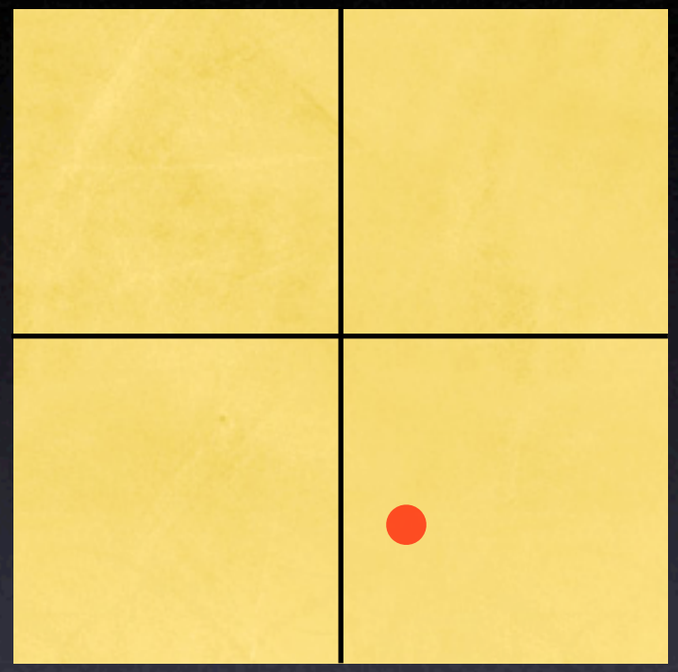
Farther than pixel center



Closer than pixel center

Degenerate Case

(for illustration)



Randomize

Center

Events on sky

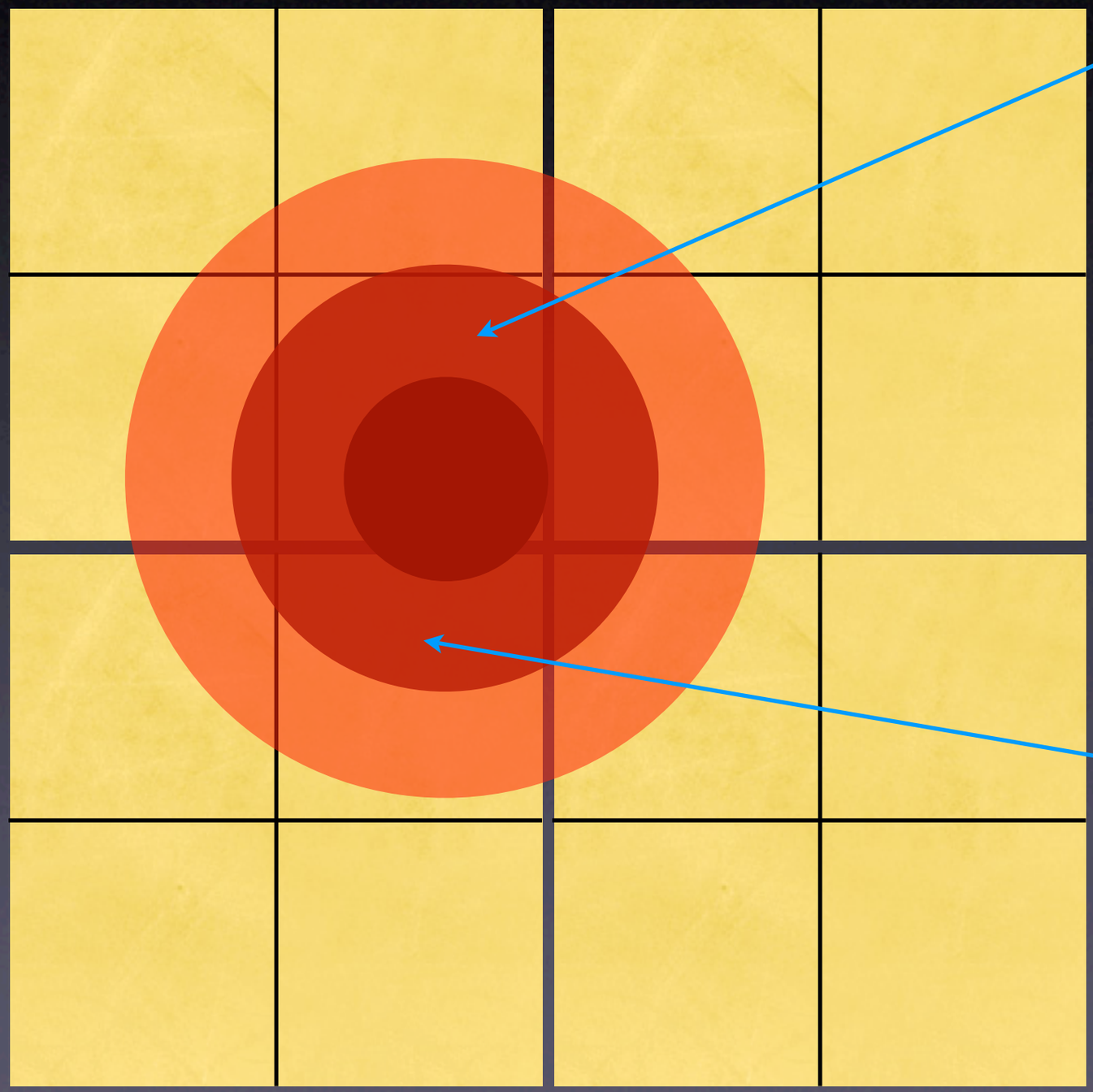
Large dispersion

Small dispersion

Large bias

Large bias

PSF width ~ Pixel size



Most events
Most bias
Most excess dispersion

Fewer events
Reduces bias
Increases excess dispersion