

# Motor Control: Various Issues

Human Learning & Performance

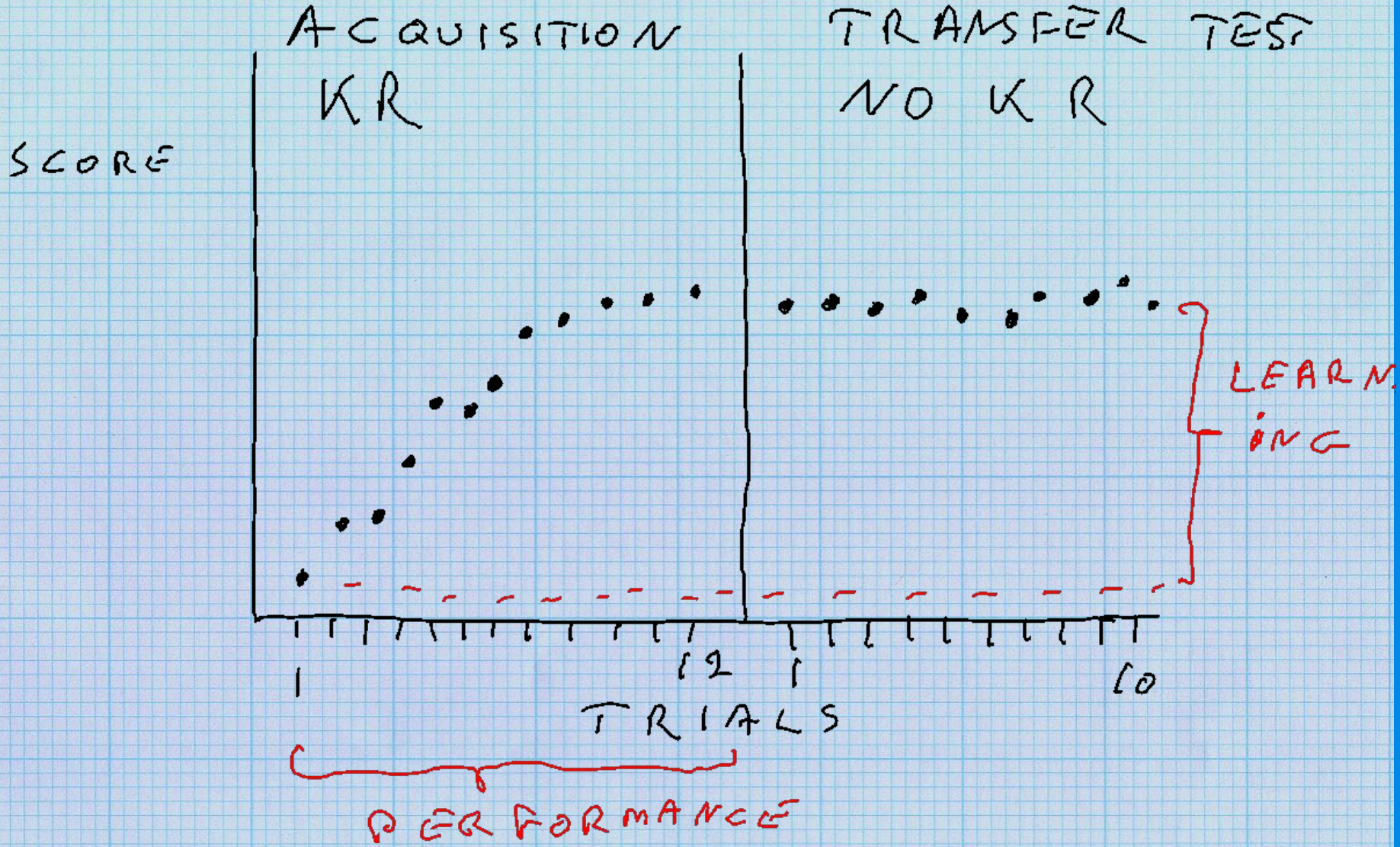
Iver Iversen

Fall, 2003

# Typical Motor Learning Experiment

- Acquisition: Some form of KR manipulation is applied to a skill (different levels of KR for different groups of subjects)
- Transfer Test: Determine the effects of the previous exposure to KR. The Transfer test has a constant level of KR (usually NO KR) for all groups of subjects

# TYPICAL MOTOR LEARNING EXPERIMENT



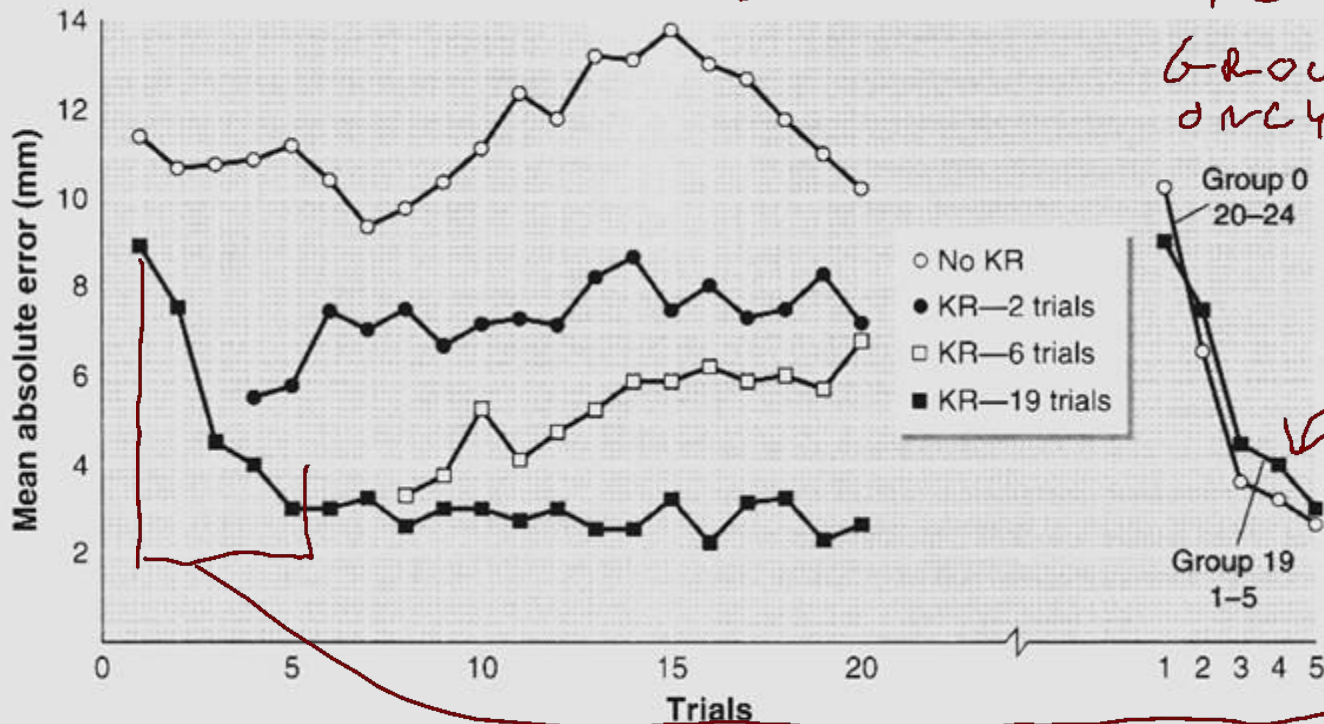
# Learning versus Performance

- Performance: Immediate or temporary effect of KR during training – seen when behavior improves during Acquisition with some form of KR
- Learning: Relatively permanent effect (of training) – seen when behavior can be sustained without KR after training is completed

ACQUISITION I

ACQ II

GROUP 0 ONLY



SAME DATA  
Re-plotted

Figure 12.2. Absolute errors in a linear-positioning task as a function of KR. (The group numbers indicate the number of KR's received before KR withdrawal; group 0 switched to a KR condition at the right, where its performance is compared to group 19's first five trials replotted from left.)

Reprinted from Bilodeau, Bilodeau, and Schumsky, 1959.

CONCLUSION: KR IS NECESSARY FOR LEARNING (NO IMPROVEMENT WITHOUT KR)

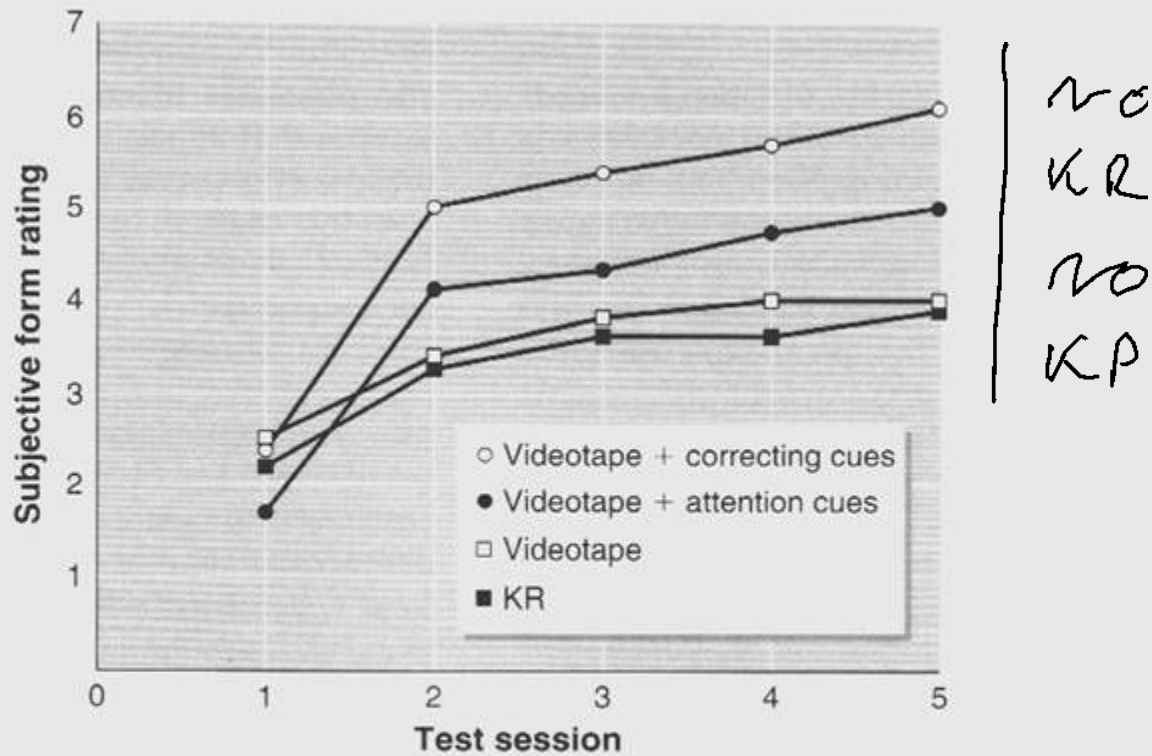


Figure 12.3. Improvements in throwing performance under various conditions of videotape replays. Adapted from Kernodle and Carlton, 1992.

UNDER AFTER

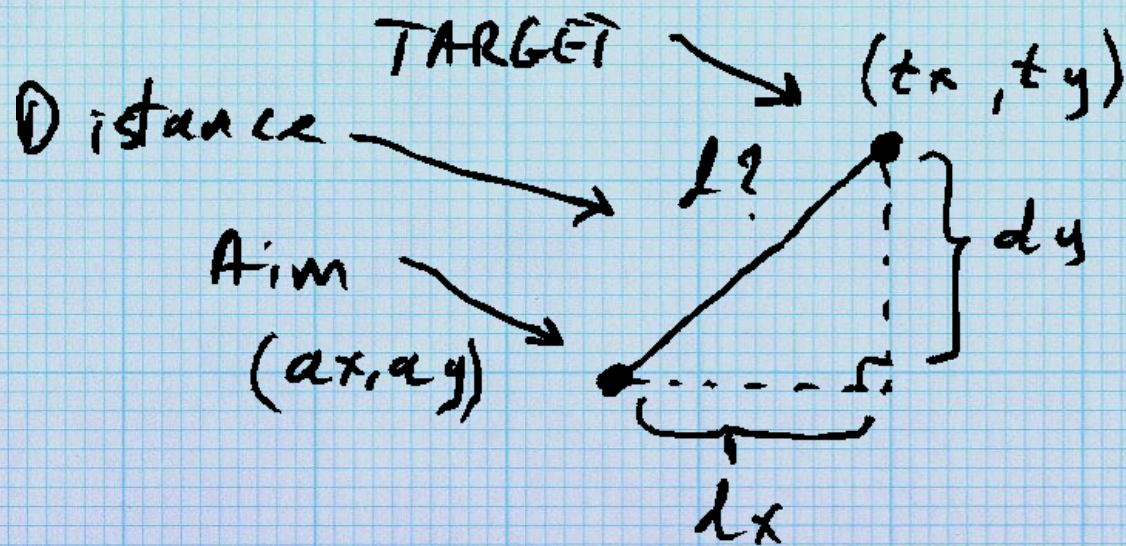
TRANSFER TEST DATA ONLY

ACQUISITION DATA NOT SHOWN

# Calculating Distance

- The next slide shows how to calculate the distance between two points in a coordinate system
- It is based on the Pythagorean Theorem
- You don't need to know this, but you might be interested in how it is done

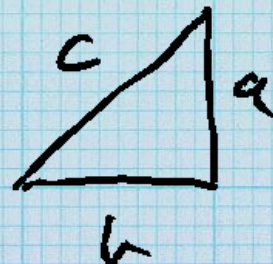
Calculating the distance  
between two points:



$$d? = \sqrt{d_x^2 + d_y^2}$$

$$= \sqrt{(t_x - a_x)^2 + (t_y - a_y)^2}$$

Reminder!



$$c^2 = a^2 + b^2$$

$$c = \sqrt{a^2 + b^2}$$



# Images

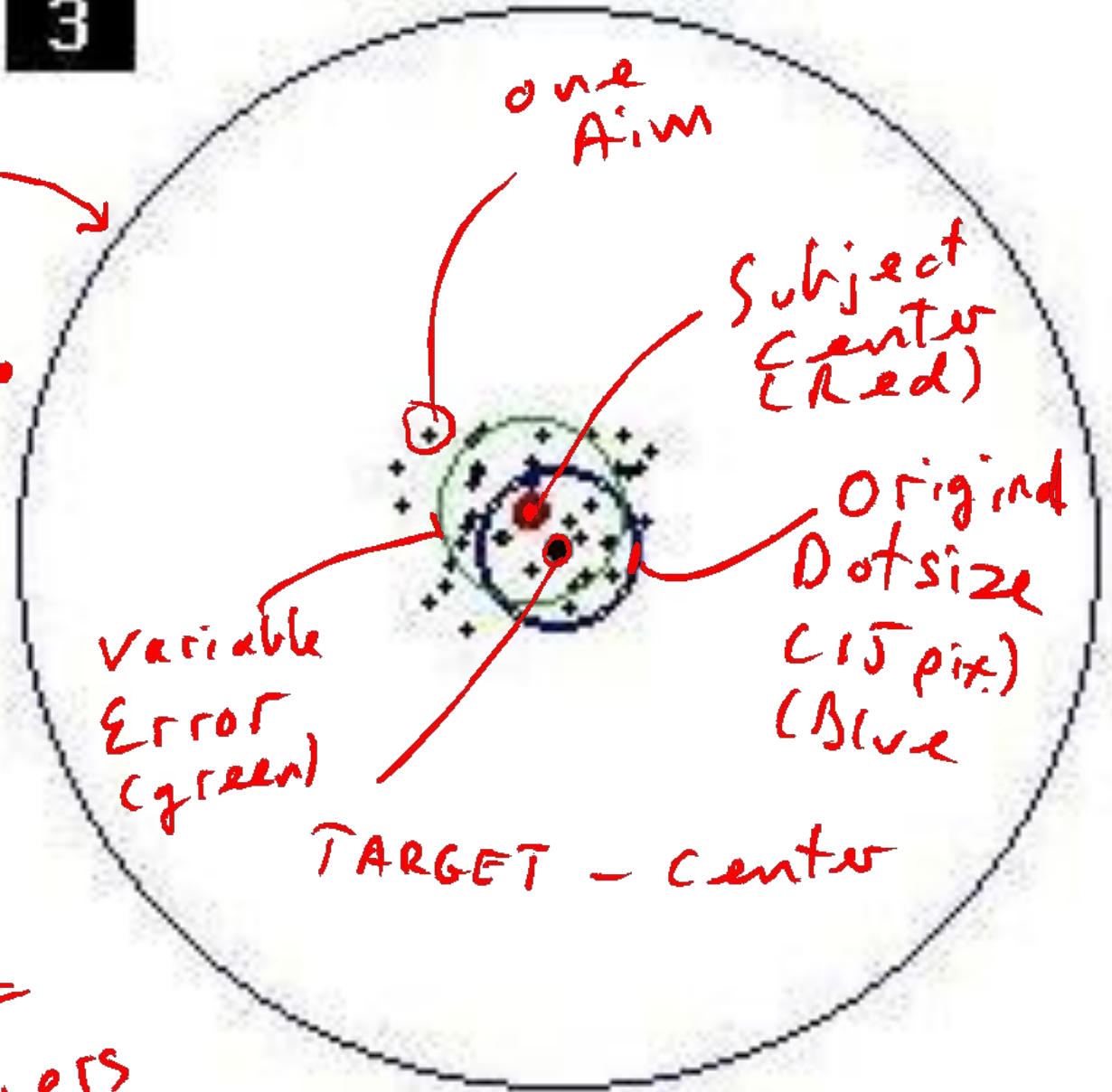
- The following slide shows a blown up version of the an individual session to better highlight the various feature of the display.
- The next three slides show all the data for 3 subjects.
- For all subjects, Variable Error clearly increases when the distracters are introduced in Session 6
- Some subjects show clear examples of Constant Error (a consistent bias in one direction from session to session)

3

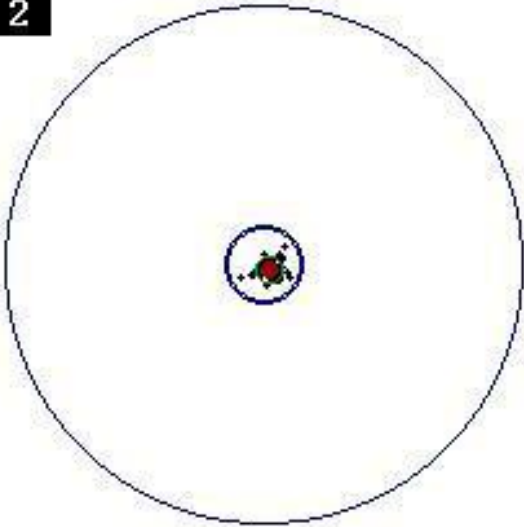
Blown Up

RADIUS  
100  
PIXELS

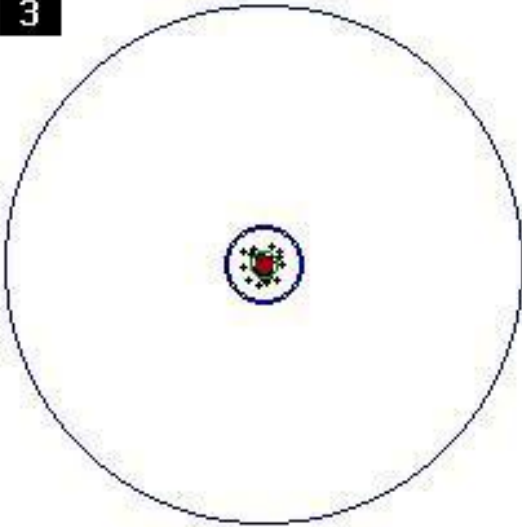
dots  
more  
than  
100 pixels  
from the  
Target =  
OUTLIERS



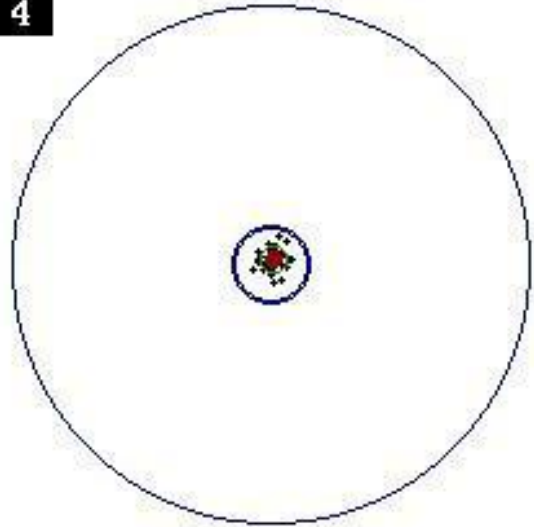
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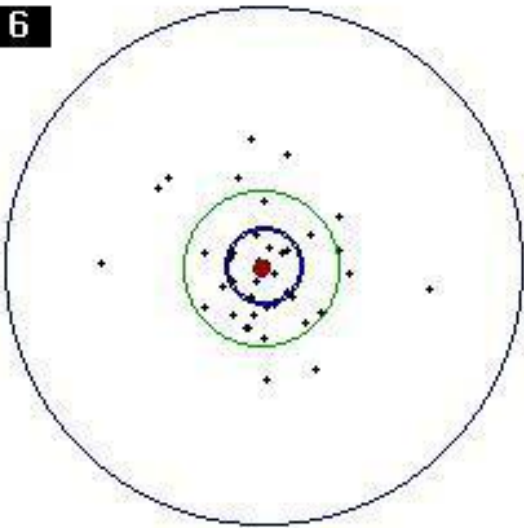
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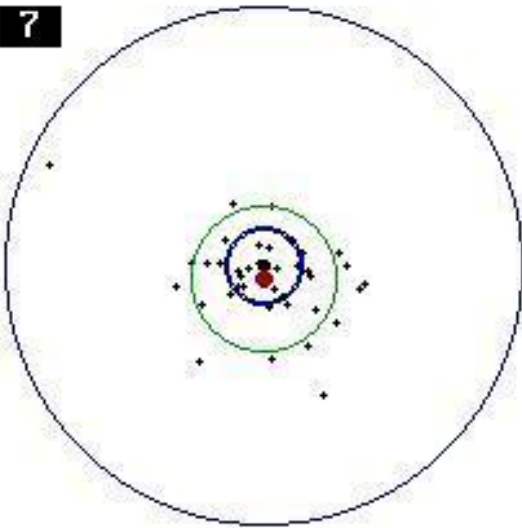
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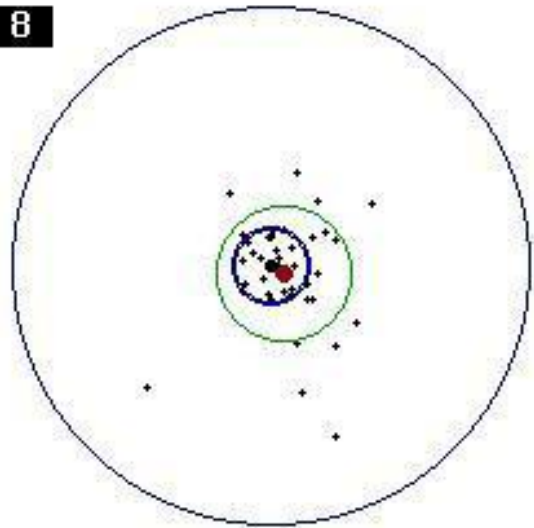
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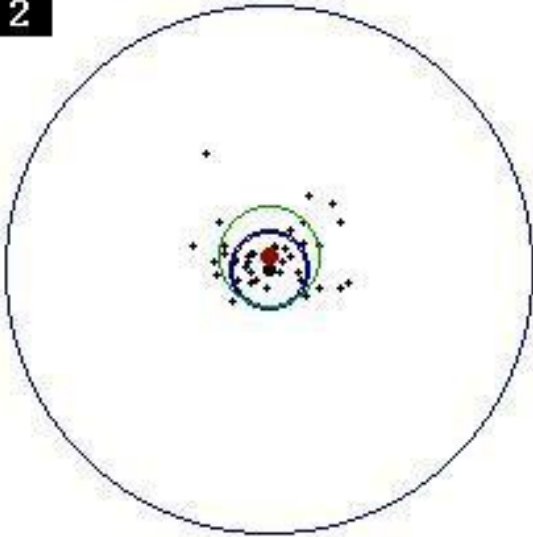
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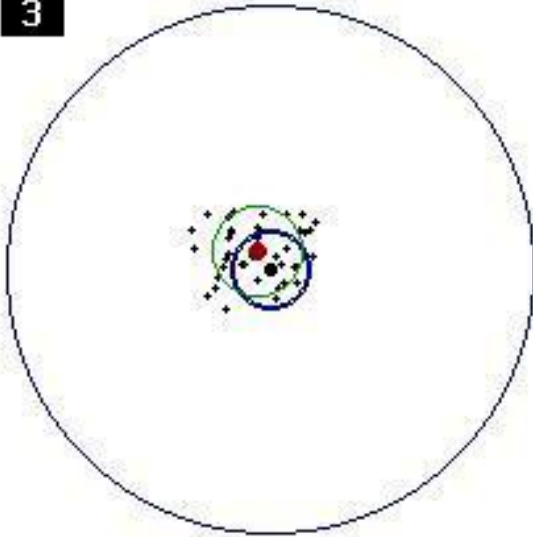
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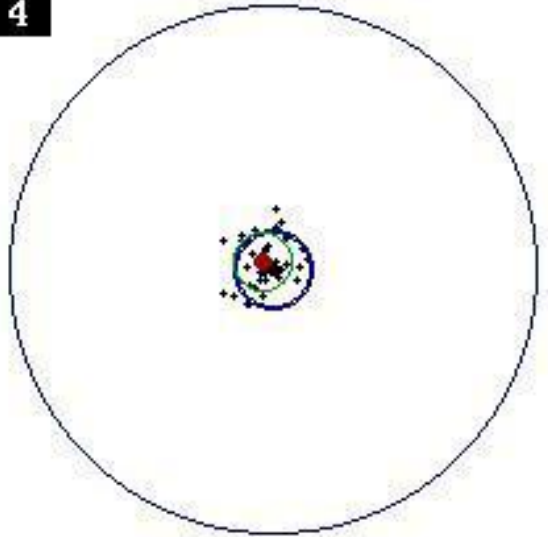
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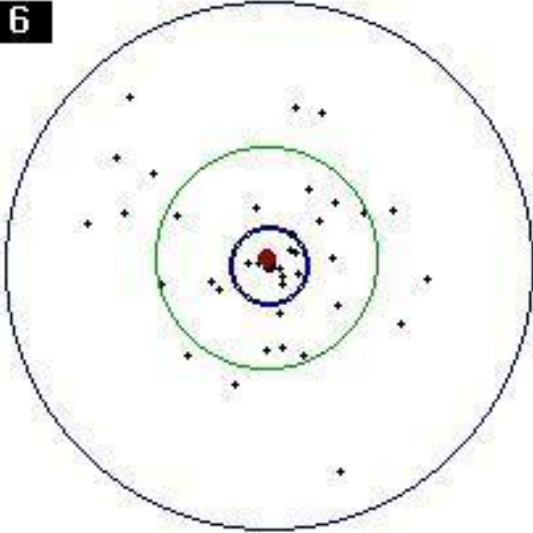
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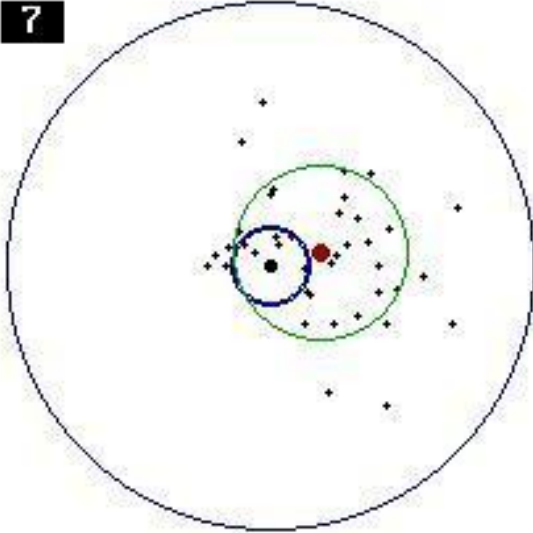
4



6



7



End