technical proof technical proof

TP A.21
Comparison of bisector-point and double-angle-bisect draw systems

supporting:
"The Illustrated Principles of Pool and Billiards"
http://billiards.colostate.edu
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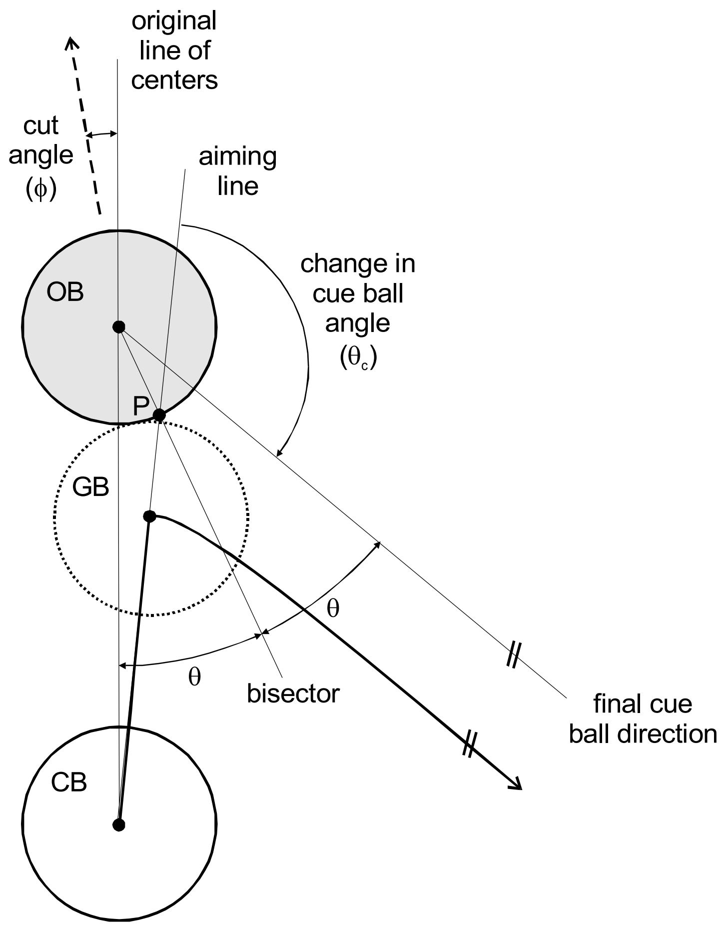
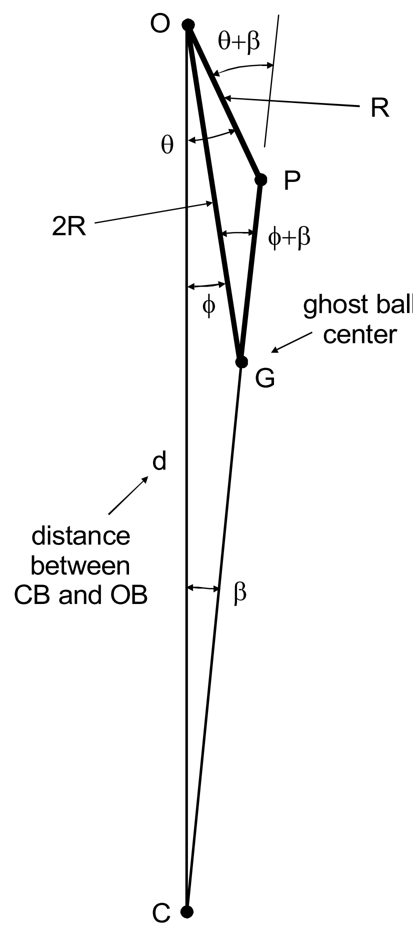




ball radius: $R := 1.125 \cdot in$

Note - the change in cue ball angle θ_c (e.g., see TP A.20) is related to the bisector angle θ according to:

$$\theta_c = 180 \cdot deg - 2 \cdot \theta - \beta$$

From the triangle formed by C, P, and the perpendicular from P to OC,

$$\tan(\beta) = \frac{R \cdot \sin(\theta)}{d - R \cdot \cos(\theta)}$$

$$\beta(\theta, d) := \text{atan2}(d - R \cdot \cos(\theta), R \cdot \sin(\theta))$$

Applying the law of sines to triangle OGP gives:

$$\frac{\sin[180 \cdot \deg - (\theta + \beta)]}{2 \cdot R} = \frac{\sin(\phi + \beta)}{R}$$

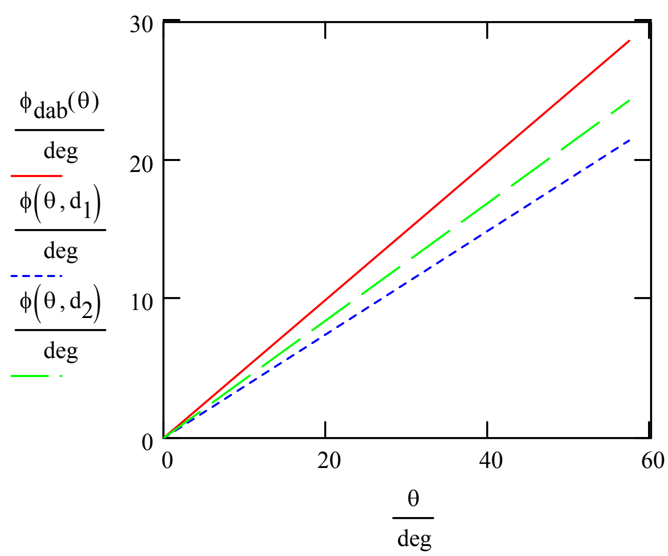
$$\phi(\theta, d) := \text{asin}\left(\frac{\sin(\theta + \beta(\theta, d))}{2}\right) - \beta(\theta, d)$$

The double-angle-bisect system (see Bob Jewett's October, 1995 BD article) predicts:

$$\phi_{dab}(\theta) := \frac{\theta}{2}$$

Here's how the methods compare for two different CB-OB distances:

$d_1 := 1 \cdot ft$ $\quad$ $d_2 := 6 \cdot ft$ $\quad$ $\theta := 0 \cdot \deg .. 60 \cdot \deg$



So the two systems agree fairly well for small cut angle shots. There is more disagrement at bigger cut angles, especially when the distance between the CB and OB is large.