

# A Novel Method for Measuring Cobb Angles

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Christopher Kestner, MD

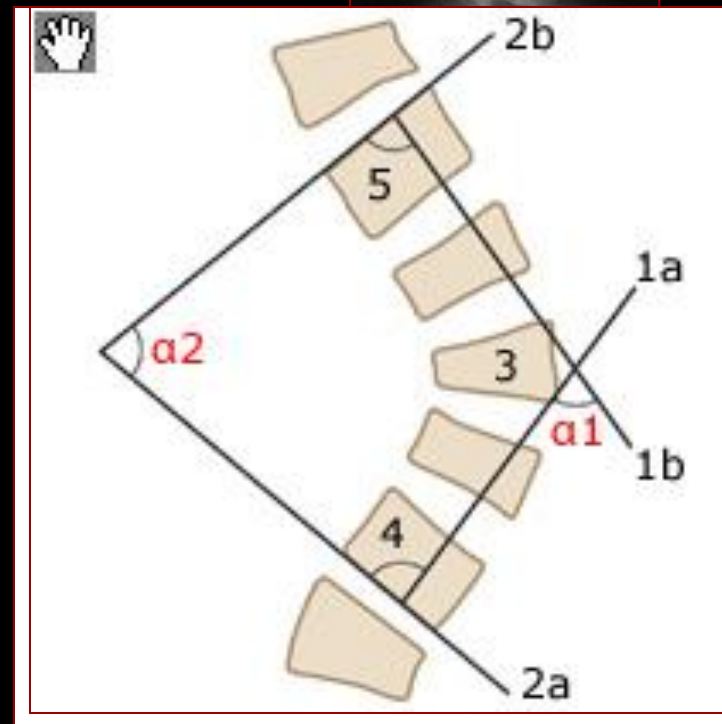
Patrick Cahill, MD

James Reed, PhD



# Introduction

- Cobb angles: used to measure degree of curvature in scoliosis
  - Measure from vertebral endplates above and below the peak of the curve
- Goniometer
- Computer angle measuring device
- Error: 3-5 degrees



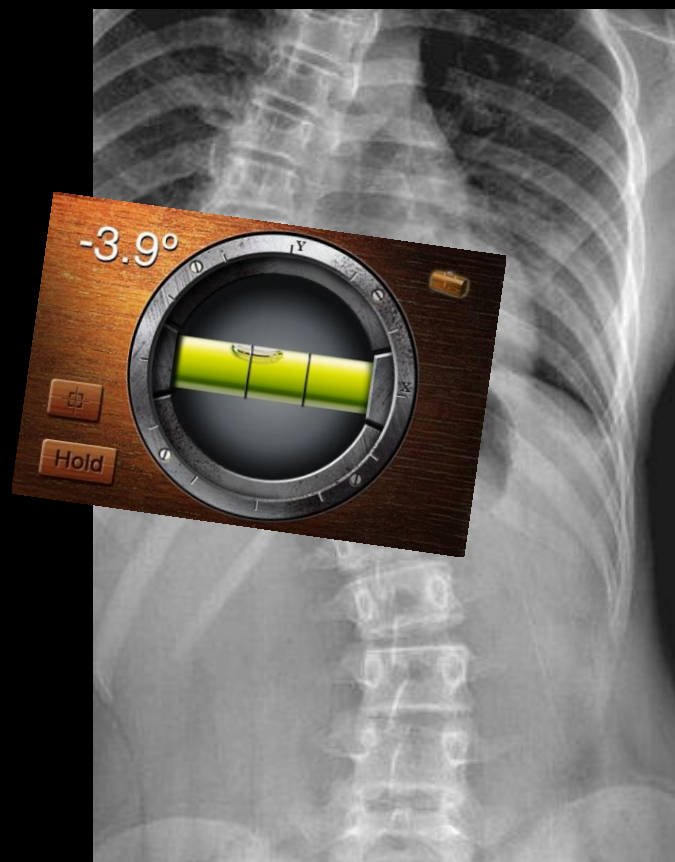
# Introduction

- iPhone accelerometer measurement as a reference
- This device allows angle measurement on Xrays.
- Hypothesis: measuring cobb angles with the iPhone will give equal or improved accuracy, interobserver and intraobserver reliability.



# Methods

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# Methods

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- Six examiners: resident, fellow and attending level.
- Measured variable cobb angles on 20 hard copy X-rays with goniometer, then iphone.
- Measured 20 cobb angles from digital X-rays using the computer angle measuring tool, and repeated using the iphone.
- All measurements were repeated two weeks later.
- All X-rays were randomly ordered to prevent bias.
- Measurements were taken from pre-selected vertebral endplates.
- Statistical analysis performed to investigate accuracy, intraobserver reliability and interobserver reliability.



# Results

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Table 1: Mean Cobb angle measurements (Mean +/- Standard Deviation)

	Goniometer	iPhone	Difference (95% CI)
Cobb angle	40.9 ± 21.7	41.2 ± 21.7	0.39 ± 2.65 (0.05 – 0.73)
	Computer	iPhone	Difference (95% CI)
Cobb angle	30.6 ± 17.1	31.1 ± 16.9	0.44 ± 4.8 (0.19 – 1.08)



# Results

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Table 2: Intraclass Correlation Coefficient

	Goniometer/iphone	Computer/iphone
Intrarater ICC	0.997 (0.986 – 0.992)	0.960 (0.947-0.971)
Interrater ICC	0.993 (0.990 – 0.994)	0.961 (0.949-0.970)



# Discussion

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- Accuracy of iphone angle measurement app is within the +/- 3-5 degrees variability for measuring cobb angles.
- The inter and intrarobserver reliability is excellent.
- This iphone app is a reliable alternative for measuring cobb angles
- Potentially could be used for measuring any angle on an X-ray
- Sources of Error: More measurements





# References

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# Thank You!

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