Validation of True Spine Length Radiographic Measurements

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INTRODUCTION

- Diminishing returns effect for T1-S1 height lengthenings for EOS
- Lengthening of spine still occurs
  - Growth out of Coronal Plane
  - Increased Thoracic Kyphosis

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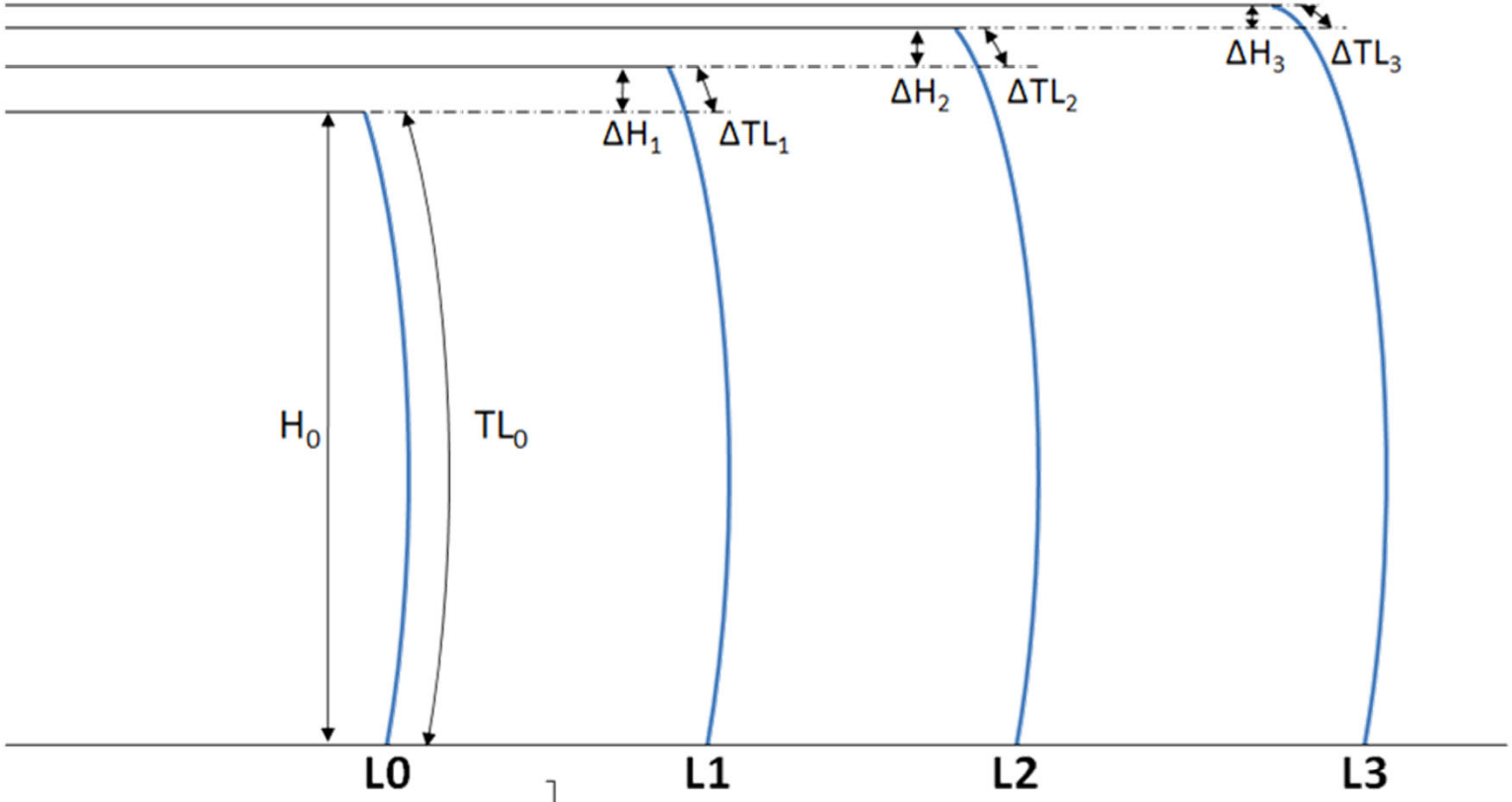
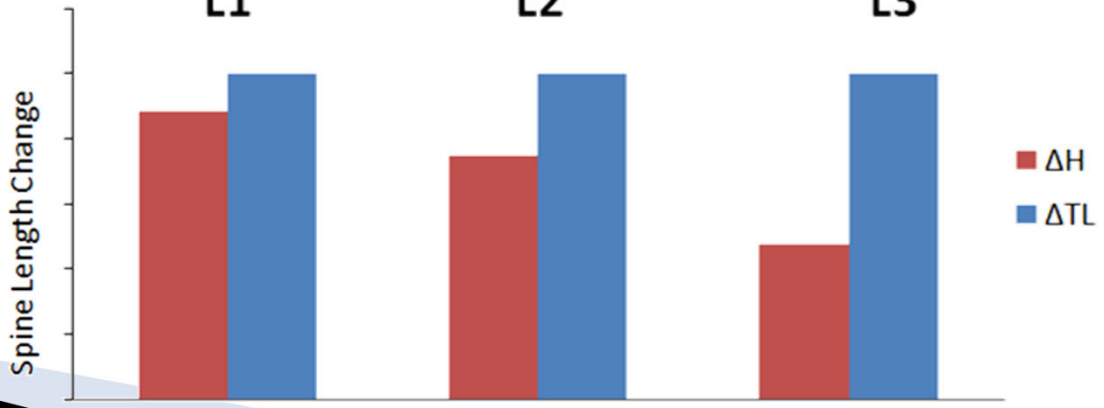
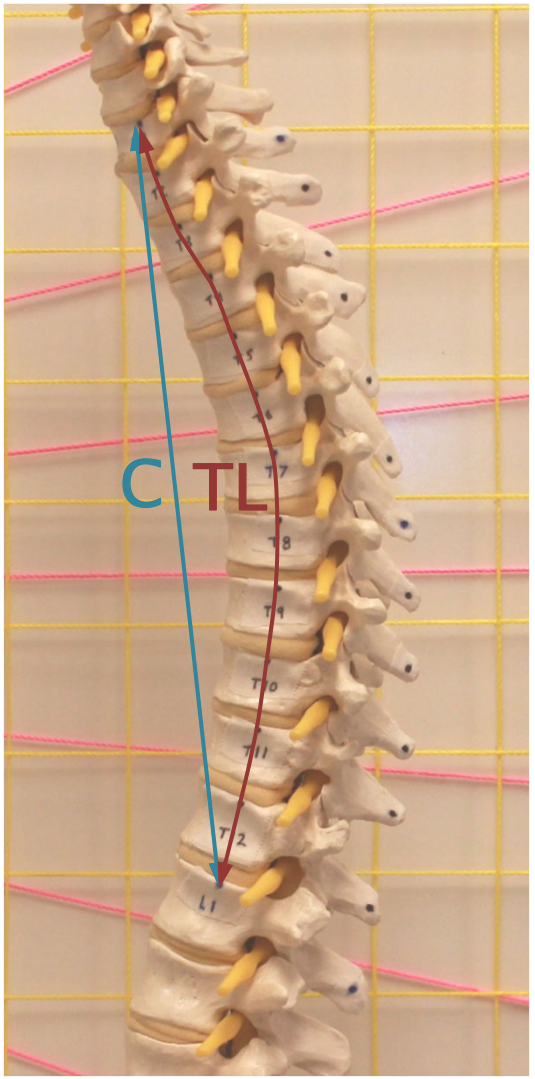
DIMINISHING RETURNS





Methodology – Phantom Model

- 6 Phantom Spine Alignments
  - 0º to 75º at 15º intervals
- Measured:
  - True Length (TL)
  - Chord Length (C)
- One reviewer for physical measurements
- Two reviewers for photographic measurements



Results – Phantom Model

- Average error between photographic measurement and physical measurement
  - 1.81mm (0.06 to 4.42mm)
- Average measurement error between the two observers:
  - 0.27mm (0.00 to 0.55mm)

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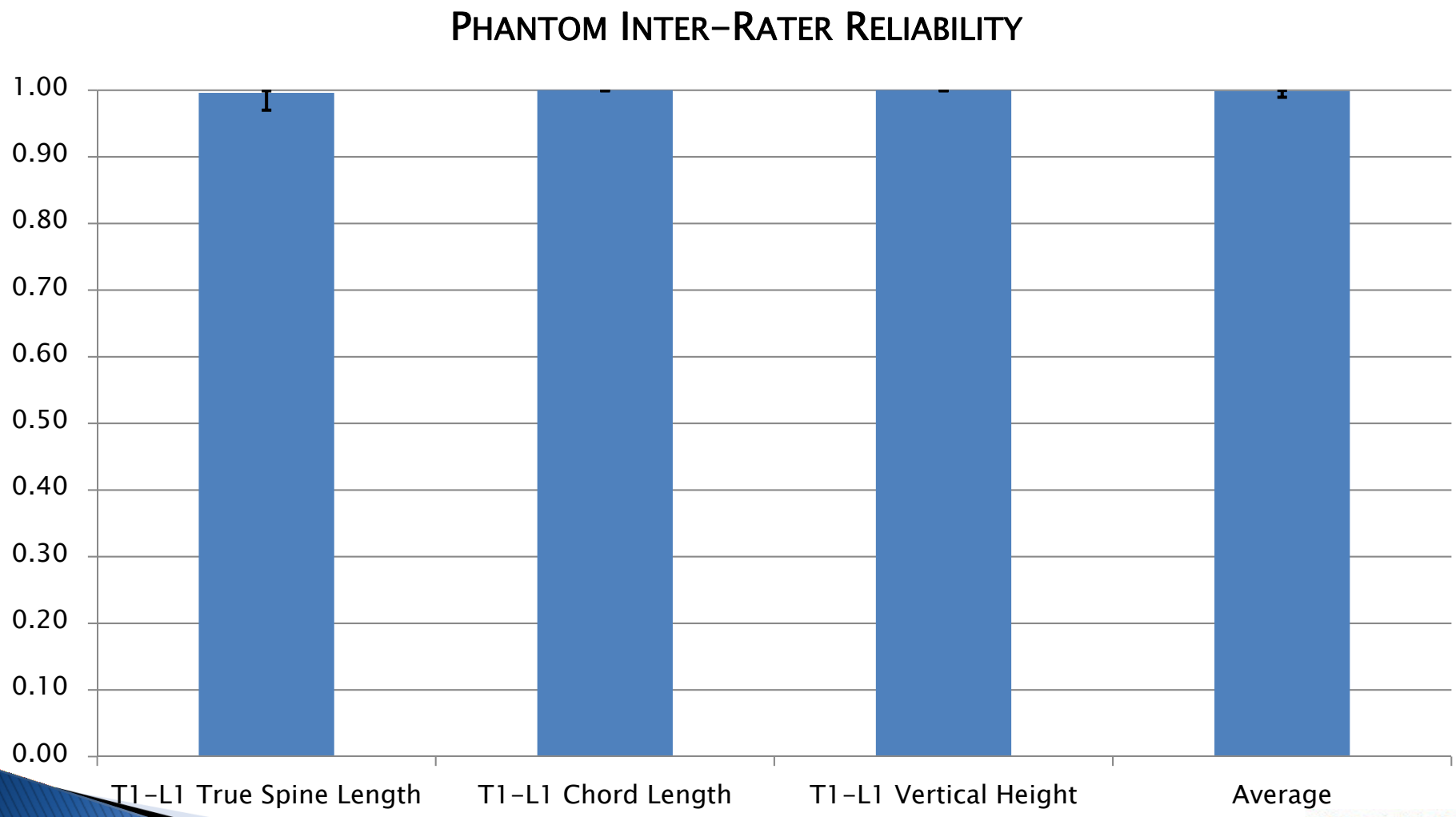
Results – Phantom Model



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Methodology – Clinical Images

Commercial Software

Coronal Measurements

- T1–L1 Height
- Cobb Angle

Sagittal Measurements

- T1– L1 Height
- T1–L1 Chord
- Thoracic Kyphosis Angle

Custom Software

Coronal Measurements

- T1–L1 Height
- T1–L1 Chord Length
- *T1–L1 True Spine Length*

Sagittal Measurements

- T1– L1 Height
- T1–L1 Chord
- *T1–L1 True Spine Length*

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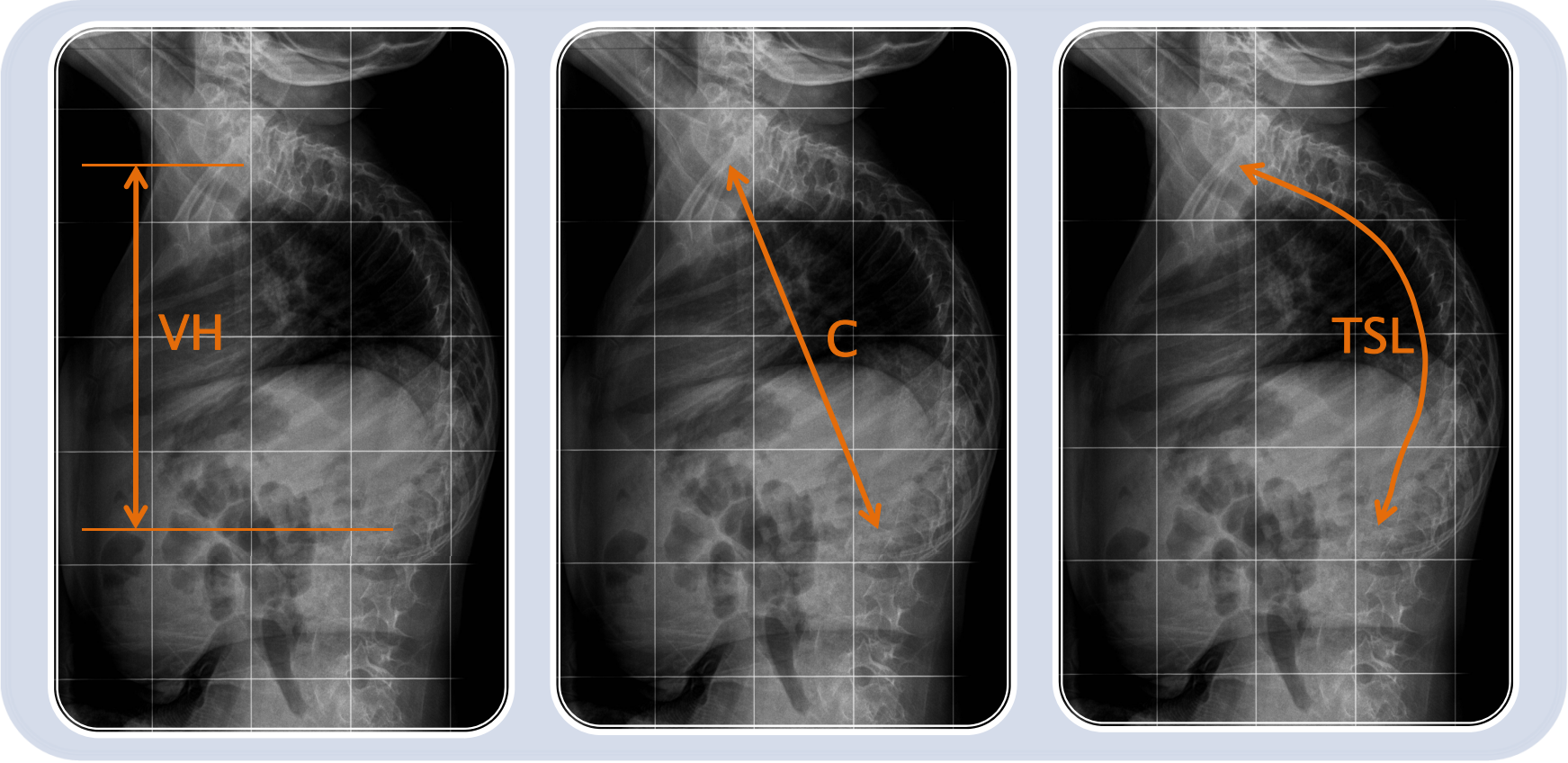
Methodology



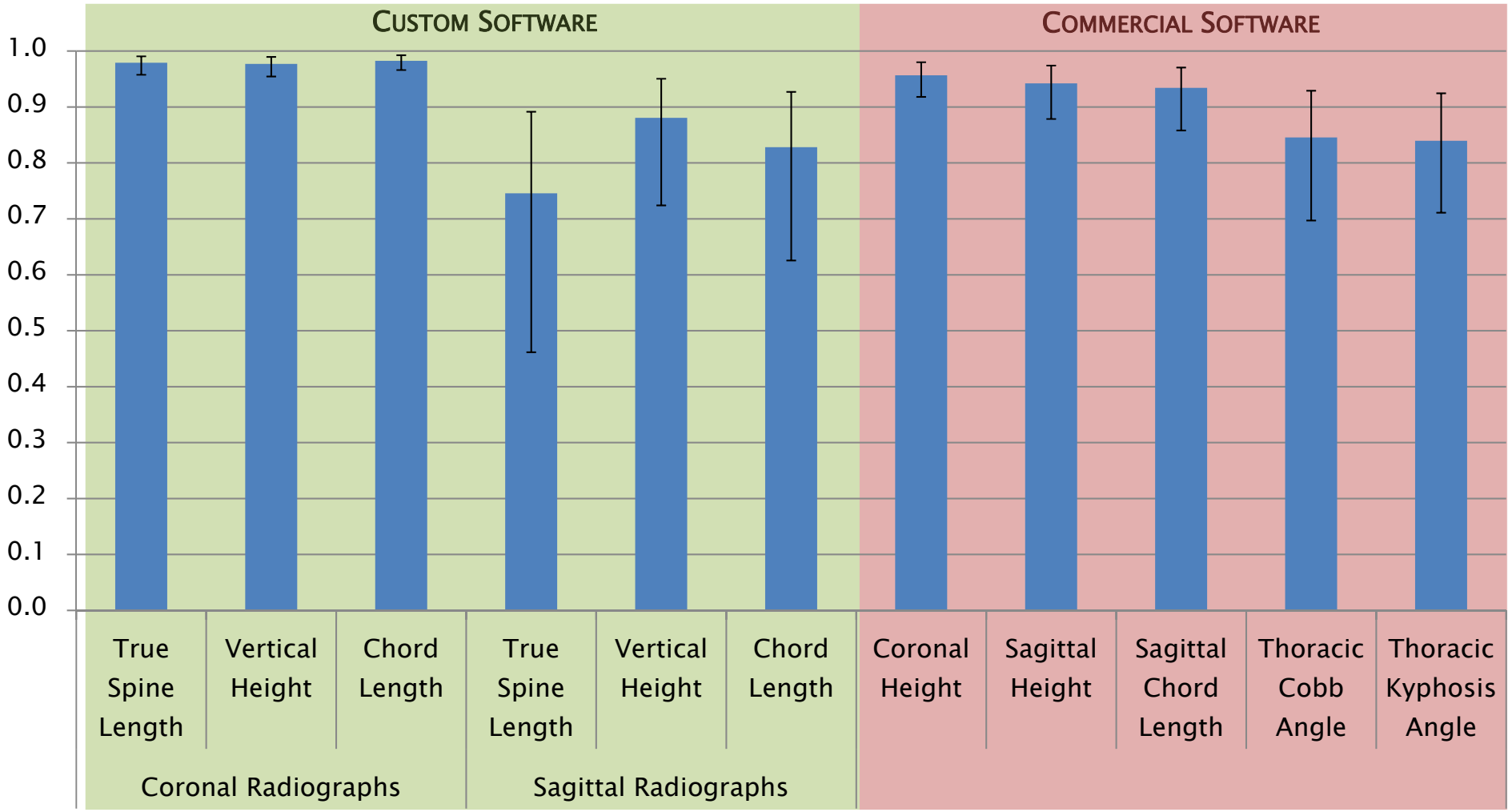
Vertical Height

Geometric Chord

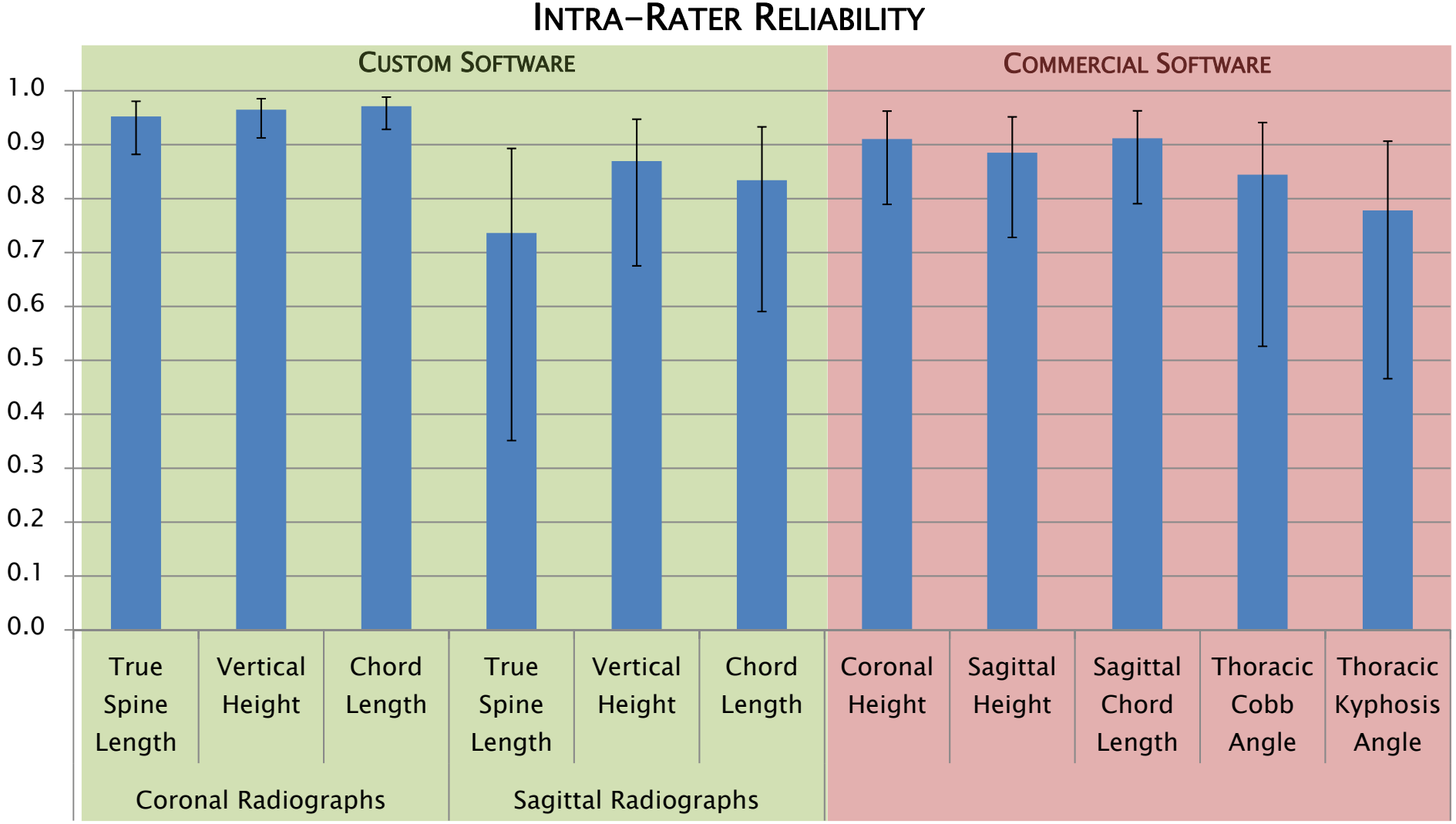
True Spine Length

Results – Clinical Images

Inter-Rater Reliability



Results – Clinical Images



Conclusion

- Image measurement of True Spine Length was shown to be accurate and repeatable in phantom assessment
- In Clinical Image Assessment:
  - Coronal Images – Very Good Agreement
  - Sagittal Images – Moderate Agreement
- No Statistical Differences found between the Custom and Commercial software measurements

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Thank You