

Characterization of the Dunning-Kruger Effect in Thoracic Radiology

Matthew Granzotto¹, Ali Beydoun², Kiran Nandalur³, Sayf Al-Katib³

¹Oakland University William Beaumont School of Medicine

²Diagnostic Radiology, University of Michigan Medical Center

³Diagnostic Radiology, Corewell Health William Beaumont University Hospital

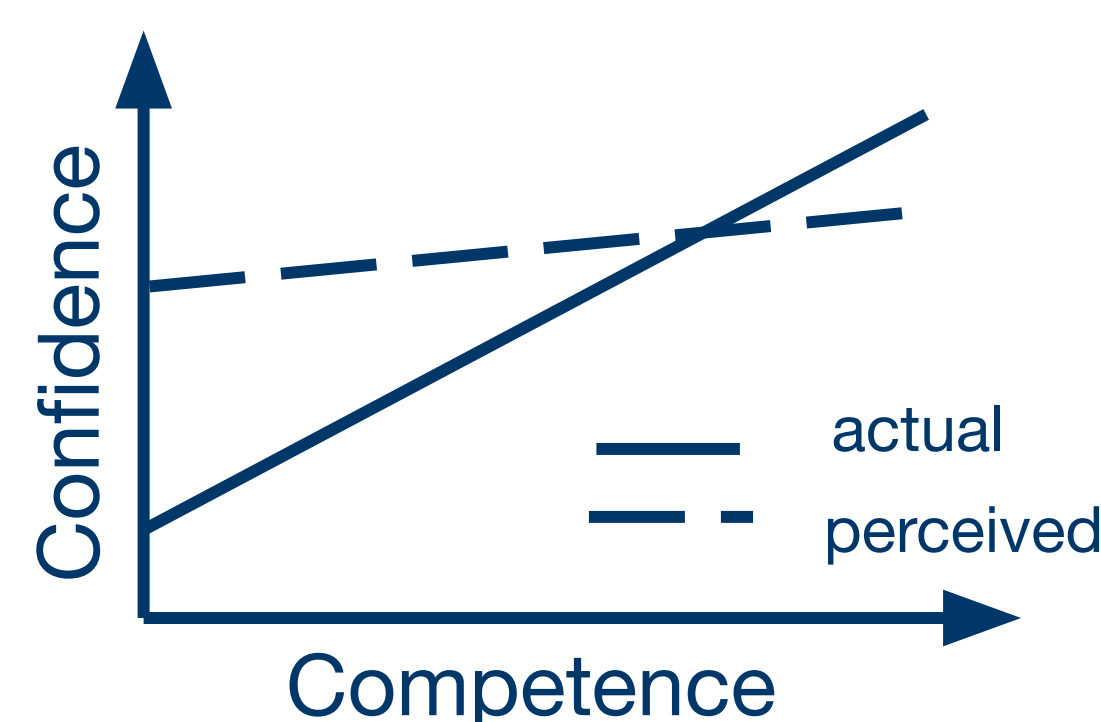
Introduction

Calibration in Diagnostic Training

- Diagnostic training requires alignment between confidence and competence (calibration)
- Miscalibration may result in overconfidence (risking diagnostic error, cognitive bias, excess healthcare costs) or underconfidence (delayed autonomy, inefficient training)¹

The Dunning-Kruger Effect

- The tendency of low-competence individuals to overestimate ability, and vice versa²
- Demonstrated across cognitive domains and among physicians broadly³
- Suggested in prior chest radiograph studies, whereby low-performing radiologists reported confidence comparable to high performers⁴



Knowledge Gap in Thoracic Radiology

- The Dunning-Kruger effect in radiology remains unclear
- The influence of factors on calibration remains uncharacterized

Aims and Objectives

- To **verify** the presence of the Dunning-Kruger effect in thoracic radiology
- To **graphically** characterize confidence against objective performance
- To **identify** factors associated with calibration accuracy, including
 - training level
 - CT volume per month
 - tumor board participation
 - gender
- To evaluate the **impact of feedback** on confidence-competence alignment

Methods

Overall Design

- Cross-sectional assessment of confidence and competence in thoracic CT interpretation

Inclusion Criteria

- Oakland University medical students
- Corewell Health University Hospital radiology residents and attending radiologists
- 59 responses (26 MS, 14 R, 18 A)

Measures

- Competence:** number of cases correctly identified as benign or malignant from 6 de-identified thoracic CT lung pathologies varying in difficulty and randomized, accessed via Pacsbin
- Confidence:** estimated score and perceived percentile relative to all participants taken pretest, posttest, and post-feedback (score report)
- Influencing Factors:** training level, CT scans reviewed per month (0, 1–10, >10), tumor board participation, and gender

Results

The Dunning-Kruger Effect Exists in Thoracic Radiology

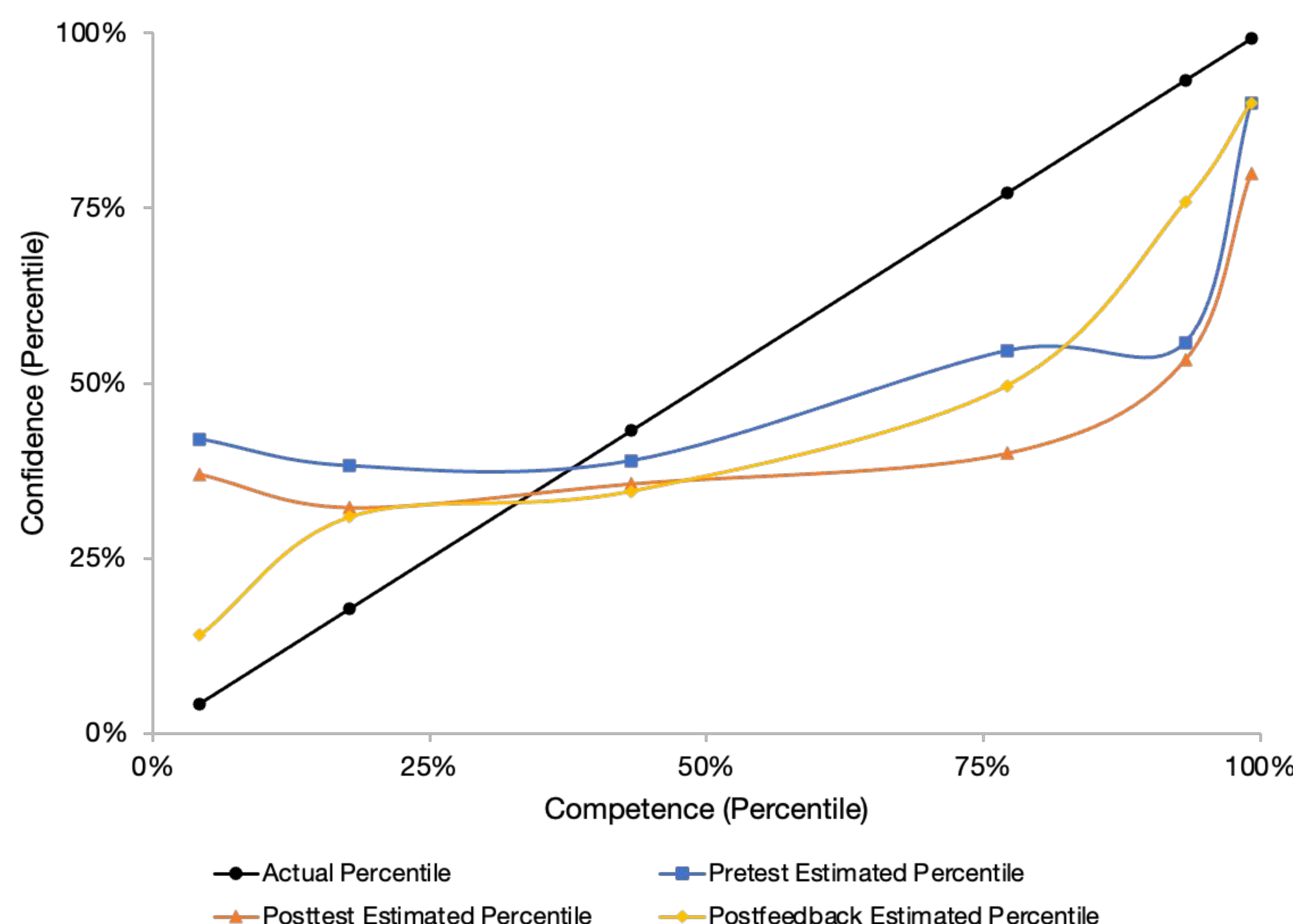
- Low performers (≤ 2 correct; $n=16$) overestimated their ability by 1.0 ± 1.7 cases, whereas high performers underestimated (-2.1 ± 1.6 cases; $p=0.001$) and high performers (≥ 5 correct; $n=7$)

Post-Assessment Feedback may be Valuable

- Feedback improved participants' improved low performer's initial average overconfidence ($25.8\% \pm 30.2\%$ to $12.1\% \pm 22.3\%$) and high performer's underconfidence ($-33.4\% \pm 28.3\%$ to $-16.2\% \pm 11.0\%$), although these findings did not achieve statistical significance ($p=0.154$ and 0.175 , respectively)

Attending Predicted their Proficiency Well

- Of all influencing factors tested, the only stratified group to achieve significant Kendall Tau-b correlation between pre-test confidence and performance was among attending radiologists ($p=0.022$)



Conclusions

- Among medical trainees, residents, and attendings, **low performers overestimate and high performers underestimate** their abilities, consistent with a Dunning-Kruger effect
- Post-assessment feedback** (score reports) improved alignment between confidence and competence, especially for low performers
- This research provides a framework for investigating miscalibration in other diagnostic specialties, with potential to **reduce errors, improve training efficiency, and mitigate healthcare costs**
- Limitations include small number of patient cases (6), limited participation, and potential self-selection bias
- Future directions: explore AI-assisted diagnostic interpretation, which may lack human metacognitive abilities, and assess whether feedback or structured training can improve calibration

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Acknowledgements

The author would like to thank Dr. Al-Katib for his invaluable mentorship and guidance. Gratitude is extended to Dr. Tracy-Wunderlich Barillas and the Institutional Review Board of Corewell Health for their assistance in approving the project.