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Language Adaptation and Metacognition in Non-Native-English-Speaking STEM Teaching Assistants

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Slide 2

Research Questions

- To what extent does ITAs' *language proficiency* develop over time in the U.S.?
- Does ITAs' *confidence* in their skills matter?
- Does it matter whether they aware of their language proficiency? (*metacognition*)
- What factors are associated with high English proficiency?

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Slide 3

Versant test

Four sub-scales are combined into a weighted score:

- Sentence mastery } Content
- Vocabulary
- Pronunciation } Intelligibility
- Fluency

} <u>Versant</u>

<u>Versant</u> = *Sentence + Vocabulary + Pronunciation + Fluency*

<u>Versant Intelligibility</u> = *Pronunciation + Fluency*

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Key Repeated Measures

5 TIME POINTS over ~2 years:

|------------------|------------------|---------------------|-----------------|
Arrival on   End of   End of   End of   End of
campus   Fall Y1   Spr Y1   Fall Y2   Spr Y2

Versant Score ⟷ Confidence in Own Communication Skills

Versant sentence mastery	⟷	Confidence in grammar
Versant vocabulary	⟷	Confidence in own vocabulary
Versant pronunciation	⟷	Perception of own English accent
Versant fluency	⟷	Confidence in presenting research

METACOGNITION variables:

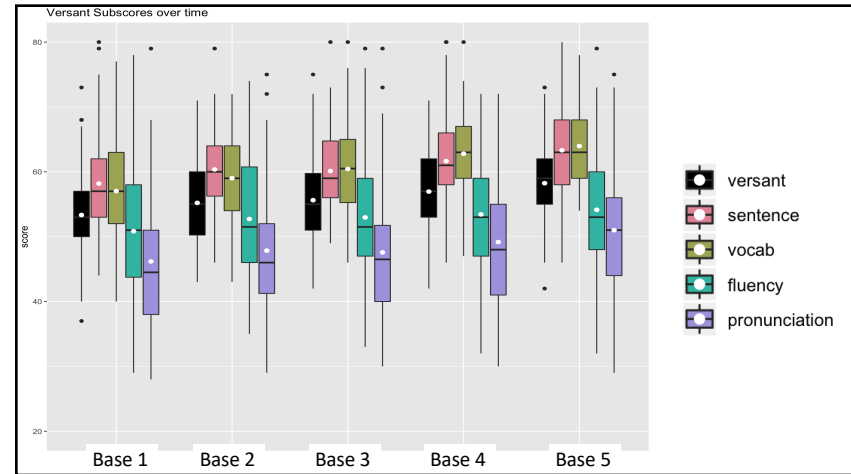Accuracy in estimating own proficiency ($Z_{Confidence}$ minus $Z_{Versant}$)

Direction of error: +Over-confidence vs. -under-confidence

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Q1: How did ITAs do on the Versant test over time?

- Versant Overall Score
- Sentence
- Vocabulary
- Fluency
- Pronunciation

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Versant Subscores over time

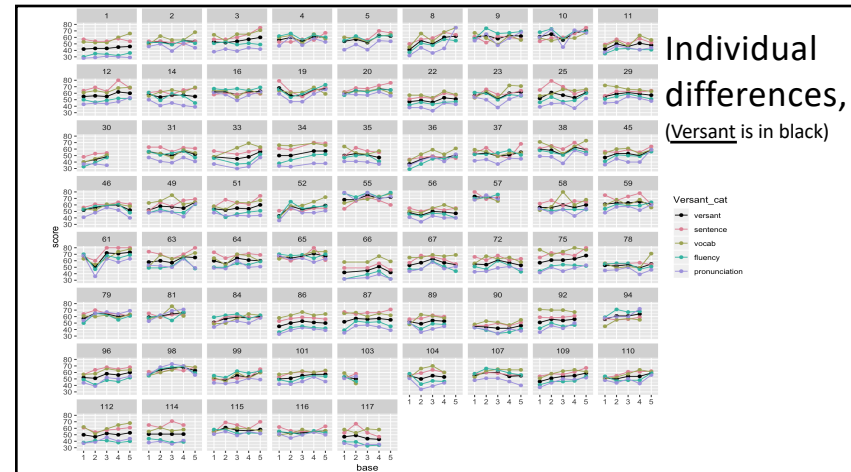6

Versant Scores

- Versant scores increased over time
- Pronunciation and Fluency scores were noticeably lower than Sentence and Vocabulary scores.
- Pronunciation scores were lowest of all
    - → This is the so-called "ITA (intelligibility) problem"
- This pattern was remarkably consistent, despite individual differences

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Individual differences,

(Versant is in black)

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Q2: How do ITAs' self-report of confidence level in English skills change over time?

- Confidence in grammar (confgrammar)
- Confidence in vocabulary (confvocab)
- Confidence in oral presentation in English (confpresent)
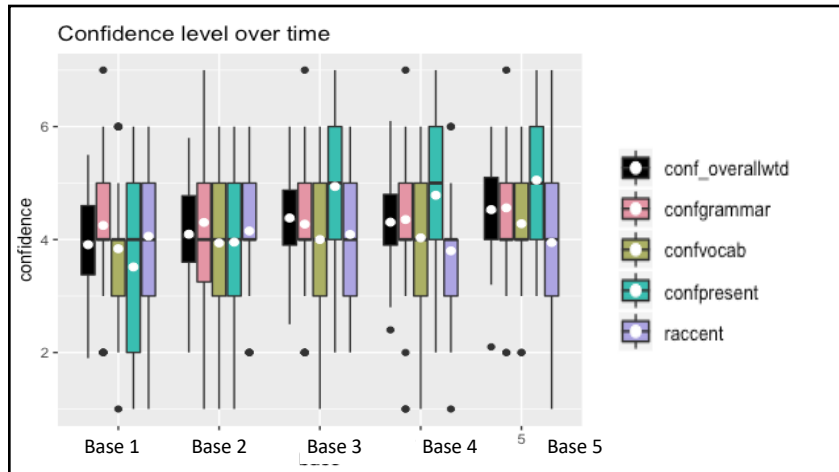- Confidence in pronunciation (raccent)

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Q2: How do ITAs' self-report of confidence level in English skills change over time?
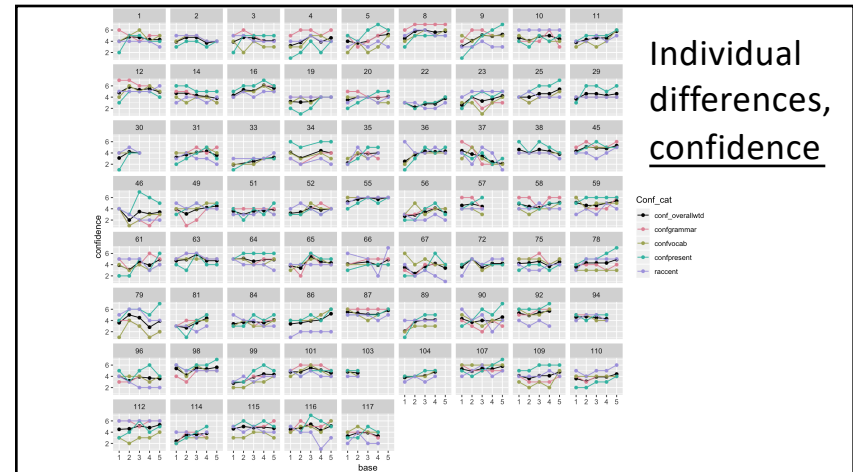
- Confidence in grammar (confgrammar) – *stays the same*
- Confidence in vocabulary (confvocab) – *goes down slightly*
- Confidence in oral presentation in English (confpresent) – *goes up (Time 3)*
- Confidence in pronunciation (raccent) – *goes down slightly*

→Versant scores and Confidence ratings pattern differently over time.

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Individual differences, <u>confidence</u>

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Q3: How is improvement in Versant related to metacognition?

- Is it better to be *overconfident*, *underconfident* or *accurate* about one's own performance?

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Difference between Confidence and Versant

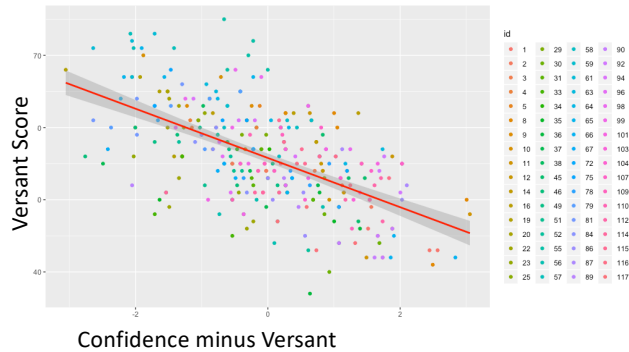Scores and ratings transformed to Z scores so they can be combined
- Overall confidence minus Versant score
- Confidence in grammar minus Sentence subscore
- Confidence in vocabulary minus Vocabulary subscore
- Confidence in oral presentation minus Fluency subscore
- Rating of their accentedness minus Pronunciation subscore

→ Metacognition
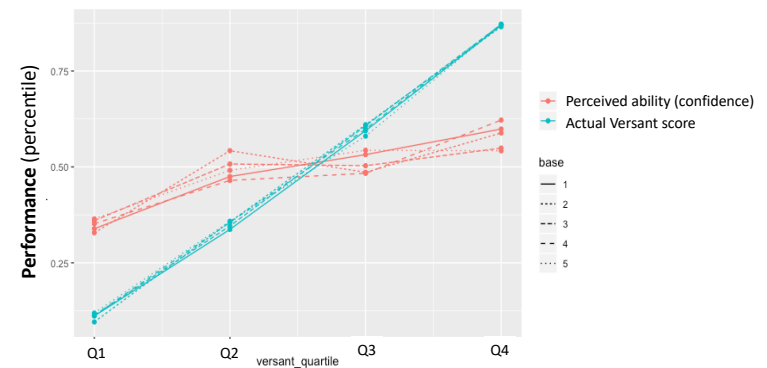   Negative = *underconfident*; positive = *overconfident*; 0 = *accurate*

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The more overconfident, the lower the Versant score

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Individual ITAs' Performance X Confidence

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What is going on here?
Can this be explained by the Dunning-Kruger Effect?

"Incompetent people lack the metacognitive skills that enable them to tell how poorly they are performing."
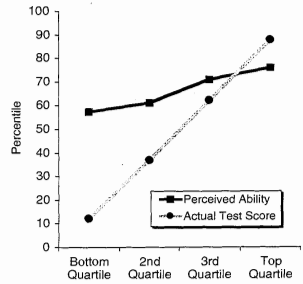

Figure 1. Perceived ability to recognize humor as a function of actual test performance (Study 1).

Kruger & Dunning, 1999)

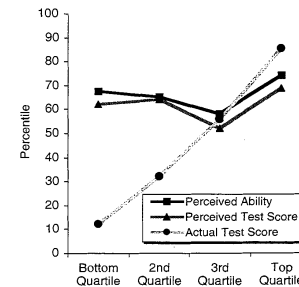17

The Dunning-Kruger Effect

Figure 2. Perceived logical reasoning ability and test performance as a function of actual test performance (Study 2).
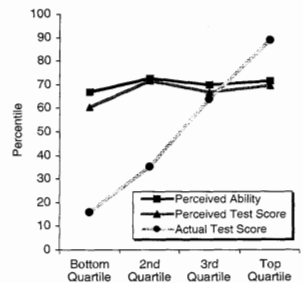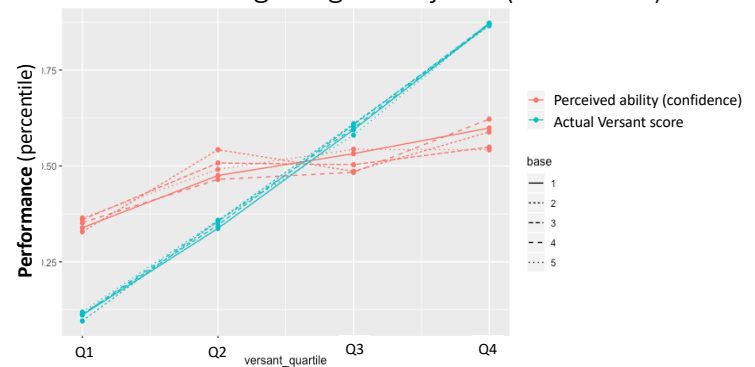
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The Dunning-Kruger Effect

Figure 3. Perceived grammar ability and test performance as a function of actual test performance (Study 3).

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More of our ITAs were underconfident than were the Dunning-Kruger subjects (at 5 times)

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Misinterpreting Dunning-Kruger

Recently, D-K has been used to explain the behavior of certain public figures ("the incompetent are blind to the truth").

However, later work emphasizes that it's true of humans generally; could be domain-dependent and due in part to wishful thinking.

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Misinterpreting Dunning-Kruger

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https://metv.com/stories/12-times-goofus-from-goofus-gallant-was-the-absolute-worst   Page 2 of 16
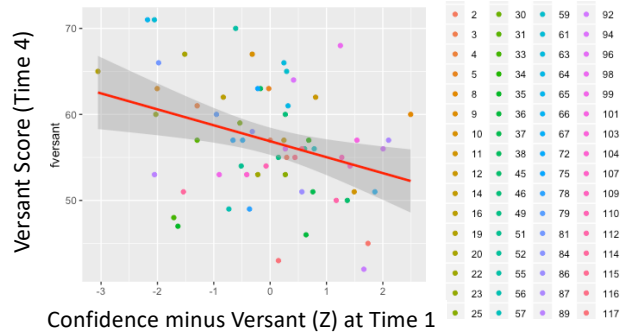
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Q4: Is Confidence minus Versant at Base Time 1 related to Versant after 2 years?

- We analyzed Base 4, as Base 5 is not finished yet.
- We tested whether Confidence minus Versant at Base 1 is correlated with Versant at Base 4.

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Q4: Is Confidence minus Versant at Base Time 1 related to Versant after 2 years?

Versant Score (Time 4) vs. Confidence minus Versant (Z) at Time 1

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Q4: Is Confidence minus Versant at Base Time 1 related to Versant after 2 years?

- We analyzed Base 4, as Base 5 is not finished yet.
- We tested whether Confidence minus Versant at Base 1 is correlated with Versant at Base 4.

→ ITAs perform more poorly (Versant, Base 4) when they are overconfident at the beginning than when they underconfident.

While this is consistent with a motivational explanation, we can't claim anything about causality until we do a path analysis.

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Thank you!

(to all of our collaborators and RAs
on the incredibly hard-working
ITA Project Team,
as well as to the 68 subjects
who showed up *over* and *over*
and *over* and *over* again!!)