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

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This material is based upon work supported by NSF under Grant #1855-1519908.

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 are aware of their language proficiency? (metacognition)
• What factors are associated with high English proficiency?

Versant test

Four sub-scales are combined into a weighted score:

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

} Intelligibility

Versant = Sentence + Vocabulary + Pronunciation + Fluency

Versant Intelligibility = Pronunciation + Fluency

Key Repeated Measures

5 TIME POINTS over ~2 years:

<table>
<thead>
<tr>
<th>arrival on campus</th>
<th>End of Fall Y1</th>
<th>End of Spr Y1</th>
<th>End of Fall Y2</th>
<th>End of Spr Y2</th>
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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 (ZConfidence minus ZVersant)
Direction of error: +Over-confidence vs. -Under-confidence
Q1: How did ITAs do on the Versant test over time?

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

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
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)

→ Versant scores and Confidence ratings pattern differently over time.
Q3: How is improvement in Versant related to metacognition?

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

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
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."

The Dunning-Kruger Effect

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

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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⇒ 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.

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!!)