# The Relationship of the Complexity of Reasoning in Students, and Their Outcomes in Graduate School

Amy Cheng Yee Au
Social Work MSW '13

Patrice Marie Miller
Department of Psychology

# Introduction

➢ Miller et al. (2011) found that graduate students' admissions essays

  ➢ Could be coded for their complexity of thinking

➢ Such complexity may be related to:

  ➢ How well students perform in graduate school

  ➢ How well they perform as professionals, post-graduation

  ➢ And may also be used as part of evaluation for admission

# Introduction - 2

➢ Understanding the role of complexity in teaching and learning may also be used in a supportive fashion

   ➢ To intervene with students to improve their performance in graduate school and beyond

➢ Coding narratives, however, is very labor intensive

➢ Another way to study complexity is with a structured problem

# Hierarchical Complexity

➢ The Model of Hierarchical Complexity has been used extensively to study:

  ➢ How reasoning differs in people of different ages and different educational backgrounds

  ➢ It proposes 16 orders of complexity

  ➢ An order characterizes the complexity of a task

  ➢ More complex actions are built out of 2 or more less complex actions

# Hierarchical Complexity & Stage

➢ If a person can solve a task at a certain order of complexity, for example, order 8

   ➢ Then, we say they are performing at Stage 8

➢ With adults, seven of the stages (and orders of complexity) are relevant:

| 6 | Preoperational | 10 | Formal |
|---|---|---|---|
| 7 | Primary | 11 | Systematic |
| 8 | Concrete | 12 | Metasystematic |
| 9 | Abstract | | |

# The Current Study

➢ Graduate students were presented with the Counselor-Patient Instrument

➢ The instrument consists of 7 vignettes, about 7 different counselors

➢ The counselor informs the patient about a treatment or treatments and by the end obtains the patient's consent

➢ Each counselor does this task at a different Order of Hierarchical Complexity

# Instructions

The following seven stories are set in another country. In each story, a Counselor tries to help a competent Patient to solve a given set of problems. The problems are serious. It is now time choose a treatment to improve the situation. All the Counselors care for their Patients equally. All the Counselors highly recommend and provide the same basic treatments. But, the Counselors arrive at their choice of how to help in different ways. In every case, the problems worsen and those who are affected suffer. During a general review of these bad results, each Counselor's method of choosing a treatment was looked at. Below, the Counselors give accurate accounts of their usual talk with their Patients. Read all seven accounts carefully and then answer the questions that follow each one.

# Vignettes - 1

- Counselor Bower offers a treatment that has been studied and is shown to work well. Bower shares the fact that not everyone has had a positive outcome from the treatment. Bower then reads a description of the treatment and its risks from a colleague's book. Bower points out that any treatment will have risks. Bower asks the patient if they understand the proposed treatment and its outcome possibilities. After thinking carefully, Bower's patient feels comfortable that Bower is a capable clinician. Feeling that Bower knows best, the patient prepares to undergo the treatment.

# Vignettes - 2

- Counselor Mason offers the Patient a treatment preferred by colleagues. Mason says that others who are friends use this treatment. A colleague is called in to tell the Patient again about the treatment. With great concern, Mason asks if the Patient would like to hear a person explain the treatment. Mason's Patient is told that these people had good results with that treatment. Mason instructs the Patient to support the treatment. Mason's Patient thinks seriously about what Mason has said. Feeling that Mason knows best, Mason's Patient prepares to undergo the treatment.

# Vignettes - 3

- Counselor Ellis offers a treatment which performs relatively better than others. Ellis relates the effects and side effects of each treatment including taking no action. Then Ellis asks the Patient questions about the treatments making sure the Patient understands. Ellis asks if the Patient feels comfortable making a decision with the present information. Since the Patient is satisfied, Ellis asks the Patient to think carefully before choosing a treatment. Ellis asks the Patient to think about what they have both said about the alternatives and then think about choosing. Feeling that Ellis knows best, Ellis's Patient prepares to undergo the treatment.

# How Vignettes are Rated

➢ After reading about each counselor, the participants in the study rated the counselor on a 1 to 6 scale (1 = very poor; 6 = extremely good)

➢ A representative question that would be rated is:

"Rate Counselor Bower's method of offering the plan."

# Analysis

➢ Rasch analysis was used on the ratings data

➢ Rasch analysis takes the ratings of each vignette on a question

➢ Using a generalized linear model, it tests whether the ratings form a scale along a dimension

➢ In this case, the dimension being tested is complexity

# Rasch Map: Do the items (questions) form a scale from less to more complex?

```
MEASURE    Participants - MAP - RANK
                    <more>|<rare>
   2                      +
                          |
                          |   P7
                          |S  P1      P2
                      4   |   C7      P3      PO1     PO2     PO7
                          |   PO3
   1                   T+ |   C1      C2
                     14   |   C3
                     16   |
              12     18 S |   F7
                          |   A7
                     10   |   A1      F1      F3
   0         13   17  7 M+M   A2      A3      F2
        15  19  3   8   9 |
                          |
                      5   6 S|
              1    11  2   |
  -1                   T+ |
                          |
                          |   S3      S7
                          |S  S1
                          |   S2
  -2                      +
                          |
                          |
                          |   M7
                          |
                          |   M3
  -3                   +T |   M1      M2
                    <less>|<frequent>
```
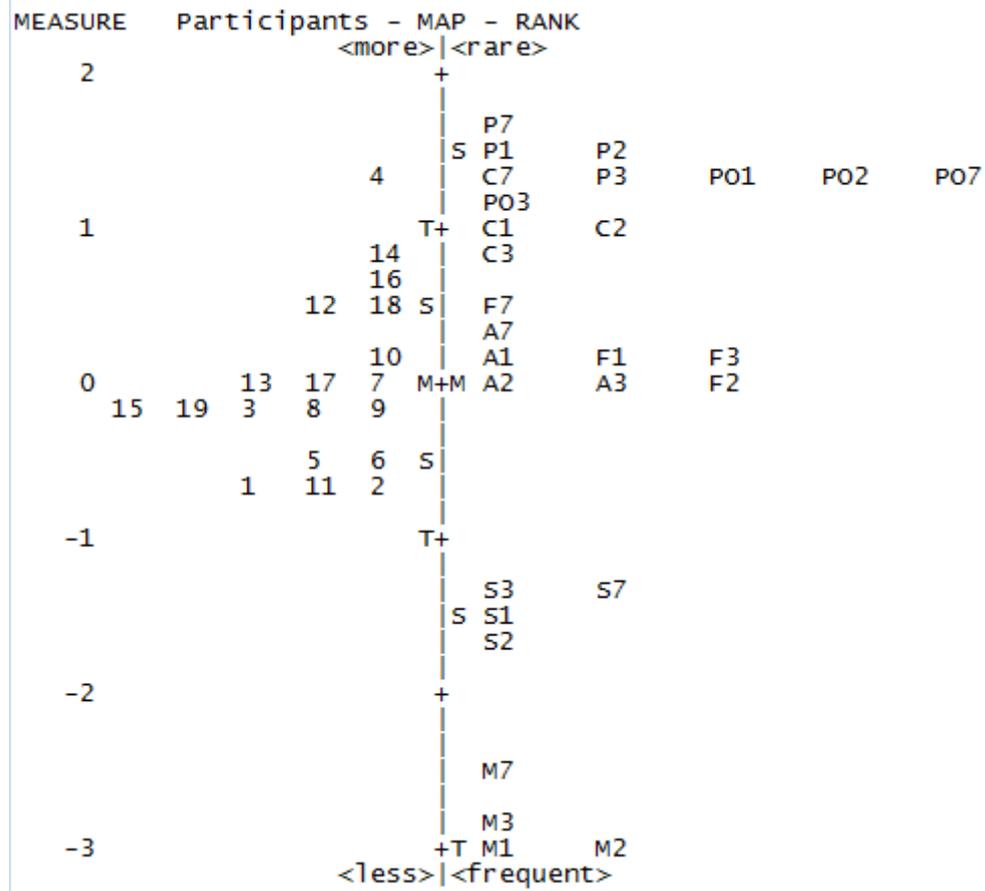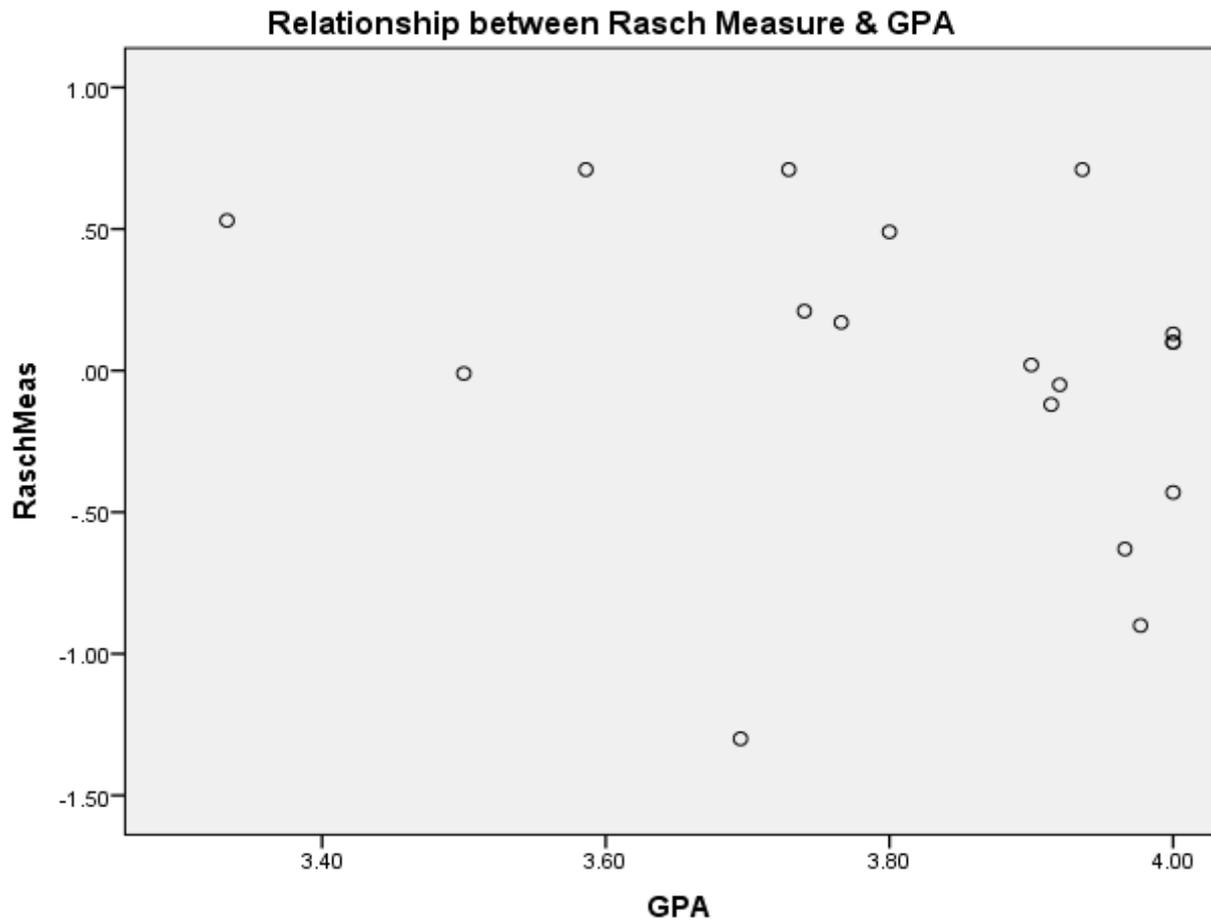
# Are participants' complexity scores related to outcomes, such as grades?

- For this analysis, each Rasch person score is converted into a stage score

- The Person Stage Score would be in the same range as the stage numbers

  – In this case, the scores ranged from 7.28 to 10.56

| Stage Score | Frequency |
| --- | --- |
| 10.45 to 10.56 | 4 |
| 10.20 to 10.42 | 4 |
| 10.08 to 10.18 | 5 |
| 8.72 to 9.07 | 3 |
| 7.28 to 8.49 | 3 |

Relationship between Rasch Measure & GPA

r (18) = -.336, p = .086