# Getting Started with the Graded Response Model (GRM): A gentle introduction and tutorial in R

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# Abstract

This tutorial paper introduces the Graded Response Model (GRM), a tool for testing measurement precision under the Item Response Theory (IRT) paradigm. Addressing common problems of measurement imprecision and lack of construct validity, the tutorial guides researchers through a one-dimensional GRM analysis in the R environment, using psych, mirt, and ggmirt packages. GRM is specifically designed to examine the psychometric properties of psychological scales with polytomous items. The tutorial illustrates the procedure using data from the Open Psychometrics Database on the Right-Wing Authoritarianism (RWA) scale, outlining the theoretical underpinnings of GRM, and steps for data preparation, model fitting, interpretation of results, and dealing with common issues and anomalies that may typically arise in the process.

*Keywords*: graded response model, item response theory, mirt, ggmirt, psych, R

# Getting Started with the Graded Response Model (GRM): A gentle introduction and tutorial in R

Measurement lays an important foundation of psychological science.

# A Brief Overview of Item Response Theory

# Graded Response Model

# Assumptions and Key Concepts

# An Illustrative Example of Graded Response Model: The Right Wing Authoritarianism (RWA) Scale

## A Brief Overview of the Altemeyer’s RWA Scale

## Step 1: Preparation

## Step 2: Inspecting Key Descriptive Statistics

## Step 3: Examining Dimensionality

## Step 4: Model Estimation, Parameters, and Fit Statistics

## Step 5: Model Residuals

## Step 6: IRT Plots

## Step 7: Computing Reliability

# Conclusions

# References