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The WTMA - A New Test of Mechanical Aptitude

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Mechanical aptitude is a well-known aptitude which is important for many jobs. It is widely used to help select employees, and has respectable predictive validity. However, existing tests of mechanical aptitude all have serious shortcomings which make them inappropriate for use in some situations.

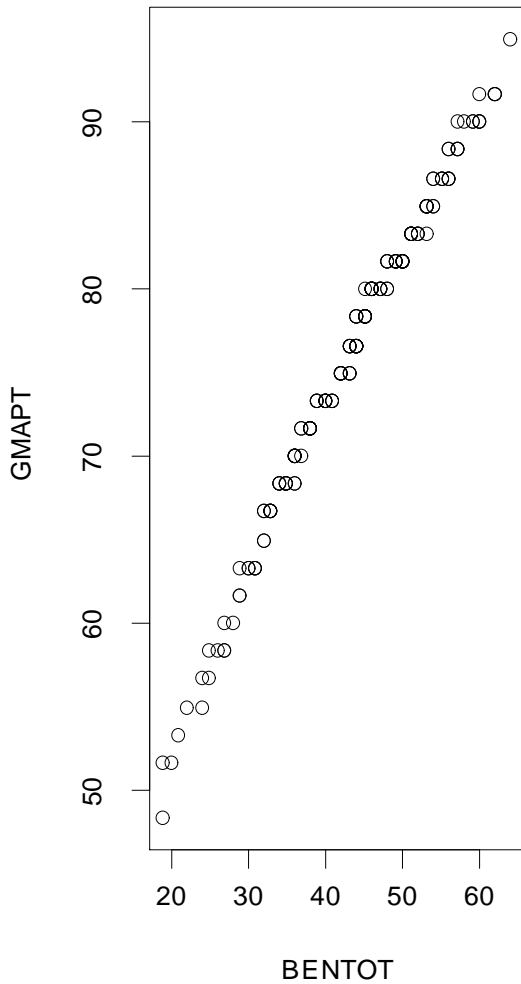
The major existing tests which measure mechanical aptitude are heterogenous in content and most date to a period when the emphasis in test development was more empirical than theoretic, and the concepts of content and construct validity, and test fairness were poorly developed. The existing tests include questions which measure academic background rather than a general ability to learn about mechanical principles as a result of everyday living in the practical world. The major existing tests are over 50 years old, and some of their content is dated. For example, the trajectory of bombs falling out of airplanes was once very important for the security of our country and widely discussed, but now this is no longer a topic of popular interest since bombs have been replaced by guided missiles as the major weapons system. Finally, existing tests show large mean score differences between males and females, a difference which grows from 8th to 12th grade, and which may be due, at least in part, to differential experience by gender. For these reasons, a new test of mechanical aptitude was developed.

The Wiesen Test of Mechanical Ability (WTMA, pronounced WIT-ma) was developed to achieve four goals: (1) to measure mechanical aptitude using questions based on common everyday objects and events, rather than objects or events encountered primarily or only in academic courses in physics or chemistry, (2) to present modern test content, (3) to minimize gender and racial/ethnic bias in the test content, and (4) to provide a tool for further academic research of mechanical aptitude. To the extent that these goals are met, the WTMA will help contribute to the understanding of the construct of mechanical aptitude, and will be particularly useful for use in personnel selection.

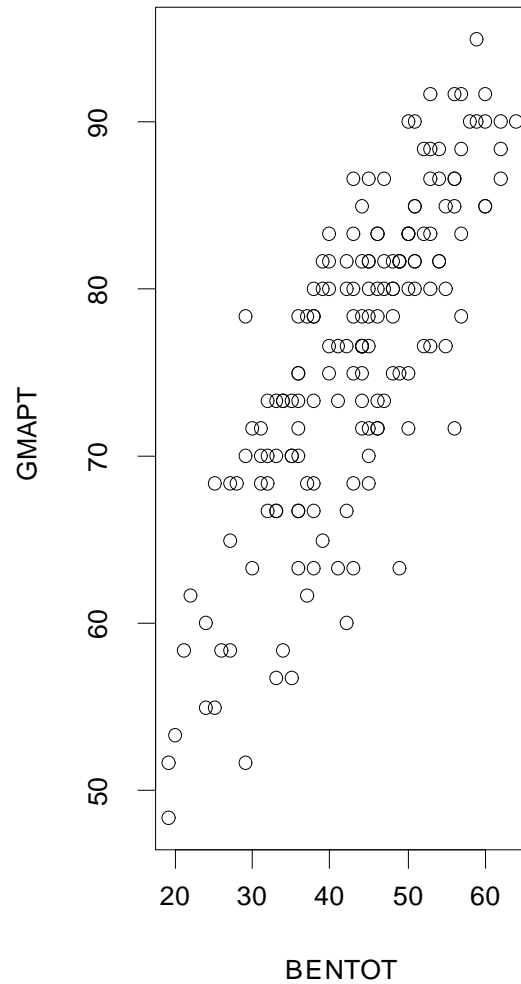
Following a brief review and discussion of other tests of mechanical aptitude, this presentation will report on the construct validity of the WTMA.

Plots of WTMA vs Bennett Scores: Utility Company Study

qqplot of Bennett vs. WTMA



scatter plot of Bennet vs. WTMA



**Intercorrelations of WTMA and Other Tests:
 Utility Company Study**

| | WTMA* | BENNETT FORM T | MATH/VERBAL/ REASON | FIT SPATIAL |
|--------------------------------|--------------|---------------------------|--------------------------------|--------------------|
| WTMA | 1.00 | .80 (**) | .46 (**) | .64 (**) |
| BENNETT FORM T | .80 (**) | 1.00 | .47 (**) | .65 (**) |
| MATH/VERBAL/ REASON | .46 (**) | .47 (**) | 1.00 | .52 (**) |
| FIT SPATIAL | .64 (**) | .65 (**) | .52 (**) | 1.00 |

* N=169 for all correlations

** Correlation is significant at the 0.01 level (2-tailed).

**Breakdown by Gender :
 Utility Company Study**

| GENDER | | AGE | YEARS IN CURRENT JOB | YEARS IN COMPANY | BENNETT FORM T | FIT-SPATIAL | WTMA | MATH/VERBAL/SPACIAL | N |
|-------------------|-----------------------|------------|-----------------------------|-------------------------|-----------------------|--------------------|-------------|----------------------------|----------|
| Male (1) | Mean | 44.0 | 10.2 | 14.9 | 48.1 | 10.3 | 79.4 | 21.3 | 83-88 |
| | Std. Deviation | 8.8 | 7.5 | 9.1 | 8.4 | 3.8 | 8.4 | 5.1 | |
| Female (2) | Mean | 44.2 | 8.8 | 14.0 | 37.7 | 7.9 | 71.9 | 19.2 | 74-81 |
| | Std. Deviation | 6.3 | 5.6 | 7.1 | 8.8 | 3.5 | 9.3 | 6.0 | |
| Total | Mean | 44.1 | 9.5 | 14.5 | 43.1 | 9.2 | 75.8 | 20.3 | 160-169 |
| | Std. Deviation | 7.7 | 6.7 | 8.2 | 10.0 | 3.8 | 9.6 | 5.6 | |

**Breakdown by Ethnic Group:
 Utility Company Study**

| ETHNIC | | AGE | YEARS IN CURRENT JOB | YEARS IN COMPANY | BENNETT FORM T | FIT-SPATIAL | WTMA | MATH/VERBAL/SPACIAL | N |
|----------|----------------|------|----------------------|------------------|----------------|-------------|------|---------------------|-------|
| White | Mean | 44.4 | 9.2 | 15.0 | 47.0 | 10.4 | 79.1 | 22.6 | 83-86 |
| | Std. Deviation | 7.6 | 6.6 | 8.1 | 9.3 | 3.7 | 8.0 | 5.1 | |
| Hispanic | Mean | 42.9 | 8.7 | 14.5 | 39.8 | 8.4 | 73.0 | 18.4 | 47-50 |
| | Std. Deviation | 7.6 | 6.2 | 8.3 | 9.7 | 3.3 | 10.0 | 5.1 | |