



# Raven's Advanced Progressive Matrices (APM)

## Evidence of Reliability and Validity



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### Internal Consistency Reliability

The internal consistency reliability estimate for the *Advanced Progressive Matrices* (APM) total raw score was .87 in the standardization sample of 462 individuals. (See the Appendix for more details regarding the composition of the sample.) This reliability estimate for the revised APM indicates that the total raw score on the APM possesses good internal consistency reliability as provided in the guidelines of the U.S. Department of Labor (1999, p. 3–3) for interpreting a reliability coefficient.

### Content Validity

In an employment setting, evidence of content validity exists when an assessment includes a representative sample of tasks, behaviors, knowledge, skills, abilities, or other characteristics necessary to perform the job. Evidence of content validity is usually gathered through job analysis.

The APM has been widely used for decades as a measure of *eductive ability*—"the ability to evolve high-level constructs which make it easier to think about complex situations and events" (Raven, Raven, & Court, 1998a, p. G8). In an extensive analysis of the cognitive processes that distinguish between higher-scoring and lower-scoring examinees on the *Standard Progressive Matrices* (SPM) and the APM, Carpenter, Just, and Shell (1990) described the Raven's Progressive Matrices as "a classic test of *analytic intelligence* ... the ability to reason and solve problems involving new information, without relying extensively on an explicit base of declarative knowledge derived from either schooling or previous experience" (p. 404). In an employment setting, evidence of the content-related validity of the APM should be established by demonstrating that the jobs for which the APM is to be used require the problem-solving skills measured by the assessment.

## Convergent Validity

Evidence of convergent validity is provided when scores on an assessment relate to scores on other assessments that claim to measure similar traits or constructs. Years of previous studies on the APM support its convergent validity (Raven, Raven, & Court, 1998b). In a sample of 149 college applicants, APM scores correlated .56 with math scores on the *American College Test* (Koenig, Frey, & Detterman, 2007). Furthermore, in a study using 104 university students, Frey and Detterman (2004) reported that scores from the APM correlated .48 with scores on the *Scholastic Assessment Test* (SAT).

Evidence of convergent validity for the current version of the APM is supported by two findings. First, in the standardization sample of 462 individuals, scores on the current APM correlated .97 with scores on the previous APM. Second, in a subset of 41 individuals from the standardization sample, the revised APM scores correlated .53 with scores on the *Watson-Glaser Critical Thinking Appraisal*<sup>®</sup>—*Short Form*. Detailed evidence regarding the validity of the Watson-Glaser as a measure of critical thinking and reasoning appears in the Watson-Glaser Short Form Manual (Watson & Glaser, 2006).

## Criterion-Related Validity

Criterion-related validity addresses the inference that individuals who score better on an assessment will be more successful on some criterion of interest. Criterion-related validity for general mental ability tests like the APM is supported by validity generalization. The principle of validity generalization refers to the extent that inferences from accumulated evidence of criterion-related validity from previous research can be generalized to a new situation.

There is abundant evidence that measures of general mental ability, such as the APM, are significant predictors of overall performance across jobs. For example, in its publication on the *Principles for the Validation and Use of Personnel Selection Procedures*, the Society for Industrial and Organizational Psychology (2003) notes that validity generalization is well-established for cognitive ability tests. Schmidt & Hunter (2004) provide evidence that general mental ability “predicts both occupational level attained and performance within one’s chosen occupation and does so better than any other ability, trait, or disposition and better than job experience” (p. 162). Prien, Schippmann, and Prien (2003) observe that decades of research “present incontrovertible evidence supporting the use of cognitive ability across situations and occupations with varying job requirements” (p. 55). Many other studies provide evidence of the relationship between general mental ability and job performance (e.g., Kolz, McFarland, &

Silverman, 1998; Kuncel, Hezlett, & Ones, 2004; Ree & Carretta, 1998; Salgado, et al., 2003; Schmidt & Hunter, 1998; Schmidt & Hunter, 2004).

In addition to inferences based on validity generalization, studies using the APM over the past 60 years provide evidence of its criterion-related validity. For example, in a validation study of assessment centers, Chan (as cited in Ree and Carreta, 2002) reported that scores on the Raven's Progressive Matrices correlated with ratings of participants on "initiative/creativity" (p.14). Another group of researchers (Gonzalez, Thomas, and Vanyukov, 2005) reported a positive relationship between scores on the Raven's APM and performance in decision-making tasks. Fay and Frese (2001) found that APM scores were "consistently and positively associated with an increase of personal initiative over time" (p. 120). The *APM Manual* and *Occupational User's Guide* (Raven, 1994; Raven, Raven, & Court, 1998b) provide additional information indicating that the APM validly predicts the ability of an individual to attain and retain jobs that require high levels of general mental ability.

The validity information presented in this guide is not intended to serve as a substitute for locally obtained validity data. Local validity studies, together with locally derived norms, provide a sound basis for determining the most appropriate use of the APM. Therefore, whenever technically feasible, users of the APM should study the validity of the assessment at their own location or organization.

# Appendix

## Description of the Sample

The information provided in the following tables is based on APM data collected during the period May 2006 through February 2007.

### Appendix 1. Composition of the Sample by Occupation (N = 462)

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<b>Occupation*</b>	
Accountant; Auditor	1.3%
Admin Assistant; Secretary; Office Support	0.3%
Architect	0.3%
Attorney	0.5%
Consultant	7.2%
Customer Service Representative	1.3%
Engineer	10.0%
Financial Analyst	1.0%
Human Resources Occupations	5.6%
Information Technology Occupations	15.6%
Installation/Maintenance/Repair	0.3%
Loan Officer	0.3%
MD, DO, DDS, etc.	0.3%
Not Applicable	23.5%
Nurse	0.3%
Other	22.5%
Psychologist	1.0%
Sales Representative (Non-Retail)	7.9%
Sales Representative (Retail)	0.5%
Skilled Tradesperson	0.3%
Teaching Occupations	0.3%

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\* Seventy-one individuals did not provide a response about their occupation.

## Appendix 2. Composition of the Sample by Position Level (N = 462)

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Position Level*	
Executive; Director	23.3%
Manager	28.6%
Supervisor	2.8%
Professional/Individual Contributor	26.6%
Hourly/Entry-Level	0.3%
Blue-Collar	0.8%
Self-Employed/Business Owner	0.3%
Not Applicable	17.4%

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\* Seventy-one individuals did not provide a response about their position level.

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