A closer look at the *Test of Personal Intelligence (TOPI)* ☆

John D. Mayer [a,*], A.T. Panter [b,**], David R. Caruso [c,***]

[a] Department of Psychology, University of New Hampshire, United States
[b] L.L. Thurstone Psychometric Laboratory, Department of Psychology and Neuroscience, The University of North Carolina at Chapel Hill, United States
[c] Yale College Dean's Office, Yale University, United States

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ABSTRACT

Personal intelligence involves the capacity to reason about personality and personality-related information. Studying ability-based measures of personal intelligence creates a virtuous cycle of better measurement and better theoretical understanding. In Study 1 ($N = 10,318$), we conduct an item-level analysis of the *Test of Personal Intelligence (TOPI)* to explore people's problem-solving abilities in the area. Personal intelligence divided into a Consistency-Congruency factor that concerned understanding traits and their associated behaviors, and a Dynamic-Analytic factor that involved understanding personality processes and goals. The finding cross-validated in Study 2 ($N = 8,459$). In Study 3 ($N = 384$), we examined correlates of the two factors. Understanding the abilities involved in personal intelligence may help us to educate people about how to better solve problems about personality.

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Personality can be characterized as "the specific mental organization and processes that produce an individual's characteristic patterns of behavior and experience" (DeYoung, 2015, p. 33). Personality organizes an individual's motives and emotions, knowledge and intelligences, and awareness and self-control (DeYoung, 2015; Larsen & Buss, 2014). Individuals then express their inner personalities in the outer world, through their choices and behaviors (Mayer, 2015; but see Hogan & Foster, 2016, for an alternative view).

People vary in the degree to which they comprehend personality. Psychologists believe that, among our evolutionary ancestors, individuals who better understood themselves and the people around them experienced adaptive advantages relative to others in terms of both survival (e.g., selecting better hunting partners) and reproduction (e.g., better mates, Buss, 2008; Dunbar, 2009). Consistent with that idea, psychotherapists have proposed that certain among their clients possessed *psychological mindedness*—a higher aptitude relative to other people for learning about themselves and others (Appelbaum,

1973). Gardner (1983) described intra- and interpersonal intelligences that included skills for building a coherent identity and understanding other people. And Funder (2001) argued for the existence of a *good judge*, who could perceive the personality characteristics of other people more accurately than average. Such concepts share a common focus on the capacity to reason about personality and personality-related information. Mayer (2008, 2014) suggested that a *personal intelligence* (the term was parallel to social and emotional intelligences) might describe this core ability.

People use their personal intelligence, according to the theory, to (a) identify personality-relevant information in themselves and others and to "read" people's traits; (b) to form models of personalities so as to understand themselves and others, (c) to guide their own and others' choices by setting goals consistent with their interests and values, and (d) to systematize their plans so as to achieve their aims (Mayer, 2008).

To test whether personal intelligence could be objectively measured, the present authors developed a *Test of Personal Intelligence*, or *TOPI*, consisting of questions corresponding to those four areas of problem solving just described, and that yielded scores keyed to each of those areas. Our work with the TOPI indicated that ability-based items about personality could be written, correct answers identified, and that people exhibited reliable individual differences in the reasoning capacities assessed (Mayer, Panter, & Caruso, 2012).

This personal intelligence appears to be a mental ability midway in breadth between *general intelligence* (i.e., general abstract reasoning) and specific abilities to solve narrower problems. Intelligence researchers often describe a continuum of intelligences from the most

general to the specific. The mid-level intelligences, which include verbal, spatial, and quantitative intelligences (among others) are called *broad intelligences* in these models (Carroll, 1993; MacCann, Joseph, Newman, & Roberts, 2014; McGrew, 2009; but see Michell, 2012 for an alternate view).

Certain broad intelligences involve reasoning about things, such as quantitative intelligence, that concerns the manipulation of numbers, or spatial intelligence, that concerns the rotation of objects in space; others such as emotional intelligence (assessed as a mental ability) are more people-focused (Mayer & Skimmyhorn, 2017). Personal intelligence is likely among these people-centered intelligences, concerned as it is with traits of social expression, self-control, and mental abilities, as opposed to more impersonal topics. The TOPI total score correlates with other broad intelligences such as the verbal, quantitative and spatial in the $r = .17$ to .30 range (Mayer & Skimmyhorn, 2017), but its relation with people-centered intelligences is stronger: $r = .53$ with "Reading the Mind in the Eyes," and $r = .68$ with the Understanding Emotions section of the Mayer-Salovey-Caruso Emotional Intelligence test (Mayer et al., 2012). The degree to which emotional and personal intelligences are psychometrically distinct requires further exploration; that said, the two are conceptually distinct in that it is possible to write hundreds of test items about personality without reference to emotion understanding. Recent findings indicate that personal intelligence predicts consequential academic and performance outcomes incrementally above measures of general intelligence alone, suggesting its practical usefulness in high-stakes testing (Mayer & Skimmyhorn, 2017).

1. The Measurement of Personal Intelligence and Aims of the Present Research

The TOPI employs four scales keyed to the four problem-solving areas of personal intelligence: (a) identifying personality-relevant information, (b) forming models of personality, (c) guiding choices, and (d) systematizing plans. The four test scales, however, overlapped in content more than was optimal for separate indicators of the construct. A first confirmatory factor analysis indicated the scales were difficult to distinguish from one another. The initial factor model was an "imperfect, first representation of the results"—a promissory note that required further consideration (Mayer et al., 2012, p. 136).

We fulfill that promissory note in this article in the form of an item-level factor analyses of the TOPI—an "item"-ized payment—to investigate whether there are alternative, useful approaches to representing the test content. If interpretable factors appear independent of the four content areas, it may suggest new ways of conceptualizing the kind of reasoning that make up the ability. As an analogy to verbal intelligence, people who study literature often make a useful distinction between reading fiction and nonfiction. At the same time, however, people's ability to understand language can be represented according to vocabulary skill and sentence comprehension. In other words, experts may divide their subject matter areas differently from the way psychological abilities cohere (and multiple factor representations are possible, e.g., Maraun, 1996).

In addition to modeling abilities that make up personal intelligence, a second purpose of these studies is to learn how people's personal intelligence is distributed across the range of human ability. General intelligence is regarded as normally distributed, although there is some evidence that it is becoming negatively skewed (i.e., fewer people score below average) as nutrition improves worldwide and positive cognitive stimulation increases (e.g., Colom, Lluis-Font, & Andrés-Pueyo, 2005).

The distributions for people-focused intelligences appear far more pronounced in their negative skew, and we expect that to be the case here (cf., Maul, 2012). Although an individual with good reasoning ability can identify people's inner qualities, and predict people's consistent behavioral expressions, such predictions are likely to be limited by the

sheer complexity of human behavior. At the lower-ability end of reasoning, however, a sizeable group of people may miss even the basics about themselves and others. This lower-scoring group may include some people who experience Autism-spectrum symptoms (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001).

We also examine the TOPI in relation to self-estimated personal intelligence, exploring whether ability and self-judged personal intelligence are distinct constructs. And, finally, we examine relationships between ability-based subscales of personal intelligence and earlier-studied criteria.

Studying a concept together with the way it is measured creates a virtuous cycle of better measurement and better theoretical understanding (Borsboom, Mellenbergh, & van Heerden, 2004; Hood, 2009). Test subscales are better justified when they are based on the actual structure of abilities measured by the test—as opposed to scales that are created conceptually by authors without regard to empirical independence among scales (Sinharay, Puhan, & Haberman, 2011). Moreover, understanding the abilities people use to solve problems in a domain can be helpful to improving their performance through education.

2. The TOPI series of tests

2.1. General overview of the TOPI tests

The *Test of Personal Intelligence (TOPI)* was developed to examine the viability of measuring a personal intelligence. As the scale underwent revisions from versions 1.0 to 1.2, evidence accrued for the construct (Mayer et al., 2012). The present version, 1.4, is a 93-item subset of the TOPI 1.2 (Mayer & Skimmyhorn, 2017). Most key characteristics of the TOPI have remained the same over forms. Across the test, all items are multiple choice, with four alternatives each. The test items fall within one of four areas of problem solving, reflecting the four theoretical areas from "Recognizing Information" to "Systematizing Plans."

The four problem-solving areas of the TOPI further divide into 13 clusters of more specific test content and similar format. For example, the Recognizing Information area includes a "Recognizing inner motives" cluster, in which test-takers are asked to assess a person's wants and needs and, from those, forecast a likely behavioral pattern. The first item of that group asks:

1. If a person wants to be with one or more people, talk to them, go out with them, and have a good time, the person is likely going to:
   a. be in love
   b. express warmth toward someone
   c. meet a goal of excellence
   d. socialize

The test-taker who answers this item correctly (alternative "d") must assess the given behaviors of being with people, going out with them, and consequent enjoyment, and extract from them the most likely motive; in this case, to socialize. The logic required for each task is different. For example, the Systematizing Plans area includes a cluster of items that ask whether test-takers can recognize goals that conflict ("problematic goals"); see Mayer et al. (2012) for more examples of clusters and their items.

The TOPI's theoretically-guided coverage ensures both that all its test questions address reasoning about personality—and that a broad range of relevant content areas are sampled, providing evidence for its adequately representative coverage, as recommended in the *Standards for Educational and Psychological Testing* (Joint_Committee, 2014).

2.2. Veridical scoring and item difficulty

Correct answers to TOPI items are scored 1 point; incorrect, 0 points. Correct answers were identified with reference to relevant, generally-