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Black–White differences on IQ and grades: The mediating role of elementary cognitive tasks

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Abstract

The relationship between IQ scores and elementary cognitive task (ECT) performance is well established, with variance on each largely reflecting the general factor of intelligence, or *g*. Also ubiquitous are Black–White mean differences on IQ and measures of academic success, like grade point average (GPA). Given C. Spearman's (Spearman, C. (1927). The Abilities of Man. New York: Macmillan) hypothesis that group differences vary directly with a test's *g* loading, we explored whether ECT performance could mediate Black–White IQ and GPA differences. Undergraduates (139 White and 40 Black) completed the Wonderlic Personnel Test, followed by inspection time and choice reaction time ECTs. Despite restriction of range, ECT performance completely mediated Black–White differences on IQ (d=.45). Group differences on GPA (d=.73), however, were larger and ECT performance did not mediate them. We discuss findings in light of Spearman's hypothesis.

A Black–White group difference on intelligence test scores has persisted in the literature for over 90 years. Currently, the group IQ mean for Blacks (85) remains about one-standard deviation below the group IQ mean for Whites (100; see, e.g., Neisser et al., 1996; Lynn, 2006; Rushton & Jensen, 2006). Though the difference exists, no consensus as to its cause is likely forthcoming. Some argue that research here is flawed because race-based classifications are invalid (see e.g., Sternberg, Grigorenko, & Kidd, 2005; Tate & Audette, 2001), or because a single, global IQ score cannot adequately represent human intelligence (see, e.g., Gardner 1983). Others argue that Black–White differences are real—due neither to cultural, nor test bias—and at least partly driven by genes (see, e.g., Herrnstein & Murray, 1994; Rushton & Jensen, 2005; Gottfredson, 2005a).

The literature also shows that Blacks, on average, are less likely than Whites to attend college, and those that do have lower standardized test scores, grade point averages (GPAs), and higher dropout rates (Dreary, Strand, Smith, & Fernandes, 2007; Roth et al., 2001; U.S. Department of Education, 2001). Academic achievement and IQ, however, are strongly related. Gottfredson (2005b) summarized data showing a median correlation of .60 between standardized tests of school performance and IQ test scores (.80 when aggregating the different academic tests into a single composite; see also Gottfredson, 2004). Clearly, a large percentage of the variance in academic performance is

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shared by variance in IQ. The direction of causality, however, and whether third variables explain the relationship, remain empirical questions.

One prominent explanation for Black–White differences is Spearman's hypothesis (Spearman, 1927; see also Jensen, 1985), which posits that race differences on IQ test scores reflect race differences on the general factor of intelligence, or *g*. Evidence for Spearman's hypothesis comes from findings that a test's *g* loading strongly correlates with the magnitude of the Black–White difference the test produces (see, e.g., Hartmann, Kruuse, & Nyborg, 2007; Jensen, 1998; Lynn & Owen, 1994; Nyborg & Jensen, 2000; te Nijenhuis & van der Flier, 2003). If the race difference on IQ tests is a *g* difference, then other valid measures of *g* (i.e., beyond traditional paper and pencil IQ tests) should mediate the relationship between race and IQ. Consistent with this prediction, our goal is to explore whether performance on basic measures of information processing, which themselves are highly *g*-loaded, can mediate race differences on IQ.

Information processing ability is inferred by subject performance on so-called elementary cognitive tasks (ECTs). Examples of commonly used ECTs are those that measure processing speed, or reaction time (RT), and those that measure speed of information intake, or inspection time (IT; see Jensen, 1998, for an overview of various ECTs). The literature shows that basic information processing ability, as measured by ECTs, correlates about .50 (after correcting for attenuation) with *g*, as measured by traditional IQ tests (for meta-analytic reviews, see Grudnik & Kranzler, 2001; Kranzler & Jensen, 1989 see also Jensen, 1998). To our knowledge, however, studies exploring the relationship between race and ECT performance have used RT but not IT (for reviews, see Jensen, 1998; Rushton & Jensen, 2005). And, although the relationship between grades, race and IQ is clear (see, e.g., Dreary et al., 2007; Gottfredson, 2004; 2005b), how ECT performance might mediate these relationships is unknown.

The paucity of research in this area is not surprising, given the politically charged environment under which literature on race and intelligence is scrutinized (see, e.g., Gottfredson, 2005c; Reynolds, 2000). Yet, it is now clear that IQ scores have criterion-related validity for many important life outcomes (Hunt, 1995; Neisser et al., 1996). For example, IQ is often the single best predictor of job performance, especially when the job is mentally demanding (Schmidt & Hunter, 1998). Newer research has even shown a link between ECT-like tasks (i.e., "safety suitability" tests, which measure selective- and focused-attention, as well as processing speed) and performance on jobs where the public's safety might be at risk (e.g., fire fighters; see te Nijenhuis & van der Flier, 2004). Given IQ's criterion-related validity, group differences must have significant practical consequences, independent of their cause. And, because race differences on IQ tests have persisted over decades (Lynn 2006; Rushton & Jensen, 2006), it seems unlikely they will go away soon. Hence, the scientific study of race and IQ is both proper and important.

The present study thus explores whether ECT-task performance can mediate Black–White IQ and GPA differences. To the extent that *g* reflects basic information processing ability, ECTs that putatively measure these processes should mediate race differences on IQ test scores, given Spearman's hypothesis. Further, since IQ is strongly correlated with academic success (Gottfredson, 2004; 2005b; Neisser et al., 1996), ECT performance should also at least partially mediate race differences on GPA. Consistent with the extant research on race differences in IQ, GPA, and ECT-task performance, together with Spearman's hypothesis, we predict:

(1) ECT performance will fully mediate the relationship between race and IQ (using the three stage test of mediation proposed by Baron & Kenny, 1986).
(2) ECT performance will at least partially mediate the relationship between race and GPA.

1. Method

1.1. Participants

The participants were 139 White and 40 Black undergraduates enrolled at a large urban university, comprising a diverse student body. We recruited from various sections (all in the same semester) of introductory accounting classes. Students signed consent forms before completing the study, and received extra course credit for participation. Race was self-reported from among the following categories: White, Black, Hispanic, Asian, Indian, and Other. We did not have enough Hispanic ($n=6$), Asian ($n=9$), Indian ($n=4$) or Other-race ($n=3$) participants to conduct statistical analyses, and so we excluded these people from the study. In addition, two older students (age 55 and 70 years) were excluded because they exhibited RTs well above their group means (see, e.g., Salthouse, 2000, for discussion of the strong inverse relationship between age and RT).

Table 1 shows the demographic characteristics of the White and Black samples, which differed by both gender and age. For gender, the Black students