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Intelligence

The path and performance of a company leader: A historical examination of the education and cognitive ability of Fortune 500 CEOs

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ABSTRACT

The path to becoming a CEO (and performance on the job) can be viewed as a difficult cognitive challenge. One way to examine this idea is to see how highly selected CEOs are in terms of education and cognitive ability. The extent to which Fortune 500 CEOs were selected on education and cognitive ability at an earlier age was retrospectively assessed at four time points that spanned 1996 to 2014 (Total N = 1991). Across the last 19 years, between 37.5% and 41.0% of these CEOs were found to attend an elite school which likely placed them in the top 1% of cognitive ability. People in the top 1% of ability, therefore, were likely overrepresented among these CEOs, at about 37 to 41 times the base rate. Even within each of the four samples, higher CEO education and cognitive ability was associated with higher gross revenue of the CEO's company. Although Fortune 500 CEOs were highly selected on education and cognitive ability, when placed in the context of a broader array of occupations in the extreme right tail of achievement (e.g., politicians, judges, billionaires, journalists, academics, powerful people, and other business elites), CEOs were not at the top. This showed the wide cognitive ability range (and mental test difficulty) across various occupations that compose the U.S. elite. That Fortune 500 CEOs had similar education and cognitive ability selectivity over time shows that the CEO (and perhaps business) occupational and filtering structure has remained relatively unchanged across the last two decades.

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1. Introduction

Life can be considered a cognitive challenge. The occupation one ends up in is a reflection in part of an individual's general cognitive ability which can have a cumulative effect on careers, primarily due to the continuous life event test items one has successfully overcome along the path to eventual achievement (Gottfredson, 2003).

One occupation at the pinnacle of business achievement is becoming a chief executive officer (CEO) of a company. The mental test battery that is the path to becoming a CEO, as well as performance on the job, is likely extremely complex, and filled with both professional (e.g. performance, navigating office politics) and personal challenges (e.g. balancing work and family). In the development of such occupational expertise (Wai, 2014a), there are likely many personal traits and other factors at work (Lubinski, 2004), including cognitive ability (Kuncel, Hezlett, & Ones, 2004; Nyborg & Jensen, 2001; Schmidt & Hunter, 1998, 2004), deliberate practice (Ericsson, Krampe, & Tesch-Romer, 1993), and even luck.

In addition to general cognitive ability, one important factor along the path to the head of a company might include whether or not a CEO attends college or graduate school and the educational or intellectual return, social networks attained, branding and institutional reputation effects, or other value that might be associated with such school attendance.

In a series of studies investigating a variety of U.S. sectors—federal judges, billionaires, Senators, House members, Fortune 500 CEOs, CEOs who attended the World Economic Forum in Davos, Davos media, Davos academia, Davos government and policy, Davos overall, and the most powerful men and women[1] according to Forbes magazine—that compose the U.S. elite (Wai, 2013, 2014b), the educational selectivity and corresponding ability levels of these groups were assessed by retrospectively assessing these factors at a younger age (Cox, 1926; Simonton, 2009). Overall, these papers showed each of these groups were quite cognitively able and intellectually gifted, but to varying degrees. One specific finding of interest for the present investigation was that 38.6% of Fortune 500 CEOs in 2012 had attended an elite school and were in the top 1% of cognitive ability (Wai, 2013).

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[1] The term "powerful people" refers to the definition given by Forbes magazine. According to Wai (2014b, p. 55), "The most powerful people list methodology included four factors: the number of people the person employed or managed, the amount of financial resources they controlled, their number of spheres of influence, and how actively they used their power." This resulted in many politicians, business and media elites, people with extreme wealth, and others that fit these selection criteria. See Ewalt (2012) and Howard (2013) for more detail.

The current study attempts to provide insight into the extent to which Fortune 500 CEOs are cognitively and educationally select, whether this has remained the same or changed across the last two decades, and whether the education and ability of a CEO is associated with the gross revenue of a company. This study also examines whether the findings from Wai (2013) do or do not replicate in samples that span 1996 to 2014. Finally, this research situates the cognitive ability of Fortune 500 CEOs in the context of a wider range of U.S. elite groups to assess whether occupations in the extreme right tail of achievement might be difficult mental tests (Gordon, 1997; Gottfredson, 2003). Whether or not these findings align with different time points provides important information about the education levels, cognitive abilities, as well as the CEO (and more broadly) business occupational structure in the U.S. across the last 19 years.

2. Samples

Fortune 500 Chief Executive Officers (*U.S. CEOs*). Information on name, company, gender, and undergraduate and graduate education was collected from *Fortune* magazine (fortune.com) at four time points where systematic data was available. Some companies had no listed CEO or other missing data and were excluded from the samples. There were 493 CEOs in 1996 (Male = 493, Female = 0), 498 in 2006 (M = 489, F = 9), 500 in 2012 (M = 481, F = 17; see Wai, 2013), and 500 in 2014 (M = 478, F = 22). The total sample size was 1,991. The Fortune 500 is a list compiled annually by *Fortune* magazine that ranks top U.S. companies by gross revenue for their respective fiscal years and other inclusion/exclusion criteria.[2] See Fortune 500 CEOs (1996, 2006, 2014) and Fortune 500 CEOs (2012) for links to data.

Groups from the broader U.S. elite. In order to place the data on Fortune 500 CEOs in the broader context of extreme right tail achievement in the U.S., data was drawn from prior papers (Wai, 2013; Wai, 2014b, Table 1) and updated with new data. The updates included broadening the list of elite schools used in Wai (2013) to encompass global schools used in Wai (2014b) and reanalyzing the data, as well as including an analysis of data using the same method on *The New Republic* masthead (N = 95; see Schonfeld, 2014 for link to data).

3. Method

Assessing education and ability level. The method for the current study is an extension of that used by Wai (2013) for the U.S. alone and is detailed in Wai (2014b). This method was used because not all people who become Fortune 500 CEOs were educated solely in the U.S. Gaining admission to a top U.S. college, university, or graduate school requires for the large majority scoring at or above a certain level on standardized tests such as the Scholastic Assessment Test (SAT), American College Test (ACT), Graduate Record Examination (GRE), Law School Admissions Test (LSAT) or Graduate Management Admission Test (GMAT), among others. Student assessment tests are regarded as being good measures of cognitive ability highly correlated with the results of psychometric IQ tests and showing similar cognitive

demands (e.g. Rindermann & Baumeister, 2015; Rindermann & Thompson, 2013). The SAT and ACT have been shown to measure general intelligence (*g*) or IQ to a large degree (Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008), and it is reasonable to think other tests (e.g. international standardized exams) also measure intelligence due to Spearman's (1927) *indifference of the indicator*—the idea that "*g* enters into any and every mental task" (Jensen, 1998, p. 33). Murray (2012, p. 366) concluded: "the average graduate of an elite [U.S.] college is at the 99th [per]centile of IQ of the entire population of seventeen-year-olds," and defined an elite college to be roughly one of the top dozen schools in the *U.S. News & World Report* rankings (America's Best Colleges's, 2013).

The list of colleges, universities, and graduate schools indicating top 1% in cognitive ability status within the U.S. can be found in Table 1 of Wai (2013). The criteria for selection of these schools was based on the average scores of an institution indicating roughly the top 1% compared to the general U.S. population.[3] However, some individuals who ended up as Fortune 500 CEOs and in other elite occupations attended colleges and universities within their home countries before coming to the U.S., therefore the QS World University Rankings (2012) were used to determine elite school status within each country.

As a reasonably select cut point, up to the top 10 schools within each country were considered elite and included. In many cases there were fewer than 10 schools within each country that made it onto the *QS* world rankings, and only the schools on the *QS* rankings were used. Although the method in Wai (2013) reasonably isolated the schools that required standardized test scores indicating top 1% in cognitive ability status, the same method cannot be directly applied for countries worldwide due to varying criteria for university admissions and lack of publicly reported standardized test scores. However, it is reasonable to think the top colleges and universities within each country would attract a large fraction of the brightest individuals. Therefore, admission to one of these schools is a direct measure of elite school status, and also a reasonable but indirect proxy of high cognitive ability relative to the selection pool within each country – likely within the top 1%.

Some students attend an elite school with lower than typical test scores (e.g., due to athletics, legacy status, political connections, or affirmative action; Espenshade & Radford, 2009; Golden, 2006; Sander, 2004), whereas others who have higher than typical test scores may not have attended an elite school (e.g. financial limitations, scholarship, staying close to home). Gender roles are additionally important. This lowers the reliability of the educational measure as an ability indicator, especially at the individual level. Factors in both directions likely counterbalance one another, which makes the method reasonable for group estimates.

4. Results

Table 1 presents data on the education and ability level of Fortune 500 CEOs from 1996 to 2014. *Elite School* indicates the percentage of people who attended one of the top schools in the U.S. (see Wai, 2013, Table 1) according to *U.S. News & World Report* (America's Best Colleges's, 2013), or one of the top schools in the world according to QS World University Rankings (2012), and roughly represents a group

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[2] According to fortune.com on the Fortune 500 methodology: "Companies are ranked by total revenues for their respective fiscal years. Included in the survey are companies that are incorporated in the U.S. and operate in the U.S. and file financial statements with a government agency. This includes private companies and cooperatives that file a 10-K or a comparable financial statement with a government agency, and mutual insurance companies that file with state regulators. It also includes companies that file with a government agency but are owned by private companies, domestic or foreign, that do not file such financial statements. Excluded are private companies not filing with a government agency; companies incorporated outside the U.S.; and U.S. companies consolidated by other companies, domestic or foreign, that file with a government agency. Also excluded are companies that failed to report full financial statements for at least three quarters of the current fiscal year. Percent change calculations for revenue, net income, and earnings per share are based on data as originally reported. They are not restated for mergers, acquisitions, or accounting changes. The only changes to the prior years' data are for significant restatement due to reporting errors that require a company to file an amended 10-K."

[3] Attendance at a national university or liberal arts college that had median combined SAT Critical Reading and Math scores of 1400 or greater according to *U.S. News & World Report* (America's Best Colleges's, 2013) was used as a reasonable indicator that the individual was in the top 1% in cognitive ability compared to the general U.S. population. This resulted in 29 schools which can be found in Table 1 of Wai (2013). Additionally, similar cut scores on the LSAT (12 schools) and GMAT (12 schools) were used as a reasonable indicator that the individual was in the top 1% in cognitive ability. Finally, for students who had graduate degrees outside of law and business, attendance at one of the 29 schools in Table 1 was used as a reasonable indicator that their GRE scores placed them in the top 1% in cognitive ability compared to the general U.S. population. For specific details on the population level statistical calculations that led to these selection criteria, see Wai (2013) and Murray (2012).