The Importance of Spearman's *g*

as a psychometric, social, and educational construct

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Abstract

Since its discovery in 1904, the general factor of intelligence (*g*) has generated considerable controversy. A historical review reveals that *g* has survived the scrutiny of psychometricians, educators, and politicians who simply wish that its importance in explaining individual and group differences would disappear. However, even in an atmosphere of political correctness, *g* survives as a robust variable explaining educational and societal attainment. In their efforts to control educative and societal outcomes, policy makers and educators commit an injustice in their active disavowal of such an important psychological construct.

Four thousand years ago, the Chinese were the first to use written mental tests in order to predict performance. Civil servants were administered standardized tests, which included measures of mathematical ability, nonverbal reasoning, and reading comprehension. Ironically, the Chinese ended this practice in 1905, the same year Alfred Binet introduced the first standardized test designed to measure the construct most psychologists and educators long identified as intelligence.

Robert Thorndike (1997) pointed to two historical influences in the development of measures of intelligence. First, in the late nineteenth century, universal education became a reality. Prior to this time, only a select few in the upper strata of society attended school. Intelligence testing became a means of ensuring that educational resources were allocated to those students who could most benefit; in particular, it helped remove genuinely dull children from normal classes. Second, in the work of Wundt, Fechner, and Galton there appeared the growing belief that individual differences in cognitive ability could be empirically quantified. Previously, scientists had relied on qualitative techniques such as introspection to gain insight into the workings of the human mind. The quantification of the mind established psychology as a science, with intelligence tests as the primary instrument for measuring cognitive ability.

Many theories of intelligence have been offered through the years. However, most have not endured the rigors of empirical scrutiny. Because they lend themselves so readily to statistical review, factor analytic theories offer the

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most promise to researchers and educators hoping to explain the structure and nature of intelligence. The following presents an overview of key psychometric theories of intelligence and outlines the important contribution of the general factor of intelligence in explaining individual differences.

Exploratory Factor Analysis and Theories of Intelligence

Charles Spearman invented factor analysis in 1904 as part of an experiment to "find out whether, as Galton has indicated, the abilities commonly taken to be intellectual had any correlation with each other or with sensory discrimination" (Spearman, 1927, p. 322). Spearman obtained teacher evaluations of 36 students from a village school. Students were rated on the usual academic subjects (Latin, English, and math) as well as music and pitch discrimination. The observed correlation between the variables prompted Spearman to hypothesize that the variables shared a common source of variance, which he termed a "general factor of intelligence" (Spearman, 1904, p. 36). From the observation that variables had different levels of intercorrelation, he concluded that the variables had different levels of saturation with the general factor, which he called *g* (distinguishing little *g* from the big *G* of Newtonian gravity). The different levels of saturation represented different loadings on the general factor.

Spearman-Holzinger Model

It was manifest to Spearman that *g* did not account for all the variance in students' scores. Therefore, he posited a two-factor theory of intelligence. That is, each variable may be described as involving two factors, *g* and a factor specific to the variable. (Figure 1 depicts the Spearman-Holzinger model of intelligence.)

Spearman devoted the rest of his academic career to explicating the general factor, which he later referred to as *g*. He conceived of *g* as "mental energy," and stated that it was the "leading part of intelligence, and is displayed by the ability to handle not merely abstract ideas, but above all symbols" (p. 211). Later, working from several data sets collected over twenty years, he evolved the idea that *g* consisted of three processes. The first process is "the apprehension of experience." Spearman assumed, as did Galton, that the greater the sphere of experiences an individual can draw upon, the more complex is the problem solving that he can undertake. The second process is the "eduction of relationships." Spearman conceived of eduction as the "drawing out of a logical relationship between two stimuli" (p. 227). The third process is the "eduction of correlates," in which an individual notes the similarities between two stimuli. A cognitive task was loaded on *g* to the extent that it drew on these three processes. Although Spearman recognized that *g* may not account for all the variance in a matrix of scores, he preferred to emphasize *g* as the explanatory factor in intelligence.

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Thurstone's Model of Primary Abilities

Advances in statistical methods permitted empirical tests of Spearman's theory. In 1938, Thurstone administered a large battery of paper and pencil tests to 240 student volunteers from the University of Chicago. Using orthogonal rotation techniques to reduce the matrix of scores to a simple structure, Thurstone identified seven factors, which he termed "primary abilities." He labeled the factors as S (Space), P (Perceptual Speed), N (Number Facility), V (Verbal Relations), M (Memory), I (Induction), and W (Word Fluency). Thurstone commented:

> So far in our work we have not found the general factor of Spearman, but our methods do not preclude it. The presence of a general factor could be indicated by a large part of the communality of each test that remains unaccounted for by the common factors identified in a simple structure. So far we have found no conclusive evidence for a general factor. (p. 7)

Thus, Thurstone offered a theory of intelligence that did not accommodate a general factor. (Figure 2 offers a Thurstonian portrait of intelligence.) Carroll (1993) criticized Thurstone for his exclusive use of orthogonal rotation, when oblique rotation would have shown many of his primary abilities to be correlated, indicating the presence of a general factor at the second order. Several researchers (e.g., Carroll, 1993) have re-analyzed Thurstone's data using various combinations of oblique and orthogonal rotation, and in most studies the variance of test scores appears evenly distributed between *g* and different combinations of group factors. Therefore, Thurstone's emphasis on group factors in explaining individual differences in intelligence may be justified, as long as they are held in equal regard to *g*.

Guilford's Structure of Intellect Model

Throughout his esteemed career, Thurstone's emphasis on primary abilities influenced many of students. He and his wife, Thelma, constructed many tests designed specifically to identify and expand the number of group factors associated with cognitive ability. Ekstrom (1979) summarized several of these studies and confirmed dozens of group and primary factors. The most fervent advocate of Thurstonian methods was J.P. Guilford at the University of Southern California. In an extensive series of studies spanning more than two decades, Guilford's Aptitude Research Project expanded Thurstone's primary abilities into the Structure of Intellect (SOI) model. Guilford largely employed a centroid method to condense each correlation matrix, and thereby carried factorization to the extreme. Guilford identified large numbers of factors, always guided by the reasonable assumption that under-factorization may lead to composite factors that cloud the true relationship between variables.

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Unlike Spearman and Thurstone, whose studies converged toward a hierarchical model of intelligence, Guilford's approach was taxonomic. In the SOI model, each factor consisted of three facets or parameters. The three facets were labeled content, operation, and product. Guilford (1967) identified four kinds of content, five types of operations, and six kinds of product, yielding 120 possible factors. (Figure 3 depicts Guilford's SOI model.) Guilford's SOI model completely disavowed the possibility of *g*, which by the 1960s had become equated for the London School [an English dominated group of researchers identified by their empirically driven, biologically grounded theory of intelligence whose ranks included Galton, Spearman, Burt, Cattell, Thomson, Eysenck, and Vernon as well as Jensen] with the biological basis of intellect (see Eysenck & Kamin, 1981). Therefore, Guilford's SOI model gained wide acceptance, especially with educators and social environmentalists who considered the possibility of a biologically based general factor unpalatable.

Cronbach and Snow (1977) criticized the SOI model on several grounds. First, the SOI model is unnecessarily complex, violating the rules of parsimony. Second, Guilford utilized orthogonal rotation methods, even when data and previous research clearly demanded oblique rotation. Third, Cronbach and Snow were unable to replicate Guilford's results upon re-analysis, prompting them to question the reliability of his instruments. Although Guilford (1985) later revised the SOI model to address these shortcomings, Carroll (1993) rejected the SOI model outright, terming it "fundamentally defective" (p. 59). Despite his vehement rejection of the SOI model, Carroll certainly found some merit in Guilford's approach. In his survey of factor analytic studies of cognitive abilities, Carroll (1993) references Guilford sixty-two times, more than any other researcher, including Carroll himself; but Carroll is very far from coming to Guilfordian conclusions.

Cattell and Horn's Model of Fluid and Crystallized Intelligence

The eminent psychologist Raymond B. Cattell was a student of Spearman; therefore, it is no surprise that he took intelligence seriously. In 1943, Cattell proposed that human intelligence is composed of two separate yet complementary factors. The first is fluid intelligence (g_f), reflecting basic reasoning abilities. The second is crystallized intelligence (g_c), indicating an individual's learning from experience (though not from specific instruction). Crystallized intelligence depends, in part, on fluid intelligence. A student of Cattell, John Horn, empirically tested the g_f/g_c theory in his doctoral dissertation in 1965. His use of Thurstonian methods not only proved the g_f/g_c dichotomy, but also disclosed six additional second-order factors, including Visualization (g_v), Working Memory Capacity (g_m), and Perceptual Speed (g_{ps}). Gustafsson (1989) has used the modern factorial method LISREL and confirmed the g_c/g_f model of intelligence clearly identifying a general factor (*g*) which is strongly related to g_c and is very close to g_f.

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The g_c $/g_f$ theory presents the first true hierarchical model of intelligence and cognitive abilities. (Figure 4 is a graphic illustration of the Horn-Cattell model of intelligence.)

Carroll's Three-Stratum Theory

In 1993, John B. Carroll undertook the massive task of re-analyzing and summarizing more than 400 high-quality data sets related to intelligence and cognitive ability. Data sets were especially selected on the basis of their broad sampling of cognitive abilities. Carroll's summary led him to posit his own theory of intelligence, a hierarchical model with three *strata* of abilities. The first stratum consists in part of narrow abilities that appear reflective of specific experiences, learning, and strategies. Examples from the first stratum include length estimation and meaningful memory. The second stratum is characterized by broad factors that represent some specialization of abilities and established traits, such as broad retrieval ability and speed of information processing. The third stratum is essentially Spearman's *g*. (Figure 5 provides a graphical representation of the proposed three-strata structure of cognitive abilities.)

Das-Naglieri PASS Theory

The Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence is the most recent factor-analytically based theory of intelligence offered to the educational and psychological community and attempts to explain individual differences within a cognitive processing framework (Naglieri, 1989). The PASS model evolved from the work of Russian psychologist A.R. Luria. According to Luria (1973), human cognitive processing involves three functional units, which work in concert, and are "necessary for any type of mental activity" (p. 43). Each functional unit is associated with a particular part of the human brain. The first unit is responsible for regulating attention and arousal. Proper states of arousal and attention are necessary for optimal mental performance (Ormrod, 1996). This first unit is associated with the brain stem, diencephalon, and medial regions of the brain. The second functional unit is responsible for simultaneous and successive processing of information. Simultaneous processing involves the integration of stimuli into groups or clusters with common characteristics. Conversely, successive processing involves the integration of stimuli into a particular series where the elements have a hierarchical or chain-like progression. The second functional unit is associated with the occipital, parietal, and temporal lobes posterior to the central sulcus. The third functional unit performs meta-cognitive duties forming, executing, and evaluating plans of action. This third functional unit is associated with the frontal lobes. These three functional units operate in concert within the context of an individual's knowledge base. In theory, the PASS processes work in concert to solve and complete nearly all tasks encountered in everyday life (Das & Naglieri, 1997).

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Processes are allocated according to the demands of the task; the individual's preferences, experiences, and motivation; and the influences of the immediate environment. Naglieri and Das operationalized the PASS model in their Cognitive Assessment System (CAS; 1997). (Figure 6 portrays the PASS model.)

Noticeably absent from the PASS model is an overarching general factor. However, independent confirmatory research (Kranzler & Weng, 1995) finds that the PASS model is inadequate in explaining variance in test scores. A hierarchical general factor is in fact needed. Ironically, the PASS tests were actually deemed to provide a superior measure of *g*: Kranzler and Weng reported, "the *g* of the PASS tests accounted for considerably more variance than the *g* of conventional IQ tests." (p. 154).

TO *g* OR NOT TO *g*, THAT IS THE QUESTION: THE EXISTENCE OF SPEARMAN'S *g*

Spearman's *g*, through custom and empirical evidence, has become the ubiquitous cornerstone of empirically based theories of intelligence. It is the reference point for most studies conducted over the past ninety years. Every factor analytic study of cognitive ability has yielded a *g*, provided the data were analyzed in such a manner as to allow a general factor to materialize. The notion of Spearman's *g* is surrounded by social, scientific, and political controversy. Therefore, a brief description of this ubiquitous general factor seems appropriate in any discussion of intelligence.

Spearman's *g* is a latent variable which apparently becomes manifest in factor analysis. The ubiquity of *g* arises from the positive manifold: the phenomenon that all mental tests correlate to some degree. Therefore, statistical and methodological considerations determine, at least in part, how "good" *g* will be in a factor analysis (Jensen & Weng, 1993). To find a good *g*, the psychological tests must be diverse with respect to content, type of response, and problem. Certainly, psychometric *g* will vary according to the reliability of the test, the number of tests, the range of participants in the sample, and the number of diverse abilities represented by the tests. However, not every general factor that arises from a factor analysis is Spearman's *g*. For example, conventional personality questionnaires do not yield a *g*. Psychometric *g* arises from a battery of cognitive tests.

Although some tests, such as Raven's Progressive Matrices, are referenced as being saturated with *g* (Jensen, 1994), every cognitive test measures *g* to some extent. There is no uniquely defining characteristic to *g* that can be expressed in psychological terms, though psychologists of the London School continue to present data showing the centrality of mental speed. Recently, Wisconsin researchers reported that inspection time (IT) performance correlated 0.63 with fluid *g* in 40 college students having a mean fluid IQ of 106; correction for restriction of IQ range (only 86-123) made the true correlation 0.74, and the researchers concluded the IT-IQ link did not just arise from visuo-spatial

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abilities (Osmon & Jackson, 2002). Tests differing in content, stimulus modality, and response modality can have identical *g*-loadings (Jensen, 1998), but the speed with which people can take in simple information has proved the most remarkable measure of a "basic" process that correlates strongly with *g*, especially in the low- and mediocre-IQ ranges (Brand, Constales, & Kane, in press).

Factor analysis is a statistical method of minimizing the number of variables under investigation while concomitantly maximizing the amount of information in the analysis (Gorsuch, 1983). This aspect of factor analysis is especially useful when the sheer amount of information in a study exceeds comprehensibility, or when certain distinctions and relationships between variables are hypothesized. Spearman regarded *g* as the "common and essential element in intelligence" (1904, p. 126).

In a comprehensive review of intelligence and theory, Brody (1992) confirms "contemporary knowledge is congruent with this belief. Contemporary psychometric analysis provides clear support for a theory that assigns fluid ability, or *g*, to a singular position at the apex of a hierarchy of abilities" (p. 349). Psychometric *g* outweighs all other factors derived from a battery of tests. It is the single most important factor in predicting scholastic and occupational achievement, as well as a host of desirable and undesirable social outcomes (Brand, 1996b, 1996c). The *g* factor is the best predictor of upward social mobility and occupational success, especially in occupations of any complexity; it is the best predictor of romantic compatibility, for people prefer partners of similar intelligence; and low levels of *g* are the best psychological predictors of delinquency in boys and out-of-wedlock births in girls.

In IQ data from around one hundred countries, Lynn and Vanhanen (2002) find that *g* and Gross Domestic Product correlate at around 0.65, a very high correlation in social science. In line with this finding, Lynn & Vanhanen's data also show a racial link. Of the world's twenty-one countries which steadily tripled their Gross Domestic Product from 1983 through 1990 and 1993 to 1996, not one was on the African mainland; whereas of the twenty-seven countries whose GDP decreased by 50% or more, ten were African (Angola, Burkina Faso, Congo, Guinea-Bissau, Libya, Madagascar, Somalia, Sudan, Zambia, and Sao Tome & Principe). [The consensus of modern work is that the average IQ in sub-Saharan Africa is not much above 70 (e.g., Rushton & Skuy, 2000).]

However, *g* is not without critics, and a number of researchers have mounted theoretical and implicit arguments to challenge its existence. As noted earlier, Guilford (1967) and Thurstone (1938) objected to the feasibility of *g* on theoretical grounds. Their positions presented genuine theoretical challenges to the actuality of psychometric *g*. To their credit, both Guilford and Thurstone submitted their respective theories to rigorous investigation (e.g., Carroll, 1968; Guilford, 1967; Spearman, 1941; Thurstone, 1938). As evidence mounted favoring the existence of a general factor, Guilford (1985) and

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Thurstone (1947) willingly conceded the likelihood of *g*. Finally, the work of Gustafsson (1989) and Carroll (1993) settled matters for all who respect empirical factoring. As Blaha and Wallbrown (1982) once observed of the most famous test of mental abilities, the Wechsler Adult Intelligence Scale (which uses a mixture of verbal, numerical, and diagrammatic problems), the *g* factor typically accounts for some three times as much variance as all other mental ability factors put together. However, most of the contemporary opponents of *g* are not prepared to accept the method of sampling populations with a good range of reliable tests and objectively factoring the results.

At Harvard University, Howard Gardner (1983) has renounced *g* in favor of a theory of multiple intelligences. Gardner's theory includes linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, and personal intelligences. These competencies may be viewed as building blocks from which behavior and actions develop. In his introductory text to the theory, *Frames of Mind*, Gardner gives his rationale for emphasizing multiple intelligences over a general factor:

> I cannot accept these correlations at face value. Nearly all the current tests are so devised as to call principally on linguistic and logical faculties…the truth is that we do not yet know how far various intelligences (or as I would now say, instantiations of various intelligences) actually correlate if at all. (p. 10)

Gardner offers no logical explanation for his rejection of *g*. In fact, a closer reading of the quotation indicates that Gardner acknowledges his intelligences are not separate constructs, but interrelated. Therefore, a general factor exists even in the context of his multiple intelligences. Gardner's own research on his theory is sparse, and usually does not support the notion of multiple intelligences, despite his heavy-handed spin of the data. For example, a recent study from his Project Zero at Harvard University consisted of forty-two children who completed tests designed to measure each of his multiple intelligences (Adams, 1993). The null hypothesis that all scores were uncorrelated with each other was rejected, indicating the presence of an underlying general factor that could account for a substantial part of the variance in test scores.

Akin to Gardner's claims of various intelligences independent of a general factor are Robert J. Sternberg's assertions of "practical intelligence," "tacit intelligence," and "creative intelligence." Much like Gardner, Sternberg's primary method of addressing the actuality of *g* is to ignore it. Investigations of his proposed constructs (e.g., Sternberg & Wagner, 1986) typically include poorly defined variables, small samples restricted in range of talent, misleading statistics (e.g., the use of R^2 instead of R as a measure of predictive efficiency), and analyses that may virtually preclude the manifestation of a general factor (Ree & Earles, 1993).

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Perhaps the most cited critic of *g* was the late Harvard biologist, Stephen J. Gould. His 1981 text, *The Mismeasure of Man*, is still widely known for its strident condemnation of *g*, as well as its personal attacks on many researchers who choose to study a general factor of intelligence. The book was well received by the general public, winning the National Book Critics Circle award. In 1996, it was re-issued as a refutation to *The Bell Curve* (Herrnstein & Murray, 1994).

The pivotal argument of *The Mismeasure of Man* is that researchers investigating individual differences in intelligence have intentionally and misleadingly reified Spearman's *g*. With immodest effrontery, Gould inaccurately paraphrased many scientists, claiming they view *g* as a "quantifiable thing" and a "single scaleable, fundamental thing residing in the human brain" (p. 259). Gould claimed this *error of reification* resulted in the "hegemony of *g*" (p. 234) as an instrument of bias and discrimination. In his own words:

> This book is about the abstraction of intelligence as a single entity, its location within the brain, its quantification as one number for each individual and the use of these numbers to rank people in a single series of worthiness, invariably to find that oppressed and disadvantaged groups—races, classes, or sexes—are innately inferior and deserve their status. (p. 25)

However, even a cursory reading of Spearman (1904), Burt (1940), and Jensen (1982) confirms that no expert in the field of factor analysis or intelligence has ever considered *g* a "thing" to be found in the human body. Fifty years before the first publication of *The Mismeasure of Man*, Burt (1940) addressed the error of reification in his text *The Factors of the Mind*. From a chapter entitled, "The Metaphysical Status of Mental Factors," Burt warned that "to speak of factors of the mind as if they existed in the same way as, but in addition to, the physical organs and tissues of the body and their properties, is assuredly indefensible and misleading" (p. 218). In a direct response to Gould's misquotations, Jensen (1982) stated:

> In the same chapter from which Gould is supposedly paraphrasing my views, I stated unequivocally that intelligence is not an entity, but a theoretical construct…which is intended to explain an observable phenomenon, normally the positive intercorrelations among all mental tests, regardless of their apparently great variety. (p. 126)

Therefore, Gould himself seems to have been the source of the error of reification, rather than Burt, Spearman, or Jensen. The funny thing is that Gould was quite happy to accept other products of factor analysis, the Thurstone-type multiple factors: it was only *g* that seemed to Gould to involve grievous philosophical error.

A growing body of research suggests that the provenance of *g* may lie not in factor analysis of mental test items, but in genetic and physical variables and in more "basic" psychological processes. Kranzler and Jensen (1991) were able to account for 54% of the variance in IQ scores using a battery of reaction time

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(RT) tasks. Vernon (1990) summarized a number of studies in which measures of *g* were regressed on subjects' RTs derived from multiple elementary cognitive tasks (ECTs). Various combinations of RT variables accounted for 22% to 56% of the variance in participants' IQ scores. Eysenck and Barrett (1985) found a rank order correlation of 0.93 between the *g* loadings of the Wechsler Adult Intelligence Scale (WAIS) and the subtests' correlations with a composite measure of the average evoked potential (AEP). Similarly, Haier (1993) reported an average correlation of -0.79 between WAIS subtest performance and glucose metabolic rate (GMR).

In effect, subjects with high IQs consumed less energy during test performance than subjects with low IQs. In vivo studies utilizing MRI measures of total brain volume have shown correlations averaging 0.40 with IQ (Jensen, 1998). Egan, Wickett, and Vernon (1995) reported a correlation of 0.48 between brain volume and IQ, with weight partialed out and corrected for restriction in range of talent. For a sample of 61 dizygotic twins, Jensen (1994) estimated the correlation between brain size and IQ to be 0.56, controlling for the effects of race, socio-economic status (SES), and environment. A recent study by Jensen and Reed (1992) involving 200 university students found that nerve conduction velocity (NCV) measured in the visual tract (i.e., the distance between the retina and the optic nerve) correlated 0.38 with scores from Raven's Progressive Matrices, a highly *g*-loaded test. In a related paper, Miller (1994) reported that the developmental growth of myelination follows the same trajectory as the growth of mental ability. Because myelin is composed of lipids and cholesterol, Benton (1995) hypothesized that *g* levels may be related to dietary variables. Using a random sample of 7,076 British citizens, Benton found that individuals consuming a high-fat diet had reaction times that were significantly faster than individuals who consumed a low-fat diet. The effect was so pronounced, at the 0.00001 *p*-level, that the RTs of white collar workers consuming low-fat diets were slower than blue collar eating high-fat diets. For most researchers in psychology, Spearman's *g* derives its importance from its behaviorally manifested relationship with educational, economic, and social outcomes. However, these studies and others (e.g., Vernon & Mori, 1990) indicate that *g* is equally grounded in a varied number of physiological and biological processes.

Therefore, far from being a statistical artifact (see Gould, 1981), *g* appears to be a material as much as a mental reality. For many years, Gould and his fellow travelers tried hard to deny that brain size was substantially correlated with IQ and also with racial differences, blacks having smaller brains though larger genitalia than whites and Asians. Especially invoked was the claim of social anthropologist Franz Boas that skull measurements differed considerably between earlier and later European migrants to the United States, suggesting that better nutrition and prenatal care could lead to big improvements in IQ and brain size. But the *New York Times* science

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correspondent Nicholas Wade reported that Boas's work had been reanalyzed (showing no difference among migrants) and could no longer be taken as a refutation of scientific racism. Apparently skull measurements can yield accurate assignment of race in as many as 80% of cases. (The substantial relations between race, IQ, and brain size were usefully summarized and updated by Rushton, 2002.) As to the "Lynn / Flynn" effect, the worldwide rise in IQ scoring in the twentieth century, this is most obviously handled as a result of increasing test sophistication rather than increasing intelligence: certainly James Flynn himself does not believe that our grandparents bordered on being mentally defective, instead maintaining that they lacked only "open-ended problem solving skills" (see Brand, 1996 and Brand, 2002). Altogether the case for thinking of *g* as firmly biologically based and racially linked remains as strong as any theory in the social sciences.

The Importance of *g* as an Educational and Social Construct

Having established the viability of *g* as a theoretical construct, the next step is to assess *g*'s practical validity. Establishing the practical importance of *g* is crucial if educators and researchers are to accept it as an explanatory concept in psychology. However, this task is not as easy as one would expect. The immutable and biological basis theorized for *g* attracts a host of detractors. Whether from political beliefs, social-environmental doctrines, or egalitarian fancifulness, the social and educational importance of Spearman's *g* is regularly disputed. Noted researchers such as Flynn (1999), Gardner (1983), Ceci (1991), and Fraser (1995) have each tried to diminish *g* as an influential agent in educational and occupational attainment. Yet their criticisms and alternative hypotheses pale in comparison to the empirical support for the very real and practical importance of the general factor. Large-scale meta-analyses reveal that *g* is the primary predictor for occupational success in the U.S. Schmidt, Ones, and Hunter (1992) surveyed the causes of promotability among occupations in the private and public sectors. Their results indicate that *g* is the singular factor offering any predictive validity. Their results also indicate that many skilled and professional jobs have a de facto minimal requirement of *g* for entry. Below certain levels of *g*, it is virtually impossible for an individual to gain access to some occupations (e.g., attorney, teacher, and doctor). Therefore, to a large degree, *g* is related to personal success and economic prosperity.

As detailed in *The Bell Curve* (Hernnstein & Murray, 1994), *g* may also account for a host of undesirable social outcomes. It has long been acknowledged that the average IQ of convicted criminals in the U.S. is on the order of 85. Simply stated, individuals who find themselves adjudicated within the court system have made poor judgments reflective of poor problem-solving ability and low levels of Spearman's *g*. This consideration has some interesting implications beyond the immediate field of psychology. In light of this finding,

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when sociologists consider the robust relationship between IQ and criminality, the sociological problem of “black” or minority criminality becomes a moot point: black crime rates are no higher than what might be expected given the distribution of *g* in the black population (Gordon, 1987). Similarly, Spearman’s *g* also casts a new light on the problem of juvenile delinquency. Criminality among youth has often been attributed to a complex constellation of environmental variables such as poor parenting practices, television violence, low SES, and inadequate community resources. The causal role of *g* is rarely examined, despite a wealth of compelling research. For example, Yoshikawa (1994) estimated that 74% of the reported crimes by delinquents were committed by children with IQs between 70 and 100. Impartial minds should find no surprise that group differences in crime rates parallel group differences in intelligence. Herrnstein and Wilson (1986) brought such parallels into sharp focus:

> During the 1960s, one neighborhood in San Francisco had the lowest income, the highest unemployment rate, the least educational attainment, the highest tuberculosis rate, and the highest proportion of substandardized housing. That neighborhood was Chinatown. Yet in 1965, there were only five persons of Chinese ancestry committed to prison in the entire state of California. (p. 86)

Strangely, liberal-minded politicians and sociologists seem to have abandoned affirmative action when it comes to punishing society’s most dangerous criminals. Contrary to the notion that blacks are executed more often than whites, the actual data indicate that whites are far more likely to be executed than blacks. In fact, if such proportions were evidenced in the workplace, they would be considered violations of law.

Obviously, *g* is not the sole agent in explaining criminality. Environmental influences often play a detectable part in accounting for desired and undesired societal outcomes, not least in interaction with genetic factors. But genetic factors were unduly played down in post-1945 Western thought (see Pinker, 2002; Brand, 2003), and *g* in particular is certainly more important than most egalitarian researchers would care to admit. This is especially true when active genetic-environmental covariation is considered. People actively select their environments and social settings. Individuals with higher levels of Spearman’s *g* may select immediate environments that are conducive to productive and positive social choices, while individuals poorly endowed with *g* may make more destructive personal choices. On a more intimate note, it is a well-accepted finding that individuals seek the friendship and romantic attachment of others with similar *g* levels. Rather than adhering to the chimerical notion that intellectual differences are exotically attractive or inspiring, most people find some comfort in social environments occupied by people similar to themselves in intelligence. From a purely practical standpoint, such cognitive similarity may aid in mutual communication and understanding. The selection of like-minded companionship begins early. Silverman (1993) notes that gifted children often seek the company of children who are older, yet cognitively

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similar, to themselves. Gross (1994) also documented that trends in assortative mating usually indicate a tendency for adults to choose intellectually similar spouses and friends.

As one would expect, the importance of *g* is most evident in educational settings. Courts and classrooms have struggled valiantly to address the perceived injustice of minority overrepresentation in special education, even going so far as to declare a moratorium on intelligence testing of blacks (e.g., *Larry P. v. Riles*). Several researchers (e.g., Ogbu, 1999) opt to abandon laws of parsimony in search of an unidentified "variable x" that may offer alternative explanations for minority achievement. Such controversies become moot when the impartial mind considers general intelligence instead of skin color. Stated differently, when only general intelligence is considered, black students are not overrepresented in special education classes. Nor are they underrepresented in classes for the gifted. Simple descriptive statistics prove this point. The usual cutoff score for a child to be considered gifted is an IQ of 130, or two standard deviations above the mean IQ of 100. The average IQ of American blacks is 85. Whereas 2% of the white population makes this cutoff, only 0.13% of the black population falls into this category. The implications of *g* are even more dramatic at the opposite end of the intellectual spectrum. Approximately 16% of blacks meet the intellectual criteria for classification as mentally retarded. A wealth of research in education and psychology reveals that children's *g* levels dictate the most appropriate instructional methods. School children with higher levels of *g* grasp content more quickly and are able to generalize beyond the context of the immediate instruction (Brand, 1996). Simply stated, individual differences in *g* account for many of the observed individual differences in achievement. Making his first big mark as a psychometrician-psychologist, A.R. Jensen (1969), in his critique of intervention programs and Head Start, noted

> If diversity of mental abilities…is a basic fact of human nature…and if the idea of universal education is to be successfully pursued, it seems a reasonable conclusion that schools and society must provide a range and diversity of educational methods, programs, goals, and educational opportunities, just as wide as the range of human abilities (p. 117).

The obvious diversity of children's intellectual capacities argues forcefully for ability grouping. Even in the midst of trends favoring smaller class sizes, it is the range of *g* levels of the students that determines the effectiveness of teaching. For example, class sizes in Britain and the U.S. are typically a third of what they were fifty years ago, when homogenous ability grouping (i.e., grouping according to a child's intelligence level) was standard practice. Yet, both nations, favoring heterogeneous ability grouping on the premise of equality of opportunity, document a decline in achievement compared to other nations. The practical reality is that in classrooms of heterogeneous grouping, instruction is oriented to the average learner, consequently placing the most

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and least able students at an educative disadvantage. In effect, the most able students sacrifice valuable instruction time and end up teaching the least able. While philosophical trends among educationists still favor the inclusion of even the most exceptional children into the same academic track (Freytag, 2001), there is good empirical evidence favoring grouping (Brand, 1998). Thus it is no surprise that Britain's moderate "New Labour" government, from 1997, backed "fast track learning" and kindred concepts in the teeth of opposition from educational experts and teachers' unions and produced in 2002 a major national ability-grouping initiative organized by The National Academy for Gifted and Talented Youth at the University of Warwick and linking to several other English universities (http://www.warwick.ac.uk/gifted/about.html).

Philosophers and educationists may say that educational choices are as much a matter of morality as they are of empirical findings: many of them wish to use the schools to provide the egalitarian input to Western society that was once provided by religion. However, when educators neglect *g* in educational grouping and methods, the result is nothing short of educational deprivation for children of many levels of intelligence. Thus to acknowledge the importance of Spearman's *g* is itself both a moral and empirical imperative. To quote Thomas Jefferson, "Nothing is so unequal as the equal treatment of unequal people."

Summary

Various theories of psychometric intelligence offer insights into the nature of cognitive abilities. These theories also provide a means for understanding personal and societal outcomes. Central to any empirically based model of intelligence is the crucial position and function of Spearman's *g* factor. Spearman's *g* routinely accounts for more variance than all other cognitive factors combined, and therefore assumes a position of hierarchical prominence in any model depicting the structure of human cognitive abilities.

Although egalitarians resist the obvious, Western societies are increasingly dependent upon Spearman's *g* as a causal factor in educational and societal outcomes. The relationship of *g* to occupational and educational attainment is so large as to effectively stratify society according to IQ. When egalitarian fallacies are set aside, the ubiquity of *g* is obvious. As Scarr (1985) noted "…there are few human endeavors that could not be included in the domain of intelligence, if one considered all of the correlates of '*g*'." Because of a reluctance of some researchers to discuss a construct that accentuates individual differences rather than individual equalities, Spearman's *g* has become one of the best-kept secrets in science and education. As global societies continue their movement toward technology-based economies, intelligence and Spearman's *g* will become increasingly important in discussions of education and public policy. Therefore, the salient issue is not the existence or importance of intelligence and its constituent factors, but rather whether policy makers will accept its impact on reality.

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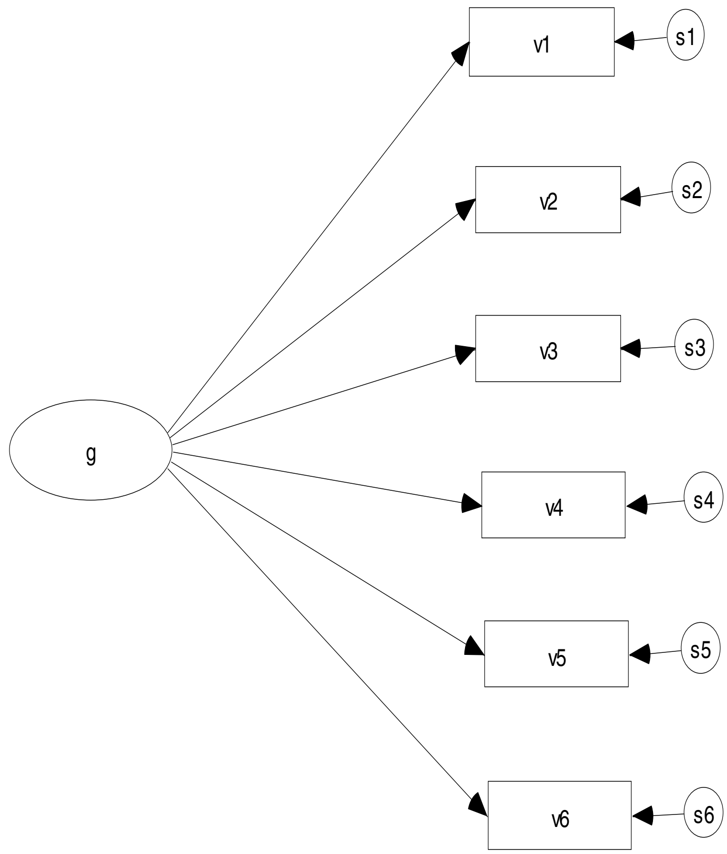

Figure 1. Spearman-Holzinger Model of Intelligence.
This simple model poses a single general factor (g)
and several specific factors (s) specific to each

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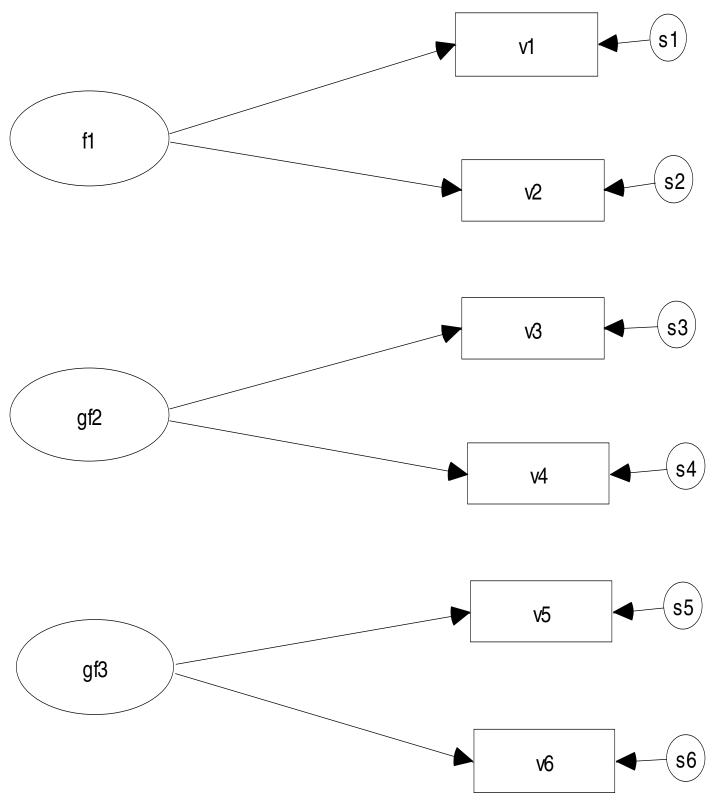

Figure 2. Thurstone Model of Intelligence.
This multiple factor model poses a number of
group factors (f) with the exclusion of
a single general factor (g).

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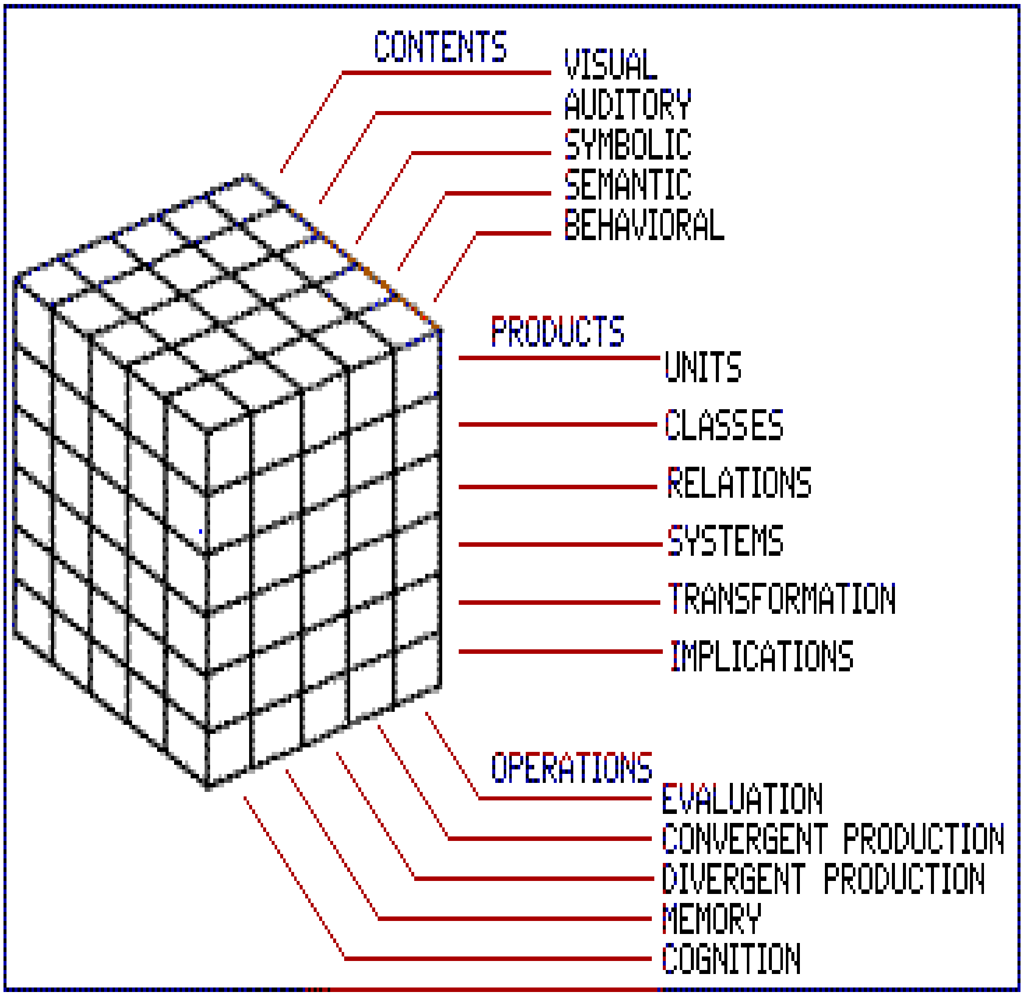

Figure 3. Guilford's Structure of Intellect (SOI) Model of Intelligence. This taxonomic model offers that each distinct mental ability is created by specific facets (Content, Operations, and Product). The SOI model marks a vast departure from other factor analytic models in that it does not accommodate group abilities or a general factor.

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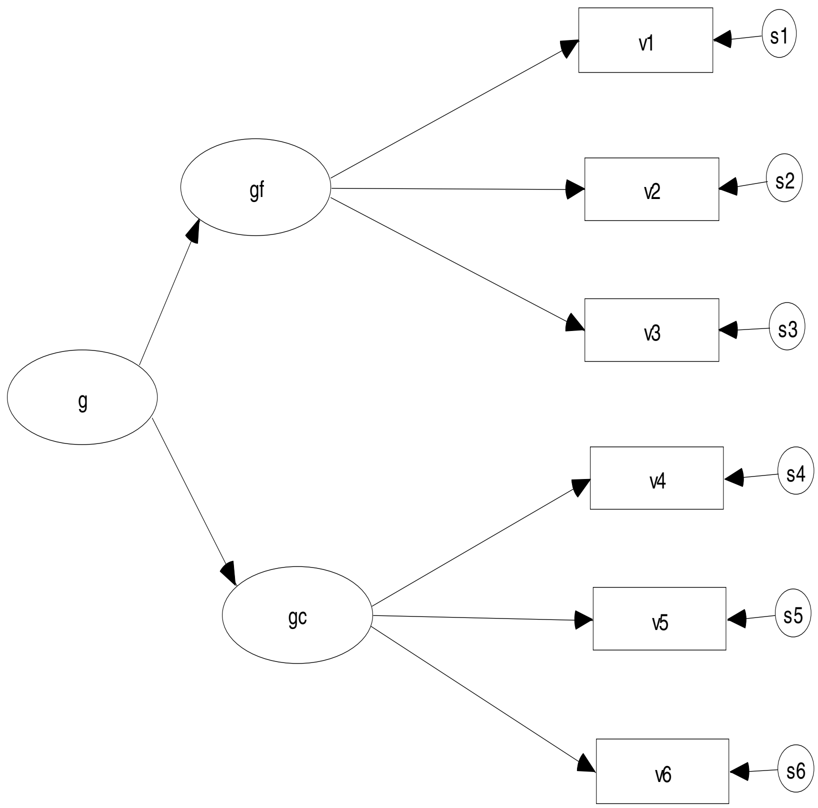

Figure 4. Horn-Cattell Model of Intelligence.
In its purest form, this multiple model poses a broad dichotomy of fluid (gf) and crystallized (gc) abilities and a single general factor (g).

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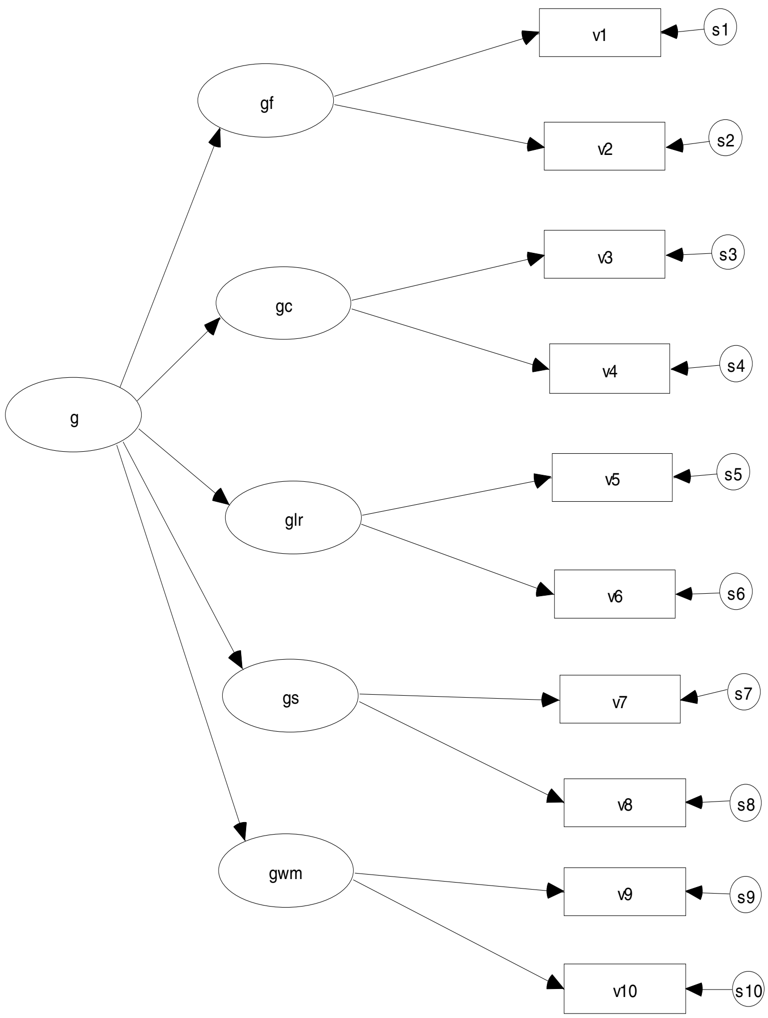

Figure 5. Carroll's Three Stratum Model of Intelligence.
This hierarchical model poses a number of
second-order group factors such as fluid ability (gf),
crystallized ability (gc), processing speed (gs),
working memory (gwm)and long-term memory retrieval (glr).
These multiple factors are subsumed by an overarching
general factor (g).

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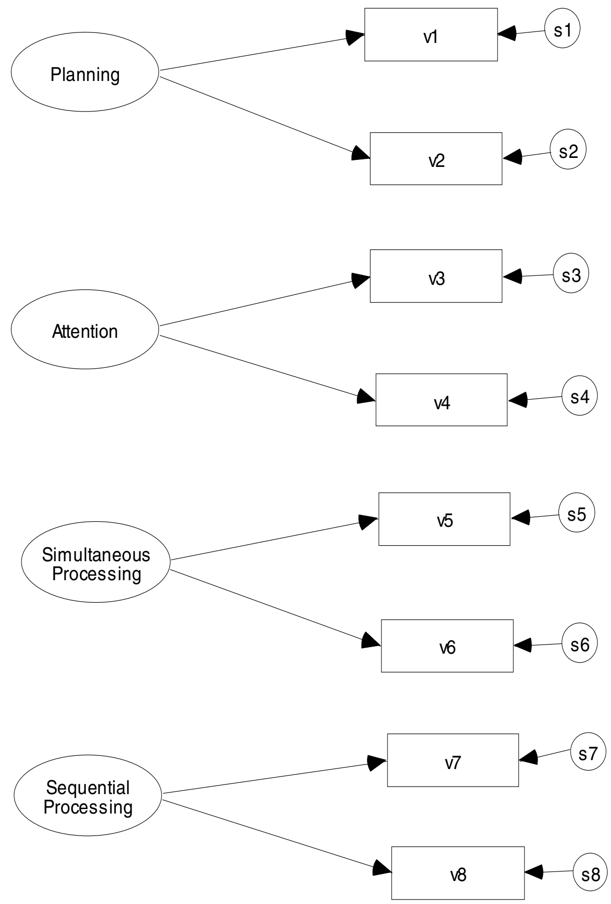

Figure 6. Das-Naglieri PASS Model of Intelligence. This model poses four factors that are directly related to specific neurological functions that are required for all cognitive activity. Although these processes are theoretically assumed to work in concert, no general factor (g) is offered as an explanative source of variance.

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Pan-European Genetic Interests

Ethno-States, Kinship Preservation, and the End of Politics

Michael Rienzi

White gentiles of European descent, unlike all other groups, seem to demand objective, rather than subjective, justification for ethnoracial preservation. Thus, white racial nationalists have long desired to see an objective work that justifies a defense by whites of their racial interests. The wait is now over.

Dr. Frank Salter, a political ethologist with the Max Planck Society, Department of Human Ethology, has recently published just such an analysis.[1] As we are well aware, typical discussions about these topics usually center around issues which Dr. Salter terms "proximate," e.g., economics, crime and security, culture, etc. Completely lacking in such discussions is concern for what can be termed the "ultimate" interest: "genetic continuity." It is this ultimate interest which is the focus of Salter's work, the central question of which is asked in the very first sentence: "Does ethnic competition over territory pay off in terms of reproductive fitness?"

Crucial for the survival and propagation of an ethny is a definite territory in which to live and successfully reproduce. According to Salter: "The special quality of a defended territory is that it insulates a population from the vicissitudes of demographic disturbances...." Thus, the acquisition and defense of territory became an integral part of the tribal strategy of humans. In the long run, only territory can ensure survival, and human history is replete with conflicts of groups expanding and contracting, conquering or being conquered, migrating or being displaced by migrants. The loss of territory can result in ethnic diminishment or destruction, with the consequent negative effects on the native's genetic fitness interests. To objectively measure the extent of this negative genetic impact, a quantitative analysis is required.

Salter's quantitative analysis of ethnic genetic interests depends on the concept of genetic kinship, a relative term which defines genetic relatedness as compared to the genetic background of a random population. Thus, even though all humans share many genes, genetic kinship measures the genetic similarities and differences above and beyond this general gene sharing. Kinship values can be either positive or negative; if individuals (or groups) share more genes than is typical of the population, then the kinship is positive; if they share fewer genes than on average, then the kinship is negative.

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