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## Editors' introduction: Contemporary perspectives on the psychology of individual differences.

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Editors' Introduction: Contemporary Perspectives on the Psychology of Individual Differences

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Human beings have tended to describe their uniqueness in two ways. They can be distinguished from all other life forms on this planet by the very fact that they are the most intellectually developed species in the animal kingdom. However, this uniformity within human kind is further characterised by a vast range of individual differences. It is this uniqueness that has held the greatest fascination as evidenced through many forms of historical documentation. Individual differences in personality and motivation were variously attributed to the “will of the gods” or Galen’s four bodily humours, and explanations for variability in human abilities and behaviours were forthcoming from the religions and social philosophies of the day. None of these descriptions or explanations appears to be grounded in the scientific method, although some do lend themselves to being “tested” within such a framework.

In contrast, the *scientific* study of individual differences is a relatively young field of investigation, which received considerable impetus from the pioneering studies of Sir Francis Galton during the 19<sup>th</sup> century. In the formative years of psychology as the scientific study of human behaviour, following the establishment of Wundt’s laboratory in Leipzig, Germany in the 1860’s, correlational and experimental studies were initiated to describe and explain a limited range of individual differences in mental and physical abilities. Today, the discipline and profession of psychology has not only been thriving in the western world, but is essentially represented in all countries. While the foundation for a scientific psychology is now well over a hundred years old, the systematic examination by psychologists of individual differences has only “come of age” during the latter half of the 20<sup>th</sup> century with a proliferation of research publications in scholarly and scientific peer-reviewed journals throughout the world. Books reporting empirical findings in individual differences were published by psychologists such as Lee Cronbach (1960) and Anne Anastasi (1965) some 40 years ago, later followed by numerous other books providing many international examples of the kind and extent of this research and its applications (see Saklofske & Eysenck, 1988).

However it was the significant impact of published empirical research by such eminent psychologists as Professors H. J. Eysenck, R. B. Cattell, and A. R. Jensen that has especially served to establish the legitimacy and importance of the study of individual differences in a comprehensive description of human behaviour. In the early 1980’s, Professor Hans Eysenck and Dr. Sybil Eysenck invited their psychological colleagues from around the world with a shared interest in the study of personality and individual differences to meet in London, UK; the

outcome was the creation of the *International Society for the Study of Individual Differences* (ISSID) and publication of the journal, *Personality and Individual Differences*. Other research societies devoted to the scientific study of personality and individual differences include the *European Association of Personality Psychology* (EAPP), the *Society for Personality and Social Psychology* (SPSP), the *Society for Personality Assessment* (SPA), the *International Society for the Study of Personality Disorders* (ISSPD), and *APA Division 8 - Personality and Social Psychology*. The impact of individual differences is now pervasive in psychology and is seen to hold a central position in psychological theory, research, and practice. Furthermore, interest in individual differences is not limited only to western psychology but may be increasingly observed in the eastern psychological literature emanating from countries such as China. This focus on individual differences now encapsulates the study of intelligence, cognition, personality, and motivation, and is essential to the application of psychology in applied fields such as health, education, work, sports, the military, and within a wide variety of other human settings and contexts.

The intent of this boxed set is to provide a representative sampling of some of the best basic and applied research relevant to the study of individual differences. We elected to develop four volumes; the first two of which focus on individual differences in intelligence and cognition, and in personality structure, respectively. The third volume examines the relationships between cognition, emotion, and conation, while the fourth volume contains articles and book chapters that highlight the relationships and relevance of individual differences to the broad fields of clinical and applied psychology. The task of selecting only 80 key publications that would encapsulate this multifaceted perspective of personality and individual differences was challenging, given that there are literally thousands of published research articles that are pertinent. Nevertheless, this difficult task of selecting some of the most important articles and providing an assessment/overview of their significance in the broader context was based on several important objective criteria.

#### Criteria for article selection

Firstly, articles based on empirical research have been included in the present integration. We were unwilling to include articles pertaining to individual differences that were based predominantly on subjective armchair theorising and opinion. Scientific psychology must often compete with "pop-psychology," as well as pseudosciences such as astrology, and other such introspective speculations. We are committed to only including articles that are grounded in the

best tradition of scientific psychology, although at times, this distinction may become somewhat “grey.” For example, classical psychoanalytic and psychodynamic approaches to personality cannot easily be put to the empirical test, although Kline (1972) in *Fact and fantasy in Freudian theory* attempted such an analysis, based mainly on the collection of data from projective personality measures. While Silver (2001) argued for the utility of projective measures such as the Rorschach Inkblot Test and the Draw-A-Person Test in clinical assessment and diagnosis, there is little sound empirical support for either measure (e.g., Lilienfeld, Wood, & Garb, 2000, 2001). Regrettably, projective measures have very low reliability and validity, with coefficients around 0.2, making the testing of psychoanalytic hypotheses related to diagnosis and treatment well nigh impossible (cf. Kline, 1972).

At the same time as we are aware of the appeal to non-scientists of alternative, speculative and non-empirically based assertions regarding individual differences, we must also express our dismay that psychologists may not always pay attention to our research (Arkes, 2003). We are hopeful that this four-volume compilation containing some of the best research studies in personality and individual differences will whet the appetite for more information by readers.

Secondly, in order to present the reader with up-to-date material, articles published during the past two decades have been selected for our boxed set. While there is a plethora of “classical” articles in the personality and individual differences fields, many of these are now mainly of historical interest, and do not help to advance our knowledge of individual differences at either the level of research or application. In large part, this is because they have already served their intended purposes. Inclusion of more recent or contemporary articles based on empirical research studies serves to keep the reader up-to-date on the latest state-of-the-art (and science) findings in the field. At the same time, we recognise that factual historical accounts are relevant to a sound, contextually based understanding of current thinking and practices, and therefore we have also included some recently published papers of this kind.

Thirdly, wherever possible, articles were selected on the basis of their citation impact ratings as indexed in the *Social Sciences Citation Index*. When deciding between two or more equally relevant articles, the one with the higher citation impact rating was selected. This ensured that only the most important and significant findings in the field are included in these four volumes. Furthermore, many articles published in top-ranked journals with high citation impact ratings were selected because they tend to be based on empirical findings, and are usually relatively

concise and well focused, integrating the literature, theory, and data collection and analyses necessary for the advancement of knowledge about individual differences. All these articles have undergone the scrutiny of both initial peer review and then continued critical appraisal by the field of research and practicing psychologists. In only a few instances, less often cited papers were included because they presented a contemporary and insightful perspective on an area mired by controversy.

Fourthly, several critical literature reviews have been included, in order help the reader to discriminate effectively between competing theories and models. Many compilations of the psychological literature have competently summarised various theoretical models of individual differences, but have often failed to evaluate one theoretical or measurement model against another. The present four-volume boxed set provides sufficient critical commentaries to enable the reader to make the necessary discriminations and evaluations of the differing theoretical models and measurement approaches.

#### Rational for the four volumes

The scientific study of individual differences is directly based on the psychometric model (see Kline, 1979, 1980) wherein the combined interaction of several cognitive and non-cognitive intrapersonal psychological variables operating simultaneously within a particular environmental context, bring about a behavioural outcome. The Cattellian behavioural specification equation (most recently elaborated by Cattell, Boyle, & Chant, 2002, Vol. 3, No. 20, in *Psychological Bulletin*) sets out a quantitative formulation of the psychometric model, such that behaviour is a function of individual differences in cognitive/intellectual abilities, normal and abnormal personality traits, dynamic motivational traits, and transitory mood states, in addition to socio-environmental variability (cf. Boyle, 1988b).

In determining which articles to include in each of the four volumes, we also sought expert advice from several internationally renowned colleagues, including Len Horowitz from Stanford University, Peter Salovey and Bob Sternberg from Yale University, Andy Comrey and Albert Mehrabian from the University of California-Los Angeles, Lazar Stankov from the University of Sydney, Jack Block from the University of California-Berkeley, Charles Spielberger from the University of South Florida, Adrian Raine from the University of Southern California, Ephrem Fernandez from Southern Methodist University, Julian Stanley from Johns Hopkins University, Linda Gottfredson from the University of Delaware, Howard Gardner from Harvard University,

Gordon Claridge from Oxford University, and Ian Deary from the University of Edinburgh, to mention but a few. We are grateful for the many excellent suggestions given by our colleagues. In addition, we wish to acknowledge the constructive role that Michael Carmichael, Senior Editor, Research Methods and Psychology at Sage in London has played in providing ongoing support and encouragement for all our endeavours in completing this exciting, but multifaceted and onerous task.

### Overview of the four volumes

We have selected and included a sampling of seminal research articles involving fresh empirical work that examines both classical and contemporary issues published in mostly high impact international journals. We have attempted to provide an evaluation of these empirical findings by also including a number of critical review articles, along with a small number of integrative book chapters, thereby bringing together many of the major contributions within the individual differences field. Our four-volume boxed set of key readings focuses on contemporary research findings, tacitly recognising that we cannot advance the *scientific* understanding of personality and individual differences by adhering slavishly to speculative, introspective arm-chair theories of the past, or to the current wave of "pop-psychology" publications.

In this opening chapter, we present an overview of the study of individual differences in intrapersonal psychological constructs, thereby providing a framework for the subsequent readings. Each of the 80 research articles is briefly discussed in this introduction, and its importance to the field is highlighted, so that the reader might be better able to integrate the various studies and to develop a critical awareness of the present state of play within the personality and individual differences fields.

## Individual Differences Defined

### What are Individual Differences?

The psychology of individual differences involves the study of psychological constructs and their interaction with environmental stimuli and resultant observable behaviours. This definition applies both to animal behaviour (comparative psychology) and to human behaviour more generally. However, the focus of our present compilation of research articles is on individual differences related only to human behaviour. While intrapersonal psychological constructs such as anxiety or depression cannot be observed directly, they can be inferred from behaviours emitted by the organism. Nonetheless, as already alluded to above, several different types of

constructs including intellectual abilities, personality traits, motivational dynamics, and emotional states all interact to impact on behavioural outcomes. Ultimately, these individual differences in psychological constructs relate to neuropsychological differences in brain functioning (Vernon, 1993; Zuckerman, 1991).

Individual differences play such a critically important role in everyday situations, that routine psychological testing has become prominent in recent years, especially in the United States. Administration of standardised tests such as the SAT, GRE, LSAT, MCAT, is now commonplace in the meritocratic selection of students for admission to university educational programs. Both in Canada and the US, legislation has shaped public education systems through the routine implementation of large-scale, high stakes testing programs that are also linked to school accountability. Accordingly, it behooves us to have a clear understanding of the strengths and weaknesses of the various theories and models of individual differences, and their related measurement instruments. All too often, psychological research into individual differences has not effectively discriminated between competing theories and models, due to failure to obtain quantitative measurement data needed to test hypotheses.

### Methodology

The study of individual differences is based on scientific analysis (e.g., see Kline & Cattell, 1977). Clearly, measurement is the *sine qua non* of any scientific enterprise. Rather than subjective "armchair" speculation, we have included several articles that utilise empirically-based psychological measurement as the starting point for subsequent statistical analyses. Hypotheses arising out of theories or models of individual differences must be able to be put to the empirical test, in order to advance our present state of psychological knowledge. As we have emphasised above, those theories and models derived from subjective theorising, often cannot easily be tested empirically.

Having accepted the central role of psychological measurement in undertaking empirical research into individual differences, the issue of the adequacy of existing psychometric measurement instruments is also of critical importance. Not only is the general reliability and validity of scales important, but also, at least in relation to psychological test construction, the factor structure of instruments is a fundamental issue. For example, many personality questionnaires, such as the *Sixteen Personality Factor Questionnaire - 16PF* (Cattell, Eber, & Tatsuoka, 1970), or the *Eysenck Personality Questionnaire-Revised - EPQ-R* (Eysenck & Eysenck, 1991), have been

constructed using factor analytic methodology. The application of exploratory factor analysis can be problematic, if simple structure solutions are not specifically sought (see Boyle & Stanley, 1986; Boyle, Stankov, & Cattell, 1995 – Vol. 2, No. 14). All too often, research reports within the individual differences field have been based on methodologically inadequate factor analytic procedures which produce only crude approximations to the actual factor structure of test instruments (see Cattell, 1978; Child, 1990; Gorsuch, 1983).

In addition, all too often, the finding of a very high Cronbach alpha coefficient is interpreted as "evidence" that a scale has good "internal reliability" (see Boyle, 1991a). However, a scale comprised of many items that are mere paraphrases of each other will necessarily generate high alpha coefficients, but this is due to the "item redundancy" contained within the scale rather than to "internal reliability." For example, there is a considerable difference in test validity and clinical utility between two highly reliable scales assessing self-reported depression when one is simply based on variations on the same question of mood (e.g., "I often feel sad," "I frequently feel unhappy," "I am not a happy person") versus another measure that assesses the range of depressive symptoms as described in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; APA, 1994). Simple interpretations of alpha coefficients in terms of "internal reliability" may reflect unwarranted value judgments. The measurement of individual differences must be based on scientifically valid methodology if the field is to advance beyond its present level.

In addition, multivariate experimental research enables a more realistic investigation of individual differences, as compared with simpler univariate methods that cannot take into account the full complexity of the simultaneous interactions between intrapersonal and extrapersonal variables in producing resultant behavioural outcomes (Boyle, 1991b). While both correlational and experimental research may each contribute valuable information, multivariate approaches including structural equation modeling (SEM), are essential for developing a theoretically robust and clinically meaningful description of individual differences (Boyle, Borg, Falzon, & Baglioni, Jr., 1995; Boyle et al., 1995 - Vol. 2, No. 14). For example, structural equation modeling has yielded a clearer suggestion that emotional intelligence and alexithymia are distinct but highly correlated constructs (Saklofske, Austin, & Minski, 2003).

Research into individual differences has been hindered by the problem of elucidating a generally agreed upon taxonomy of psychological constructs. There have been many attempts to derive

such a universally agreed upon taxonomy of trait and state dimensions, but much controversy still exists as to the major dimensions within each of the ability, personality trait, dynamic motivation, and transitory mood state domains. For example, the issue of the normal personality trait dimensions, presented in Volume 2 could be no more contentious than is currently the case. Several investigators have derived varying numbers of purported trait dimensions, each claiming that his/her particular taxonomy is more valid than that put forward by other researchers.

### **Volume 1 - Individual Differences in Cognitive/Intellectual Abilities**

The history of intelligence testing is replete with examples of both the utility and misuse of intelligence tests (e.g., see Block & Dworkin, 1976; Herrnstein & Murray, 1994; Jensen, 1980). While intelligence tests continue to be among the most often used individual and group measures, there is certainly disagreement within the professional ranks of psychology and even greater misunderstanding of the intelligence construct and its measurement among the general public. In order to provide a factual history to the highly regarded Wechsler Intelligence Scales, we have included an up-to-date account of the development of the earlier Wechsler-Bellevue Intelligence Scale (forerunner of the modern WAIS-III, WISC-III, WPPSI-III, etc.) with its separation of verbal and performance subscales (see Boake, 2002 - Vol. 1, No. 19).

#### The structure of intelligence: One, some, or many factors?

Historically, in the early part of the 20<sup>th</sup> century, Spearman differentiated between a general factor of intelligence (g), and specific factors (s)--see Brody (1992). This dual description has been maintained, extended and refined up to the present day (Gottfredson, 1997a,b - Vol. 1, Nos. 12 & 13). A major refinement and extension was delivered in the theory of fluid (Gf) and crystallised (Gc) intelligence, a distinction that was shown empirically to have invariance right across the age range (Horn & McArdle, 1992 - Vol. 1 No. 4). During the past decade, this Gf-Gc model has been further elaborated for example by Boyle (1988a), wherein several additional higher order ability factors have been highlighted, including visualisation capacity (Gv), auditory organisation (Ga), perceptual speed (Gps), memory capacity (Gm), and retrieval capacity (Gr). The detailed taxonomic investigation of human intellectual structure has progressed rapidly during the past century, and now it is generally recognised that some 30-40 primary ability factors are needed rather than the seven originally proposed by Thurstone in the 1940s (see Cattell, 1987). The Gf-Gc theory, together with the factor analytic results described by Carroll (1993), often referred to as the Cattell-Horn-Carroll model, has provided the foundation for newer intelligence tests such

as the *Woodcock-Johnson III Tests of Cognitive Abilities* (Woodcock, McGrew, & Mather, 2001). At the same time, it is also noteworthy that all intelligence tests that tap more cognitively complex abilities, whether the *Wechsler Intelligence Scales for Children* or WISC-III (e.g., Sattler & Saklofske, 2001) or the *Woodcock-Johnson III*, all yield a higher-order general mental ability factor. The question for clinicians is more related to how meaningful a full scale IQ score is, in spite of its greater reliability, in contrast to an analysis of separate subtest scores that have greater specificity (see Prifitera & Saklofske, 1988).

Certainly, how we study intelligence in relation to research design, methodology and statistical analyses will have a major impact on the kind and number of factors that are identified. Models and paradigms in individual differences' research into cognitive abilities have been discussed at length (e.g., Cattell, 1986; Detterman, 1994; Saklofske & Zeidner, 1995). More recently, Stankov et al. (1995 - Vol. 1, No. 7) reviewed the empirical research literature pertaining to individual differences in intelligence, and examined several different models. They concluded that the Gf-Gc theory of fluid and crystallised intelligence remains a central focal point for contemporary ability research (cf. Snow 1981).

#### Reaction and inspection time

Various experimental studies involving inspection time (IT), and reaction time (RT), have been undertaken by Jensen and his colleagues (also see Deary, 1993; Eysenck, 1986). Jensen (1987 – Vol. 1, No. 1) investigated the relationship between psychometric g (measured by the Raven's Advanced Progressive Matrices) and individual differences in processing some elementary cognitive tasks (cf. Stankov et al., 1995 – Vol. 1, No. 7). Jensen found that although the general factor (g) predominated, individual differences in separate component processes were still discernible, showing that the general ability factor alone cannot adequately account for performance on cognitive tasks. This finding speaks against the simple interpretation of IQ scores, since clearly individual differences in a whole gamut of separate ability factors are critically important. In the article by Kranzler and Jensen (1989 – Vol. 1, No. 2), a meta-analysis of general intelligence (IQ scores) and inspection time was carried out. Results showed that the relationship between inspection time and IQ appears to be relatively constant across samples of children, adults, and cognitively impaired individuals. Subsequently, Kranzler and Jensen investigated the role of individual differences in psychometric g or general intelligence (IQ scores), showing the importance of separate cognitive processes such as visual search speed and memory speed.

Although many investigators have focused primarily on speed of mental processing and reaction time in their experiments, Stankov and Roberts (1997 - Vol. 1, No. 15) showed that mental speed is not really the basic process of intellectual functioning. Indeed, they have correctly pointed out that much of the “human intelligence research has unjustly overemphasised the role played by mental speed.” (p. 69).

#### Intelligence across the lifespan

The stability of individual differences in intellectual ability across the entire age span has been amply demonstrated. For example, Horn and McArdle (1992 - Vol. 1, No. 4) undertook multiple group factoring and structural equation modeling analyses of abilities measured in the *Wechsler Adult Intelligence Scale* (WAIS-R) across four separate age groups (Young, Adult, Middle, Old). Deary, Whalley, Lemmon, Crawford, & Starr (2000; Vol. 1, No. 18) administered the Moray House Test of mental abilities to adults aged 77 years who had previously all taken the same intelligence test at age 11 years. A test-retest correlation of 0.73 (corrected for attenuation) was reported across the 66-year time interval, suggesting considerable stability in intelligence test scores over the human lifespan. Clearly, such high correlations should not be interpreted as suggesting that IQ scores remain fixed and immutable, whether as a function of age or other conditions (e.g., traumatic brain injury, schizophrenia). It is well known that some cognitive abilities such as vocabulary scores, are more resilient to the effects of aging, all things being equal, than are others such as processing speed and non-verbal spatial reasoning abilities. What is remarkable is that after early childhood, test scores become quite stable and the factor structure reflected in tests such as the WAIS-III tend to hold up across the life span (cf. Deary et al., 2000 - Vol. 1, No. 18).

While there is considerable stability in intelligence test scores after early childhood, there is evidence of cognitive decline with age or as a result of brain injury. The issue of reserve brain capacity following brain injury has been discussed in terms of a threshold theory for acquired brain injury (see Satz, 1993 - Vol. 1, No. 6). Thus, the onset of clinical symptoms, or expression of impaired test performance following brain injury may be dependent upon the intellectual capabilities of the individual prior to acquiring the brain injury. While the notions of reserve brain capacity and threshold concepts are not themselves new, Satz has provided a formal integration of both concepts into a more wholistic theory, thereby facilitating future empirical

research into the effects of acquired brain injury on cognitive functioning, personality, motivation, and emotions.

### Causal factors

The important role that genetic factors play in intellectual abilities is a long standing arena for discussion and debate (Halpern & Cass, 1994). Reviewing data from twin studies, Bouchard (1998 - Vol. 1, No. 17) estimated the relative contribution of genetic and environmental influences on both general intelligence and special mental abilities (such as verbal, spatial, perceptual speed and accuracy, memory). He reported heritability estimates respectively in the order of 0.60-0.80 and about 0.50, suggesting that, "Genetic factors strongly influence special mental abilities but less than for general intelligence." (p. 273). While these findings do not dismiss the critical importance of environmental factors and such personal factors as motivation and self-efficacy in understanding the "causes" of intelligence, they certainly negate an extremist "tabula rasa" viewpoint.

Raine, Reynolds, Venables, and Mednick (2002 - Vol. 1, No. 20) investigated the relationship between stimulation-seeking behaviour among three-year old children and their subsequent intellectual development at age 11 years. They reported that "High 3-year old stimulation seekers scored 12 points higher on total IQ at age 11 compared with low stimulation seekers and also had superior scholastic and reading ability...young stimulation seekers create for themselves an enriched environment that stimulates cognitive development." (p. 663). This finding linking temperament, personality and intelligence provides further support for exploring the interface between these major variables in a description of individual differences.

### Is there a consensus about intelligence amongst psychologists?

Given the public's perceptions of frequent misunderstandings regarding intelligence among psychologists, a major public statement entitled *Mainstream Science on Intelligence* was made by 52 eminent intelligence researchers in *The Wall Street Journal* in December 1994 (see Gottfredson, Vol. 1, No. 12). Subsequently, what is known and unknown about individual differences in human intelligence has been further highlighted in a major review article commissioned by the *American Psychological Association (APA) Board of Scientific Affairs* (Neisser et al., 1996 - Vol. 1, No. 9). They concluded that while an impressive body of research findings has emerged from psychometric research into intelligence over the 20<sup>th</sup> century, nonetheless, many fundamental questions remain unanswered. Still unresolved questions relate

to the impact on intelligence of genetic differences, environmental factors such as schooling, the role of dietary supplements in adequately-fed populations, the relationship between information-processing speed and psychometric intelligence, the continual increasing of IQ test scores, differential IQ test scores of different ethnic groups (also see Lynn, 1982, in relation to IQ scores in the USA versus Japan), the role of intellectual abilities not measured by standardised IQ tests (such as creativity, social sensitivity, practical or common sense intelligence, wisdom, and so on). Importantly, Neisser et al. (p. 97) concluded that, “The study of intelligence does not need politicized assertions and recriminations; it needs self-restraint, reflection, and a great deal more research.”

#### Intelligence, creativity, and sex differences

The relationship between creativity and personality has been investigated, as well as that between creativity, abilities, and achievement emanating historically from the early work of Galton, Goddard, Spearman, Binet, and Terman up to the present day researchers. For example, Stanley (1997 - Vol. 1, No. 16) reported on the life outcomes of intellectually talented students included in the *Study of Mathematically Precocious Youth* at Johns Hopkins University, in an attempt to clarify the relationships between intellectual prowess, creativity, and achievement. He found that there was considerable variability in terms of adult achievement outcomes, despite earlier precocity in childhood (cf. Gardner, 1993a,b). As Stanley stated (p. 113), “About all we can do for gifted children, however defined, is to provide them special, supplemental, accelerative educational experiences appropriate to their abilities and interests.” Earlier, Eysenck (1993 - Vol. 1, No. 5) had put forward a theoretical model of the relationship between creativity and personality. The proposed model differentiates between creativity as a dispositional trait or cognitive style (originality) that can readily be subjected to psychometric measurement, and creativity as exceptional achievement. Eysenck also suggested a causal chain bringing about variations in creativity and abnormal personality, starting with DNA, and involving the hippocampal formation, neurotransmitters and enzymes (see also Eysenck, 1995; Zuckerman, 1991).

Sex differences in intellectual abilities have been highlighted in several research studies (e.g., Benbow, 1988, 1990; Halpern, 1992; Hennessy & Merrifield, 1978; Lynn, 1994; Scarr, 1992). Thus, Stumpf and Stanley (1996 - Vol. 1, No. 11) reported that although male students significantly outperformed female students on the College Board's Achievement examinations in Physics, Chemistry, and Computer Science, female students significantly outperformed males in

standardised language tests such as French, Spanish and Modern Hebrew. Likewise, Halpern (1997 – Vol. 1, No. 14) reviewed the empirical literature on sex differences in intelligence and concluded that females generally outperform males on “tasks that require rapid access to and use of phonological and semantic information in long-term memory, production and comprehension of complex prose, fine motor skills, and perceptual speed. Males, on average, score more highly on tasks that require transformations in visual-spatial working memory, motor skills involved in aiming, spatiotemporal responding, and fluid reasoning, especially in abstract mathematical and scientific domains.” (p. 1091).

#### Social policy and intelligence: Some new challenges

In direct contrast to the call by the *APA Board of Scientific Affairs* specially convened review committee for an apolitical approach to investigating intellectual abilities and promoting intellectual achievement (Neisser et al. 1996 – Vol. 1, No. 9), it may be argued that the overzealous application of "equity" policies over the past several decades has unduly hampered the progress of high ability students, especially in the United States. Benbow and Stanley (1996 - Vol. 1, No. 10) have comprehensively addressed this problem of excessive egalitarianism, evident in the emphasis on equity rather than excellence (instead of both being promoted), the preponderance of anti-intellectual attitudes, declining academic standards and weakened curricula, the denigration of aptitude and achievement testing as discriminatory elitism, the prevalence of fads, and the lack of curricula tailored to individual differences in abilities among students. Failure to provide challenging curricula for intellectually advanced students can only be regarded as a waste of scarce human resources. Indeed, Kauffman (1999) argued that, "in the case of giftedness, we want to nurture even greater discrepancies between these children and the norm. Suggesting otherwise undermines their full development." (p. xi).

One of the major criticisms of public schooling in the United States has been the lack of appropriate and challenging curricula and learning experiences for all children, which is quite different from offering the same teaching-learning environment to all children. Anne Anastasi (1965) alluded to this when she commented that while we are all of equal value as human beings, this does not deny the fact of individual differences in human traits such as ability. Kauffman (1999) supported this position, arguing that, "If we do not value what people can do, then we have no reason to teach anyone anything." (p. xii).

As noted by Neisser et al (1996 – Vol. 1, No. 9), challenges to current models of intelligence and especially the tests that reflect these theoretical and empirical perspectives have come from within psychology and from the general public. Sternberg, Wagner, Williams, and Horvath (1995 - Vol. 1, No. 8) challenged the long-held view that psychometric measures of cognitive abilities (IQ tests) have adequate predictive validity. They demonstrated that only about 25% of the variance in real-life performance (such as job performance) is accounted for by standardised tests of intelligence (also see Sternberg & Wagner, 1993). They have pointed to the significant role of “practical intelligence” and “common sense intelligence” in everyday performance, as contrasted with the limited range of cognitive abilities measured in traditional IQ tests.

### **Volume 2 - Individual Differences in Personality**

As with the efforts made to measure and describe human intelligence over the past century, personality descriptions did not originate with the scientific discipline and practice of psychology. The term personality is derived from the Latin word “persona” and has a history that can be traced back to the time of ancient Greece and then forward to the philosophers of the 16<sup>th</sup> century and, eventually, to the early years of psychology (see Saklofske & Eysenck, 1994 – Vol 2, No. 12). Personality, like intelligence, is certainly a cornerstone of the psychology of individual differences. Personality theories abound in psychology including the many variations discussed in the psychoanalytic and neo-analytic literature, humanistic and existential views, cognitive and social-cognitive models, and trait perspectives. While some of these theories are interesting and make for some intriguing reading, not all are able to be tested satisfactorily within the rigours of the scientific method (Kline, 1986). For example, many of the tenets of psychoanalysis are essentially untestable, or when subjected to study, have not resulted in the kind of empirical support that would give credence to the theory and its potential for use in applied psychology.

While some theories certainly have heuristic value, others have also yielded empirical evidence to support the hypotheses that may be generated from them. Clearly, the study of personality traits and typologies has received a major share of attention among personality researchers in the past 50 years. Use of the lexical approach in elucidating personality structure has a conspicuous place in the history of psychology (see John, Angleitner, & Ostendorf, 1988 - Vol. 2, No. 3). It can be linked back to Cattell's early efforts in reducing the more than 4000 terms compiled by Allport and Odbert from the English dictionary to just 36 trait clusters, and subsequently via factor analysis down to only 16 normal primary trait factors (subsequently, Cattell proposed an additional 12 abnormal trait factors—see Krug, 1980).

The structure of personality: Contributions by Cattell and Eysenck

Much has been made of the fact that two of the most prolific psychologists of the 20<sup>th</sup> century (after Freud and Piaget) were mainly engaged in research into personality and individual differences (Hans Eysenck was the third most highly cited, while Raymond Cattell was the seventh most highly cited--see Haggbloom et al., 2002). While both Eysenck and Cattell based their research into individual differences on the empirical factor analytic approach, they produced models with differing numbers of personality dimensions. Focusing on primary trait dimensions, Cattell derived 16 normal personality factors that were incorporated into the *Sixteen Personality Factor Questionnaire* (16PF). In contrast, although Eysenck concentrated on only three broad dimensions (extraversion, neuroticism, and psychoticism)--(see Saklofske & Eysenck, 1994 - Vol. 2, No. 12), he did explore some of the primary traits (e.g., venturesomeness, impulsiveness) underlying the major personality types (e.g., Eysenck & Eysenck, 1978; Saklofske & Eysenck, 1983). Eysenck developed various measures over the years, including the *Maudsley Personality Inventory* (MPI) and the *Eysenck Personality Inventory* (EPI), to measure extraversion and neuroticism, and later, the *Eysenck Personality Questionnaire* (EPQ) which incorporated an additional scale to assess psychoticism.

Higher-order factor analysis of the intercorrelations among the Cattellian 16 primary personality trait factors reduces to five broad trait dimensions (plus intelligence)--(Krug & Johns, 1986 - Vol. 2, No. 2; Hofer, Horn, & Eber, 1997 - Vol. 2, No. 17), the first two of which align themselves very closely with the Eysenckian extraversion and neuroticism dimensions. Evidently, the Cattellian and Eysenckian factor analytic findings are in much closer agreement than is commonly asserted, although Eysenck chose to focus on second-order factors, whereas Cattell was more interested in primary trait dimensions (see Boyle, 1989). Eysenck himself stated that the actual degree of unanimity in their findings was much greater than many commentators had otherwise suggested (see Eysenck, 1984 - Vol. 2, No. 1). Indeed, the Eysenckian extraversion and neuroticism factors have emerged consistently at the 16PF second-order level, as well as among second-order mood-state factors (e.g., Boyle, 1987a).

The factor analytically derived models of personality structure proposed by Eysenck and Cattell have been challenged by research studies reporting various other key personality traits. The second-order 16PF factors elucidated by Krug and Johns (1986) – Vol. 2, No. 2--(cf. Matthews & Oddy, 1993; Ormerod, McKenzie, & Woods, 1995; and Russell & Karol, 1994—*The 16PF Fifth*

*Edition Administrator's Manual*) are one such example; others include the six factors proposed by Hogan (1991), and the eight factors that have been incorporated into the popular *Comrey Personality Scales* or CPS (Comrey, 1993), which has been useful in career selection, for example (e.g., Comrey, 1995).

Nevertheless, Krug and Johns (1986 – Vol. 2, No. 2) carried out a higher-order scale factoring of the 16PF on 17,381 subjects and reported five second-order personality factors labelled extraversion, anxiety (neuroticism), tough poise, independence, and control (plus an intelligence factor). Their factor analyses were based on (1) the intercorrelations of the 16 scale factors; (2) methodologically sound simple structure procedures; and (3) were cross-validated across samples of 9222 males and 8159 females respectively, with virtually identical factor loadings being obtained on the extraversion, anxiety (neuroticism), and control (superego) factors. Likewise, Hofer et al. (1997 – Vol. 2, No. 17) conducted separate higher-order factor analyses on the data from 16PF Form C and Part I of the CAQ on four samples comprising 15,332 male and female police applicants, and two samples comprising 15,460 male felons. Their factor analytic results essentially replicated the findings of Krug and Johns with the same five second-order personality dimensions (plus an intelligence factor) being obtained as outlined above.

#### The five factor model

Many psychologists have argued that the *Five Factor Model* (FFM; Digman 1990 – Vol. 2, No. 6) provides an acceptable account of the number of normal personality trait dimensions. The FFM comprising dimensions labelled neuroticism, extraversion, openness to experience—intellectance, agreeableness, and conscientiousness has been derived from analyses of the trait lexicon (also see Goldberg, 1990, 1993). As Zuckerman (1991, p. 17) pointed out, on the one hand, the three Eysenckian factors are considered to be insufficient and too broad to allow for more precise predictions of human behaviours, while Cattell's 16 primary trait factors are sometimes considered too many for practical utility. Still, reduction from many primary factors down to a much smaller number of broader second-order dimensions necessarily reduces the proportion of predictive variance that is accounted for or explained (Mershon & Gorsuch, 1988 - Vol. 2, No. 4). This raises the interesting question of reductionism in science and when such parsimony crosses the boundary, both in theory and practice, from providing a comprehensive description, understanding and prediction in individual differences to one that is so gross as to essentially explain nothing. This is not unlike the debates surrounding the structure of intelligence described in Volume 1 above.

The "Big Five" personality factors are a phenotypic description of essentially *static* regularities in behaviour (Cattell et al., 2002 – Vol. 3, No. 20). The FFM provides a conceptual framework for outlining the developmental and structural aspects of the five personality factors, including the dynamic and structural learning aspects of these factors within a larger psychological structure. Although theorizing on the FFM is rather limited at this point, there is some empirical evidence along these lines that might be considered (e.g., McCrae & Costa, 1996).

The FFM has received added impetus with publication of the *NEO Personality Inventory*, and its updated version the NEO-PI-R (Costa & McCrae, 1992b; McCrae & Costa, 1989 - Vol. 2, No. 5). The NEO-PI-R measures the FFM (although not entirely, as openness to experience has not been found in lexical analyses). The instrument also comprises 30 facet subscales, highlighting the need to consider primary factors, in addition to secondary dimensions. However, contrary to accepted factor analytic guidelines, Costa and McCrae (1992a, p.661) boldly asserted that simple structure was unimportant (cf. Deary, 1996), raising questions about the adequacy of the methodology employed in the construction of the popular NEO-PI-R instrument for the assessment of the "Big Five" personality factors (cf. Child, 1990; 1998).

#### Limitations of the five factor model

It would appear that the FFM and the scales developed for its assessment have, in some ways, superseded the earlier work of Eysenck and Cattell, at least in North America, Europe and Australia. Despite the dominance of the FFM in personality psychology in recent years, many other psychologists have nevertheless expressed reservations about the model. An increasing number of published papers offer serious challenges to the adequacy of the FFM. Many of these findings have been published in major critiques of the FFM, one excellent example being the *Psychological Bulletin* article by Block (1995 - Vol. 2, No. 13). In addition, several empirical investigations have failed to provide support for this model (Ben-Porath & Waller, 1992; Boyle & Smári, 2003; Cattell, 1995; McKenzie, 1998; Eysenck, 1991 - Vol. 2, No. 8; Eysenck, 1992 - Vol. 2, No. 9; McAdams, 1992 - Vol. 2, No. 10; Church & Burke, 1994 - Vol. 2, No. 11; Block, 1995 - Vol. 2, No. 13; Schneider, Hough, & Dunnette, 1996 - Vol. 2, No. 16; Paunonen & Jackson, 2000 - Vol. 2, No. 19). For example, Hahn and Comrey (1994) factor analysed the intercorrelation matrix for the combined NEO-PI-R and the *Comrey Personality Scales* (CPS) and reported that at least nine separate personality factors are required to account for the variance within the normal personality trait sphere, rather than just the five broad dimensions as proposed in the FFM

Evidently, there has been considerable controversy generated by these various critiques (e.g., Block, 2001 – Vol. 2, No. 20; Goldberg & Saucier, 1995; Costa & McCrae, 1992a; Eysenck, 1993), and consequently it is time to revisit the static "Big Five" model of personality (Cattell et al., 2002 - Vol. 3, No. 20). For this very reason, and given the central importance of the structural dimensionality and taxonomy of personality traits, we have deliberately included a larger sampling of published papers on this particular model.

Several investigators have factor analysed FFM marker variables but have not been able to obtain the expected five-factor structure (e.g., Church & Burke, 1994 – Vol. 2, No. 11; Livneh & Livneh, 1989; Schmit & Ryan, 1993). Moreover, Borkenau and Ostendorf (1990) carried out a confirmatory factor analysis, but also failed to obtain strong support for the claimed five-factor structure. Evidently, the FFM can only be reproduced reliably when there is a discernible restriction both in samples and measurement variance (Boyle, 1997; Waller, 1995), a situation which is clearly unsatisfactory. Fisher and Boyle (1997) have tentatively supported use of the FFM arguing that occupational performance criteria themselves are broad constructs. However, reliance on only five factors necessarily restricts predictive accuracy (see Hogan, Hogan, & Roberts, 1996). Indeed, Schneider et al. (1996 – Vol. 2, No. 16) acknowledged that more specific trait dimensions are more predictive of occupational performance criteria (cf. Hofstee, de Raad, & Goldberg, 1992). Akin to the findings with clinical diagnosis, it would appear that the best predictive validity is obtained when specific traits are matched to specific occupational performance criteria, and broad traits are matched to broad occupational performance criteria (cf. Deary & Matthews, 1993).

#### New research avenues in the study of personality

Finally, turning to other key examples of recent personality research, various psychophysiological mechanisms underlying the personality trait of sensation seeking have been investigated at length (Eysenck (1990). For example, Zuckerman (1990 - Vol. 2, No. 7) studied electrodermal and heart-rate responses as well as cortical evoked responses as a function of high and low sensation-seeking trait. They reported that “High sensation seekers tend to give stronger physiological orienting responses than lows to novel stimuli...Lows tend to show defensive responses as defined by heart-rate acceleration. The cortical reaction of the highs tends to be augmented by intense visual or auditory stimuli...” (p. 313).

More recently, psychological attention has been turned to protective and resiliency factors that would serve to protect the individual from the negative effects of stress resulting in health and psychological disorders. This has occurred concurrently with the growing interest in psychological wellness. An account of well-being and happiness has been provided in this volume. Thus, DeNeve and Cooper (1998 - Vol. 2, No. 18) carried out a meta-analysis of 137 personality traits relating to subjective well-being. They found (p. 197) that neuroticism strongly predicted life satisfaction, happiness, and negative affect.

Lastly, the age-old question of the role of situations in the appearance of invariance in personality structure has been revisited during the past decade and a new more wholistic theory put forward by Mischel and Shoda (1995 - Vol. 2, No. 15). These authors have now conceded that, “Rather than dichotomizing personality research into the study of dispositions *or* processes, this theory allows one to pursue concurrently both personality dispositions and processes—structures and dynamics—as aspects of the same unitary system.” (p. 263). Clearly, the field has made significant progress over the past two decades and the earlier situationist controversy sparked by Mischel in the late 1960s (cf. Mischel & Peake, 1982) now appears to have essentially been resolved, with the general recognition that the person-situation interaction is indeed important.

### **Volume 3 – Individual Differences in Cognition, Emotion and Conation**

Both intelligence and personality are powerful variables in the study of individual differences (Hilgard, 1980 - Vol. 3, No. 1). Thus, general mental ability, reflected in the full scale IQ scores of intelligence tests such as the most recent *Wechsler scales* or the *Stanford-Binet IV*, is perhaps the best single predictor of academic achievement (especially at primary school level where the correlation is about 0.50--see Brody, 1992; Cattell, 1987; Detterman, 1994; nevertheless, IQ tends to “wash out” as a significant predictor at university level due to the restriction in the ability variance, where IQ scores are predominantly negatively skewed). Likewise, personality traits have demonstrated considerable utility in the diagnosis and treatment of psychological disturbance (e.g., Costa & Widiger, 2002; Eysenck & Eysenck, 1985; Krug, 1980; Widiger, 1988).

However, by themselves, IQ and personality differences do not account for the full range of variation in human behaviour. The observation that several people with the same measured general intelligence perform quite differently in a work situation requiring specific abilities and considerable social interaction and skills, can be further accounted for by also considering

variations in personality traits such as extraversion-introversion (see Boyle, 1983; Saklofske & Eysenck, 1994 – Vol. 2, No. 12). This integrated perspective on personality and intelligence in enhancing our knowledge of individual differences has been noted earlier (see Boyle, Stankov, & Cattell, 1995 - Vol. 2, No. 14; Collis & Messick, 2001; Saklofske & Zeidner, 1995). However, the integrative process has not been limited only to personality and intelligence; conative variables and emotion have also demonstrated a significant role in the psychology of individual differences (e.g., Boyle, 1988b; Boyle, Stanley, & Start, 1985; Snow, Corno, & Jackson, 1996).

From the earliest days of psychology, there was an ever growing awareness of the role that experience, external factors such as reinforcement history, beliefs, attitudes, goals, self-regulation, self-efficacy, motivation and volition, etc. all contribute to the diversity of human behaviours in various environments (e.g., see Cattell's "dynamic calculus model" in Child, 1984; Hall, Lindzey, & Campbell, 1998, p.328-329). Thus, a third major area of human research has focused on the important role of *conation* (drives; incentive motivation; desire; will), a term used years before by Spearman (1927) and other early pioneers in the history of psychology (see English & English, 1958). As Hilgard (1980 - Vol. 3, No. 1) pointed out, "The tripartite classification of mental activities into cognition, affection, and conation originated in the German faculty psychology of the eighteenth century, but was adopted by the association psychologists of the nineteenth century of Scotland, England, and America. Its influence extended into the twentieth century through the writings of William McDougall. It is proposed that the classificatory scheme is still useful in the assessment of contemporary emphases in psychology, such as the present prominence of cognitive psychology to the relative neglect of affection and conation." (p. 107).

Research into conation recognises that the "whole is greater than the sum of the parts" and that intelligence-personality and conative factors, taken together, would account for even a greater share of the variance in individual differences (see Cattell & Kline, 1977; Saklofske & Zeidner, 1995; Zeidner, 2001). The improved research methodologies and capacity to analyse complex data sets that considers both independent and interactive relationships of both a correlational and causal nature (e.g., structural equation modeling) and the continuing advancement of knowledge related to the "parts" has allowed for the further integration of cognition, personality and conation. Thus, Corno and Snow (2001 – Vol. 3, No. 17) stated that, "conative constructs are no longer viewed as in the heads of individuals, but rather as unions of persons and situations that

necessarily cross functional boundaries between cognition, affection, and affording activities.” (p. 135).

Following on from the above statements, intelligence and personality traits each, by themselves, are critical to achieving an understanding of individual differences. In addition, the interaction between intelligence and personality factors allows for an increased understanding of the robustness of human behaviour (e.g., bright and stable extraverted individuals will likely benefit from a learning environment that encourages exploration and is characterised by novelty and less structure, in contrast to more anxious introverted individuals of average ability who would likely achieve better in a more teacher directed and structured learning context). However, assessment of motivation, interests, goals and planning and other conative factors further helps to understand why some human behaviours are more or less stable, while other behaviours exhibit greater variability.

On another front, the study of emotions (affection) has recently shown promise as contributing to a greater understanding of individual differences. During the past two decades, the limitations of traditional psychometric intelligence testing have become well recognised (see Gardner, 1983), and partly as a consequence, a new focus of research has emerged in the area of emotional intelligence (EI). For example, Salovey and Mayer (1990 – Vol. 3, No. 3) pointed out that emotional intelligence involves skills that "contribute to the accurate appraisal and expression of emotion in oneself and in others, the effective regulation of emotion in self and others, and the use of feelings to motivate, plan, and achieve in one's life." (p. 185). Likewise, Mehrabian (2000 – Vol. 3, No. 14) reported several individual differences' correlates of life success, including emotional intelligence, not measured by traditional IQ tests. Davies, Stankov, and Roberts (1998 – Vol. 3, No. 8) carried out three empirical studies in which they investigated the relationship between emotional intelligence measures and traditional personality and cognitive abilities measures. They concluded that despite the popularity of the emotional intelligence construct over the past decade, "as presently postulated, little remains of emotional intelligence that is unique and psychometrically sound...questionnaire measures are too closely related to 'established' personality traits, whereas objective measures of emotional intelligence suffer from poor reliability." (p. 1013). Subsequently, Roberts, Zeidner, and Mathews (2001 – Vol. 3, No. 19) carried out several exploratory factor analyses of the *Multi-factor Emotional Intelligence Scale* or MEIS...along with other personality and ability measures, and concluded (p. 196) that it is

uncertain whether or not the MEIS operationalises emotional intelligence as a reliable and valid construct.

In fact, discussion of the relationships between cognition, affection, and conation can be found in much earlier published works. For example, Hilgard (1980 – Vol. 3, No. 1) examined the use of these constructs in the history of psychological research and concluded that they still remain valid distinctions today (see also Snow et al., 1996, for an additional historical account of the term *conation*). According to Hilgard (p. 107), "An examination of the tripartite classification in historical perspective may show the extent to which affection and conation are now suffering neglect by contrast with cognition ...". Furthermore, Hilgard (p. 115) pointed out that, "Information processing and the computer model have replaced stimulus-response psychology with an input-output psychology...dynamic features such as drives, incentive motivation, and curiosity have been more or less forgotten. Cognitive processes presented in computer terms...commonly [represent] 'cold' cognition, while ignoring 'hot' cognition. Hot cognition refers to thoughts and decisions that have high affective or conative importance..." Consequently, the computer analogy has failed to account for individual differences in *real* psychological processes, as opposed to merely providing a simplistic account of *unreal* (computer) psychological processes. To illustrate the inadequacy of the computer metaphor, one only has to consider that computers, which are mere machines, cannot for example, account for individual differences associated with sex differences in psychological functioning that are highlighted in Volume 1 above (also see Boyle, 1989c; Boyle, Start, & Hall, 1989).

Despite the predominance of cognitive psychology and the computer analogy over the past two decades, Messick (1996 – Vol. 3, No. 6) attempted to investigate the dynamic interrelatedness of cognitive and non-cognitive domains (i.e., cognition versus affection, and conation), focusing especially on individual differences in cognitive styles within the educational context. They found (p. 369) that "matching of instructional environments to student cognitive styles may not only enhance learning but also strengthen the [cognitive] style..." Ackerman and Heggstad (1997 – Vol. 3, No. 7) conducted a meta-analysis of personality-intelligence correlations, and reviewed interest-intelligence associations. They identified (p. 219) individual differences in four broad trait complexes ("social, clerical/conventional, science/math, and intellectual/cultural"). Matthews, Schwean, Campbell, Saklofske, and Mohamed (2000 – Vol. 3, No. 10) investigated the cognitive, and personality traits related to self-regulation. They reported (p. 199) that "Styles of self-regulation are an integral aspect of personality." Ashby, Isen, and

Turken (1999 – Vol. 3, No. 11) put forward a neuropsychological theory of the influence of positive affect on cognitive tasks. They postulated (p. 529) a theory of individual differences that "predicts or accounts for influences of positive affect on...consolidation of long-term (i.e., episodic) memories, working memory, and creative problem solving." At the second Spearman Seminar, Corno and Snow (2001 – Vol. 3, No. 17) "examined the nature of individual differences in conative aptitudes for learning, including the distinction between motivation and volition." (p. 135). They concluded (p. 135) that "taxonomies have been slow to develop in this domain and construct proliferation has been steady...Conative constructs are no longer viewed as in the heads of individuals, but rather as unions of persons and situations that necessarily cross functional boundaries between cognition, affection, and affording activities. These 'aptitude complexes' (Snow, 1981), or 'contextual modules' (Bereiter, 1990), in turn show important interactions with instructional treatments and also account uniquely for individual differences in learning beyond the variance attributable to cognitive ability differences alone."

Furthermore, in recent years much new research has emerged into the state-trait aspects of individual differences. For example, in relation to the curiosity construct, Boyle (1983 – Vol. 3, No. 2) contended that "state-trait research offers good prospects for new insights into human curiosity." (p. 377). He reported that much of the previous research into such state-trait measures had been based on inadequate factor analytic methodology. Green, Goldman, and Salovey (1993 – Vol. 3, No. 4) carried out studies into the bipolarity of mood (affect) ratings and found strong evidence for a bipolar structure. Importantly, they concluded (p. 1029) that "the evidence that purportedly shows the independence of seemingly opposite mood states, that is, low correlations between positive and negative moods, may be the result of failures to consider biases due to random and nonrandom response error." Iwata et al. (1998 – Vol. 3, No. 9) extended the state-trait approach by producing a Japanese adaptation of the Spielberger *State-Trait Anxiety Inventory Form Y* (STAI). They reported cross-cultural differences in STAI scores, wherein the mean state-trait anxiety scores of Japanese workers were significantly higher than those of their North American counterparts. Even if it can be shown that mean state and trait anxiety scores differ somewhat across different cultures, there are still likely to be significant individual differences in personality dispositions and emotional/mood states (see Boyle, 1989a).

The role of motivation in relation to cognition, personality traits and emotional (mood) states has also received increasing attention from researchers over the past decade (see, for example, the journal *Motivation and Emotion*). For example, Cacioppo, Petty, Feinstein, and Jarvis (1996 –

Vol. 3, No. 5) examined dispositional differences in cognitive motivation. As they reported, *intrinsic motivation* is an important non-cognitive variable, wherein the evidence "supports the existence of stable individual differences in people's tendency to engage in and enjoy effortful cognitive activity." (p. 247). Zuckerman, Joireman, Kraft, and Kuhlman (1999 – Vol. 3, No. 12) examined the role of motivational and emotional factors within three-factor models of personality. Using exploratory factor analysis, they found that negative mood states were aligned with neuroticism trait, while positive emotions were associated with extraversion personality trait (also found by Boyle, 1987c). Lubinski and Benbow (2000 – Vol. 3, No. 13) investigated the dimensionality of individual differences related to exceptional achievements and concluded that research within the individual differences tradition is essential for the optimal development of exceptional talent (p. 137). Lyubomirsky (2001 – Vol. 3, No. 18) examined the issue of why some individuals are happier than others, and concluded that, "multiple cognitive and motivational processes moderate the impact of the objective environment on well-being." (p. 239). Likewise, Salovey Rothman, Detweiler, and Steward (2000 – Vol. 3, No. 16) reported that "Positive emotional states may promote healthy perceptions, beliefs, and physical well-being itself...positive emotions and healthy outcomes may be linked through multiple pathways." (p. 110). In addition, Ryan and Deci (2000 – Vol. 3, No. 15) examined factors that may enhance intrinsic motivation, self-regulation and well-being, and postulated three innate psychological needs (competence, autonomy, and relatedness) that seek satisfaction. At a more theoretical level, Cattell et al. (2002 – Vol. 3, No. 20) have postulated an enriched behavioural prediction equation, that takes into account the separate and interactive roles of individual differences in intrapersonal variables including cognitive/intellectual abilities, personality traits, affective mood states (emotions), and conation (dynamic motivation traits; drives).

#### **Volume 4 – Individual Differences: Clinical and Applied Research**

Individual differences' research grounded within the scientific discipline of psychology has impacted on all areas of applied psychology. In return, applied studies have contributed substantially to progress in psychological theory and research by providing the very data that enable a theory to be put to the empirical test. While individual differences' research has impacted on all of the broadly defined specialty areas of clinical, school, counseling, forensic, and industrial-organizational psychology, there is also a similar reciprocity with such related areas as social, military, and sport psychology (see Boyle, 1997; Saklofske & Zeidner, 1995). Thus, it appears that a complimentary relationship has been forged between both nomothetic and

idiographic approaches (Allport, 1955) of research and practice, respectively, in relation to describing, explaining, predicting, and even changing human behaviour.

The majority of psychologists is engaged in practice rather than in research. Thus the psychological community, in the main, is comprised of consumers of psychological knowledge. The number of APA (*American Psychological Association*) approved programs in clinical psychology far exceeds all of the other specialty areas. Among the most popular of the APA's many quality journals are those with titles such as *Psychological Assessment*, and the *Journal of Consulting and Clinical Psychology*. The focus of clinical psychology is very much on assessment, diagnosis and intervention. These areas of practice are also central to clinical neuropsychology, forensic psychology, and school psychology, to mention only a few specialisations. Furthermore, these specialty and subspecialty fields have created their own divisions within APA, but also their own associations with supporting publications. As described in Volumes 1-3 above, intelligence, personality and conation are significant individual differences' variables that are the foundations for psychological assessment, models of mental health and illness, and intervention and prevention strategies. We do not for a moment argue that the 20 articles included in this volume are fully representative of the huge field of clinical and applied psychology, and the areas of assessment and treatment, in particular. Rather, we claim only to have made a concerted effort to present some of the "best examples" of current research articles of particular relevance to these broad areas.

#### Personality and psychopathology

Personality theories have tended to present normal and abnormal personality as being either on a continuum or as a dichotomous human condition. Eysenck's model of personality, defined by the extraversion, neuroticism, and psychoticism factors has demonstrated considerable potential for a description of both wellness and psychopathology as described in Volume 2 by Saklofske and Eysenck (1994 - Vol. 2, No. 12). Furthermore, Matthews et al. (1998 - Vol. 4, No. 9) concluded that dimensional trait models "capture and clarify the principal clinical features of conditions such as schizoid and antisocial disorders" and furthermore, "provide a framework for the systematic understanding of clinical expressions of abnormality in personality and their implications for diagnosis and treatment." (p. 36).

More recently, studies have attempted to locate abnormal personality traits within the FFM factor space. Matthews et al. (1998 - Vol. 4, No. 9) observed that all the FFM factors have been

implicated in personality disorders. The FFM has been shown to be related to DSM-IV Axis II clinical constructs (see Costa & Widiger, 2002). Evidently, the FFM does explain some of the variance in abnormal personality dimensions, and there is overlap between FFM measures and MMPI scales (Wiggins & Pincus, 1993). In addition, there are empirical links between FFM measures and DSM-IV Axis I disorders, such as the link between neuroticism and other FFM dimensions and anxiety disorders (Trull & McCrae, 2002). Widiger (1998) reported that borderline personality disorder correlated highly with the FFM neuroticism dimension; that schizotypal personality disorder correlated highly with introversion; and that histrionic individuals exhibited much maladaptive extraversion (cf. Boyle, 1998; Claridge et al., 1996; Green & Williams, 1999; Irwin & Green, 1998).

However, despite having some utility in assessing personality disorders (Costa & Widiger, 2002), the FFM approach does not appear to be directly helpful in psychiatric diagnosis (Clark, 1993), in contrast to more direct measures of say, anxiety, depression, psychopathy and antisocial behaviours. These latter scales are intended as measures of the presence or absence of psychopathology. In some ways this is not surprising as the FFM, as well as Eysenck's extraversion, neuroticism, and psychoticism typology are descriptions of personality and not psychopathology. Also, the FFM does not appear to adequately cover the major psychoticism trait dimensions (Boyle, 1987b; Ortet, Ibañez, Moro, Silva, & Boyle, 1999). Thus, Clark (1993 – Vol. 4, No. 4) reported that the FFM “may be inadequate for the clinical assessment of personality disorder because the characterizations it provides are too broad and abstract for many clinical purposes... It is especially problematic to focus too much attention on the highest level of the trait hierarchy rather than on explorations of the specific dimensions... important in the domain of personality pathology.” (p. 104). Since the FFM does not provide specific coverage of the abnormal trait domains, as measured for example in the *Minnesota Multiphasic Personality Inventory* (MMPI), the *Clinical Analysis Questionnaire* (CAQ), or the *Personality Assessment Inventory* (PAI), it is understandable that many DSM-IV classified personality disorders do not readily lend themselves to clear differentiation using the FFM (e.g., see Boyle, 1995, 1997). This leaves the FFM quite a way from the clinical objective of differential diagnosis of personality disorders and Axis I mental disorders (Waller, 1995), and highlights the need to consider abnormal personality trait dimensions, in addition to normal traits alone (cf. Comrey & Schiebel, 1985).

Indeed, in recent years, various new and promising models of abnormal personality structure have been proposed. For example, Mehrabian (1997 – Vol. 4, No. 8) compared his *Pleasure-Arousal-Dominance* (PAD) model with the *Positive and Negative Affect* (PANAS) model for describing emotions such as anxiety and depression. He reported that arousability trait was a primary factor that distinguished between anxiety and depression. It was found that anxiety was associated with greater arousability than was depression. Subsequently, Matthews et al. (1998 – Vol. 4, No. 9) reported that traits such as neuroticism “may influence depression and anxiety through abnormality of cognitive processes...” (p. 36). On a different note, Horowitz, Dryer, and Krasnoperova (1997 – Vol. 4, No. 11) suggested that a two-dimensional circumplex model might be useful in organising our conceptualisation of clinical interpersonal problems.

#### Questionnaire assessment of personality and psychopathology

Psychological testing and assessment define a considerable area of practice amongst applied psychologists. Self-report inventories or questionnaires are very frequently employed to assess a wide range of affective, cognitive, and conative factors. Certainly multimodal assessment will include such methods and information sources as observation (e.g., observation schedules of pre-defined behaviours), interview (e.g., structured, unstructured, open-ended), historical documents (medical and educational records), as well as informal assessment (noting eye contact in social situations, or monitoring a client's work habits, keeping a portfolio of work samples in a special needs classroom, etc.), and formal intelligence testing (e.g., with the various *Wechsler Intelligence Scales*, *Stanford-Binet IV*, or a diagnostic test to determine strengths and weakness in various facets of memory, such as the *Wechsler Memory Scale*). Personality and other areas of affect (e.g., depression, anxiety, self-esteem) are quite regularly assessed with the use of rating scales and self-report questionnaires. Awareness of the potential for response distortion (see Boyle, 1985 - Vol 4, No. 1) has resulted in the inclusion of special scales (e.g., faking good/bad, lie, dissimulation, validity, inconsistency index) to detect response characteristics that might call the results into question.

Thus, a major limitation of most research and clinical application of personality questionnaires is that these instruments suffer from problems of motivational and response distortion (both conscious and unconscious)--(see Boyle, 1985 - Vol. 4, No. 1). This may in part be due to item transparency such that individuals desiring to present a particular "picture" of themselves (e.g., prisoner applying for early parole; job applicant competing for a prestigious management position; or an outpatient wishing to appear more disturbed in order to receive residential

treatment) will tend to answer items in a very particular way. In other instances, the nature of the question requires self-analysis and understanding ranging from perceptual distortions to limitations in assessing causal relationships. Response distortion, whether due to malingering, denial, faking good or bad motivations, may result from lack of sufficient self-insight all the way to deliberate dissimulation. In addition, it is not necessarily a conscious act, but may operate at the unconscious level of awareness. This major limitation of self-report methodology (along with ratings of others) has been discussed at length in relation to self-report measures of clinical depression (Boyle, 1985 - Vol. 4, No. 1).

Historically, the most highly cited and often used psychometric instrument used for measuring abnormal personality (psychopathological) traits has been the MMPI. This instrument has been in existence since the mid-twentieth century, but only underwent a major revision during the past decade (MMPI-2). While it is likely that the MMPI and MMPI-2 will continue to hold a central position in clinical assessment and research, unfortunately, both instruments have several major limitations, as discussed in detail by Helmes and Reddon (1993 - Vol. 4, No. 5).

Advances in clinical psychology: From psychopathology to wellness.

Specific areas of psychopathology and abnormal personality traits have been the focus of ongoing empirical research during the past decade. For example, schizophrenic disorders, schizotypy, and schizoid personality all have received considerable research attention along with the diathesis-stress theory of disease (e.g., Eysenck, 1992; Fowles, 1992; Grossarth-Maticcek, Eysenck, & Boyle, 1994 - Vol. 4, No. 7). In addition, Claridge (1994 – Vol. 4, No. 6) has pointed out that the research into schizophrenia has expanded from attempts to map its developmental course, to the search for specific genetic markers. Research has also continued in an effort to discover underlying personality dimensions and the biological basis of schizotypy and psychopathy (Green & Williams, 1999; Irwin & Green, 1988). For example, Boyle (1998 – Vol. 4, No. 13) factor analysed the *Combined Schizotypal Traits Questionnaire* (Claridge et al., 1996) and obtained five simple structure factors, rather than the four hybrid factors previously reported. According to Boyle (p. 114), “Positive and negative schizotypal trait factors emerged separately from general personality factors pertaining to extraversion, neuroticism, and psychoticism, showing that schizotypal traits cannot simply be reduced to the Eysenckian personality dimensions.” Boyle also found that delusional cognition (as measured by the Foulds scales) plays an important role in schizotypal personality. Raine, Venables, Mednick, and Mellinger (2002 – Vol. 4, No. 19) reported that “heightened SC [skin conductance] arousal and orienting in early childhood is a

significant risk factor for later schizotypal personality...” (p. 77). Raine et al. found that, “prefrontal structural deficit may underlie the low arousal, poor fear conditioning, lack of conscience, and decision-making deficits that have been found to characterize antisocial, psychopathic behavior.” (p. 119).

Research into the diagnosis of individual differences in pain assessment has made much headway during the past decade. Fernandez and Turk (1992 – Vol. 4, No. 3) reviewed the empirical literature showing that there are separate sensory and affective components of pain.

Subsequently, Fernandez and Boyle (2002 – Vol. 4, No. 18) analysed the sensory and affective descriptors in the *McGill Pain Questionnaire* (MPQ) and reported that, “several descriptors of pain sensations...are difficult to classify within MPQ sensory subcategories because of incomprehension, underuse, or ambiguity of usage.” (p. 70). Pain is often overlooked or underestimated as contributing to personality disorders (Fernandez, 2002). For example, Boyle, Goldman, Svoboda, and Fernandez (2002 – Vol. 4, No. 15) showed that the pain (and associated sensory denervation) inflicted on many newborn male infants through circumcision may have a long lasting adverse psychosexual and emotional impact (cf. Boyle, Svoboda, Price, & Turner, 2000). Indeed, involuntary circumcision has been linked “with a range of negative emotions and even post-traumatic stress disorder (PTSD).” (p. 329).

So too has there been much new research into the role of personality-stress in disease proneness versus health and well-being. Grossarth-Maticek et al. (2000 – Vol. 4, No. 14) conducted a 15-year prospective intervention study on a sample of 8,059 women who were classified as high or low on personality-stress. Results showed that psychological factors (such as stress/strain) interacted synergistically with physical risk factors in relation to both cancer morbidity and mortality. In addition it was reported that psychological autonomy training prolonged survival times for terminally ill breast cancer patients. Zeidner and Saklofske (1996 – Vol. 4, No. 10) pointed out that, “At present, there is no consensus about which coping strategies are most effective and adaptive in promoting positive outcomes. Further research is needed to clarify how a coping strategy resolves problems, relieves emotional distress, and prevents future difficulties.” (p. 525). Rothman and Salovey (1997 – Vol. 4, No. 12) discussed the cognitive and affective processes that could impact on the influence of message framing in motivating healthy behaviour. In addition, Greenspoon and Saklofske (2001 – Vol. 4, No. 17) showed that psychopathology and subjective well-being are not merely opposite poles on a single continuum. Of interest to

practicing psychologists is the sometimes apparent contradiction between an objective appraisal versus a self-description of a person's psychological status.

Finally, the treatment of clinical disorders has received much impetus over the past decade. The wealth of published research into empirically validated psychological treatments has provided compelling data on the efficacy of specific psychological interventions. The links between psychological assessment, diagnosis, and treatment are now much better understood in relation to, for example, depression, phobias, generalised and specific anxiety. The *Journal of Clinical and Consulting Psychology* continues to be a major source of solid research on the psychological treatment of mental health problems. The websites of some of the professional psychology associations now include information on treatment effectiveness that may be consulted by the general public as an information service. The literature base has grown substantially to the point where enough well conducted studies of psychological treatments have been published to permit *meta-analytic* studies of their overall effect size (see Fernandez & Boyle, 1996). For example, Westen and Morrison (2001 – Vol. 4, No. 20) carried out a meta-analysis of the efficacy of published treatments for depression, panic, and anxiety disorder. They reported differential treatment efficacy for different types of psychological disorders.

### **Summary and Conclusions**

In summary, the psychology of individual differences has a rich history extending back throughout the 20<sup>th</sup> century. The creation of intelligence tests demonstrated that this illusive construct could be operationally defined and measured, but also that the results could be effectively and usefully applied in such diverse settings as schools, mental health settings, and the military. This gave the needed impetus to the systematic study of individual differences that is so conspicuous in current research and applied psychology. Clearly, the psychological study of individual differences has made a major contribution towards our understanding of human kind. The broad individual differences' areas of intelligence, personality, motivation, and emotions (i.e., cognition, affection and conation) can be seen in their contributions not only to clinical psychological practice, but also to psychological health and well-being, more generally.

The advantage that psychology brings to the study of individual differences is the application of a scientific methodology. It is the very methods of science that allows the generation of hypotheses, their testing, and the determination of whether the ideas and resulting findings are either more or less useful or useless in explaining, predicting and even changing behaviour.

Thus, even in the early years of the 21<sup>st</sup> century, we can find several descriptions of intelligence, and recognise that there are both “knowns and unknowns.” The issue of the structure of personality has received much attention over the past two decades. Yet, despite its popularity, the *Five Factor Model* is seen by some to be unduly restrictive, and representative of a simple static trait model which fails to take into account dynamic personality-learning changes.

While intelligence and personality traits have formed a major part of psychology since its inception, new areas continue to emerge as psychology begins to interact with the biological but also other social sciences. More and more, psychology and the study of individual differences are expected to address issues of relevance to human kind, ranging from health psychology to psychology in the schools. One quite new topic to emerge is the area of emotional intelligence. Much has been written on emotional intelligence over recent years, however, quantitative test measures remain psychometrically deficient. On the other hand, research into affective and conative psychology (motivation/emotion; desire etc.) has received renewed impetus over the past two decades, moving beyond the less than adequate computer metaphor of human cognition. While computers have assumed an increasing role of importance in every aspect of our lives, computer models applied to individual differences fail to account for *real* psychological processes, including both affection and conation. Attempts to explain human behaviour only in terms of “cold cognition” are doomed to failure from the outset (despite the cognitive revolution in psychology), and it is now widely recognised that renewed focus must be placed on “hot cognition” and individual differences’ psychology. Indeed, the study of individual differences is central to the understanding of human behaviour, and as such, will continue to be a focal point of psychological research in the years ahead.

### **Supplementary References**

- Allport, G.W. (1955). Becoming: Basic considerations for a psychology of personality. New Haven, CT: Yale University Press.
- American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4<sup>th</sup> ed.). Washington, DC: Author.
- Anastasi, A. (Ed.). (1965). Individual differences. New York: Wiley.

- Arkes, H.R. (2003). The nonuse of psychological research at two federal agencies. Psychological Science, 14, 1-6.
- Benbow, C. P. (1988). Sex differences in mathematical reasoning ability in intellectually talented preadolescents: Their nature, effects, and possible causes. Behavioral and Brain Sciences, 11, 169-232.
- Benbow, C. P. (1990). Sex differences in mathematical reasoning ability: Further thoughts. Behavioral and Brain Sciences, 13, 196-198.
- Ben-Porath, Y. S., & Waller, N. G. (1992). "Normal" personality inventories in clinical assessment: General requirements and the potential for using the NEO Personality Inventory. Psychological Assessment, 4, 14-19.
- Bereiter, C. (1990). Aspects of an educational learning theory. Review of Educational Research, 60, 603-624.
- Block, N. J., & Dworkin, G. (Eds.). (1976). The IQ controversy: Critical readings. New York: Pantheon.
- Borkenau, P., & Ostendorf, F. (1990). Comparing exploratory and confirmatory factor analysis: A study on the five-factor model of personality. Personality and Individual Differences, 11, 515-524.
- Boyle, G. J. (1987a). A cross-validation of the factor structure of the Profile of Mood States: Were the factors correctly identified in the first instance? Psychological Reports, 60, 343-354.
- Boyle, G. J. (1987b). Psychopathological depression superfactors measured in the Clinical Analysis Questionnaire. Personality and Individual Differences, 8, 609-614.
- Boyle, G. J. (1987c). Typological mood-state factors measured in the Eight State Questionnaire. Personality and Individual Differences, 8, 137-140.
- Boyle, G. J. (1988a). Contribution of Cattellian psychometrics to the elucidation of human intellectual structure. Multivariate Experimental Clinical Research, 8, 267-273.

- Boyle, G. J. (1988b). Elucidation of motivation structure by dynamic calculus. In J. R. Nesselroade & R. B. Cattell (Eds.), Handbook of multivariate experimental psychology. (2nd ed.). (pp. 737-787). New York: Plenum.
- Boyle, G. J. (1989a). Breadth-depth or state-trait curiosity? A factor analysis of state-trait curiosity and state anxiety scales. Personality and Individual Differences, *10*, 175-183.
- Boyle, G. J. (1989b). Re-examination of the major personality-type factors in the Cattell, Comrey, and Eysenck scales: Were the factor solutions by Noller et al. optimal? Personality and Individual Differences, *10*, 1289-1299.
- Boyle, G. J. (1989c). Sex differences in reported mood states. Personality and Individual Differences, *10*, 1179-1183.
- Boyle, G. J. (1991a). Does item homogeneity indicate internal consistency or item redundancy in psychometric scales? Personality and Individual Differences, *12*, 291-294.
- Boyle, G. J. (1991b). Experimental psychology does require a multivariate perspective. Contemporary Psychology, *36*, 350-351.
- Boyle, G. J. (1995). [Review of the Personality Assessment Inventory.] In J. C. Conoley & J. C. Impara (Eds.), The twelfth mental measurements yearbook. (pp. 764-765). Lincoln, NE: Buros Institute of Mental Measurements.
- Boyle, G. J. (1997). Crisis in traditional personality assessment: Implications for military testing. Proceedings of the 39<sup>th</sup> Annual Conference of the International Military Testing Association. (pp. 61-64). Sydney: October 14-16.
- Boyle, G. J. (1998). Schizotypal personality traits: Extension of previous psychometric investigations. Australian Journal of Psychology, *50*, 114-118.
- Boyle, G. J., Borg, M. G., Falzon, J. M., Baglioni, Jr., A. J. (1995). A structural model of the dimensions of teacher stress. British Journal of Educational Psychology, *67*, 49-67.
- Boyle, G. J., & Smári, J. (2003). Vers une simplification du modèle cattellien de la personnalité. Bulletin de Psychologie, *55*, 535-643.

- Boyle, G. J., Stankov, L., & Cattell, R. B. (1995). Measurement and statistical models in the study of personality and intelligence. In D. H. Saklofske & M. Zeidner (Eds.), International handbook of personality and intelligence (pp. 417-446). New York: Plenum.
- Boyle, G. J., Stanley, G. V., & Start, K. B. (1985). Canonical/redundancy analyses of the Sixteen Personality Factor Questionnaire, the Motivation Analysis Test, and the Eight State Questionnaire. Multivariate Experimental Clinical Research, *7*, 113-132.
- Boyle, G. J., & Stanley, G. V. (1986). Application of factor analysis in psychological research: Improvement of simple structure by computer-assisted graphic oblique transformation: A brief note. Multivariate Experimental Clinical Research, *8*, 175-182.
- Boyle, G. J., Start, K. B., & Hall, E. J. (1989). Dimensions of adolescent motivation as measured by higher-order factors in the School Motivation Analysis Test. Journal of School Psychology, *27*, 27-33.
- Boyle, G. J., Svoboda, J. S., Price, C. P., & Tuner, J. N. (2000). Circumcision of healthy boys: Criminal assault? Journal of Law and Medicine, *7*, 301-310.
- Brody, N. (1992). Intelligence. San Diego, CA: Academic.
- Carroll, J. B. (1993). Human cognitive abilities: A survey of factor-analytic studies. Cambridge, UK: University of Cambridge Press.
- Cattell, R. B. (1978). The scientific use of factor analysis in behavioral and life sciences. New York: Plenum.
- Cattell, R. B. (Ed.). (1987). Intelligence: Its structure, growth and action. Advances in Psychology Series, No. 35. Amsterdam: North Holland.
- Cattell, R. B. (1992). Human motivation objectively, experimentally analysed. British Journal of Medical Psychology, *65*, 237-243.
- Cattell, R. B. (1995). The fallacy of five factors in the personality sphere. Psychologist, *May*, 207-208.

- Cattell, R. B., Boyle, G. J., & Chant, D. (2002). Enriched behavioral prediction equation and its impact on structured learning and the dynamic calculus. Psychological Review, 109, 202-205.
- Cattell, R. B., & Child, D. (1975). Motivation and dynamic structure. New York: Wiley-Halsted.
- Cattell, R. B., & Kline, P. (1977). The scientific study of personality and motivation. New York: Academic.
- Cattell, R. B., Eber, H. W., & Tatsuoka, M. M. (1970). Handbook for the Sixteen Personality Factor Questionnaire (16PF). Champaign, IL: Institute for Personality and Ability Testing.
- Child, D. (1984). Motivation and dynamic calculus: A teacher's view. Multivariate Behavioral Research, 19, 288-298.
- Child, D. (1990). Essentials of factor analysis (2<sup>nd</sup> ed.). London: Cassell.
- Child, D. (1998). Some technical problems in the use of personality measures in occupational settings illustrated using the "Big Five." In D. Shorrocks-Taylor (Ed.), Directions in educational psychology (pp. 346-364).
- Church, A. T., & Burke, P. J. (1994). Exploratory and confirmatory tests of the Big Five and Tellegen's three- and four-dimensional models. Journal of Personality and Social Psychology, 66, 93-114.
- Clark, L. A. (1993). Personality disorder diagnosis: Limitations of the five-factor model. Psychological Inquiry, 4, 100-104.
- Claridge, G., McCreery, C., Mason, O., Bentall, R., Boyle, G., Slade, P., Popplewell, D. (1996). The factor structure of "schizotypal" traits: A large replication study. British Journal of Clinical Psychology, 35, 103-115.
- Comrey, A. L. (1993). Revised manual and handbook of interpretation for the Comrey Personality Scales. San Diego, CA: Educational and Industrial Testing Service.
- Comrey, A. L. (1995). Career assessment and the Comrey Personality Scales. Journal of Career Assessment, 3, 140-156.

- Comrey, A. L., & Schiebel, D. (1985). Personality factor structure in psychiatric outpatients and normals. Multivariate Behavioral Research, 20, 419-426.
- Costa, P. T., Jr. & McCrae, R. R. (1992a). Four ways five factors are basic. Personality and Individual Differences, 13, 653-665.
- Costa, P. T., Jr. & McCrae, R. R. (1992b). The NEO Personality Inventory (Revised) manual. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., Jr. & Widiger, T. A. (Eds.). (2002). Personality disorders and the five-factor model of personality (2<sup>nd</sup> ed.). Washington, DC: American Psychological Association.
- Cronbach, L. J. (1960). Essentials of psychological testing. New York: Harper.
- Deary, I. J. (1993). Inspection time and WAIS-R IQ subtypes: A confirmatory factor analysis study. Intelligence, 17, 223-236.
- Deary, I. J. (1996). A (latent) Big Five personality model in 1915? A reanalysis of Webb's data. Journal of Personality and Social Psychology, 71, 992-1005.
- Deary, I. J., & Matthews, G. (1993). Personality traits are alive and well. Psychologist, 6, 299-311.
- Detterman, D. K. (Ed.). (1994). Current topics in human intelligence, Vol. 4: Theories of intelligence. Norwood, NJ: Ablex.
- English, H. B., & English, A. C. (1958). A comprehensive dictionary of psychological and psychoanalytical terms: A guide to usage. London: Longmans.
- Eysenck, H. J. (1986). Inspection time and intelligence: An historical introduction. Personality and Individual Differences, 7, 603-607.
- Eysenck, H. J. (1990). Biological dimensions of personality. In L. A. Pervin (Ed.), Handbook of personality: Theory and research. New York: Guilford.
- Eysenck, H. J. (1992). The definition and measurement of psychoticism. Personality and Individual Differences, 13, 757-785.
- Eysenck, H. J. (1993). Comment on Goldberg. American Psychologist, 48, 1299-1300.

- Eysenck, H. J. (1995). Genius: The natural history of creativity. Cambridge: Cambridge University Press.
- Eysenck, S. B. G. & Eysenck, H. J. (1977). The place of impulsiveness in a dimensional system of personality description. British Journal of Social and Clinical Psychology, *16*, 57-68.
- Eysenck, H. J., & Eysenck, M. W. (1985). Personality and individual differences: A natural science approach. New York: Plenum.
- Eysenck, H. J., & Eysenck, S. B. G. (1991). Manual of the Eysenck Personality Scales. London: Hodder & Stoughton.
- Fernandez, E. (2002). Anxiety, depression, and anger in pain. Dallas, TX: Advanced Psychological Resources.
- Fernandez, E., & Boyle, G. J. (1996). Meta-analytic procedure and interpretation of treatment outcome and test validity for the practitioner psychologist. In M. Smith & V. Sutherland (Eds.), International review of professional issues in selection and assessment, Vol. 2. New York: Wiley.
- Fisher, C. D., & Boyle, G. J. (1997). Personality and employee selection: Credibility regained. Asia Pacific Journal of Human Resources, *35*, 26-40.
- Fowles, D. C. (1992). Schizophrenia: Diathesis-stress revisited. Annual Review of Psychology, *43*, 303-336.
- Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. New York: Basic Books.
- Gardner, H. (1993a). Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi. New York: Basic Books.
- Gardner, H. (1993b). The relationship between early giftedness and later achievement. In G. R. Bock & K. Ackrill (Eds.), The origins and development of high ability (pp. 175-186). New York: Wiley.
- Goldberg, L. R. (1990). An alternative "description of personality": The Big Five factor structure. Journal of Personality and Social Psychology, *59*, 1216-1229.

- Goldberg, L. R. (1993). The structure of phenotypic personality traits. American Psychologist, 48, 26-34.
- Goldberg, L. R., & Suacier, G. (1995). So what do you propose we use instead? A reply to Block. Psychological Bulletin, 117, 221-225.
- Gorsuch, R. L. (1983). Factor analysis (2nd ed.). Hillsdale, NJ: Erlbaum.
- Green, M. J., & Williams, L. M. (1999). Schizotypy and creativity as effects of reduced cognitive inhibition. Personality and Individual Differences, 27, 263-276.
- Haggbloom, S. J., Warnick, R., Warnick, J. E. et al. (2002). The most eminent twentieth century psychologists. Review of General Psychology, 6, 139-152.
- Hahn, R. & Comrey, A. L. (1994). Factor analysis of the NEO-PI and the Comrey Personality Scales. Psychological Reports, 75, 355-365.
- Hall, C. S., Lindzey, G., & Campbell, J. B. (1998). Theories of personality (4<sup>th</sup> ed.). New York: Wiley.
- Halpern, D. (1992). Sex differences in cognitive abilities (2<sup>nd</sup> ed.). Hillsdale, NJ: Erlbaum.
- Halpern, D. F., & Cass, M. (1994). Laterality, sexual orientation, and immune system functioning: Is there a relationship? International Journal of Neuroscience, 77, 167-180.
- Hennessy, J.J., & Merrifield, P. R. (1978). Ethnicity and sex distinctions in patterns of aptitude factor scores in a sample of urban high school seniors. American Educational Research Journal, 15, 385-389.
- Herrnstein, R. J., & Murray, C. (1994). The bell curve: Intelligence and class structure in American life. New York: Free Press.
- Hofstee, W. K. B., Raad, de B., & Goldberg, L. R. (1992). Integration of the Big Five and circumplex approaches to trait structure. Journal of Personality and Social Psychology, 63, 146-163.
- Hogan, R. T. (1991). Personality and personality measurement. In M. D. Dunnette & L. M. Hough (Eds), Handbook of Industrial and Organizational Psychology, Vol 2 (pp. 873-919). Palo Alto, CA: Consulting Psychologists Press.

- Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions. American Psychologist, *51*, 469-477.
- Irwin, H. J., & Green, M. J. (1998/1999). Schizotypal processes and belief in the paranormal: A multidimensional study. European Journal of Parapsychology, *14*, 1-15.
- Jensen, A. R. (1980). Bias in mental testing. New York: Free Press.
- Kauffman, J.M. (1999). Forward: What we make of difference and the difference we make. In V. L. Schwean & D. H. Saklofske (Eds), Handbook of psychosocial characteristics of exceptional children. (pp. ix-xiii). New York: Kluwer.
- Kline, P. (1972). Fact and fantasy in Freudian theory. London: Methuen.
- Kline, P. (1979). Psychometrics and psychology. London: Academic.
- Kline, P. (1980). The psychometric model of man. In A. Chapman & D. Jones (Eds.), Models of man. Leicester, UK: British Psychological Society.
- Kline, P. (1986). A handbook of test construction: Introduction to psychometric design. London: Methuen.
- Kline, P., & Cattell, R. B. (1977). The scientific analysis of personality and motivation. New York: Academic.
- Krug, S. E. (1980). Clinical Analysis Questionnaire Manual. Champaign, IL: Institute for Personality and Ability Testing.
- Lilienfeld, S. O, Wood, J. M., & Garb, H. N. (2000). The scientific status of projective techniques. Psychological Science in the Public Interest, *1*, 27-66.
- Lilienfeld, S. O., Wood, J. M., & Garb, H. N. (2001). What's wrong with this picture? Scientific American, *284*, 80-87.
- Livneh, H., & Livneh, C. (1989). The five-factor model of personality: Is evidence of its cross-measure validity premature? Personality and Individual Differences, *10*, 75-80.
- Lynn, R. (1982). IQ in Japan and the United States shows a growing disparity. Nature, *297*, 222-223.

- Lynn, R. (1994). Sex differences in intelligence and brain size: A paradox resolved. Personality and Individual Differences, *17*, 257-271.
- Matthews, G., & Oddy, K. (1993). Recovery of major personality dimensions from trait adjective data. Personality and Individual Differences, *15*, 419-431.
- McCrae, R. R., & Costa, P. T., Jr. (1996). Toward a new generation of personality theories: Theoretical contexts for the five-factor model. In J. S. Wiggins (Ed.), The five-factor model of personality: Theoretical perspectives (pp. 51-87). New York: Guilford.
- McKenzie, J. (1998). Fundamental flaws in the five-factor model: A re-analysis of the seminal correlation matrix from which the “openness-to-experience” factor was extracted. Personality and Individual Differences, *24*, 475-480.
- Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., Eisman, E. J., Kubiszyn, T. W., & Reed, G. M. (2001). Psychological testing and psychological assessment: A review of evidence and issues. American Psychologist, *56*, 128-165.
- Mischel, W., & Peake, P. K. (1982). Beyond déjà vu in the search for cross-situational consistency. Psychological Review, *89*, 730-755.
- Ormerod, M. B., McKenzie, J., & Woods, A. (1995). Final report on research relating to the concept of five separate dimensions of personality--or six including intelligence. Personality and Individual Differences, *18*, 451-461.
- Ortet, G., Ibañez, M. I., Moro, M., Silva, F., & Boyle, G. J. (1999). Psychometric appraisal of Eysenck's revised Psychoticism scale: A cross-cultural study. Personality and Individual Differences, *27*, 1209-1219.
- Prifitera, A. & Saklofske, D. H. (Eds). (1988). WISC-III clinical use and interpretation: Scientist-practitioner perspectives. San Diego: Academic.
- Russell, M. T., & Karol, D. L. (1994). The 16PF Fifth Edition Administrator's Manual. Champaign, IL: Institute for Personality & Ability Testing.

- Saklofske, D. H., Austin, E. J., & Minski, P. (2003). Factor structure and validity of a trait emotional intelligence measure. Personality and Individual Differences, *34*, 707-721.
- Saklofske, D. H. & Eysenck, S. B. G. (1983). Impulsiveness and venturesomeness in Canadian children. Psychological Reports, *52*, 147-152.
- Saklofske, D. H. & Eysenck, S. B. G. (Eds.). (1988). Individual differences in children and adolescents: International perspectives. London: Hodder & Stoughton.
- Saklofske, D. H. & Zeidner, M. (Eds.). (1995). International Handbook of personality and intelligence. New York: Plenum.
- Sattler, J. M. & Saklofske, D. H. (2001) Wechsler Intelligence Scale for Children-III (WISC-III): Description. In J. M. Sattler, Assessment of children: Cognitive applications. (4<sup>th</sup> ed.). pp. 220-265). San Diego: Jerome Sattler Publisher Inc.
- Scarr, S. (1992). Developmental theories for the 1990s: Development and individual differences. Child Development, *63*, 1-19.
- Schmit, M. J., & Ryan, A. M. (1993). The big five in personnel selection: Factor structure in applicant and nonapplicant populations. Journal of Applied Psychology, *78*, 966-974.
- Silver, R. J. (2001). Practicing professional psychology. American Psychologist, *56*, 1008-1014.
- Snow, R. E. (1981). Toward a theory of aptitude for learning. Fluid and crystallized abilities and their correlates. In M. P. Friedman, J. P. Das, & N. O'Connor (Eds.), Intelligence and learning. (pp. 345-362). New York: Plenum.
- Snow, R. E., Corno, L., & Jackson, D. N. III (1996). Individual differences in affective and conative functions. In D. Berliner & R. Calfee (Eds.), Handbook of educational psychology (pp. 243-310). New York: Macmillan.
- Sternberg, R. J., & Wagner, R. K. (1993). The geocentric view of intelligence and job performance is wrong. Current Directions in Psychological Science, *2*, 1-4.

- Trull, T. J., & McCrae, R. R. (2002). A five-factor perspective on personality disorder research. In Costa, P. T., Jr., & Widiger, T. A. (Eds.), Personality disorders and the five-factor model of personality (2<sup>nd</sup> ed.). (pp. 45-57). Washington, DC: American Psychological Association.
- Vernon, P. A. (1993). Biological approaches to the study of human intelligence. Norwood, NJ: Ablex.
- Waller, N. G. (1995). Evaluating the structure of personality. In R. Cloninger (Ed.), Personality and psychopathology. Washington, DC: American Psychiatric Association.
- Widiger, T. A. (1998). Personality disorders. In D. F. Barone & M. Hersen (Eds.), Advanced Personality (pp. 335-352). New York, NY: Plenum.
- Wiggins, J. S., & Pincus, A. L. (1993). Personality: Structure and assessment. Annual Review of Psychology, 43, 473-504.
- Woodcock, R.W., McGrew, K.S., & Mather, N. (2001). Woodcock –Johnson III Tests of Cognitive Abilities. Itasca, IL: Riverside Publishing.
- Zuckerman M. (1991). Psychobiology of personality. New York: Cambridge University Press.
- Zuckerman, M., Kuhlman, D. M., Thornquist, M., & Kiers, H. (1991). Five (or three) robust questionnaire scale factors of personality without culture. Personality and Individual Differences, 12, 929-941.