Introduction to Ability Testing

Psychometric Theories

One of the earliest psychometric theories is **Spearman's (1927) two-factor theory.** This suggested that different ability tests are significantly intercorrelated and their common variance can be represented in terms of a single, **g** (general) factor. He argued that each test reflected ability but also **task-specific factors** such as distractibility, stress, attention impairment and fatigue.

These are based on analysis of statistical properties/relationships (e.g. **factor analysis).** He was the first to use this technique, which is where covariations between group of variables are correlated in to one single, latent factor.

Thurstone (Early 20th Cent) argued against Spearman's theory however and suggested that intelligence was an adaptational process, which could be measured through several primary factors. Namely, verbal comprehension, word fluency, number facility, spatial visualisation. This is similar to **Guilford's** theory, who came to develop one of the largest catalogues of abilities, although he did eventually acknowledge the existence of **second and third order factors**.

P.E Vernon (1971) then argued for a **hierarchical model of intelligence** which somewhat unified the two conflicting theories. This stated that though there are different abilities, there is a single underlying general intelligence factor. This creates the **two-tier hierarchical model** comprised of specific abilities and general intelligence.

Biodata

Biographical Data

This is the use of facts from one personal history and attempting to correlate it with abilities and occuptations.

A paper and pencil selection technology in which applicants are asked about previous life experiences that are presumed to influence their personal development (Dean, 2004)

Examples include Age, Education, Health, Marital Status, Domestic Situation, Financial Commitments, Parents' Education.

There are however so many types that it does not compare as well to tests of general cognitive ability, as replications may use different measures and so change potential inferences.

In occupational psychology, Hunter & Hunter (1984) reported correlations between biodata and promotion, training success and tenure of around r= .30.

Information Processing

Sternberg (1983) developed the **Triarchic Theory of Intelligence** in which he argued that intelligence is how well an individual deals with environmental change. This takes a more cognitive approach than psychometric theorists.

Developmental Theories These ask how intelligence develops with age. **Piaget** (Mid 20th Century) was the key figure. He suggested that childhood, intelligence development occurs in four stages: Sensorimotor (>2) (e.g. Object Permanence), Pre-Operational (e.g. Symbolic Thinking) (2-7), Concrete Operational (e.g. Conservation)(7-11) and Formal Operational stage (e.g. Inferential Reasoning) (11+).

Intelligence Testing

The attempt to quantify and measure individual differences in cognitive ability by the means of standardised tests (Chamorro-Premuzic)

There are now numerous ways of approaching intelligence testing, which contrasts to a century ago. There are now **biological, culture sensitive, developmental and information processing theories.**

Culture Sensitive Approach This maintains that intelligence varies between cultures and that there is no **human-universal** definition of intelligence.

Cole, Gay et al. (1971) asked West African tribespeople to sort objects in to groups They sorted objects according to function (e.g. knife with orange) whereas western adults sorted the objects taxonomically (e.g. orange with apple).

Deregowski found differences in visual perception and drawing of objects. Where tribespeople were deemed to be '2D perceivers' compared to Western people, who are supposed '3D perceivers'.

IQ Testing

Intelligence Quotient A score derived from standardised test of intelligence, usually combining several sub-tests that measure various cognitive abilities. Assumed to be relatively unbiased (which is why it they are used in so many applied fields).

Binet's IQ Test (Late 19th Century) Alfred Binet was commissioned by the french government to develop a test to identify children with learning disabilities. This was to avoid teacher bias, which was often against children with poor discipline (this symbolises the distinction between **personality** and **intelligence**).

Larger Individual Differences are found using complex tasks. This is why psychologists moved from simple tasks such as sensory discrimination to more complex tasks that measure abstract reasoning. The **Stanford-Binet** test was one of the first to introduce these complicated tasks and the first to use the concept of **'mental age'.** Through this, the **IQ Score** was born (MA/RAx100).

Advantages include that its difficult to fake, is relatively unbiased, quick, easy, cheap (in comparison to biodata) and relatively stable across time.

Intelligence Testing History

But implicit conceptions of intelligence can differ according to **culture. Sternberg et al. (1985, 1997)** asked Chinese and North American people to give example characteristics of an intelligent person. **American's** said problem solving ability, intellectual balance, verbal ability, fluid thought etc. **Chinese** said a general cognitive factor, intrapersonal intelligence, modesty.

Furnham (1992) also reported that correlations between IQ tests and job performance "range from about r=.15 to r=.30. Thus **only about 10 percent of the variance appears to be accounted for by ability**..."

One of the earliest examples of testing for individual differences comes from **Plato's Republic** "no two persons are born exactly alike, but each differs from each in **natural endowments**, one being suited for one occupation and another for another". He recommended "actions to perform" to test for military aptitude.

Aristotle hinted at existence of outliers and existence of average people within subjects and between subjects when he said "In everything that is continuous and divisible there is excess, deficiency and the mean, and these, in relation to us and in relation to each other..."

Descartes "If something exists, it exists in some amount. If it exists in some amount, then it is capable of being measured".

Galton's Hereditary Genius (Late 19th Century) Galton argued that 'genius' was hereditary and normally distributed. These levels of intelligence are selected under competition. He believed (as someone with a 200 IQ score himself (Boring, 1950)) the Ancient Greeks were superior to the English and that they, in turn were more superior to Africans and African Americans. He believed that the aristocracy (e.g. families of judges) was testament to this and he was one of the first to test MZ and DZ twins.

Galton mostly measured sensory processes such as hearing and vision to indicate higher intelligence, but also invented **'free association'** tests to measure individual differences in perception and memory.

J.M Cattell's Mental Test (Note that he is not related to Raymond Catell). Cattell invented the term **'mental test'**. He constructed tests to measure university students, but what he tested did not necessarily correlate with or define intelligence in its broadest sense. He measured abilities like reaction times to colours, strength of grip, LND or auditory memory span (and was the first to propose the 'magic number seven' hypothesis (Miller, 1956)).