Intelligence Testing and Alfred Binet

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**Abstract**

Philosophers were the first to contemplate the meaning of intelligence. The belief that intelligence is considered a human property was developed in the 20th century. There are different types of intelligence and different levels; therefore, intelligence ranges from individual to individual. Over the years, psychologists have studied the categories of intelligence and invented ways to measure it using mental tests. Mental tests are designed to measure an individual’s mental abilities. Alfred Binet designed a basis for intelligence testing which has been revised over the years in order to determine accurate

results.

*Key words:* Alfred Binet, intelligence, mental tests, psychologists

**Introduction**

Intelligence is a controversial topic that has been explored for years. It can be described as a humanistic trait that varies from individual to individual; therefore, there have been debates on defining and measuring it. Intelligence has been studied in a multitude of fields such as science and philosophy, all of which have constructed different theories. In the field of psychology, researchers have conducted experiments to assess this humanistic characteristic which they believe can be tested and measured through scientific evaluations. Theories from different psychologists throughout centuries have been collaborated in order to better gain an understanding of the concept of intelligence. Intelligence testing was first introduced in the 20th century by psychologist Alfred Binet. He concluded that intelligence, like personality, could be altered and improved and therefore was insistent on doing so. Intelligence testing allowed for the measurement of one’s intellectual ability. Early mental tests were used to identify children with learning abnormalities. With later research and new theories declared by other psychologists, Binet’s original format of intelligence testing has been modified into a revised version. Other mental tests have also been developed using the Simon-Binet test. Alfred Binet’s findings were significant to the history of psychology and the study of intelligence.

**Alfred Binet**

Alfred Binet was born on July 11, 1857. He was raised in Nice, France as an only child. His mother was an artist and his father, being a doctor; set high expectations for Binet at a young age. Binet graduated from the University of Paris where he studied law. During his spare time, he enjoyed spending time in the library and reading educational novels. Because he spent so much time alone studying for recreation, he was considered to be introverted. The books he was most interested in contained information on mental pathology and hypnosis. He studied a variety of psychological books and quickly gained an interest. Because of his passion and knowledge for these subjects, others considered him to be “self- taught” in the field of psychology. (Foschi & Cicciola, 2006). He veered farther away from his future career in law. He later married Laure Balbiani. They had two daughters, Alice and Madeline. Using the knowledge he gained from the books, Binet used his own daughters for research and performed psychological tests on them regarding individuality. He performed a variety of cognitive tests on topics such as attention, imagination, and reasoning. As his daughters grew up, he studied their growth in such areas to observe the growth of individual cognition. Although he was just studying his two daughters at the time, he used his observations to generalize his theories on individual differences; his curiosity in the psychological field flourished. He had various interests in many different fields as well. Binet produced numerous findings in areas such as cognitive, experimental, and social psychology. He published many articles ranging in topics from hysteria in humans to the nervous system of insects. Throughout his career, he published over 200 books on vast subjects. His attentiveness and expertise to several topics in the field of psychology led him to many accomplishments especially pertaining to individualistic behaviors and intelligence.

**Sonbornne Laboratory**

Before Binet’s direct attention to the study of intelligence, he worked in other fields of psychology. He started his career in psychology as Jean-Martin Charcot’s researcher. Charcot who worked in the medical field, analyzed mental illness in a neurological clinic. Charcot and Binet conducted studies on hypnosis in the Salpêtriére Hospital. He began his initial interest in individual psychology and the unconscious after working in the hospital. He wanted to expand his experience and conduct experiments based on the unconscious, so he left the Hospital in order to further his research of the individual and unconscious. Around the same time, Henry Beaunis, another experimental psychologist, developed the first experimental laboratory in Paris. He opened the laboratory at the Sonbornne building. The Sonbornne Laboratory was established in order to study different types of individual psychology and conduct experiments. After Binet had just left working in the hospital, he started working in the lab as Beaunis’s assistant along with Jean Phillipe. Beaunis had the lab equipped with instruments and furnished accordingly. The laboratory consisted of many rooms including a library, lecture room, and a room where experiments were conducted. Binet insisted on investigating personality traits of individuals, specifically intelligence to further his observation on a more general population, other than his daughters. Beaunis later retired, leaving Binet as the new director of the lab (Serge & Sanitoso, 2012). Theodore Simon nominated himself as Binet’s collaborator in which they would work together to evaluate intelligence. Simon and Binet researched intelligence and ways to measure individual’s mental deficits, mainly focusing on children. Eventually, their research and studies led to the formation of the Binet Simon scales: a test assessing individual intellectual levels. The lab provided Binet and Simon instruments and an appropriate setting for observation, experiments, and a place to keep records. During the duration at the lab, Binet conducted a multitude of experiments. In order to create an intelligence test, Binet wanted to study many aspects of individual cognition. Not only did he study children, but he expanded his research to various other subjects like the mentality of chess players, for example. He also studied plays and actors to understand creativity and imagination (Serge & Sanitosa, 2006). His research on diverse subjects helped him grasp intelligence characteristics in order to gain accuracy for a potential test.

Simon and Binet desired to carry out a course of action regarding child development outside of the laboratory. Binet developed a committee in order to propose a plan that he could present to the government and use in school systems internationally. In his plan he argued that giving abnormal children an intelligence test would better their education by creating specialized classes. He suggested the benefits that individuals could receive if there was a way to identify those with special needs and intellectual deficiencies. After presenting their ideas to an international audience in Rome, Simon and Binet were asked to create an intelligence test to help diagnose children with disabilities. After years of extensive research, Simon and Binet proposed these first few tests under an article called ‘New Methods for the Diagnosis of the Intellectual Level of Abnormal Children” (Nicolas & Levine, 2012). This served as a basis to the creation of the Binet Simon scale.

**Binet Simon Scale**

Binet was passionate about improving intellectual development, especially in children. He believed intelligence was a wide range of skills that must be used together in order to learn. If he improved these skills, then “retarded” children could succeed in average classes. For one year he worked with a group of children with intellectual disabilities to help further his theory and he designed ways to improve their intelligence. He invented a multitude of exercises which he called “mental orthopedics” (Cianciolo & Sternberg, 2004). These exercises, he believed, would help improve the overall intelligence of these disabled individuals. One exercise he designed was “playing statue.” The children ran around the classroom and would freeze when directed to. This exercise helped to develop speed and control of motor skills. He also used a memory board in which the children were instructed to remember the placement of pictures. After one year of working with these children, they advanced in school performance by an average of two years. This observational research was significant in developing a standardized test to evaluate the students.

After several years of experiments and research, the Binet Simon scale was published in 1914. Because Binet believed that intelligence had many different aspects, the Binet Simon test consisted of 54 tests. The tests were designed to measure overall intelligence, not just school related factual information. The test questions varied in difficulty ranging from preschool level to adult level. The questions went in order of simplest to hardest. The test consisted of questions regarding simple definitions as well as comprehension tests. A guide was constructed in order to recognize norms regarding intelligence for each age group. For example, a two year old should be capable of obeying simple commands and movements. The highest mental age which can be obtained is 19.5 (Cianciolo & Sternberg, 2004). At age four, a child should be able to differentiate between genders. An eight year old child should be able to simply and fluently count to 20. The concept of rhyming should come easy to a 12 year old. Results were considered based on the total number of tests with the number of tests that should be passed. Based on such results, children were categorized as either average, advanced, or retarded. Children who did not meet the norms of a two year old were considered “retarded” (Huey, 1910). Teachers used the test as a tool to categorize the children into class level: “retarded” or “accelerated” (Mateer, 1917). Special education classes were then developed and focused on children who were labeled feebleminded based on the Binet-Simon in order to give the children special attention in the classroom. The Binet- Simon scale was primarily created in order to measure children’s intelligence which could help create specialized classes.

After the Binet-Simon scale was used in classrooms, it became evident that different factors could adjust the outcomes of the intelligence test. Because everyone has unique biological and environmental backgrounds, some individuals may not have a fair advantage. Psychologists must consider all factors when analyzing intelligence. For example, physical conditions could affect an individual’s scores. Individuals with physical impairments, blind, or deaf are accommodated appropriately during testing. Even impairments as minor such as fatigue could alter test scores. Language was also another disadvantage. Studies have shown individuals whose family speaks a different language at home than the social norm tended to do more poorly on the test. Social and cultural aspects were considered as well. Cultural and racial aspects have always caused biased controversy in intelligence; however, there was never a way to scientifically prove it. The Binet- Simon Scale verified that children of Asian ethnicity tended to score higher on the test. Individuals who lived in a more well off society scored higher on the test than those in poverty. Results showed individuals from a low economic class scored about five points below the mean test results while children in a higher economic class scored about five points above the mean (Tulchin, 1933). Psychologists related this correlation to the “nature vs. nurture” factor. Intelligence includes biological influences as well environmental influences; both play a role not just one or the other. The sex of an individual is also considered; the debate of which sex is more intelligent is common. Results showed that no significant sex is smarter than the other; however, one sex does better than the other in specific areas. For example, females are generally stronger in areas of math and verbal ability. On the other hand, males are stronger in visual-spatial ability (Cianciolo & Sternberg, 2004). All of these factors can be influential in analyzing one’s intelligence.

**Other Influences**

Other psychologists played a role in the formation of intelligence testing. Psychologists before and after Binet influenced the way intelligence testing is interpreted. Many made revisions of his test and conducted other multiple studies in order to alter it. Psychologists such as William Stern, Lewis Terman, Henry Goddard, Leta Hollingworth, and Robert Yerkes are examples of other influential individuals important to intelligence and mental testing. Their interpretations of intelligence and use of the Binet-Simon contributed to the revised tests.

William Stern was one of the first psychologists who altered the Binet- Simon scales. He introduced the term mental age. Mental age describes the highest age level a child could perform. Stern developed a ratio in which an individual’s mental age is divided by the chronological age. The quotient is then multiplied by 100. Stern’s ratio is used as the modern day IQ score. This IQ score was used to help calculate results in the Binet-Simon test.

Goddard was the 1st person to use the scale in America in a study in which he labeled individuals incorrectly “feebleminded”. He translated the French version of the Binet-Simon test into English so it could be used in America. He believed intelligence was genetic, and conducted studies to try and demonstrate this. In his famous book *The Kallikak Family: A Study in the Heredity of Febblemindedness,* Goddard described his view on effect of heredity and intelligence. He compared the intelligence of two families. He used the Greek roots Kalos, which means “good” and Kakos, which translates to “bad.” One family was labeled the Kalos family and the either Kakos with regards to intelligence. Because he believed feeblemindedness is caused by genetics, he wanted to stop the population he considered “retarded”. In other words, feebleminded people should not breed any more feebleminded children. He altered photographs of the Kakos family to make them appear retarded and publically posted his false findings. Many then believed a person’s intelligence could alter appearance like what was seen in the photographs. He set immigration policies, giving intelligence tests as well as a physical appearance evaluation, in order to keep the feebleminded out of America (Fancher, 1987). His theory is unacceptable in society today. His results, although inaccurate helped better understand intelligence by studying an individual’s cognitive ability rather than his/her genetics and physical appearance.

Leta Stetter Hollingworth was an influential woman. She challenged historical misconceptions such as functional periodicity, which is the idea that women are psychologically altered during menstruation. She also argued the use of labeling. Hollingworth believed the words pertaining to geniuses or those with intellectual disabilities were degrading. Before the 20th century, such words were used commonly to categorize levels of intelligence. For example “retard”, “idiot”, and “moron” were used to describe a person. Today, those words are socially unacceptable regarding individuals with intellectual disabilities.

Robert Yerkes was the first to use the Binet- Simon test in the army. He classified each individual into groups according to each person’s intelligence levels. He separated the army into two levels dependent upon intelligence: Alpha and Beta. Army Alpha described the group that was literate and Army Beta described the illiterate group. His use of mental testing in the army showed other psychologists intelligence ranged in certain groups of people. Yerkes also developed the Yerkes- Dodson Law. He stated that if an individual has too much or too little stress, his or her performance is not satisfactory. However, if an individual does not have too little or too much stress, he or she can reach an optimal level of performance. This is an important theory with regards to intelligence and test-taking.

Together these psychologists each uniquely played a role in the study of intelligence. Their research and use of intelligence testing developed new theories and were used to further revise the Simon-Binet test and expand intelligence testing. With the discovery of the modern day IQ and theories such as the Yerkes-Dodson Law, researchers could provide scientific explanations for results on intelligence tests and calculate scores accurately and quickly.

**Stanford-Binet Test**

Similar to the Binet - Simon test, the Stanford - Binet test measures general knowledge, memory, and visual-spatial abilities (Cianciolo & Sternberg, 2004). However, the revised version tests both verbal and nonverbal capabilities. The Binet-Simon Test used the original IQ defined by Stern. The Stanford-Binet used the deviation IQ. The deviation IQ is based on an individual’s test results compared to other individuals with the same chronological age. This gives specialists a general idea of where the individual falls within his or her population and then additional educational help can be administered if necessary.

There have been multiple revisions to the original Binet-Simon Test. With all of the psychologists interpretations and further research, the Binet-Simon Test was revised into the Stanford-Binet Test. Terman was the most influential psychologist in developing the expanded version that was published in 1916. His revision was developed in order to improve the statistical accuracy. The Stanford-Binet test not only focused solely on children, but expanded its scale to measure intelligence of adolescence and adults. It also focused on a new objective. The Binet- Simon scale focused solely on children’s education. The Stanford-Binet analyzed the test results data and the correlation between intelligence and social influences such as crime for example (White, 2010).

Terman evaluated a total of 2,300 subjects in order to accurately expand the original Binet-Simon. Each subject took 40 extra tests as well as the original Binet-Simon test questions. It was a longitudinal, between-groups design in which each participant conducted a part of the test every two years. Terman himself trained the subjects and scored the tests in order to get valid standard results (Mateer, 1917). He compared the scores of the tests against the results of the revised scale to check for reliability. If the scores were the same or close to the same, the test was reliable.

There have been many revisions to the Stanford-Binet itself. Over the years, details were altered in order to improve the validity and accuracy. The revisions are very similar to the original, but still have minor changes. Most changes that were made dealt with age. The deviation IQ was still incorporated into the new revisions as well as the guide which listed what the individual’s ability should be at any certain age. Minor changes have been added to the new edition. The revision focused on the difficulty with mental age. Because there are certain ages in which growth is rapid, half ages were added in order to validate the test. The revisions are now also directed to be more difficult. The scale now began at age 3 and was extended to age 19.5 (Kohls, 1917). Examples of changes such as these took a span of 10 years thus far (Goodenough, 1937). Binet assisted in the publication up to the third revision before his death in 1911.

**Measuring Intelligence**

In order for results from intelligence tests to be evaluated, a source of measurement had to be valid. Different intelligence tests acquired different types of measurement accordingly. For example, the Stanford-Binet test measures scores using the deviation IQ. This allows for the results to be compared to other individuals of the same age group to determine if the child is below or above average intelligence. Measurement for intelligence tests is not only important to compare individuals, but to monitor change of intelligence levels. The industry uses measurement in multiple situations. A college acceptance measures the results of SAT scores in order to determine admission. On the other hand, management is more likely to higher an individual whose results measure higher than competing potential employees. Depending on each individual intelligence test, a tool of measurement is developed to interpret results.

**Accomplishments**

Although Alfred Binet is most well-known for his development of intelligence testing and the study of mental functioning, he also had many other accomplishments. Such accomplishments were not publically mentioned until after his death in 1911.

Binet’s exploration in individual behaviors was limitless. He studied personality traits from intelligence to hypnosis to sexuality. Although his interest in human sexuality was not as publically recognized, he conducted research pertaining to sexual fetishes. Binet coined the term “erotic fetishism,” which is used to describe one’s psychological sexual arousal from an object or situation (Howard, 2009). He determined erotic fetishism to be a psychological disorder for an individual.

His discovery of mental testing, using the Binet-Simon, served as a basic, general tool for intelligence testing. Since the creation of the test, other psychologists have used the Binet- Simon scale and their own interpretation of intelligence to create new intelligence tests. Mental tests are in some ways similar, but new theories have been altered according to new research and theories. Also, the content of the tests could be directed toward different audiences. The Wechsler Intelligence Scale for Children is another commonly used intelligence test for children with intellectual and learning disabilities. It is also used in a school setting as well as clinics and tests children in areas such as comprehension, memory and functioning. The Wechsler Adult Intelligence Scale is directly related to the test for children, only this test focuses on adult intellectual ability. It tests under similar subjects, but the questions are altered to meet the appropriate age group. Other tests include the Woodcock-Johnson Test and the Cognitive Assessment System. These are just a few examples of other intelligence testing. Alfred Binet’s Binet-Simon Scale helped to create many other modern day tests which focus on similar context, but reflect different age groups and different settings.

Alfred Binet developed cognitive exercises, or “mental orthopedics,” when he conducted a study of children with intellectual disabilities in the classroom. These mental exercises are incorporated into the program *Head Start* which is popular in the education systems today. The program is used to improve the skills of abnormal students and ready them for further education so they do not fall behind. His early suggestion of improving one’s intelligence is incorporated into this modern day program implying this concept of improving intelligence is significant (Cianciolo & Sternberg, 2004). Binet also made many publications regarding educational development. One book, “Modern Ideas of Childhood,” he discussed his observation of unsuccessful teaching techniques (Nikolas & Levine, 2012). His book was used as a guide for teachers on how to improve their teaching strategies in order to enhance their students’ learning abilities.

Binet’s accomplishments are countless. He has published many books and articles pertaining to humanistic behavior that are still used today. While his expertise of psychology is noted with mental testing, his accomplishments in other areas are still significant in the history of psychology.

**Conclusion**

Alfred Binet is one of the most influential psychologists of all times. He defined the meaning of intelligence as a humanistic trait that can be measured, observed, and improved; in which he managed to succeed in all. He developed a diagnostic tool to measure intelligence. He made substantial observations from numerous studies in classrooms as well as the Sonbornne Laboratory. Lastly, he used his scale of measurement, and observations to improve the intelligence of children with intellectual disabilities. His development of a standardized test transformed over the century into modernized versions still used today. Because of all of his accomplishments, Binet is considered the “father of the 1st intelligence test” by other psychologists and researchers. Binet’s research not only on intelligence testing but in other fields such as social and experimental psychology has earned him international acknowledgment and is considered as one of the most overall influential psychologists in history.

References

Ciancioio, A. T. & Sternberg, R. J. (2004). Intelligence a brief history: Massachusetts. Blackwell Publishing.

Fancher, R. E. (1987). Goddard and the Kallikak family photographs. *American Psychologist,*  42(6). doi:10.1037/0003-066X.42.6.585.

Foschi, R., & Cicciola, E. (2006). Politics and naturalism in the 20th century psychology of Alfred Binet. *History of Psychology,* 9, 267-289. doi:10.1037/1093-4510.9.4.267.

Goodenough, F. L. (1937). Review of measuring intelligence. A guide to the administration of the new revised Stanford-Binet tests of intelligence. *Psychological Bulletin*, 34(8). doi:10.1037/h0050978.

Howard, R. (2009). Alfred Binet- a truly applied psychologist. *Psychologist*, 22(3).

Huey, E. B. (1910). The Binet scale for measuring intelligence and retardation. *Journal of Educational Psychology,* 1(8), 435-444. doi: 10.1037/n0070625.

Kohls, S. C. (1917). Stanford (1915) and the Vineland (1911) revisions of the Binet scale. *Psychological Review,* 24(2). doi:10.1037/h0073796.

Nicolas, S. & Levine, Z. (2012). Beyond intelligence testing: Remembering Alfred Binet after a century. *European Psychologist,* 17(4). doi:10.1027/1016-9040/a00017.

Mateer, F. (1917). Review of the development of intelligence in children and the intelligence of the feebleminded. *The Journal of Abnormal Psychology,* 11(16). doi:10.1037/h0069300.

Serge, N., & Sanitoso, R. B. (2012). Alfred Binet and experimental psychology at the Sorbonne laboratory. *History of Psychology,* 15(4), 328-363. doi: 10.1037/90028060.

Tulchin, H. S. (1933). The evaluation of psychological test results. *American Journal of Orthopsychiatry,* 3(3). doi: 10.1111/j.1939-0025.1993.tb06258.x.

White, H. S. (2010). Conceptual foundations of IQ testing. *Psychology, Public Policy, and Law,* 33-43. doi: 10.1037//1076-8971.6.1.33.