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MAKING UP INTELLIGENCE SCALES
De Sanctis's and Binet's Tests, 1905 and After

Elisabetta Cicciola, Renato Foschi, and Giovanni Pietro Lombardo
"Sapienza" University of Rome

Sante De Sanctis (1862–1935) and Alfred Binet (1857–1911), the latter in collaboration with Théodore Simon (1873–1960), introduced their intelligence tests to the scientific community at the Fifth International Congress of Psychology, held in Rome in 1905 on April 26–30. The cultural and political contexts within which De Sanctis and Binet developed their respective intelligence tests showed certain similarities. Nevertheless, De Sanctis's intelligence test and Binet's test did differ in certain respects. The objective of this article is to understand the differences and similarities between the Parisian and the Roman contexts in relation to mental testing, and to investigate the theoretical-methodological contributions of each. In addition, the article analyzes the "diversity" of De Sanctis's context and test, which did not influence the international psychology.

Keywords: history of intelligence testers, French psychology, Italian psychology, Alfred Binet, Sante De Sanctis

Our research is focused on certain issues raised by the development of mental tests as a category of instruments, issues that have concerned the psychological disciplines for a long time and that continue to characterize them to this day. Despite this long-standing concern, few studies exist that seek to reconstruct the origins and development of these instruments. The names of Alfred Binet, Théodore Simon (1873–1960), Francis Galton (1822–1911), and James McKeen Cattel (1860–1944) exist in the memories of psychologists, but the names of other European and extra-European psychologists who used and developed tests are not as well known. This is the case for a number of Italian psychologists; this article explores the work of important scholars such as Alfred Binet and Sante De Sanctis, paying special attention to the social and scientific context in which mental testing was applied in Italy.

As was recently demonstrated, Binet's test was developed as an application of his psychology of individual differences and it evolved over the course of the 1900s, connecting diverse disciplines such as psychiatry and pedagogy, new technologies, and new theoretical-methodological points of view (Chapuis, 1998; Nicolas & Levine, 2012; Nicolas & Sanitioso, 2012). Prior to World War I, general and applied psychology was principally rooted in those countries touched by modern industrialization, in which it was necessary to manage social phenomena such as illiteracy, immigration, and mass education, and to rationalize modern methods of production (e.g., Ash, 2003; Rose, 1996). Following World War I, psychologists in general sought to standardize the intervention tools used for evaluations, and especially those tools that proved useful in addressing emerging social needs.

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Elisabetta Cicciola, Renato Foschi, and Giovanni Pietro Lombardo, Dipartimento di Psicologia Dinamica e Clinica, "Sapienza" University of Rome.

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Correspondence concerning this article should be addressed to Renato Foschi, Dipartimento di Psicologia Dinamica e Clinica, Sapienza Università di Roma, Via degli Apuli, 1, 00185, Roma, Italy. E-mail: renato.foschi@uniroma1.it

In the early 20th century, Italy had to contend with a set of new problems, such as the need to create a public education system that stimulated scientific and psychological studies (Cimino & Foschi, 2012). Likewise, in France, in the last decades of the 19th century, new social needs emerged, including the need to establish compulsory and secular education, available free of charge to all children (Foschi & Cicciola, 2006, 2007).

In contrast to the prevalence of conservative powers toward the close of the 1800s, Italian and French politics of the early 1900s were primarily characterized by progressive and broadly leftist governments whose secular and reformist agendas became the cultural terrain for the application of the human sciences. In this period, mass education in primary schools that were free, open to, and obligatory for all—both normal and abnormal—was one of the principal "solidaristic" and/or "opportunistic" objectives of the nation-states that sought to improve institutional competence in public and social interventions that involved a vast array of social strata. In this European context, two "experimental" psychologists—namely, the Italian Sante De Sanctis and the Frenchman Alfred Binet—presented the first well-thought-out intelligence tests in 1905.

Influenced by transformism, Binet and De Sanctis each constructed a conceptualization of "educability," with the aims of the intellectual recovery of children with mental problems as well as of the poor and marginalized (Binet & Simon, 1907; De Sanctis, 1915; see also Carroy, Ohayon, & Plas, 2006; Foschi & Cicciola, 2006, 2007; Gardou, 2006). In this sense, the mental tests in France and in Italy primarily came to be used in public education, above all for educational purposes and in progressive social reform movements.

The individualization of "delayed" children was the first step in providing them with a special education that was useful for their training, as a way to rebalance that which nature or society had denied the children in terms of equal opportunities through a psycho-pedagogic intervention. There is a clear difference here from other contexts, such as Spain or America, in which the tests were used with the aim of eugenic selection rather than to promote interventions that sought to improve the conditions of the disadvantaged (Carson, 2007; Mülberger, 2010).

Binet's test was, in concrete terms, the result of a program of craniological and anthropometric research that had led French psychology to exclude methodologies for measuring intelligence that were based on correlations between body measurements and corresponding school success. In a similar vein, De Sanctis first supported and then distanced himself from a positivistic and anthropometric conceptualization—as was embodied, for example, in the work of his teacher Giuseppe Sergi (1841–1936) (Lombardo & Cenci, 2004; on De Sanctis, see Cimino & Lombardo, 2004; Dazzi & Lombardo, 2011; Foschi & Lombardo, 2006; Lombardo, 2007; Lombardo & Cicciola, 2006; Lombardo & Foschi, 2008, 2010).

These tests had been developed with different aims and generated different results. Binet's test was used primarily with normal children and with a selective aim. De Sanctis's test, on the other hand, was informed by a different school of psycho-physiological research and was meant to be used primarily with abnormal children. To guide educational interventions with children, Binet continued to revise his 1905 test over the course of his career; for example, in the version, released in 1908, he constructed what was seen as an objective, scientific technique that was capable of measuring a complex mental phenomenon such as intelligence (Binet, 1911; Binet & Simon, 1905, 1906, 1908; see also Cicciola, 2008; Foschi & Cicciola, 2006; Nicolas, 2004; Nicolas & Andrieu, 2005; Wolf, 1973). Likewise, De Sanctis applied measures that he referred to as "reactives" in order to indicate gradations of mental insufficiency in children and adolescents as part of medical, psychological and educational interventions.

The objective of this article is to understand the similarities and differences between the Parisian and Roman contexts, particularly as they relate to mental testing, and to investigate the applied and structural theoretical-methodological contributions of each. In addition, in this paper we will analyze the "diversity" of De Sanctis' context and reactives, which did not further influence the international test movement.

Two Intelligence Tests Presented at the Fifth International Congress of Psychology (1905)

In 1905, both Binet and Simon's intelligence test, known as *Echelle Métrique de l'Intelligence*, and the Reactives of De Sanctis were introduced to the psychological field at the Fifth International Congress of Psychology, under the careful direction of Sante De Sanctis—who officially served as vice-secretary (De Sanctis, 1906a).[1] After the inauguration, held at the *Campidoglio* on the morning of April 26 in front of the authorities, the participants presented their contributions at the Policlinico Umberto I, the hospital of Sapienza University. The congress was divided into four sessions: experimental psychology; introspective psychology; pathological psychology; and criminal, pedagogical and social psychology. Binet, Simon, and De Sanctis presented their works as new approaches to the testing of the intelligence levels of children in the pathological psychology session.

By the end of the 19th century, there had been several attempts to "test" individual differences in basic psycho-physiological processes, and James McKeen Cattell had introduced the notion of mental testing. In Germany, Axel Oehrn (1862–1907) had developed a series of attitudinal tests meant to differentiate individuals at work (Oehrn, 1899, 1896)[2]; likewise, Hermann Ebbinghaus (1850–1909) had attempted to measure the overworking and mental fatigue of elementary school pupils by testing their errors in additions, in numbers memory, and in finishing words that were lacking syllables (Ebbinghaus, 1897). This latter approach was referred to as the "combinations method" and was criticized by both the Parisian and Roman schools (e.g., Binet & Henri, 1898; De Sanctis, 1906b; Henri, 1898), although its influence can be detected in the works of both Binet and De Sanctis (e.g., McPherson, 1987).

Binet and his contemporaries, during the period 1895–1905, were thus in search of a reliable and structured technique to measure individual differences in intelligence. The Parisians presented their scale as a "new" method in comparison to previous psychological tests developed by such psychologists as Cattell, Kraepelin, Ohern, and Ebbinghaus, many of whom worked in other countries; these tests were considered to be an imprecise and random range of tests and were thought to be useless for the study of higher cognitive processes (e.g., Binet & Henri, 1896; Binet & Henri, 1898; Henri, 1898; on the difference between Binet's test and contemporary attempts at measuring intelligence, see Stern, 1914).

Binet and Simon coauthored a paper, entitled *Méthodes nouvelles pour diagnostiquer l'idiotie, l'imbécillité et la débilité mentale* [New methods for diagnosing idiocy, imbecility and feeble-mindedness] (1906), which was inserted in the pathological session due to the fact that the method they proposed concerned the diagnosing of a mental disorder. It must be noted that the paper was read neither by Binet nor Simon, but by Henri-Etienne Beaunis (1830–1921), who represented the physiological psychology laboratory of the Sorbonne. An unpublished letter dated April 25, 1905, demonstrated that the French scientist would have preferred to entrust the reading to Sante De Sanctis but, taking into consideration De Sanctis's organizational duties as the vice-secretary of the Congress, he instead proposed the paper be read by his colleague, Beaunis:

> My dear Colleague,
>
> As I have written to you in an earlier letter, I am sending you a paper for the Congress in Rome. It is written by me and an alienist, Dr. Simon. It would give me great pleasure if you could read it at the Congress. But I know that the duties of secretary are very demanding, and hence it is possible that you do not have

[1] 1905 was also an important year for Italian psychology, because it saw the initial publication of the *Rivista di psicologia* [Journal of Psychology], the International Congress of Psychology was organized in Italy for the first and only time, and the first tenured university positions in experimental psychology were announced. Other relevant events included the establishing of pedagogical schools (in Regio Decreto 19 January 1905, n. 29, and Regio Decreto 1 February 1906, n. 30), tasked with training primary school teachers through the elaboration of new aids that supported childhood education. De Sanctis became professor of Psychology at the University "La Sapienza" and at the pedagogical school of Rome, the context in which he worked on his intelligence test (cf. Ceccarelli, 2010a).

[2] Oehrn was a pupil of Emil Kraepelin (1856–1926). He was part of a group of physicians trained by Kraepelin in experimental psychology at the University of Dorpat (German name of Tartu, Estonia) between 1886 and 1891 that sought to study dreams and sleep in accordance with psychological and psycho-physiological methods. For this reason the Dorpat group of psychologists were well known to De Sanctis (see Lombardo & Foschi, 2010).

> the time. I ask you, in this case, to entrust the manuscript to Professor Beaunis, who would without a doubt be pleased to read it. (Binet, 1905)

Binet's differential diagnosis of children consisted of three principal methods: (a) the medical/anthropological method, (b) the pedagogical method, and (c) the psychological method (Binet & Simon, 1906). The scholars acknowledged the reliability of the "psychological" method, which consisted of the application of the Metric Scale of Intelligence and sought to determine the abnormal child's level of cognitive functioning by comparing their inferior state with what was considered normal for the majority of children. Binet and Simon's preference for the psychological method, and specifically for the Metric Scale of Intelligence, was thus made evident. For them, it was the only method able to objectively establish the intellectual level of abnormal children and to identify "certain" signs of mental retardation on the basis of the deviation from a statistically constructed norm (Binet, 1910; for discussion of the other methods, see Cicciola, 2008; Foschi & Cicciola, 2006; Nicolas, 2004; Nicolas & Andrieu, 2005). We should note here two items. First, the diagnostic method developed by Binet and Simon was expected to establish the intelligence level of abnormal children. In this way it would be possible to place the children in objective and verifiable diagnostic categories, including "idiocy" (inferior level of intelligence), "imbecility" (intermediate level) and those who were "weak of mind" (a less severe level). Second, the instrument made it possible to distinguish between a normal and an abnormal child. The scale was composed of 30 tests presented in order of increasing difficulty. The scale began with the lowest observable level of intelligence (e.g., follow a moving object) and ended with tests that indicated an average or normal intelligence (e.g., define abstract terms). Administering the full instrument required about 15 minutes and the individual tests were chosen because they were "simple, quick, easy, precise, and heterogeneous" (Binet & Simon, 1906, p. 195).

Binet was, in fact, in search of a measure of the level of intelligence that was more precise than the cephalometric ratings of intelligence and he elaborated a creative multitasking method that measured the intelligence and personality processes hypothesized by Hippolyte Adolphe Taine (1828–1893), in particular (Taine, 1870; see Carson, 2007; Cicciola, 2008; Foschi, 2003; Nicolas & Sanitioso, 2012). In his first revision of the test (1908), Binet and Simon devised an arithmetical scoring that was simple and reliable. In a vertical column, the testers marked a "+" if the answer was correct, and a "−" if it was incorrect. A horizontal line divided the test results of different-aged subjects. The child was first presented with tasks designed for those of a younger age and progressed through the tasks until he was no longer able to complete them. The age associated with the last successfully completed task corresponded to the "mental age" of the participant and the subject's overall intellectual level was then calculated by subtracting the mental age from the actual, chronological age, according to the following formula: "mental level" = "mental age" – "chronological age." In this revision, the children whose mental age was 2 years below chronological age could be identified as abnormal (Binet & Simon, 1908, p. 91; on Binet's early measures of intelligence, see also Ceccarelli, in press; Cicciola, 2008; Nicolas, 2004; Nicolas & Andrieu, 2005).

The question remains, however, as to which theory of abnormality Binet adhered. The author invoked a theory of partial development as the cause of abnormality; in fact, the development of abnormal children was argued to follow irregular and partial processes that varied from individual to individual but that, nevertheless, did not exclude the possibility of substituting for deficits in some sectors with surpluses from other, better developed areas. As a result, a "psychological" intervention intended to increase the developmentally deficient sectors of the abnormal individual continued to be thought to be possible.

As was the case with Binet and Simon's *Echelle Métrique*, De Sanctis's test was created as a diagnostic method to classify children. De Sanctis's paper, entitled *Su alcuni tipi di mentalità inferiore* [About some types of mental inferiority (1906)], contains an early version of his Reactives (De Sanctis, 1906b). The tests developed by De Sanctis, known as "De Sanctis' Reactives," were applied and developed first and foremost in the context of his *Asili-Scuola* (training school for the education of disadvantaged and feeble-minded children, founded in

1899), with the aim of grading the mental insufficiency of children, primarily to acknowledge the "phrenasthenic" (equivalent to Binet and Simon's "idiot" or "imbecile") and the mentally abnormal (equivalent to Binet & Simon's "slightly retarded" or "weak of mind" person; see also De Sanctis & Bolaffi, 1914).[3]

As had been the case for Binet, De Sanctis's aims in developing his test had been influenced by the context in which he worked—an Italian society in search of a scientific technique useful in improving the education and training of primary school teachers. In 1905, De Sanctis stated that the use of a fixed series of tests would be more reliable than attempts to measure intelligence by means of a unique test or a random and raw series of tests (De Sanctis, 1906b). Binet and De Sanctis thus on the one hand maintained that "no single test, no matter how good it may be, should ever be made the instrument for testing the intelligence of an individual" (Binet & Simon, 1911, p. 201), while on the other hand they both were in search of a reliable and fixed series of tests that would be useful for the gradation of intelligence in children.

In the 1905 version that De Sanctis presented at the Congress, he introduced His Reactives in the following way:

> The series that I propose is applicable to all phrenasthenics, as long as they are not under the age of 7 and as long as they are calm; it is worth noting that this should only be applied during *periods of utmost calm and when the subject is in full health* and not when the subjects are in a bad mood, emotionally disturbed, tired or feeling negative, in a tantrum or of a similar spirit. *Choosing the moment for the application of the reactives in order to obtain from the reagent optimal responses*; this is the difficulty that only a capable expert or an experienced doctor will know how to overcome successfully. (De Sanctis, 1906b, p. 586)

De Sanctis therefore devised six, simple "Reactives for Children": (1) Give me a ball [presenting five glass balls of different colors and measuring the child's response time using the time reactions method developed by Pierre Janet (1859–1947) or Mariano L. Patrizi (1866–1935)]; (2) Which ball did you give me? (presenting the same five balls in a row as a test of memory; originally developed by De Sanctis); (3) Do you see this piece of wood? (presenting a Froebelian wooden cube) Find the pieces of wood that are the same as this one mixed in with all of the other pieces that you see (presenting five cubes mixed with three cones and two parallelepiped; a modified version of Ebbinghaus's combinations method); (4) Here is a pencil; mark all of the equal pieces of wood (the cubes) that you saw earlier on this carton (presenting a carton on which squares, rectangles and triangles are drawn; a logic test originally developed by De Sanctis); (5) Here, once again, are lots of pieces of wood of the same shape as those that you just indicated on the carton (12 cubes of different sizes displayed at various levels on the table). Tell me how many there are, which of these is the biggest of all of them and which one is farthest from you (a capacity of abstraction test originally developed by De Sanctis); (6) Now tell me: do you think that the largest objects are necessarily the heaviest? Are the most distant objects really the smallest, or do they only appear to be smaller than the closer objects? (a capacity of description test originally developed by Binet) (pp. 586–587; see also De Sanctis, 1906c).

Moreover, De Sanctis established some rules to follow while administering the test, such as repeating the question no more than three times and repeating the whole series, after some time, as a check on the results. The results of each item should be expressed in numbers (i.e., "1" if the child responded well, "2" if the child just did not respond well and "3" if the child responded very poorly, along with the response time and the number of errors and omissions). A "high degree" of mental insufficiency would be the diagnosis if the subject (reagent) was not able to advance beyond the second task (reactive); a "medium degree" if the reagent was not able to advance beyond the fourth or executed the fifth only with serious difficulty or many errors; a "light degree" if the reagent, having executed the fifth task, was not then fully capable of executing the sixth; finally, a subject that correctly completed the full series of reactives in a normal time frame would not be considered

[3] There were additional versions of De Sanctis's test developed and presented after 1905; the final version contains numerous modifications and continues to be applied in the De Sanctis *Asili-Scuola*. In the 1914 version, certain modifications proposed by Nikolaj Pavlovich Postovskij (Trans. as Postowsky)—a scholar who applied De Sanctis's Reactives in Russia (see Postovskij, 1913)—were partially included and the number of degrees of mental insufficiency was increased (Ceccarelli, 2002, p. 42).

"phrenasthenic"—intellectual insufficiency observed, but not measurable. The 1914 article, entitled *La gradazione dell'insufficienza intellettuale con il metodo dei reattivi* [The gradation of intellectual insufficiency by the method of reactives], described the versions of the tests developed by De Sanctis and attempted to improve on earlier versions by introducing additional subtests that constituted a true "operational series" of exams, with an established sequence, prescribed verbal deliveries and a complete description of the materials used (De Sanctis & Bolaffi, 1914).

Binet's Test in De Sanctis's *Laboratorio*

De Sanctis's test, like that of Binet and Simon, therefore presented itself as a test consisting of tasks ordered by increasing difficulty. The substantive difference between the two tests was found in the different objectives they pursued: De Sanctis did not intend to measure the normal mental age and then compare it with the pathological age. For De Sanctis, the test measured the intellectual deficit capable of *sic et simpliciter* photographing a difference in the level of mental capacity to verify the presence of learning difficulties that called for a specific psycho-pedagogic training. De Sanctis was interested in applications more so than in methodological issues. In De Sanctis's cultural and political context—as was the case for Binet, as well—the psychological application in primary education were important and the teaching of experimental psychology was a fundamental subject in the pedagogical school for teachers founded in Rome by Luigi Credaro (1860–1939), a pedagogue and Minister of Public Education. Sante De Sanctis was entrusted to teach the subject (Barausse, 2004; D'Arcangeli, 2004; Guarnieri, 1979; Messa & D'Arcangeli, 2009).[4] Thus, from 1905 on, the problem of training teachers and the issue of the application of psychology to pedagogy were clearly fundamental for these European pioneers. Therefore, one of the main research perspectives of the De Sanctis laboratory was the study of intelligence in collaboration with primary schools teachers (Ferreri, 2003).

The work of De Sanctis and his colleagues was also intended to compare the Roman and Parisian tests to establish the rules for examining children. The ultimate version of Binet and Simon's test took a long time to administer and required the completion of a lengthy list of tasks just to be able to distinguish between the mentally normal and the mentally "abnormal" (or retarded), whereas De Sanctis's test was shorter, quicker and simpler to administer and even provided a more specific classification of the mental insufficiency of the child. The primary concern for De Sanctis was to devise a practical test for the classification of the "phrenasthenics" (cf. De Sanctis, 1915; see also De Sanctis & Bolaffi, 1914). Alda Jeronutti, working in Rome, and Nikolaj Pavlovich Postovskij, working in Russia, compared the two tests and found De Sanctis's Reactives to be more useful for the gradation of mental retardation in children. Jeronutti, in particular, did not ascertain significant correlations between De Sanctis's *Reattivi* and Binet and Simon's *Scala* (using the 1911 version in conjunction with Stern's IQ) such that would allow for a secure classification of the degrees of mental "insufficiency" (Jeronutti, 1909; Postovskij, 1913).

De Sanctis's most pressing goal was to distinguish "actual mental retardation" from the retardation caused by social and educational factors. Following a complete clinical-differential observation, De Sanctis applied his Reactives just for the gradation of the "actual phrenasthenics" and recommended only limited use of Binet and Simon's test in distinguishing between doubtful cases of feeble-mindedness that required a more careful diagnosis (De Sanctis, 1915, pp. 157–199). Until World War I, on the basis of these studies, there spread in Italy the notion that Binet and Simon's test could be useful in identifying the deviants who were below average and then, by clinical-differential examination, it could be established who was really "phrenasthenic"; then, using De Sanctis's Reactives, the latter group could be classified so that they would receive a special education (Graziani, 1918).

The intelligence tests developed in early 20th century Rome therefore were studied in a con-

[4] For instance, in 1906, the Laboratory of Psychology of *La Sapienza* University of Rome, of which De Sanctis was the head, was established in the same building as Credaro's pedagogical school, the *Palazzo Giustiniani*, which at the time was also the Italian Masonic Home (on the early 20th-century psychological application and Masonic policy in Rome and Paris see Foschi & Cicciola, 2007).

text in which the need to develop a scientific psycho-pedagogical model for the identification of feeble-minded children was seen to be fundamental. As Babini (1996) stated, at the origin of the Italian school of psychology there was a "phrenasthenics-question" that had challenged doctors and psychologists to find a means of scientific management. In this regard, psychologists in Rome were at the forefront of the development of experimental pedagogical methods, such as the method developed by Maria Montessori (1870–1952). Each devised methods that reflected a concern over how to deliver the best quality education to children (Montessori, 1912/1909, 1914; see also Babini, 1996, 2000; Foschi, 2008, 2012).

Testers and Criticism in Italy

As was noted by Ceccarelli (2002, 2009), in Italy the use of psychological tests was restricted to attempts to standardize or modify Binet and Simon's scale. In particular, there were scholars such as Giulio Cesare Ferrari (1867–1932) who considered intelligence tests to be psychological experiments—a sort of scientific tool to specify psychiatric diagnoses. Other scholars, such as Umberto Saffiotti (1882–1927) and Zaccaria Treves (1869–1911), were interested in the pedagogical use of tests in the schools, and particularly in classifying weak and strong pupils. Specifically, Saffiotti and Treves, after testing 962 children, divided them into three groups corresponding to three broad grades of intelligence: *Weak* (W), *Medium* (M), and *Strong* (S). Moreover, they introduced the notion of "mental grades" as an alternative to "mental age" (Saffiotti, 1916; Treves & Saffiotti, 1911).

The "Treves-Saffiotti" method was based on two main criteria:

> (a) the mental development of children of the same age-group, differentiated according to the amount of schooling received; therefore, for every class it is necessary to arrange as many test-groups as there are age-groups of pupils. Basically, instead of measuring intelligence in relation to age only, we assert that one must measure intelligence in relation to both age and school year; (b) the test-groups for each age-group in the individual classes may constitute, according to the rising level of difficulty of the tests themselves, three grades of difficulty which correspond to three grades of intellectual capacity. (Saffiotti, 1916, p. 139; trans. in Ceccarelli, 2010b, p. 85)

Saffiotti also criticized the methodology of Binet and Simon's intelligence test. He considered it to be quite dangerous because, despite its scientific value and utility for "educational" aims, it could lead to discrimination against feeble-minded children in schools (Saffiotti, 1916, pp. 110–113; see also Intorrella, 2008).

In Italy, as in other parts of Europe, there was thus a pioneering effort to standardize Binet and Simon's metric scale that favored the voicing of criticisms and the introduction of changes. Saffiotti has recently come to be considered by historians as the main Italian expert on Binet and Simon's scale, and as one of the first psychologists to reveal the cultural biases inherent to mental tests (Ceccarelli, 2010b; Intorrella, 2008).

Despite this pioneering context, the use of intelligence tests remained limited in pre1950s Italy. Even De Sanctis's test, while the most widely used "Italian" intelligence test, had a rather limited use in particular psychiatric clinics and "experimental" education. The limited use of the intelligence test was probably due to a general criticism of an academic philosophy—one that was highly influential in Italy—that was very much opposed to experimental psychology and its applications. In Italy, the 1910s were characterized by the rising authority of Neo-idealist philosophy, which had only limited knowledge of psychology and the social sciences and still regarded them as branches of philosophy.[5] Neo-idealists such as Benedetto Croce (1866–1952) and Giovanni Gentile (1875–1944), did not accept psychology as having its own scientific autonomy from medicine and philosophy. Similarly, the intelligence tests, which were based on measures and models of higher psychological processes, gradually were dismissed both as research tools and as devices

[5] Neo-idealism distinctly separated the "real" psychology, as a philosophical science, from the experimental—which it saw as a pseudoscience, with no theoretical-cognitive character and useful only for practical and classificatory functions. This pragmatic account of "psychology" contained a very narrow conception of psychological knowledge, much of which originated from Italian neo-idealist philosophy. In conformity with neo-idealism, Italian psychologists neglected their theoretical standpoints in favor of an applied psychology founded on basic psychophysiological research and with no connection to broader theories or systems (Cordeschi & Mecacci, 1978; Lombardo & Foschi, 1995, 1997).

for the improvement of pedagogy. The tests were seen as merely useful in the psychiatric classification of mental retardation in very limited samples of people (e.g., De Sanctis, 1925).

In this context, pedagogy was also a field colonized by neo-idealism. For instance, in 1916, experimental psychology was removed from the ministerial programs of Italian pedagogical schools (Decree of Lieutenant, 5 November 1916, n. 1553; Barausse, 2004, p. 68). On this, De Sanctis wrote: "The worried souls of some pedagogists and many philosophers will be happy to have finally disinfected the obnoxious smell of an experimental science in pedagogical schools" (De Sanctis, 1917, p. 564). Likewise, in 1923, Giovanni Gentile—the Minister of Education during fascism—reformed the Italian educational curriculum (cf. Colombo, 2004). Psychology—which had until then been taught in high schools by innovative positivist professors such as Roberto Ardigò (1828–1920), Giuseppe Sergi and many others, and which had been sustained by positivistic pedagogists such as Credaro—was considered a servant of philosophy and thus lost its specifically empirical character. The new Italian education laws reduced the space for psychological research and contributed to the cutting back of research activity, which in the early 20th century had been carried out in a number of important Italian laboratories in Rome, Florence, Padua, Milan, and Turin (cf. Cimino & Foschi, 2012; Guarnieri, 2012; Mecacci, 1998).

In Italian culture, therefore, influential scholars were suspicious of intelligence tests; in her pioneering liberal pedagogy, Maria Montessori—herself a student of Sergi and De Sanctis—criticized the usefulness of testing. In fact, Montessori collaborated with De Sanctis in the construction of his tests (De Sanctis, 1906c, p. 79), but gradually distanced herself from diagnoses generated through intelligence testing and did not consider the tests helpful for education. She did not judge this device to be genuinely supportive of efforts to create a new approach to education. In 1926, Montessori finally declared, "[. . .] with the tests of Binet, and their derivatives developed in the United States of America, applied experimental psychology [. . .] has not led to educational reforms, but reforms of the exams! Instead of testing the results of learning, psychologists examine human value of the students and their mental abilities." (Montessori, 1926/2000, p. 65; see also Babini, 2000; Foschi, 2008, 2012).

Conclusions

Early 20th century psychology, social medicine and anthropology were considered to be useful sciences in terms of meeting public pedagogical needs and public education policy (see, e.g., the Ferry Laws [1881–1882] in France and the Coppino [1877], Orlando [1904] and Daneo-Credaro [1911] laws in Italy). With this aim, France's Bourgeois Commission of the Third Republic (1870–1940)—which had to reorganize primary education—supported the use of Binet and Simon's test in differential classes (see also Vial, 1990; Vial & Hugon, 1998). For similar reasons, the Roman psycho-pedagogical experience of De Sanctis was favored in Italy and represented the tip of the iceberg of a myriad of independent initiatives for child institutions and cooperatives that operated at least until 1911—the year in which public education was nationalized— mainly within the territory of the municipality of the city of Rome (AA. VV., 2013; Alatri, 2001; Carson, 2007; Ciani, 2007; Foschi, 2008, 2012; Foschi & Cicciola, 2006, 2007; Genovesi, 2006; Guarnieri, 2001; Sante di Pol, 2005; Wolf, 1973).

Although the intelligence tests had been considered useful tools in "special schools" (e.g., primary schools, experimental schools, differential classes) during the period 1900–1910, afterward they were nevertheless confined to medical clinics. From the 1920s, neuropsychiatric practice with children aimed simply at diagnosing "mental retardation" (De Sanctis, 1915, 1925). Therefore, after the first decade of the 1900s, the use of mental tests in Italy underwent a sort of progressive constraint and medicalization.

Binet and Simon's Metric Scale of Intelligence presented itself as the most mature product of all of those socially useful efforts that had left a decisive imprint on applied psychology in the 1900s; it had social, pedagogical, and clinical goals and was based on the measurement of general intelligence using arithmetic methods that were prelude to psychometric standardization and were susceptible to various forms of criticism. Binet and Simon's test was aimed not only at the identification and classification of abnormal children, but also and above all at the

development of a series of interventions—"mental orthopedics" being foremost among these—designed to reorient their intelligence in support of their reentry into society (for a genealogy of mental orthopedics and a discussion of the concept of the child in the Age of Positivism, cf. Guarnieri, 2006; Ottavi, 2001; Rose, 2011; Rossi, 2001/2013). In this respect, even though one can highlight a number of common points between the Roman and Parisian experiences, a subtle and important difference exists on an epistemological level. Binet, on numerous occasions, underlined the fact that his scale was designed only for clinical purposes, as a way to compare the individual's mental age with their chronological age on the basis of a structured study of a sample of individuals of the same age. Along these lines, the intelligence of an abnormal child could also be "educated" and transformed by means of exercises suitable for the reentry of the abnormal child into society, beginning with the institutionalization of the "abnormality" by means of "*classes de perfectionnement*" or "differential classes," in which the reeducation process would take place (Binet & Simon, 1907; see also Foschi & Cicciola, 2006). It remains true, however, that of the test's three categories of abnormalities—idiot, imbecile, weak of mind—in the end, only the last category, characterized by the mildest disturbances, could effectively benefit from psycho-pedagogical interventions.

De Sanctis, on the other hand, developed his test, with the aim of identifying intellectual deficits and precise grades for feeble-minded children. The exclusive use of De Sanctis's test on small groups did not allow for its standardization because it measured deficits. Furthermore, it did not have as an objective the quantitative description of general intelligence, as can be found in Binet's theory of intelligence, which was derived from a theoretical model Taine originally put forward in 1870 (Carson, 2007; Cicciola, 2008; Foschi, 2003; Foschi & Cicciola, 2006; Nicolas & Sanitioso, 2012).

In comparing the different versions of De Sanctis's tests, it is evident that, from its initial presentation in 1905, the criterion of increasing difficulty was used. In analogy with Binet and Simon's metric scale, De Sanctis's test also placed importance on verifying and confirming the results of the application. It should be noted that De Sanctis, in contrast to Binet, did not introduce a measure—not even an approximate one—of intelligence, nor did De Sanctis speak of "mental age," a concept that can be found in Binet's work beginning with the second version of his test in 1908 and that was well-known in De Sanctis's laboratory.

From De Sanctis's work in Rome emerged a mainly clinical-differential tradition for the use of tests. The tests developed in Italy were implemented as part of the clinical interview and were widely used in psychiatric contexts (Lombardo, 2007; Lombardo & Cenci, 2004; Lombardo & Cicciola, 2006). Following the premature death of Saffiotti and until the end of World War II, there were no concerns surrounding the standardizing of statistically representative samples and the popular use of the test. In his treatise on child neuropsychiatry published in 1925, De Sanctis wrote:

> If one considers mental development during childhood one becomes quickly aware that establishing a specific relationship between age and mental development is not an easy endeavor when one wants to take into consideration the cultural level that is the number and quality of scholastic knowledge and practical life. (De Sanctis, 1925, p. 209)

De Sanctis did not believe that, for either normal or abnormal children, the developmental steps of mental age corresponded to a chronological age that was fixed and valid for every social or educational situation (De Sanctis, 1915). The main consequence of De Sanctis's position was the acceptance of a contextualized use of the test applied to "particular" populations, which means an application restricted to children from a specific city, a specific neighborhood or a specific clinical sample without comparative aims between contexts. These groups of children were similar in terms of culture and social level. The difference between chronological and mental age was considered only a clinical clue, to be investigated in detail. The epistemological specification of the clinical and practical use of the test was always present in De Sanctis's writings, as can be seen in the following:

> We are permitted to repeat that our reactives yield good results in the hands of considerably skilled people. Furthermore, it would not be a mistake to remind doctors for the hundredth time: it is not possible (as, in particular, many American and French psychologists have done) to make a comparison between our reactives and the Binet-Simon scale. Our tests are not

> meant to establish the *mental age*, but are exclusively intended for the *recognition and gradation in 4 degrees, for clinical use, of the mental insufficiency* of abnormal-psychic and phrenasthenic children. This does not impede—and we appreciate—the attempts that have been made to place our reactives in a scale (L. Martin, 1916; W. B. Drummond, 1920; Claparède, 1924), in order to utilize it as a method for the gradation of intelligence in normal subjects. (De Sanctis, 1925, p. 215)

In the Italian, medical, psychological, and pedagogical context of the first decade of the 20th century, there was a common conviction that the test was not a *passe partout* instrument that could be applied in the same manner as, for instance, a thermometer. The test was always used to complete the clinical interview and the systematic description of the child's physical, behavioral and social situation, among specific populations and with practical aims. It was a common conviction among psychologists and physicians, also, that the test would not pass the test–retest reliability assessment for the average subject and this limitation was willingly accepted in order to promote the critical and clinical use of the mental test (e.g. Ossicini, 1973).

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