MENTAL ASSOCIATION: TESTING INDIVIDUAL DIFFERENCES BEFORE BINET

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This paper challenges the historiographical discontinuity established between earlier “anthropometric testing” and the arrival of “psychological testing” with Binet and Simon’s intelligence test in 1905. After some conceptual clarifications, it deals with “word association”: a kind of psychological experimentation and testing which became popular over the last two decades of the 19th century. First Galton’s exploration are presented, followed by experiments performed at the Leipzig laboratory by Trautscholdt, and then Cattell and Bryant’s collective testing. Additionally, I document the use of this method for the study of mental difference through the works of Münsterberg, Bourdon, Jastrow, Nevers and Calkins. The cases I present show how the method gave rise to various measurements and classifications. I conclude that the word association technique triggered reflection on mental “uniqueness”, gender traits and the influence of education, among other topics. Moreover, it prepared the terrain and anticipated some basic attractions and problems intelligence testing would later encounter. © 2017 The Authors. Journal of the History of the Behavioral Sciences published by Wiley Periodicals, Inc.

INTRODUCTION

From Anthropometric to Psychological Testing

The aim of the present paper is to approach the history of mental testing from a different angle from that of previous studies, showing how the word association method was a kind of psychological testing which was profusely practiced and circulated in the last two decades of the nineteenth century. Thereby, I will argue that the method prepared the terrain and popularized experience with psychological testing, years before the French psychologist Alfred Binet1 (1857–1911) and his co-worker the physician Théodore Simon (1873–1961) published their famous intelligence test (Binet & Simon, 1905).

At present, we have a vast amount of historical literature on the history of mental testing at our disposal (see, e.g., Sokal, 1987; Zenderland, 1998; Carson, 2007; Mülberger, 2014, etc.). One key element of interpreting this history lies in establishing a historical discontinuity or turning point. Following Sokal (1987), this break has been seen as a move away from what is called “anthropometric (mental) testing” practiced in the 1880s and 1890s by Francis Galton (1822–1911) and James McKeen Cattell (1860–1944). At the end of the nineteenth century, that tradition of “mental testing”—as Cattell dubbed it (Cattell, 1890; Benjamin & Baker, 1969; Foschi & Cicciola, 2006; Klein, 2009).
—collapsed, giving way to “psychological testing,” as inaugurated by Binet and Simon’s test. Thus, historically, new type of assessment practiced by Binet and Simon is celebrated as a great advance and a major breakthrough (Jansz & van Drunen, 2004).

According to the historical accounts cited above, what was the essence of this methodological change? Contrary to Cattell’s test, in the French one, the tasks were more similar to everyday tasks (pursued at school) such as telling the time from a clock, following verbal commands, naming objects, etc. Binet and Simon’s method is seen as a change that passes from laboratory experimentation with “inferior psychological processes” (mainly based on psychophysical measurement of sensations and perceptions, time reaction experiments, and anthropometric techniques) to a set of exercises which are supposed to examine “superior mental processes,” linked more directly to intelligence (such as judgment, memory, abstract thinking, language skills, local orientation, suggestibility, and understanding). Binet and Henri (1895) explained this shift as the key to the success of their assessment and why previous attempts had failed. The new method measured intelligence correctly because the test scores correlated with students’ academic performance (see also Wolf, 1973; Viney & Brett, 2003; Leahey, 2004; Greenwood, 2009). Additionally, in 1908 Binet and Simon would introduce the notion of “mental age” as the norm which would permit them to evaluate the degree of intellectual maturity of each child (later standardized as IQ). This score would be obtained through the deviation of the answers from what would be expected of a child of the same age (established through the group average). Finally, the test underwent several revisions (1908, 1911) and was later developed further in the U.S. through the creation of new versions (e.g., Terman’s Stanford-Binet test), with the first mass testing being applied to U.S. soldiers during World War I.

Meanwhile, some historians (Sokal, 1987; Zenderland, 1998) have added more details to this history, prior to the popularization of the French intelligence test, and have included further historical actors. For Carson (2007), the story starts with the interest developed by Taine and others in the topic of intelligence in the nineteenth century. It was in the political context of the U.S.A. and French Republic, ruled by democracy and the aim of establishing a new meritocratic order in society, that mental testing gained importance. Contrary to previous assessments, such as those of Gould (1981), Sokal (1987), and Carson (2007), which traced the origin of psychological testing back to a growing interest in the study of intelligence (linking the issue to nineteenth century anthropometry), here I switch emphasis and connect the historical emergence of testing to experimental practices in psychology; and, more specifically, to the way the word association method was used and spread. Although the Binet and Simon test inaugurated a novel way of testing, I will prove that the historical interpretation of this as a shift from one era to another is clearly an oversimplification. I argue that word association was a kind of psychological test that was already used and firmly established in the 1880s: two decades before Binet and Simon’s intelligence test appeared and nearly four decades before Woodworth’s personality test (the Woodworth Personal Data Sheet; see Winston, 2006).

My examples will show that word association was not a sterile or old-fashioned mode of experimentation, but gave rise to rich empirical material and intense discussions concerning human differences. It constitutes an excellent case of a technique which shows three historical developments during the last two decades of the nineteenth century: (1) how mental association experiments mirrored and fostered a growing interest in assessing and measuring human differences; (2) how an increase in the number of experimental subjects in these experiments led to group testing; and (3) how individual and group differences were defined, graded, and evaluated. This last aspect also included the demarcation between male and female minds.
What Is a “Test”? Historical and Conceptual Clarifications

Before I present my historical cases, I need to define the term “test” and its relation to psychological experimentation. If we look at the different historical narratives, we see immediately that there was and is no consensus regarding the meaning of the term. For Doyle (1974), who situated the origin of testing in Ancient Greece, it signified an assessment of abilities; Du Bois (1970) who argued that scholastic testing started in China three thousand years ago, viewed it as an elaborated system of competitive intellectual examinations for selecting personnel; for Bondy (1974), it started with the first psychiatric examinations for anamnesis in the sixteenth century; and Gould (1981) considered nineteenth century craniometry as its historical roots. Sokal (1987), moreover, has pointed out the relevance of phrenology as an early form of testing. These examples suffice to make it clear that each author adopted a different understanding of what mental testing is.

The inconsistencies in the narratives led me to realize that there is a need for conceptual and historical clarification of what is meant by mental or psychological testing. In the first place, an important distinction has to be made between how we understand testing nowadays, and how it was understood a hundred years or more ago. Nowadays, psychological testing is defined as standardized procedures applied to an individual in order to ascertain his or her sensitivity, memory, intelligence, aptitudes, abilities, or personality traits. In the specialist literature, we can find the following definition: “Psychological tests are methodically prepared, standardized situations in which a person shows behavior that is considered exemplary of a large amount of behavior, of an aptitude, or of a personality characteristic, and that is used to draw conclusions about future behavior in other situations” (Gundlach, 2007, p. 214). As measuring instruments, tests nowadays must meet certain standards of objectivity, reliability, and validity (Strack & Schwarz, 2007).

Historically, the English word “test” was already popular among native speakers of the nineteenth century, meaning some kind of procedure for critical evaluation or judgment. Among psychologists from non-English-speaking countries, the word had not yet gained widespread acceptance and they often used other expressions. For example, German scholars talked of “geistige Prüfung” (Ebbinghaus, 1897); in Italy, the psychiatrist and psychologist Sante de Sanctis (1862–1935) used “prova”; and in Spanish, psychologists employed the expression “un reactivo” (literally meaning reagent or “item which provokes a reaction”). Binet and his collaborators were surprisingly quick in appropriating Cattell’s expression “mental tests” (see Binet & Henri, 1895, p. 426), they also used terms such as “method,” “series of assessments” (séries d’épreuves), and “metric scale” (échelle métrique; Binet & Simon, 1904).

In Europe, the word “test” was introduced from English toward the turn of the century to refer to both a piece of the experimental setting and a series of tasks to measure intelligence. Nineteenth and early twentieth century psychologists made no distinction between testing and experimenting. For some scholars, a “test” was the stimulus, and therefore an essential part of the psychological experiment. For example, the psychologists Édouard Toulouse (1865–1947), Nicolas Vaschide (1874–1907), and Henri Piéron (1881–1964) used the word to refer to a very precise and elementary object, such as a small card with numbers or letters on it (see Figure 1), which was to be perceived and was expected to provoke a reaction in the experimental subject.

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2. See, for example, http://medical-dictionary.thefreedictionary.com/psychological+tests.
3. According to the Oxford English Dictionary, it was originally used as a “test” for gold or silver and was derived from the Latin testa, testum, an earthen pot, a variant of testa: jug, shell.
4. See also the comment in Baldwin (1905, p. 682) stating that there is no equivalent for “test” in German.
The image shows a practical instrument used to present, at a given place and for a given length of time, a “test” through a square window (source: Toulouse, Vaschide, & Piéron, 1904, p. 141, Figure 16).

(following some previously given instructions; Toulouse, Vaschide, & Piéron, 1904; and see also Claparède, 1903).

At that time, the term was still unknown in Spain, too. The translator of a French textbook, the pedagogue Ricardo Rubio (1856–1935), felt the need to offer some explanation to the Spanish reader. In a footnote, he explains that it refers to an examination; “something we use [. . .] for the study or scrutiny of psychic phenomena” (Toulouse, Vaschide, & Piéron, 1904, p. 140; this and all the following translations of quotations are my own).

As Winston (1990) has shown, it was only after the 1930s that a narrower definition of (psychological) experiment, as a method distinct from testing, became accepted through Woodworth’s influential textbook published in 1938. Woodworth called testing the “correlational method” and pointed out that it does not include an independent variable and, therefore, does not directly study cause and effect, as the experimental method does. Some years later, Boring (1950) also made it clear that administering a test is not the same as performing an experiment. At the same time, he noted that there is no clear “logical demarcation” between the two and that there was clearly no such differentiation at the time testing started.

Additionally, the secondary literature mentioned above shows that historians often link psychological testing to one or more of: psychometry, (clinical) diagnosis, and psychological differentiation, by ranking people with regard to their peers. If the main aim of psychological testing is to select and rank human beings with regard to their “intellectual worth,” then stimuli which turn out to be instrumental in obtaining (gradable) differences in performance between subjects would be useful tests. Such evaluation can also be performed through school examinations or testing knowledge and abilities for the selection of potential employees (see Du Bois, 1970).

Nevertheless, nowadays, most psychologists would not agree with such a definition. At the beginning of the twentieth century, Binet and Simon (1904) introduced a distinction between “medical, pedagogical, and psychological methods.” The first aimed to evaluate anatomical, physiological, and pathological signs of “intellectual inferiority”; the second, acquired knowledge; and the third make “direct observations and measurements of the degree of intelligence” (Binet & Simon, 1904, p. 194). An example of a test of the second kind is the
Vaney test; of the third, the Binet-Simon intelligence test. The former evaluates the content of scholastic knowledge, probing the things the sane (normal) child should learn. The latter evaluates the subject’s capacities, independently of his or her previous (scholastic) training; it mainly assesses intelligence but may also evaluate memory, language skills, mathematical ability, logical thinking, and other abilities or personality traits. Whether these traits or abilities are innate or acquired, is an issue for discussion. In any case, the psychological test is meant to indicate more stable characteristics.

From the foregoing digressions, three conclusions are relevant for my research and for future historiography of mental testing. First, before the 1930s, performing psychological experimentation and administering a mental test was one and the same thing. Second, we have to be aware that in non-English-speaking areas, expressions other than the word “test” were common. And third, in the nineteenth century, there was no clear differentiation between pedagogical (scholastic) and psychological testing.

The present paper focuses on the practice of testing. I will consider the experimental use of word association as an experimental method and, at the same time, as a way in which “psychological testing” was performed toward the end of the nineteenth century. This is compatible with some of the characteristics of a test mentioned above: considering it a methodologically prepared, more or less-standardized situation, in which a person’s reactions on receiving certain stimuli (i.e., words) are evaluated. On the one hand, all my case studies assess, to a certain extent, individual or group differences, often even quantitatively (mainly through chronometry and the counting of frequencies). On the other, the word association test does not constitute a scale but resembles more closely the format of a personality test in which the order of the items does not imply any increment or direct scaling. Beyond a general interest in human differences, the question concerning what kinds of psychological characteristics and differences were tested through word association will be explored in each case. In part 4, before my conclusions, I contextualize the cases within the broader discussions which took place at the time in a field sometimes called “associationist psychology.”

TRIGGERING MENTAL ASSOCIATIONS IN THE 1880s: FROM CHRONOMETRY TO GROUP TESTING

Chronometry of Mental Association

Galton, a polymath and psychometrician, contributed to the study of human differences and the inheritance of intelligence (Galton, 1869; see also Sweeney, 2001; Bulmer, 2003). He is famous for introducing the use of tests and questionnaires to collect anthropometrical data and as a pioneer in eugenics; a term coined by him. In his “Inquiries into Human Faculty and its Development” (1883), Galton presented some psychometric experiments using the word association method. He performed the experiments on himself, first selecting a list of words and then recording the ideas which would appear in his mind when reading each of them. He did this in a methodical way, recording the time taken and writing down the associations obtained. He observed “much less variety in the mental stock of ideas” than he had expected and concluded that “the roadways of our minds are worn into very deep ruts” (Galton, 1883, p. 138). Reviewing his associations, he discovered that some 40 percent were old ones, acquired in early boyhood, while only 15 percent were due to events that had occurred recently in his life. Moreover, as the early experiences are different for each person, the experiment reinforced his convictions concerning the profound mental differences between human beings. Therefore, he predicted that: “My associated ideas were for the most part due to my own unshared
experiences, and the list of them would necessarily differ widely from that which another person would draw up who might repeat my experiment” (Galton, 1883, p. 140). Interestingly, at the same time, the study of associations took him also to acknowledge the presence of “purely English ideas, and especially such as are prevalent in the stratum of English society in which I was born and bred” (Galton, 1879, p. 6). Thereby, he underlined the strong effect of early education. He did not, however, follow this path of inquiry systematically using a sample to prove these propositions; though as we will see, other researchers soon would.

The British word association studies were well known to German psychologists of the nineteenth century. Wilhelm Wundt (1832–1920), the founder of the first psychological laboratory in Leipzig, acknowledged the British tradition while at the same time he demarcated his later voluntarist psychology from Hartley’s and Hume’s “intellectual associationism” (Wundt, 1896; see also Araujo, 2016). In his work Wundt established ties between psychic phenomena in the form of assimilation or complication, similar to chemical fusion (mergence). While mental associations are mainly passive experiences, not under the control of the will, they are nevertheless capable of awakening volitional processes. Thus, apperception (Apperceptionsverbindungen), which is an active experience, is based on associations but at the same time, are not reducible only to those elementary associations.

Wundt distinguished between internal and external associations. The former is based on meaning and logical relation (such as: subordination and supraordination, similarity, contrast, causality, and function); while the latter depend on temporal coincidence in the presentation of stimuli. Within this conceptual framework, Wundt’s students were able to explore processes of apperception and association using the word association method. To see how such research was undertaken, we turn to a PhD produced by one of his students, a work which would soon be part of the standard literature on association experiments. The author was Martin Trautscholdt (1855–?), who studied in Leipzig between 1875 and 1881.

Along the lines of “mental chronometry,” Trautscholdt (1883) studied the time it took for the mind to establish an association of representations. The method consisted of the experimenter calling out a (one-syllable) word (while pushing a Morse-key “si,” see Figure 2) that elicits a “representation” in the mind of the experimental subject. The moment this second representation emerged in the mind and was apperceived, the experimental subject pushed a button 8 “re” to interrupt an electrical circuit, while the word was written down.

The instructions invited the subjects to repress active attention: they should disengage their will from control over the thinking process and passively surrender themselves to the different emerging representations. This was a crucial strategy thought to enable the mind to act “naturally.” Finally, the experimental subjects themselves classified their responses into categories and talked to the experimenter about their experience.

Four psychologists acted as experimental subjects: Wundt; Stanley Hall (1846–1926); and two doctoral students, R. Besser and Trautscholdt himself. Trautscholdt counted the number of times different kinds of associations appeared in the trials (Trautscholdt, 1883). Thereby, he obtained a numerical preponderance of similarity as a principle of association (in 56 cases)

5. Calkins translates it as “intrinsic” and “extrinsic” (Calkins, 1892, p. 393). Following Wundt, the first refers to the principle of similarity and the second is due to coexistence.
6. Cattell and Bryant (1889) called them whole-to-part and part-to-whole.
7. After completing his PhD, he worked at the University library and later as a teacher at the Nicolai School (Kraepelin, 1983). Today he and his work are all but forgotten.
8. While English-speaking psychologists talked of “ideas,” the Germans used the expression “Vorstellung” which can be translated as “representation.”
9. About Wundt’s understanding of apperception, see Araujo (2016).
versus contrast (only 25 cases). He acknowledged Galton’s observation that most associations are already established during the early stages of life. In his study, Wundt would attribute 57 percent of his associations to early youth (under the age of 17), 32 percent to the age between 17 and 25, and only 11 percent to experiences in later years of his life. Among the younger participants this would also be the tendency, but less marked.

Trautscholdt knew of Galton’s attempt to measure the time needed for an association to emerge. Now he tried to calculate more precisely the “pure” reaction time; that is, the time the mind needs to produce an association, excluding other times such as the time needed to hear and understand the stimulus word or to pronounce the answer. Thereby, he obtained the time of 0.727 seconds, considered a “psychological time.”

Although his research was based on the responses of different subjects who were supposed to react in a similar way, Trautscholdt (1883) did not ignore individual differences. Indeed, he had deliberately included the American psychologist Stanley Hall as an experimental subject, correctly assuming that his reactions would differ because of his difficulties with the German language. His reactions would take more time and he produced more “sound associations.”

Moreover, he also found a relation between the profession and the predominant type of association. Thus, Wundt would tend much more to produce internal associations and when he heard “sense” he immediately responded “sensory organ.” Finally, when analyzing his results, Trautscholdt noticed the strong effect of training and referred to Otto Liebmann’s principle of identical succession (see Liebmann, 1876), which means that associations appear in the same order as they were learned (e.g., April–May).

10. These are associations that are only produced by sound similarities and with no semantic relation. For example, in German, “Bild-mild,” which appeared among Hall’s answers, or in English, “mouse-house,” which was obtained by Cattell and Bryant (1889), see part 2.2.
Group Testing: Mental Association as a Comparative Tool

The American psychologist Cattell would also become involved in reaction time experimentation while working on his doctoral thesis in Leipzig (Cattell, 1886). Afterwards he secured a lecturing post at the University of Cambridge (England). Meanwhile, he made occasional visits to America, until in 1889 he returned to the United States to take up the post of Professor of Psychology (Sokal, 1987, 2009). Through his travels and stays in different countries, Cattell had become well connected with colleagues around the world. Between 1885 and 1889, he and Sophie Bryant (1850–1922) designed and conducted three series of experiments which they hoped would shed some light on the nature of thought. Bryant was a British mathematician and teacher. In 1875, she held a part-time post teaching mathematics and German at the North London Collegiate School, where she later (from 1895 to 1918) became headmistress.

To perform the test on many subjects at the same time, it was necessary to adapt it: a word was now spoken distinctly, and the experimental subjects were required to write down as many words as they could in 20 seconds. They used different samples: Some colleagues (George Frederick Stout, Francis Edgeworth, E. P. Hughes, and C. E. Collet), American students (men and women), German students from a gymnasium, students from girls’ schools in London and Dublin.

As their main results, the authors of the report first provide the frequency of certain associations. For example, in 74 cases, “house” led to the idea of “room(s)”; and in 43 cases, to the idea of “window(s).” The word “tree” suggested the idea of “leaf” or “leaves” 212 times; and “branch(es)” 45 times. As a third example, we find the word “ship,” which led to “sail(s)” on 111 occasions; to “mast(s)” on 80; and to “sea” on 67.

The aim of such an ambitious project was to highlight individual and group differences. Especially useful for this is Table X (Figure 3) in which the results (percent) are ordered in columns for each person and group. Associations were subdivided in two large categories of logical (including correlation, specialization, generalization, final and efficient cause) and objective (including co-ordination, whole-to-part and part-to-whole, as well as successive associations, forward and backward).

In the table (Figure 3), the results of school classes (experimental subjects) and the experimenters are exposed, side by side. Of course, the results are expected to be different. Therefore, one of the first remarks made by the authors along these lines is that logical and verbal associations are more frequent in their own responses (see the first four columns of the table). The reason given for this is that the experimenters are professionals who practice teaching and writing. Edgeworth and Cattell would present the greatest number of logical associations because they were “engaged in abstract studies” (Cattell & Bryant, 1889, p. 243), referring to their intellectual projects (statistics and psychometry). Students, in contrast, prefer a whole-to-part relation, which seems to imply visualization of the object and then naming of part of it. The only exceptions to this trend were the 14 percent of verbal associations made

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11. In 1881, she obtained her BSc from the University of London in mental and moral science and mathematics; three years later, at the same university, she became the first woman to be awarded a DSc (in physiology, logic, and ethics; Valentine, 2003, 2006; Valentine & Sokal, 2016).

12. Stout (1860–1944) had studied psychology at Cambridge University under James Ward. His collaboration in this study is rather surprising because like Ward, he opposed the theory of association (Humphrey, 1951). In 1896, he was appointed to a lectureship at the University of Aberdeen, before became reader in at the University of Oxford (1898–1902).

13. Edgeworth (1845–1926) was an Anglo-Irish philosopher and political economist who made significant contributions to statistics.
Results of the study by Cattell and Bryant (1889) comparing the frequency of associations obtained with different experimental subjects.

| OBSERVERS       | E. | CT. | B.  | C.  | UNIV. | LONDON SCH. | DBR. SCH. | GER. SCH. | AV. |
|-----------------|----|-----|-----|-----|-------|-------------|-----------|-----------|-----|
| No. of Assoc....| 250| 250 | 250 | 250 | 810   | 800         | 1110      | 840       | 710 |
| Co-ordination...| 11 | 8   | 14  | 9   | 7     | 15          | 12        | 10        | 7   |
| Whole to Part...| 4  | 8   | 4   | 1   | 47    | 35          | 41        | 47        | 42  |
| Part to Whole...| 1  | 6   | 3   | 3   | 0     | 3           | 1         | 0         | 4   |
| Forwards.........| 3  | 14  | 14  | 10  | 1     | 1           | 1         | 1         | 5   |
| Backwards........| 5  | 19  | 5   | 2   | 0     | 0           | 0         | 0         | 5   |
| Correlation......| 22 | 19  | 20  | 12  | 9     | 24          | 6         | 4         | 6   |
| Specialisation...| 38 | 19  | 24  | 21  | 20    | 10          | 18        | 19        | 15  |
| Generalisation...| 11 | 1   | 5   | 2   | 2     | 1           | 1         | 3         | 2   |
| Final Cause......| 7  | 3   | 8   | 37  | 11    | 10          | 15        | 11        | 16  |
| Efficient Cause. | 1  | 2   | 1   | 3   | 2     | 0           | 1         | 2         | 1   |
| Unclassed........| 0  | 4   | 0   | 0   | 0     | 1           | 1         | 1         | 1   |
| None ............| 0  | 0   | 0   | 0   | 0     | 0           | 1         | 0         | 4   |
| Objective........| 24 | 50  | 40  | 25  | 55    | 54          | 55        | 53        | 58  |
| Logical..........| 74 | 44  | 58  | 75  | 44    | 45          | 41        | 40        | 40  |
| Verbal...........| 8  | 33  | 26  | 12  | 2     | 1           | 2         | 1         | 8   |

Figure 3.
MENTAL ASSOCIATION

which was therefore set down in Dr. Cattell’s list, was a hopelessly inadequate indication of what was actually taking place in my mind” (Cattell & Bryant, 1889, p. 244). Cattell’s comment was extremely short, emphasizing the value of chronometry and statistics of mental associations.

This historical case shows how, in the hands of Cattell, Bryant and their collaborators, the association method was turned into a test to be administered collectively to classes of students from secondary schools or universities. Thus, this research, undertaken between 1885 and 1888, is an early example of psychological group testing, in which a considerable number of data were collected. Overall, they recorded some 12,000 word associations using 516 experimental subjects. Thus, we can see that the testing of U.S. Army soldiers during World War I, organized by Yerkes and his collaborators, was not the first collective testing in psychology.

Moreover, the study consists of the collection of mental data with the aim of comparing individuals and groups. The observations related above are clear evidence of one of the key findings of the study: “The nature of the association differs considerably with different persons and classes of persons” (Cattell & Bryant, 1889, p. 242). Thereby, the nature of association does not only depend on the kind of stimulus (or word), but also on the type of experimental subject; more precisely, on the age and kind of training the subject has received as well as the profession. Later the word association method would be used for broader cultural (and linguistic) comparisons (see, e.g., Peters & Němecěk, 1914 and Schütz, 1917).

EXPLORING HUMAN DIFFERENCES IN THE 1890S: DIFFERENTIAL PSYCHOLOGY AND GENDER

Testing Intellectual Differences

In a talk delivered in 1891, the psychologist Hugo Münsterberg (1863–1916), at the time still working in Freiburg (Germany),15 outlined the importance of developing a truly individual psychology (Individualpsychologie), sometimes also called “differential psychology.” He had already been conducting association experiments, since at least 1889, and had collected over 50,000 associations (Münsterberg, 1892). The classification and analysis of such a large number was nearly impossible, as he himself acknowledged. Nevertheless, he was able to explore the wealth of material at least partially, to determine “profound and typical differences” in word associations, within his experimental subjects. He called out 200 nouns, 100 adjectives, and 100 verbs individually to 12 subjects who, with their eyes closed, had to say the first word that came into their mind. He deliberately did not spend any time on chronometric registering which he thought would not be worth the effort (see also Benjamin, 2006). Moreover, for him the empirical data showed that he was not dealing with individual associations of representations but with “associative constellations”: each representation lies at the heart of a great number of relations with other representations. Given two central point-associations (ASSOCIATIONSMITTELPUNKTE), the next emergent representation would necessarily be one that lies in the association-circles of both. Thereby, mental content changes (Münsterberg, 1892).

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14. The abbreviations used in the table are: E = Edgeworth, CT = Collet, B = Bryant, C = Cattell; UNIV. GRADS. = 31 university students (mostly women); LONDON SCH. = London girls’ school in different grades (3rd, 4th, 5th, and 6th); DB. SCH. = Dublin girls’ school; GER. SCH. = boys at a German Gymnasium (with Latin as important subject); and finally, AV. means average. “Observers” refers to the experimental subjects.

15. For more information on Münsterberg, who would soon after direct the psychological laboratory at Harvard University, see Hale (1980), Blatter (2015), and Spillmann and Spillmann (1993).
Analyzing the word types, his results show some individual differences, as can be seen in the table reproduced here as Figure 4.

Experimental subjects I–V tended to associate coordinated representations (N), subjects VI–VIII subordinated representations (U), and subjects IX and X supraordinated representations (Ue; see Figure 4). An example of each kind of association (following the same order) is: painter-poet, flower-tulip, and hand-body. Münsterberg was satisfied and concluded that he seemed to be dealing with three types of “intellectual physiognomy,” among which he could also find intermediate forms (the responses of subjects XI and XII; see Figure 4). He enthusiastically recommended further explorations of mental associations because: “with the consideration of these differences ‘individual psychology’ has the possibility to oppose the temperamental differences on the emotional level, with some clearly delimited intellectual differences; differences which may be partially due to the dominance of phantasy or to the deductive or inductive constitution of the individual mind and which can be easily controlled experimentally as has been shown here” (Münsterberg, 1892, p. 36). It is a pity that he did not explain in more detail the way he arrived at this deduction concerning mental constitution based on the response patterns. Presumably, he considered the second group of people (VI–VIII), who made subordinated associations, to be “deductive” thinkers; whereas the third group (IX–X), who made supraordinated associations, would be “inductive.”

Meanwhile, Münsterberg’s French colleague, the psychologist Benjamin Bourdon (1860–1943), also started to explore individual differences with the help of mental association (Bourdon, 1893). He was the first professor to offer a course in experimental psychology at

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16. The Roman numbers are the experimental subjects. Münsterberg does not give any information on them, but from similar experiments he was doing at that time (see Münsterberg, 1892) it is probably a sample of young men undertaking academic studies. Each of them produced 100 associations, reacting with different kinds of words: Ue = supraordinated noun; U = subordinated noun; N = coordinated noun; A = dependent noun; E = adjective; S = verb (of which the noun is the subject); O = verb (of which the noun is the direct object); IO = verb (of which the noun is the indirect object).
the University of Rennes, in 1891 (Nicolas, 1998). Historians such as Serge Nicolas (1998) present Bourdon as a student of Wundt because of the long-lasting effect his visit to Leipzig in 1886 had on his research. In his association experiments, Bourdon used letters and words as stimuli. Already when using only letters, he acknowledged the varying number and kind of responses given by different subjects. For example, he found that the number of answers varied from 67 to 112 words (Bourdon, 1893, p. 250). In a series of “word-to-word associations” (Bourdon, 1893, p. 237), he used 15 experimental subjects\(^{17}\) and 60 words to which each subject reacted with the first word that came to mind. Similarly, to Münsterberg (1892), he distinguished between quality (adjectives), objects (nouns), and acts (verbs), pointing out that the subjects had a tendency to respond with the same kind of word as the stimuli. Thus, after hearing a noun, the person usually reacted with another noun; and the same happened in the case of adjectives and verbs.

Additionally, he analyzed similarity, difference, and opposition. He found a predominance of “difference” in all three categories (qualities, objects, and acts; see Figure 5), which is not surprising as it refers to a broader, less-specific category than similarity or opposition.

Bourdon was especially keen on deducing individual differences in mental organization from the different patterns observed in the responses of the subjects. He saw the practical relevance of his association experiments in the “easy with which the results can be used to determine almost mathematically individual aptitudes” (Bourdon, 1893, p. 260; see also Richard, 1962). Reactions which are difficult to understand were interpreted as a sign of “mental incoherence” (Bourdon, 1893, p. 259). Also, frequent reactions with verbs to nouns or adjectives, would be viewed by him as incoherent. In contrast, someone who tends to associate through difference and opposition, and reacts with the same word type as the stimulus (noun-noun, adjective-adjective, verb-verb), would indicate a logical and “discriminative” spirit (Bourdon, 1893). Moreover, he recognized an effect of habit and training in the results, and occasionally abnormal traits. This last diagnosis he obtained from registering unusual (or “abnormal”) responses such as when hearing “salt” the subject answered “NaCl” (see Bourdon, 1893, p. 252).

A couple of years later, Bourdon (1902) used two series of 100 words and 100 people from two different regions (Lilloise and Rennaise) and found that, depending on the kind of word stimulus, the responses of different people are often the same. Thus, he categorized the words with regard to the frequency of coincidence in the responses. Thereby, he obtained a list of 50 words which usually obtained 20–39 identical responses. For example, apricot often evokes peach (22 times), loam-soil (26) and dog-cat (24) (for the complete list, see Bourdon, 1902, p. 56). He proposed this list as a “test” to study the uniqueness (individualité) of the associations for each person by calculating the deviation of their responses from the mean of his sample of 100 subjects. The French psychologist concluded that there is a general disposition among some subjects not to give the same answers as the rest; a tendency which

\(^{17}\) He gave no information on his subjects, something which would later be criticized by Stern (1894).
may be the result of “a natural disposition to be strongly interested in the abnormal, (…) and therefore to retain in their minds as strong associations, combinations of ideas which are not usual” (Bourdon, 1902, p. 61). Meanwhile, there are also well-educated people who make very common associations and, thereby, show a certain “banality of spirit.”

**Discussions of Gender Differences**

While an attempt was made to measure individual differences with the help of word associations, gender differences also started to come under scrutiny. The French physician Charles Feré (1852–1907) had already registered longer reaction times in his word association experiments for women than for men (Aschaffenburg, 1894). At the beginning of the 1890s, the Polish-born American psychologist Joseph Jastrow (1863–1944), an influential experimentalist who would later become president of the APA (1900; Sokal, 1987), started to assemble statistical mental association data from students (25 men and 25 women in his University of Wisconsin psychology class; Jastrow, 1891). In the freely written word lists, he observed that 55 percent of the men used different words from the rest of their peers; while only 45 percent of the women gave original answers. Therefore, he concluded that “the women repeat one another’s words much more than the men” (Jastrow, 1891, p. 563). Another gender difference he observed was that the women’s answers generally referred to entertainment, arts, and educational matters. They used words related to their immediate surroundings, finished products, the ornamental, the individual and concrete; while the men preferred the remote, constructive, useful, general, and abstract. Jastrow, who’s attitude toward women is well known (see, e.g., Rossiter, 1982; Pettit, 2007), was quick to offer an explanation, referring to the existence of differential mental traits, the “woman’s household instincts” and to the fact that a woman’s dress is more “conspicuous, more complex, and more various than that of a man” (Jastrow, 1891, p. 564).

At the same time, more and more women were becoming involved as experimental subjects and experimenters in the study of mental association. One of them (Bryant) has already been mentioned (see part 2.2). Now other expert women would contest Jastrow’s observations and provoke a debate on gender differences (the episode was already mentioned briefly in Furumoto, 1980; Sokal, 1987). In 1895, a study appeared by Cordelia C. Nevers, a student at Wellesley College of the philosopher and psychologist Mary Whiton Calkins (1863–1930). Calkins had started her career under the guidance of the psychologist and pragmatist philosopher William James (1842–1910). In 1891, she had returned to Wellesley College as an instructor of psychology and started to run a psychology laboratory (Furumoto, 1979, 1980). Her desire for further experimental training took her to work at Münsterberg’s laboratory in Harvard from 1892 to 1895. At that time, she was greatly interested in association (Calkins, 1892).

Soon, Calkins’ student (Nevers, 1895) reported a replication of Jastrow’s early mental experiments (Jastrow, 1891). While in her study women also referred often to entertainment, arts and educational matters, there are striking differences with regard to the frequency of words related to the household: “Our lists include only 84 such words [those referring to common articles of household furniture and interior fittings], suggesting, perhaps, a lack of household instinct on the part of the Wellesley students, who appear less domestic even than the Wisconsin University men” (Nevers, 1895, p. 365). The author finally concluded by voicing caution when it comes to generalizations about psychological differences between the sexes (Nevers, 1895); a remark the philosopher Jonas Cohn (1869–1947) agreed with completely (Cohn, 1896). In a similar way, other feminists of the time, such as...
Hollingworth, had also argued against psychological concepts such as “maternal instinct” (Rossiter, 1982).

Jastrow (1896a) reacted furiously to this challenge, denouncing the fact that his method had been varied: Nevers used only 15 lists for her analysis while he had obtained 50. Moreover, he had instructed his subjects to write as rapidly as possible, while Nevers had decided not to restrict the thought-process at all by imposing velocity. Thereby, the words written at Wellesley seemed to Jastrow to be less natural and unreflective than those written at Wisconsin. Calkins, who meanwhile had performed research on association and memory (Calkins, 1896a 1896b), took Jastrow’s criticism seriously and replicated his word association experiment (Calkins, 1896c). This time she worked with 50 women students and obtained 25 word lists, ensuring that these were free from any suspicion of being less natural and unreflective than those obtained by him. She obtained a greater proportion of different words for women than Jastrow had, although still slightly inferior to that for men (Jastrow, 1891, 1894). The number of different words used by the three samples was (see Calkins, 1896c, p. 427):

- Wellesley Women: 1,306
- Wisconsin (men): 1,675
- Wisconsin (women): 1,123

Calkins concluded that this difference seems an insufficient basis for Jastrow’s conclusion that women present less word variety than men. Moreover, when counting the number of words appearing only once, she obtained 868, which was more than Jastrow had obtained for either of his groups (men: 746; women: 520). Therefore, she insisted once again: “The Wellesley results distinctly, therefore, oppose the generalization concerning the tendency of women to repeat each other” (Calkins, 1896c, p. 428). Nevertheless, the predominance of certain topics and women’s strong interest in apparel and interior furnishings clearly converged with that obtained at Wisconsin. Calkins (1896c) acknowledged this as “empirical fact” but still questioned Jastrow’s interpretation: these results were not evidence of “mental traits,” but were due to the influence of education and environment. In conclusion: these preferences “are obviously cultivated interests” and not a consequence of “a distinction between masculine and feminine intellect per se” (Calkins, 1896c, p. 430). Calkins’s report (1896c) was finally followed by a last reply by Jastrow (1896b) who insisted once more in his original conclusions (Jastrow, 1896b).

After 1896, word association was still practiced intensively, and gender was a variable that was taken into account. A later pivotal study was conducted by the American psychologists Catherine Cox Miles and the well-known pioneer in mental testing, Lewis M. Terman (1929), on “Sex difference in the association of ideas.” After collecting and comparing the results of numerous previous studies, the authors concluded that gender differences exist in the association of ideas but “It is possible that they merely reflect present social custom and practice” (Miles & Terman, 1929, pp. 205–206). Although with prudence, the authors clearly supported Calkins’ view here.

**MENTAL ASSOCIATION: A TRICKY ISSUE**

Mental association constitutes a psychological process which can, in a straightforward manner, be triggered spontaneously or by presenting a stimulus word. It had been studied

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18. The stimulus can be of any kind: visual, aural, odorant, gustatory, or tactile. Most researchers at that time used: colors, letters, signs (such as a Japanese letter), syllables (with or without meaning), or pictures. Nevertheless, I focus here mostly on word-to-word associations.
since antiquity and more profusely since Locke’s “Essay” (1690). On a very general level, it is based on the idea, well expressed by Baldwin (1905), that there is “a union more or less complete formed in and by the course of experience between the mental dispositions corresponding to two or more distinguishable contents of consciousness, and of such a nature that when one content recurs, the other content tends in some manner or degree to recur also” (p. 78). Since Aristotle, the main laws of association had been: similarity, contrast, coexistence and succession. In the nineteenth century, efforts were made to reduce the laws to one or two, mainly similarity and coexistence (Wundt, 1892; Warren, 1921; Humphrey, 1951).

Nevertheless, in the nineteenth century, strong criticism had been voiced against the consideration of association as the basic mechanism of mental life. In 1887, Alexander Bain reflected on the controversies in order to reestablish association as an explicative principle (Bain, 1887). Due to this debate, Drever (1965) considered that in the 1880s, Britain was already entering a “post-associationist age” and diagnosed the final death of associationism, as an all-embracing theory, to occur in Britain and Western Europe by 1900. It is true that for many, association was no longer the key explanation of mental life, as it had been previously for Hume, J. Mill, J.S. Mill, Spencer, and other thinkers. Nevertheless, it still attracted attention among psychologists and was considered an essential mental characteristic. Therefore, toward the end of the nineteenth century and during the first decades of the twentieth, it constituted a fashionable psychological practice and a hot topic.

Yet, meanwhile, many doubts had arisen with regard to associationist theory. Even on a basic level such as Baldwin’s definition, the questions concerning what kind of units are associated, what types of associations exist, how they are formed, and so on, received very different answers from different psychologists. Are the units of association “ideas” (representations), sensations, objects, or actions? Are these sometimes feelings or facilitated through a certain state of mind or unconscious mental link? Wundt and Trautscholdt, for example, only considered representations (words) as the units. This would be criticized by their colleagues Münsterberg, Aschaffenburg, and Bourdon. These authors included perception (Sinnesvorstellungen). Thereby, the number of possible combinations increased considerably. One stimulus (word) may trigger several sensations (even combining different senses), ideas (representations) and feelings at the same time! Scripture (1892), for example, tried to show that feelings constitute an autonomous mental element, which can appear independently from representations; and Foullière (1893) underlined the role of associations of feelings.19

For most researches, mental association implied more than a relation between two mental elements. Wundt (1892), for example, stipulated a “complex” in which primary and secondary representations and sensations may be linked or can even merge. As we have seen, Münsterberg (1892) talked of “associative constellations.” Bourdon (1891) made a strong claim for changing the term. He argued that the word “association” was inadequate (in French) because it refers to an accidental and casual connection. To express the kind of stable and “natural” connection (guided by laws) between mental contents, he proposed to talk about “societies” (société) of phenomena (Bourdon, 1891, p. 561). Although he had good reason, his proposal fell on stony ground, as the term “association” was already too widespread.

19. Höfning seems to have been the first to point out the important role feelings play in association. Wundt (1892) acknowledged him for this but in his own analysis only included a “feeling of recognition” (which means that the person notices that a representation he or she has is not new).
Several systems of classification circulated in the 1880s and 1890s, and their adequateness was highly controversial. Some of the most cited (and criticized) were Wundt and Trautscholdt’s (1883) classification based on the distinction of internal and external associations (see part 2.1). Later proposals by Münsterberg, Bourdon, and Ziehen (1898/1900) rejected this distinction while usually maintaining some of Wundt’s subcategories (coordination, subordination and supraordination, etc.). Moreover, Münsterberg (1892) concluded in his study that association occurs only through simultaneity, not successiveness. Bourdon (1891) agreed with Höfding in advocating similarity as a general principle under which he subsumed different kinds. At the time, a discussion took place on what should be considered logical and what psychological categories of mental association (see Orth, 1901). A student of Karl Marbe, Johannes Orth (1872–1949), and the Swiss psychologist and pedagogue Édouard Claparède (1873–1940) criticized the previously mentioned versions for focusing mainly on words and grammar structures, that is, logical relations (Orth, 1901; Claparède, 1903). Instead, they developed psychological categories which took into account the way the experimental subject perceived the stimulus. The latter gave preponderance to whether the association was accompanied by a “relational feeling” (Claparède, 1903, p. 246). Thus, we see that the discussion led to the question of whether association experiments needed introspective testimony or not.

Things became even more complicated when the American physician and psychologist Edward W. Scripture (1864–1945), who had studied under Wundt and later founded the experimental psychology laboratory at Yale University, detected “connecting association” (“mittelbare Assoziation,” see Scripture, 1892), produced by an unconscious link. In Wundt’s view (1892), this result is extremely relevant because it shows that the impression one may have of “freely appearing representations” in the mind is an illusion. As the links that connect ideas are seldom remembered, the subject normally cannot say why such a representation came to mind and interprets it as spontaneous. This observation led Wundt to maintain association as a basic mechanism, stating: “(…) all changes in representations are based on association, as long as they are not determined by direct sensorial impressions (…)” (Wundt, 1892, p. 361). Others rejected Scripture’s results. While Wundt (1894a) and Jerusalem (1894) still searched for new evidences, Münsterberg (1892) and Howe (1894) repeated their experiments but could not find any traces of this.

In my research, I have focused on the practice of word association, viewing it as experimental technique, as well as a way to perform mental testing. The examples offered here reveal the extent to which the empirical material was inextricably integrated into theoretical discourse and debate concerning scientific method, the functioning of the mind, and individual (mental) differences. In the nineteenth century, human differences became a relevant issue. This is usually linked to the spread of evolutionary theory and its interest in studying individual differences (variability) within the same species. Historical figures such as Galton

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20. A complete discussion of this topic lies beyond the scope of the present paper. General information can be found in Warren (1921; especially pp. 247–257) and Humphrey (1951).

21. Scripture used eight cards. On each there was a word in German or in Japanese but with Latin letters, and therefore the subject could at least read it. Moreover, on both cards there was also a Japanese sign. After presenting different cards, the Japanese word was shown and the experimental subject was asked for the German word they had seen on the other card. If they were able to remember the right word, which had been presented with the same Japanese sign, it meant that, unconsciously, the sign had mediated the association between the two words.

22. In my paper there is no space to comment in more detail on the broader discussions which were taking place at the time but I would at least like to mention Wundt’s attack on Münsterberg’s materialist stance, the latter’s attack on Wundt, Scriptures and Trautscholdt’s insistence on precise psychological measurement; the question about the value of introspection, applied psychology, and psychophysical parallelism.
and Lombroso are known for the boost they gave to the systematic and empirical (scientific) examination of physical, psychological, and moral differences between humans. The word association method proved to be a technique which could be applied to different “kinds” of human beings: adults (un/educated) and children; healthy and insane; men and women; different professionals; criminals; people from various ethnic and cultural backgrounds; etc. Moreover, it was expected to reflect genetic as well as social and cultural differences. The historical material on this topic is so abundant and rich (see selection of 225 references on the topic in Claparède, 1903) that I decided to focus here on research by psychologists into healthy adults (and children); leaving aside psychiatric, forensic, and other uses of the method.

The present study shows how the word association method traveled from one setting to another and was thereby transformed and adapted to meet the precise aims of the new study. For Galton, it functioned as a way to explore personal memories. In Leipzig, it became an experimental tool for mental chronometry used to reveal the “normal” associative functioning of the mind. Framed as a laboratory experiment, the testing situation was standardized and the responses of several experimental subjects were recorded and analyzed to provide typical (average) reaction times, frequencies, and numbers of different types of associations. In Trautscholdt’s study (1883), human differences were acknowledged but did not constitute a primary goal.

Trautscholdt was proud of being able to determine with precision, for the first time, what he considered to be an essential chronometric unit of mental activity: the “pure association time” of 0.727 seconds. His confidence in the measurement was based on the concordance between the times obtained with his different experimental subjects, as well as a compatibility of his measurements with times registered in other similar studies. It demonstrated to him that after hearing and understanding a word, the “normal” human mind needs less than a second to bring a second representation to mind; a time unit which is bigger than simple reaction time (see Canales, 2009) and which curiously corresponds to: (1) the measurement of a physical chronometric unit; and (2) the time interval which is usually correctly estimated. The first was determined in Weber and Weber’s (1836) study of the mechanics of walking and the second at the laboratory of Leipzig. Trautscholdt was amazed to find a concordance between the three times, especially with what was considered a basic physical unit (the time the human leg swings during quick walking, see Weber & Weber, 1836). This was probably a convenient way to confirm the psychophysical parallelism adopted by his mentor (see Wundt, 1894b).

In the hands of Cattell, who had experience with the research undertaken in Leipzig, and Sophie Bryant together with colleagues, the word association method turned into an instrument for a broader, international field of research, which aimed primarily to reveal the psychological functioning of “different minds.” For collective application, it was necessary to introduce slight changes into the method. The researchers were interested in generating statistics on the most frequent kinds of associations for different groups (adult scholars and students of different grades and nationalities). In their report (Cattell & Bryant, 1889), certain associations exemplified the way the mind of a teacher or an intellectual was expected to work. The relatively high number of logical and verbal associations supplied by the senior “experimenters” was immediately attributed to their intellectual profession, which is supposed to train such associations. Meanwhile, the less-mature students were expected to use more “primitive” associations, such as images, which lead to whole-to-part associations. Such observations reveal much concerning the social roles and characterization of the mental functioning of “the intellectual,” based on a small sample of men and women whose performance was contrasted with that of their students (of different levels).
Münsterberg (1892) called out words to which his subjects had to react and found three psychological patterns in the answers by analyzing the verbal relation between the word stimulus and the answer. From them he obtained three types of “intellectual physiognomy”: (1) coordination; (2) subordination, which would be a sign of a deductive thinker; and (3) supraordination, which indicates an inductive thinker.

Bourdon (1893) based his psychological diagnosis, on the one hand, on the correspondence between the word types used by the subject. If the answer was of the same kind as the stimulus (e.g., noun-noun), this would be interpreted as a sign of a logical and discriminative mind; and if not, the person would be judged “incoherent.” On the other hand, he devised a 50-word test to measure psychological uniqueness by establishing the deviation of an answer from the most common reactions (Bourdon, 1902). Thus, he would value as superior the fact that a person reacted by giving some unusual response, such as “mammal” or “tail” (on hearing “dog”), then giving the “typical” answer: “cat.” The latter would be seen as banal or vulgar.

At first sight, Bourdon’s assessment seems to fit well with the general tendency in the elitist French academy to value the outstanding mind which is able to differentiate itself from the rest (Carson, 2012). Nevertheless, the superior value given to the original answers can also be observed in other researches. For example, the German psychologist Ernst Meumann (1862–1915) connected greater originality in the associations with a higher level of intelligence (Meumann, 1907). In the United States, the psychologists I have mentioned also agreed with Bourdon. For the researchers, Calkins and Nevers, there was no doubt that Jastrow’s judgment that female mind offered more “common” answers implied psychological devaluation and degradation. Therefore, they were eager to question these observations through empirical results. Even when obtaining similar data, concluding from this the existence of fixed mental differences between men and women seemed to them inappropriate and unwarranted.

Nevertheless, this interpretation had two serious problems and was soon contested. First, it was not easy to distinguish between originality and pathological reactions. A second problem was that studies showed that children generally produce more idiosyncratic and less-common associations than adults, which shows that commonness depends on education (see, e.g., Schütz, 1917, cited in part 2.3; and Ziehen, 1898/1900).

CONCLUDING REMARKS

The cases I consider here are only examples of the profuse mental association studies that were performed toward the end of the nineteenth century. The collaborations and citations make it clear that researchers in this field were well informed as to what happened in other places, and thereby connected on an international scale. Moreover, scholars from different places were aware of contributing to a truly scientific and international undertaking. They cited each other’s works, discussed each other’s classifications and exchanged word lists to obtain comparable results. The desire for standardization led scholars to fix a set of words and instructions, in order to make their empirical material comparable and the procedures repeatable. In this regard, it is of interest to note that Bourdon (1902) called his list of 50 words (which achieved between 20 and 29 common answers) a psychological “test”; a test to measure mental uniqueness (individualité). As a consequence, when referring to the psychological practices of the time, Danziger’s three national traditions or models do not seem an adequate historiographical tool but appear to be a rather artificial distinction.23

23. Danziger (1990) distinguishes between: the Leipzig model (experimental psychology), French clinical psychology, and Galton’s differential psychology (the aggregate model).
Besides Galton, Bourdon, and Münsterberg, other well-known advocates of “individual psychology” (psychologie individuelle) were Binet and Victor Henri (1872 – 1942). They insisted on the need to develop this strand for practical reasons (1895) and on focusing on what they called “superior psychic faculties” (facultés psychiques supérieures, see part 1.1 of the paper). One of these faculties was mental association. Curiously, when they established series of tasks to evaluate mental differences, they decided not to include word associations but tested memory, mental images, imagination, attention, understanding, and suggestibility (Binet & Henri, 1895; see also Binet & Simon, 1904, 1905). This may be due to the difficulties in grading and interpreting word associations. So, this technique was not part of the first intelligence test.

In the cases reviewed in this paper, some of the experiments, such as those of Jastrow (1894), were conducted “freely,” with the only instruction for the subject being to write down all the words that came to mind as quickly as possible, in their home and at a time of their convenience. On other occasions, the method was applied in a laboratory under more restrictive circumstances (Trautschold, 1883). In any case, the test produced a wealth of empirical material which was not easy to analyze. The answers were always classified retrospectively (sometimes after consulting the experimental subject concerning the reason(s) for his or her associations). The classifications summarized what were interpreted as “mental laws.” At the same time, the former needed to be all embracing, in the sense that they had to cover each and every answer (if possible, unequivocally). This was tricky because the association strategies differed from simple associations by sound to logical (even causal) relations. Often a pass-per-tout category was added for reactions for which no reason could be found. Attempts were made to make these associations comprehensible, hypothesizing an unconscious middle link (Scripture, 1892).

One striking aspect in the cases considered here is the fact that the researchers do not seem to have been aware or willing to distinguish between verbal habits and thinking. Richard (1962) has already observed this in relation to Bourdon, but this was very common. Only later, in the publications of Marbe and his co-workers, would a clear distinction appear. On the one hand, Marbe produced empirical data on frequencies of word associations for linguistic analysis (Thumb & Marbe, 1901); while on the other, his students Mayer and Orth (1901) used the same method of word associations (together with introspection and psychological analysis) in the study of thinking. Thus, at the dawn of the twentieth century, the word association test would still be prominent in psychological research and practice, becoming a fundamental instrument in the emergence of the Würzburg School.

In short, the historical cases of research using mental association permit to conclude:

1. There was an attempt to recognize individual types and patterns in the reactions, often pursued through an analysis of the relation between word types.
2. The word association test was supposed to reflect group differences, to distinguish between the different minds of children and adults, educated and uneducated, logical/discriminative and incoherent, deductive and inductive, and male and female. From a methodological point of view, Cattell and Bryant’s study (1889) can be viewed as a real hybrid between psychological experimentation on individuals (using introspection) and later paper-and-pencil testing, in which large numbers of “naïve” people are tested at the same time.

24. In relation to social status, the native or nonnative status of the speaker and the level of education.
3. The researchers realized that association is closely linked to psychological processes such as perception, memory, will, learning, and thinking.
4. The experiments revealed a high degree of agreement among the reactions of different subjects in large samples. Moreover, several researchers interpreted converging answers as banal and indicating poorly developed “individuality.”
5. Most researchers agreed that education and verbal habits influenced the responses. Nevertheless, Jastrow’s talk of women’s “household instincts” and other traits of the female mind placed in sharp contrast to male psychic functioning, situated the debate with Calkins and Nevers into the framework of the nature-nurture debate.

Thus, the association method often turned out to be an instrument which cut both ways: on the one hand, it enhanced a demarcation between different kinds of minds and social discrimination; and, on the other, it fostered awareness of shared associations and the influence of the cultural environment.

Finally, my aim was to show that the rise of testing was not limited to the topic of intelligence. The craze for testing mental associations was already on the way when Binet and Simon’s test arrived, and the birth of the intelligence test did not stop mass testing using the word association method. To a certain extent, the two methods are even linked, as for some psychologists, word associations reflect intellectual maturity as well as intelligence.

Thus, the word association method was clearly not a sterile, old-fashioned mode of experimentation. In some ways, research employing the word association method anticipated some of the basic attractions and problems that would later be associated with intelligence testing. We have seen that it was straightforward and relatively easy to apply; it could be adapted to collective testing, and thereby provided a considerable quantity of intriguing empirical results. The answers indicated a measurable degree of coincidence with regard to the responses, but also individual differences. As seen here, the method was flexible enough give rise to different research lines, reflections, and discussions. It could be developed, adapted, and transcended disciplinary and national borders. And it would still be profusely practiced into the twentieth century, despite the fact that it was still unclear how to analyze the results and what a word association test really measured.

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