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WHY WAS EMIL KRAEPELIN NOT RECOGNIZED AS A PSYCHOLOGIST?

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Abstract. According to a dominant view, Emil Kraepelin (1856–1926) was the founder of modern psychiatry, but his contribution to the history of experimental psychology was insignificant. This interpretation contradicts Kraepelin's own view during his stay in Tartu (1886–1891) because at that time he was more interested in psychology than in his not very satisfying clinical work. He also considered his research on the work curve to be his chief scientific contribution, not the distinction between schizophrenia and affective psychoses which is still valid in the modern classifications of mental disorders. In this paper, I analyse Kraepelin and his students' contribution to four fields of psychology: pharmacopsychology, individual differences, sleep studies, and the work curve. In each of these four areas, Kraepelin and his students made important and pioneering contributions which, although initially recognized by contemporaries, were later gradually forgotten by more recent generation of researchers. I argue that the lack of recognition of Kraepelin's psychological studies is unjustified because he, together with many of his associates, created these four branches of psychology, very much as Hermann Ebbinghaus created the experimental study of memory and Oswald Külpe created the experimental study of thinking.

Keywords: Emil Kraepelin, psychiatry, psychology, Tartu University, history of science

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1. Introduction

Emil Kraepelin (1856–1926) is usually identified as the founder of modern scientific psychiatry whose ideas about mental illness continue to inspire psychiatric research even 160 years after his birth (Decker 2004, Engstrom, Kendler 2015, Healy, Harris, Farquhar, Tschinkel, Le Noury 2008, Jablensky 2007). The dichotomy of psychoses, which he proposed, into affective psychoses (*manisch-depressives Irresein*) and schizophrenia (*Dementia praecox*) constitutes

the basis for two important classification systems of psychiatric disorders, the International Classification of Diseases (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (Becker, Steinberg, Kluge 2016). A search with Harzing's *Publish or Perish* in *Google Scholar* revealed that the search term 'Kraepelin, E.' returned 17,655 papers (H-index = 40) in which at least one of Kraepelin's original or translated publications was cited (October 26, 2016). Thus, his papers are still cited hundreds of times every year. A vast majority of citations, of course, relate to *dementia praecox* (Kraepelin 1919/1971) or various editions of his textbook *Psychiatrie* (Kraepelin 1976) – two of Kraepelin's most cited works. However, against the backdrop of a massive interest to Kraepelin's psychiatric works, his contribution to psychology is rarely acknowledged. It is even possible to write a history of a modern psychology without mentioning Kraepelin at all (e.g. Brennan 1994, Brett 1921, Esper 1964, Robinson 1986, Woodworth, Sheehan 1964). This dismissive attitude towards Kraepelin as a psychologist was probably encouraged by a remark made by Edwin Boring, perhaps the most influential historian of psychology, in his classic *A history of experimental psychology* (Boring 1929/1957):

> *"None [of] Wundt's students played so important a rôle in establishing the new psychology as Külpe and Titchener. There was Emil Kraepelin (1856–1926) of Heidelberg (1890–1903)*[1] *and Munich (1903–1926), but he was a psychiatrist. In fact, he had written a psychiatry (1883) when he was only twenty-seven years old, one that went into many editions. He was as distinguished as any of Wundt's pupils but not as an experimental psychologist, as the phrase is used."*(p. 429)

From this passing remark it is obvious that Kraepelin contributed, according to Boring at least, nothing substantial toward the establishing experimental psychology. In any case, his contribution cannot be measured by the same yardstick as the contributions of Külpe and Ebbinghaus (I am not so sure about Titchener) who, without any shade of hesitation, noticeably shaped the emerging field.

True, some historians still recognize the role of Emil Kraepelin in the history of psychology. For instance, Hothersall (1990) wrote that Kraepelin applied his mentor Wundt's model of attention to the thinking of schizophrenics (Kraepelin 1919/1971). Kraepelin, according to Hothersall, accounted for certain form of schizophrenic behaviour as being due to reduced or poorly focused attention (Hothersall 1990:102). As another example, Leahey (1980) proposed that Wundt attempted to explain schizophrenia as the loss of the apperceptive control of associative processes. Instead of the coordinated process directed by volition, the thoughts of a schizophrenic become a simple, uncontrolled train of associations (Leahey 1980:201). Similar arguments were formulated by other researchers as well (Hildebrandt 1993). Interestingly, these short notices recognize Kraepelin as

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[1] This is another one of Boring's small mistakes, of course. Kraepelin was in Dorpat from 1886 until 1891 when he moved to Heidelberg (1891–1903). By the way, this is not the first time he erred concerning the facts related to Tartu (see Allik 2007).

someone who applied known psychological principles to the explanation of psychopathology. From these citations it becomes obvious that Kraepelin is not perceived as a discoverer of some new phenomena or principle about how the human mind operates. He simply applied one of the Wundt's well-known principles to the field of insanity, which was his main professional interest.

After this short introduction, it may seem justified to affirm the common story about Kraepelin's interest in experimental psychology being mainly his private obsession and leaving no visible trace on his reputation as a scientist. In this paper, however, I dispute this interpretation. I am going to demonstrate that Kraepelin's legacy as an experimental psychologist should be considerably more prominent than is usually thought. Kraepelin deserves more credit as an innovator who opened several unexplored areas that played a pivotal role the history of psychology. In addition, there are several new ideas that should be associated with his name, placing him alongside other great reformers of the experimental psychology, such as Ebbinghaus and Külpe.

2. Emil Kraepelin in Dorpat

When at the age of thirty Kraepelin became Professor of Psychiatry at the University of Dorpat (today the University of Tartu, Estonia) (Kraepelin, Burgmair, Engstrom, Hirschmüller, Weber 2003, Steinberg, Angermeyer 2001, Vahing, Mehilane 1990), he was more interested, as he himself admitted, in experimental psychology than in his not so satisfying clinical work (Kraepelin 1987:43).[2] This was partly due to a language barrier. Most of his patients spoke no other languages except their native Estonian or Russian. In his *Memoirs*, Kraepelin wrote: "I tried to learn Russian and Estonian more thoroughly, but gave it up, when I realized that the success achieved was not in proportion to the time and effort necessary" (p. 40).[3] Although two editions of his monumental *Psychiatrie* (1887 and 1889) were prepared during his stay in Tartu, the small number of patients obviously impeded progress.

Beside teaching psychiatry, Kraepelin taught courses in experimental and forensic psychology. According to archival data, Kraepelin taught courses in experimental psychology in the academic years 1887/88, 1888/89, and 1889/90. In addition, he taught criminal psychology in 1888/89 and general psychology in 1889/90 (Kraepelin et al. 2003:30–31, Ramul 1974). If the fruits of these lectures

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[2] Kraepelin obviously suffered from the fact that he had not been able to continue his work at Wundt's laboratory. In his letter to Wundt (October 21, 1888) he expressed his regrets after hearing news that Oswald Külpe, a graduate from the University of Dorpat, had become Professor of Philosophy in the field of experimental psychology (Steinberg, Angermeyer 2001:305).

[3] In his self-assessment, Kraepelin wrote that mastering languages, especially in written form, was not difficult for him. He also admitted that he was able to understand, if not more, both Russian and Estonian (Engstrom, Burgmair, Weber 2002:101).

are difficult to assess, they are more obvious when it comes to those who joined Kraepelin to write their doctoral theses. Kraepelin was obviously very pleased with his doctoral students. In his *Memoirs* he wrote:

> *"Luckily, I found a lot of keen, self-sacrificing students prepared to devote many, many months' work solely to their doctorate theses. Thus, studies were made, which brought important new finding with them; for example the work by Michelson on the depth of sleep, individual psychology by Oehrn, time sense by Eyner [Ejner], contrast sensitivity with the perception space by Higier and the diversion of attention by Bertels. The difficulties to be overcome on the technical side were often considerable and I constantly admired the patience of the youngsters in withstanding all these obstacles"* (Kraepelin 1987:45).

Table 1 presents a list of Kraepelin's students who prepared doctoral theses on topics related to psychology (Kraepelin et al. 2003:42). In addition to the year, author, and topic, the last column refers to journals where the dissertation was reviewed and by whom. Seven out of nine theses were more or less directly related to experimental psychology. Perhaps only Albert Behr (1891) and Leon Daraszkiewicz (1892) wrote on psychiatric topics such as catatonia and hebephrenia respectively.

The lack of recognition of Kraepelin's significance may be explained by the fact that many of his ideas were expressed in the doctoral theses of his students, not in publications authored by him. None of Kraepelin's Dorpat students became academically renowned and they are only occasionally mentioned in the subsequent psychological literature. It is also possible that theses which were defended in an obscure provincial university had no chance of attracting the attention of a wider audience. This last statement is probably not true because reviews of all of these theses appeared in the *Philosophische Studien* – the journal

Table 1. Doctoral dissertations on experimental psychology supervised by Emil Kraepelin in Dorpat

Year	Author	Topic	Review
1887	Heinrich Dehio	The influence of caffeine on the duration of mental processes	*Allgemeine Zeitschriftfür Psychiatrie*, 1890, 45, 3:20–37.
1889	Arved Bertels	The diversion of attention	*Allgemeine Zeitschrift für Psychiatrie*, 1890, 46, 6:15–29.
	Michael Einer	Study of the time sense	*Allgemeine Zeitschrift für Psychiatrie*, 1890, 46, 6:15–29.
	Axel Oehrn	Experimental study of individual differences	*Revue Philosophique de la France et de l'Etrange,* 1890, 29:320–321
1890	Max[imillian] Falk	Spatial sense through hand movement	(Külpe 1890)
	Heinrich Higier	Contrast sensitivity and space perception	(Ebbinghaus 1891, Higier 1892)
1891	Eduard Michelson	The depth of sleep	(Ebbinghaus 1893)

established by Wilhelm Wundt – or in some other journals. Beside anonymous reviews, likely arranged by Kraepelin himself, two very renown psychologists Oswald Külpe (Külpe 1890) and Hermann Ebbinghaus (Ebbinghaus 1891, 1893) reviewed Dorpat's doctoral theses. As another example, Axel Oehrn's (1862–1907) thesis on individual differences was regarded by Kraepelinas being so important that it was reprinted in the first volume of the *Psychologische Arbeiten* (Oehrn 1895), a journal established by Kraepelin with the aim of publishing his and his students' psychological studies. Thus, the knowledge created in Dorpat was available to a well-informed audience almost immediately. Some of these theses (e.g. Higier and Falk) were written on rather ordinary topics, if we can say that about a field which was just emerging, and could have be done in Wundt's laboratory as well. However, all the other theses were to a certain extent original and opened new perspectives. It is possible to identify at least four areas – pharmacopsychology, individual differences, sleep depth curve, and the working curve – in which Kraepelin and his collaborators' contribution was original and significant.

3. Pharmacopsychology

It seems beyond doubt that Heinrich Dehio's (1861–1929) thesis represented one cornerstone of Kraepelin's attempt to establish the field of pharmacopsychology (Müller, Fletcher, Steinberg 2006, Schmied, Steinberg, Sykes 2006). Although there were several attempts to establish and measure the psychological effects of various chemical substances, it was Dehio's thesis that provided the first comprehensive treatise on this question. Even before Dehio's thesis, Kraepelin started a series of pharmacological experiments investigating the effects of common recreational (alcohol, coffee, tea) and medical drugs (amyl nitrite, chloral hydrate, chloroform, ethyl ether, morphine, paraldehyde) on simple visual reaction times and more complex cognitive processes (Müller et al. 2006:134). Although Kraepelin was not the first to perform experiments that administered drugs to healthy volunteers with subsequent psychometric testing, he was the person who coined the term 'pharmacopsychology' and contributed considerably to what became the science of psychopharmacology; he was the first to design and perform a systematic series of experiments in healthy volunteers (Müller et al. 2006:135). It is worth noting that Kraepelin's experimental work was essential in establishing drug-screening protocols that are still used today (Schmied et al. 2006). Thus, it is rightful to acknowledge that both Kraepelin and Dehio should be credited for their contribution to the conceptual foundation of pharmacopsychology and systematic exploitation of its potential for psychology and psychiatry (Käbin 1986, Müller et al. 2006, 136, Saarma, Vahing 1976).

If the impact of the Kraepelin's pharmacological studies on the course of psychology requires justification, its impact on Kraepelin's own life is well documented by himself. In his *Memoirs* he wrote:

> *"Already in Dorpat my test on the mental effects of alcohol led me to consider whether one should give up alcohol completely. As a test, I was abstinent for a few months, but did not notice any effect on my personal well-being. In 1892, I tried to clarify whether the use of alcohol was practical for mental health reasons. To my surprise, I found that there was really no reasonable motive for drinking unless one wanted to improve one's mood. This discovery impressed me. /.../ Finally, in the spring of 1895 I tried resined wine in Greece, which I did not enjoy at all. As I returned home, I decided that I would finally give up alcohol altogether and fight against alcoholism"* (Kraepelin 1987:70).

Kraepelin's abstinence obviously caused a sensation among his colleagues. In his memoirs he bitterly noted: "I am quite sure that my entire scientific work did not make my name as famous as the plain fact that I did not drink alcohol" (p. 71).

4. Individual psychology

A story about individual differences is more nuanced. The role of Kraepelin in the development of the study of individual differences seems to be underestimated. In this section I try to understand why Kraepelin's achievement in this area was largely forgotten.

Initially, the problem was known by the name of 'individual psychology' and its godfathers were jointly Alfred Binet and Emil Kraepelin (Sharp 1899). Unlike general psychology, individual psychology studies those psychical processes which vary from one individual to another (p. 330). Both of them, Binet and Kraepelin, were inspired by the application of the idea of individual difference to exceptional groups of people. Kraepelin was mainly interested in those who had an abnormal mental life, while Binet was interested in extraordinary people who, for example, were distinguished in their ability to play chess blindfold or to conduct-mental calculations (Varon 1935).

Prior to Oehrn's doctoral dissertation (Oehrn 1889) there were only a few published studies on individual differences. Historically, this field can be traced back to Friedrich Bessel (1784–1846), the astronomer at Königsberg Observatory, who proposed that personal errors of astronomical observation can be compensated for by constructing 'personal equations' which characterize constant differences in the reaction time between two observers. There is no need to repeat this famous story one more time because Boring devoted a whole chapter to the description of this celebrated episode in the history of psychology (Boring 1929/1957, 134–153). It is remarkable that Dorpat was mentioned repeatedly in this episode because Bessel was eager to compare his own observation data with those of Friedrich Struve (1793–1864), who was the astronomer at Dorpat (Allik 2007:620). Thus, it is possible to say that the idea of stable individual differences was born twice in Tartu.

Early enthusiasts of psychometry such as Francis Galton (1822–1911) were convinced that moral and intellectual faculties were so closely bound up with the physical ones that both must be considered together (Galton 1883:3). For example,

the list of human traits measured by James McKeen Cattell (1860–1944), another of Wundt's students who could be credited for developing individual psychology, seems to be an almost random collection of measures, at least from our current perspective. Cattell called them 'mental tests' including – among other measures – dynamometric pressure, bisection of a 50 cm line, and judgement of 10 seconds of time (Cattell 1890). Frances Galton, who commented on Cattell's paper in the journal *Mind*, pointed to the need to learn which of these measures was the most instructive. He made no secret of what kind of criterion he had in mind: mental tests are supposed to determine to what extent somebody is "mobile, eager, energetic; well shaped; successful at games requiring good eye and hand; sensitive; good at music and drawing" (Cattell 1890:380). In other words, what Galton had in mind were gentlemanly qualities.[4]

Compared with this almost eclectic collection of traits, the work of Alfred Binet (1857–1911) and Victor Henri (1972–1940) represented genuine progress. In their "Individual psychology" they intended to confront two major problems (Binet, Henri 1895). First, they aimed to study how psychic processes vary from individual to individual. Second, they planned to study relations among different psychic processes, meaning questions of whether there is any relation between, for example, variation in the span of memory and variations in other psychic faculties of individuals. This second idea – use of covariation to establish the structure of mental faculties – turned out to be most productive in the history of mental testing. For example, the following studies showed that contrary to Cattell's expectations, a simple reaction time is not related to what we nowadays call intelligence (Jensen 1998). In this regard, Binet and Henri (1895) were right to study the more marked and important individual differences, rather than all differences. They blamed other authors, including Cattell and Oehrn, for ignoring this rule. Otherwise these authors, Binet and Henri noticed, would not have set up so many measures of elementary sensations and processes (Cattell, for instance, recommended measuring thresholds for tactile discrimination). Binet and Henri said that their main goal was to deal with the higher or superior psychic faculties including memory, comprehension, moral feelings, and willpower. In spite of their goal of studying superior faculties, like their predecessors they did not forget about measuring muscular strength. Thus, the distinction between elementary and higher mental faculties was not especially well articulated at this time. Nevertheless, efforts to measure superior functions, not elementary ones, apparently determined their further success.

This research program leads logically to the development of the first standardized intelligence tests (Binet, Simon 1904). Initially for Binet-Simon and later Stanford-Binet, intelligence tests were perceived as a monumental

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4 Kraepelin met Galton during his visit to London: "It was a delight to visit Francis Galton, a fine old gentleman, who stimulated the field of psychology without having any real contact with this particular branch of science." (Kraepelin 1987:55) Not all London experiences, however, were pleasant. Kraepelin found the English theatre particularly disappointing (p. 55).

achievement of all psychology. For example, Theta Wolf called Binet's intelligence scales, as a psychological innovation, a giant step (Wolf 1964:762). Even before that assessment, to cite Wolf, "Terman (1916) has called it a "discovery that ranks, perhaps, from the practical point of view, as the most important in all the history of psychology [p. 41]"; while Goddard (1912), in an excess of enthusiasm, insisted that "the scale would one day take a place in the history of science beside Darwin's theory of evolution and Mendel's law of heredity [p. 326]" (p. 762).

However, nowadays very few experts will place Binet on the same level of significance with Darwin or Mendel. For example, Haggbloom and colleagues composed a list of the 100 most eminent psychologists in the 20th century (Haggbloom et al. 2002). This list was based on three different criteria: journal citation frequency, textbook citation frequency, and survey (among historians and heads of departments) frequency. Surprisingly, Binet is not mentioned in the final list of the 100 most eminent psychologists.[5] However, David Wechsler—the author of the *Wechsler Adult Intelligence Scale* or *WAIS*—occupies a very prominent 51st position in the ranking of eminence. In other words, what was once perceived to be the most important achievement in all the history of psychology or even beyond, does not even rank among the 100 most eminent events in the 20th century. Many historians believe that neglecting Binet's role in the development of psychodiagnostic methods is unjust (Cicciola, Foschi, Lombardo 2014, Nicolas, Levine 2012, Varon 1935, 1936, Wolf 1964). Similarly, there is probably no excuse for overlooking the role and impact that Kraepelin and Oehrn exerted on the emergence of individual psychology.

One possible reason why Binet's research program was relatively successful, while Kraepelin's and Oehrn's were not, is that researchers in Dorpat faithfully followed Wundt's research paradigm and its main emphasis was on the analysis and combination of elementary sensory and motor elements. It is well known that Wundt denied that higher psychic processes such as memory and thinking could be subject to experimental analysis. For Wundt, the goal of psychology was to analyse the mind based on simple qualities that were combined into more complex units. This method, Wundt thought, is adequate to the task except in the case of higher psychic processes where experimental methods failed and needed to be replaced with comparative observation of social phenomena (Boring 1929/1957: 333). This possibility, however, seems to be untrue because Kraepelin and Oehrn measured mainly superior, not elementary mental capacities. For example, beside the capacity for the perception, tests were borrowed or invented for the capacity of memorizing what was perceived, forming association between ideas, and for the capacity of voluntary movement. Perception was even studied not on the level of elementary thresholds and discrimination limens but using relatively complex tasks such as the counting of letters, the search for particular letters, and proof

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[5] In fairness, it is important to mention that in two earlier, similar lists Binet was mentioned among the most eminent psychologists (Korn, Davis, Davis 1991, Myers 1970).

reading. The capacity to memorize was tested by learning twelve nonsense syllables or abstract figures. The speed of associations was measured by adding a series of one-digit numbers. Finally, the motor functions were tested by observing how fast one can write or read, which is certainly a more complex activity than pressing a button in the response to a simple visual or acoustic signal. The performance in each of these tests can be measured quantitatively. Beside execution time, fluctuations in performance were also indicative of internal processes, for example fatigue. It was concluded that the more numerous and larger the fluctuations were, the lower the estimates of the physical energy of the studied individual must be (Oehrn 1889, Sharp 1899). In his Memoirs Kraepelin described the whole situation as follows:

> *"I realized that if we were to begin psychological tests in psychiatry, we would need different equipment compared to what has been used up to now. On the one side, such investigations, which only aimed at the theoretical basic problems of psychology and especially at the validity of Weber's law, did not seem to be very promising. Sensory psychological research was of little interest to us. We not only wanted to identify the behaviours of the different intellectual processes in mental disease, but also the external and internal influences. As well as comprehension, the capacity to register, memory, association of ideas, all kinds of intellectual tasks, we particularly wanted to define the manifestation of will, the course of simple movements, the energy output, the expressive movements of writing and speech. Finally, it was important to measure the basic qualities of personality more exactly, for example, the capacity to practice, fatigue, practice durability, recovery capacity and distractibility. In this way, we hoped to gain insight into the different forms of pathological disposition"* (Kraepelin 1987:62–63).

It is very obvious that Kraepelin intended to measure 'the basic qualities of personality', not only intelligence, which later brought fame to Binet. This intention, however, was obviously misunderstood by most of his contemporaries. For example, Charles Spearman (1863–1945), in one of the most influential papers in the whole history of intelligence studies, devoted an entire section, just after Galton, to criticising Oehrn's doctoral thesis (Spearman 1904:207). After acknowledging that Oehrn's study was the earliest actual experiment in mental correlation, Spearman criticises Oehrn for using heterogeneous mental tests. Instead of progressing towards general laws and uniformities, Kraepelin's student had come up with mental tests that did not correlate with one another. For instance, Spearman noted, Oehrn observed that perception, memory, and motor functions (please remember that we are talking about reading and writing) were 'proportional to one another', but that the association test stood at odds with all the others (Spearman 1904:207). This criticism is adequate if Kraepelin's and Oehrn's intention was to devise a practical instrument for measuring general intelligence. But in fact, they had something different in mind. They were looking, among other things, for a particularly good measure of will, not simply of an individual's mental capacities.

It is true that initially Kraepelin identified one group of psychoses as *Dementia praecox* – a 'premature dementia' or 'precocious madness' – because this group of patients was apparently characterised by deteriorated intellectual functioning (Kraepelin 1919/1971). Years later, Eugen Bleuler's (1857–1949) schizophrenia rose in prominence as an alternative to Kraepelin's *Dementia praecox* because it was understood that a patient's intellectual capabilities may be relatively intact in schizophrenia; for Bleuler, the main problem involved a mind that was split into disorganized parts and lacked willpower (Berrios, Gili 1995, Good 2010). There are good reasons to think that in planning their research both Kraepelin and Oehrn had only a vague understanding that the problem they were interested in was not the intelligence but rather the weakness of will or the inability to coordinate attention.

Knowing this brings us closer to explaining why Emil Kraepelin was not recognized as an experimental psychologist. It is likely that Oehrn's study was misclassified as a failed attempt in the development of useful intelligence tests. But it would be more appropriate to say that Kraepelin and Oehrn were after something that today we can call personality and character. The structure of personality is certainly more complex than intelligence which can be united by the singular concept of general intelligence (Jensen 1998, Spearman 1904). Even one of the founders of the modern understanding of personality traits, Gordon Allport (1897–1967), complained that the structure of personality that psychologists seek to understand may be too complex: "Since traits, like all intervening variables, are never directly observed but only inferred, we must expect difficulties and errors in the process of discovering their nature. The incredible complexity of the structure we seek to understand is enough to discourage the realist, and to tempt him to play some form of positivistic gamesmanship" (Allport 1966, 3). Tools for the analysis of complex structures were developed much later than those that Spearman created for the discovery of some general factor common to all variables (Thurstone 1931). It is widely agreed that for the description of both the normal and pathological personality it is not enough to consider only a single dimension; many independent dimensions are required (Markon, Krueger, Watson 2005, Watson, Clark, Chmielewski 2008). It is indeed very difficult to see any affinity between Oehrn's mental test battery and, for example, the *Schedule for Nonadaptive and Adaptive Personality* or SNAP (Clark 1993). Nowadays, psychologists prefer to ask direct questions about how a patient feels, thinks, or behaves ("I have sometimes felt that strangers were reading my mind," "I have sometimes felt confused as to whether my body was really my own," or "I think that I could learn the other's mind if I wanted to") instead of observing how prolific he or she is in memorizing nonsense syllables, counting letters, or in proof reading.[6]

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[6] Hoff (1994:11) noticed that, during his Dorpat years, Kraepelin neglected individual and biographical factors in favour of a 'language-free' experimental psychological approach (Steinberg, Angermeyer 2001:308). However, the inability to learn Estonian and Russian perfectly is obviously an insufficient explanation why Kraepelin was so fond of experimental psychology.

By his own account, while already working in Wundt's laboratory in Leipzig, Kraepelin prepared a large study of verbal associations and had collected thousands of test-results for this purpose (Kraepelin 1987:25). Later in Dorpat, he continued his association experiments, extending them to psychiatric patients. In his *Memoirs* he wrote:

> *"I had set up my own equipment for the measurement of mental reactions and carried out tests on aphasic and other suitable psychiatric patients and on manic patients. I made the surprising discovery that the association times were by no means shorter, but were often longer and very irregular. This fact lead me to understand that the flight of ideas was not the accelerated consequence of mental images, but were volatile and instable emerging processes in the conscience"* (Kraepelin 1987:44).

It is characteristic that Kraepelin wrote about verbal association in terms of processes – how fast and how regular or irregular they were. Unlike Galton (1879), he was not very interested in the content of association. In neglecting this, Kraepelin probably missed a great opportunity. Further development of personality psychology has demonstrated that the analysis of verbal meaning and psycho-lexicon was the main engine behind progress in understanding personality structure (John, Angleitner, Ostendorf 1988). How people use words with different meanings was a key to understanding human personality (Allport, Odbert 1936).

There is also a similar historical gap between Kraepelin's attempts to measure will and more modern approach to understanding willpower (Baumeister, Tierney 2011). Kraepelin obviously cared very little about will as a life principle, as understood by philosophers such as Schopenhauer. For Kraepelin, the will was something that makes psychic processes predictable and stable and that protected them from fatigue. Although the current understanding has not gone very far from this (Baumeister, Vohs, Tice 2007, Gailliot, Baumeister 2007, Gailliot et al. 2007), there are traces that help us recognize Kraepelin's contribution to this field. Modern researchers of willpower usually do not recognize Kraepelin as their predecessor or even as someone who inspired them.

To conclude this section, Emil Kraepelin was doubtless a pioneer in the study of individual differences. However, his and Oehrn's contribution is neglected because it was erroneously classified as an attempt to develop an intelligence test at which Alfred Binet was more successful and for which he has taken all the credit. When psychologists finally learned how to reliably measure personality dispositions, Oehrn's early experiments were almost forgotten. Although Kraepelin was the first to study verbal associations of psychotic patients, these studies made little impression on the psycho-lexical approach (Allport, Odbert 1936) that revolutionized personality psychology.

5. Sleep and dream studies

Before the introduction of electrophysiological methods, all attempts to analyse sleep appear rather primitive. Nevertheless, Eduard Robert Michelson (1861–1944), born in Reval (Tallinn), established a sleep laboratory in Dorpat in 1888. In this laboratory, which was located in an assistant's bedroom in the hospital, he and Kraepelin conducted a fundamental and innovative study about the physiology of sleep regulation (Weber, Burgmair 2009). His thesis, completed in 1891, was reviewed in the *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* by Hermann Ebbinghaus (Ebbinghaus 1893). Unfortunately, as mentioned by Weber and Burgmair, Michelson's thesis nearly disappeared into oblivion as contemporary theories of sleep could not offer an explanation for his findings. Nevertheless, Michelson's study should be considered as one of the key studies in the development of sleep research in the 19th century and a pioneering description of sleep periodicity (the 'sleep depth curve') (Weber, Burgmair 2009).

In Dorpat, Kraepelin conducted so-called 'psychological discussions' (*psychologische Besprechungen*), as he had learned from his mentor Wundt (Becker et al. 2016). During these discussions, participants debated – among other topics – sleep-related questions and students gave presentations about specific questions related to the topic of sleep. Based on these discussions, one of the participants, Friedrich Heerwagen (1864–1941), a physicist who was interested in sleep studies, published a paper which appeared in the *Philosophische Studien* (Heerwagen 1889). This is one of the first statistical studies of sleep and dreams based on questionnaires. In compiling this questionnaire, Kraepelin was obviously closer to modern personality questionnaires than anybody else before him. Most importantly, by analysing the answers it was possible to observe co-occurrences between different items. Based on these data and discussion about them, Kraepelin eventually produced the hypothesis that the depth of sleep correlated negatively with the probability of dreams occurring. In fact, this hypothesis received support from Heerwagen's studies: "the deeper the sleep, the more seldom the dreams" (Becker et al. 2016:13).

However, the most important result was Eduard Michelson's doctoral thesis "Investigations into the depth of sleep" (Michelson 1891). Kraepelin regarded this paper particularly highly and decided to reprint it eight years later in his *Psychologischen Arbeiten* (Michelson 1899). In this innovative study, Kraepelin and Michelson invented a disarmingly simple method for measuring sleep depth. They proposed to measure the 'wake-up threshold' for which they constructed an apparatus containing 14 balls of different weights allowing for different strengths of acoustic stimuli (the heavier the ball, the louder the noise) (Becker et al. 2016:Figure 5). The dropping of the balls was remote-controlled electrically from a separate room and was repeated every 15 minutes. Using this simple apparatus, Michelson was able to construct the first sleep curve. The most important innovation was that, to ensure objectivity, researchers were not allowed to enter the subject's sleeping room during the experiment. The most important outcome of

this study was the sleep curve. This sleep curve demonstrated that without using more advanced EEG techniques, there were different phases of sleep which followed periodically one upon the other. The phases of 'deep' sleep were replaced with the phases of 'light' sleep and vice versa. This result anticipated one of the most important theses about the physiological structure of sleep as established by Eugene Aserinsky (1921–1998) and Nathaniel Kleitman (1895–1999) in the 1950s (Weber, Burgmair 2009).

Evaluating Kraepelin's contribution to understanding sleep, I can rely on a recent excellent paper which deals specifically with this question (Becker et al. 2016). Becker and colleagues concluded that Kraepelin's contributions to the '"physiology' of sleep, when seen in the context of his time, hardly appeared original. The opposite is true, Becker and colleagues argue, "for his – relevant and path breaking – findings on the 'phenomenology' of sleep: besides the determination of a sleep curve, exhibiting marked fluctuations of sleep depth and the identification of different sleep stages (e.g. 'deep sleep') being differently associated with either dreaming or 'somnambulism', the description of preference types, nowadays termed 'chronotypes', should be mentioned here" (Becker et al. 2016:17).

Michelson published two different sleep curves for evening and morning types (Michelson 1891, 1899). These types were understood as dispositions. For example, an individual with the morning disposition gets up early, is very productive in the morning and during the day without a rest in the afternoon, becomes tired early in the evening, does not feel predisposed to mental exertion and goes to bed early. The evening type, by contrast, can manage mental work best in the evening, he continues working into the night, goes to bed late, and gets up late (Becker et al. 2016:14). Based on Michelson's and Oehrn's theses, it seems that Kraepelin believed that people with a good morning disposition represent the more common type, whereas those with a better evening disposition included a greater number of nervous and psychopathically predisposed individuals. The distinction between two different sleep curves reinforced Kraepelin's hypothesis that the evening type was more prone to mental illnesses. Thus, Kraepelin and his students described morning and evening dispositions more than 30 years before Nathaniel Kleitman (Becker et al. 2016:14).

Becker and colleagues (2016) conclude that Kraepelin's dedication to the study sleep has received little attention to date. "Reasons for that may include that he reported his findings rather sporadically and distributed over a variety of publications. In addition, considering the multitude of other valuable and more prominent contributions to psychiatry, they possibly simply got forgotten. However, we deem his findings on sleep, compiled in this article, worth being considered by modern sleep research" (Becker et al. 2016:17).

Work Curve (Die Arbeitscurve)

In October 1888, Kraepelin wrote a letter to his mentor Wundt in which he proudly reported that his studies of exercise and tiredness had progressed most. He

wrote about exploiting several processes that occur in daily life (reading, writing, counting, arithmetic skills, etc.), devising different coefficients for adaption, exercise and tiredness. These coefficients could be calculated for every field and every individual and would in general reflect his recent state of mind as well as his energy (Steinberg, Angermeyer 2001:306). As we can read in Kraepelin's memoirs he was, later in his academic career, particularly proud of his research on the work curve:

> *"Although some of our results remained incomplete, the most important result of all studies was that we were able to gain insight into the course of the working curve, the analysis of the influences, whose combination during each moment of work defined the level of the performance. I concluded these investigations provisionally in honour of Wundt's 70th birthday, by attempting to analyse a given working curve. I presume that by dealing with this problem mathematically more attractive results would have been achieved. However, my earlier attempts to understand more advanced mathematics had convinced me that it would always be difficult to for me to use a mathematical approach.*
>
> *The analysis of the working curve helped us to make some practical discoveries with regard to cases with traumatic neurosis" (Kraepelin 1987:105).*

In spite of his reservations about advanced mathematics, Kraepelin regarded the work curve as his top achievement as a scientist. Roback summarizes Kraepelin's contribution to psychology in the following way:

> *"His chief contribution was the work curve, establishing the process at every stage. W. Weygandt, who wrote an elaborate obituary in* Psychologische Arbeiten*, reveals that Kraepelin had hoped to receive the Nobel award for his labors on the work curve. A naïve expectation, perhaps, but it shows how much weight he placed on those extensive researches"* (Roback 1962:308).

Kraepelin's thoughts and studies on the work curve were scattered across many publications (Hoch, Kraepelin 1896, Hylan, Kraepelin 1902, Kraepelin 1902, Rivers, Kraepelin 1896). The first study which is relevant to this topic was Oehrn's doctoral thesis (1895), in which , as Eysenck and Frith (1977:17) commented ironically, he employed the sensationally large number of 10 subjects. Technically, the working curve was nothing but a minute-to-minute performance level in relation to rather uninspiring tasks such as letter counting, letter search, proofreading, nonsense syllable learning, number learning, writing and so forth. The first important observation that was made by Kraepelin and his students was that in spite of some general similarities, the obtained working curves had individual shapes. They looked for reliable individual differences to distinguish, for example, between normal and psychotic individuals. Eysenck and Frith praise Kraepelin and Oehrn for this intention: "This recognition of the need for introducing personal constants into general equations of performance curves preceded Hull's (1943) programmatic statement by some 50 years, and issued in far more experimental attempts to put the program into practice than did Hull's; its neglect by experimentalists has vitiated all too many empirical investigations" (Eysenck, Frith 1977:26).

A more refined understanding of the general shape of the work curve eluded Kraepelin and his colleagues, most likely due to Kraepelin's repeated complaints about his inability to deal with more sophisticated mathematics. Mathematical analysis of the curve was done by others (Neifeld, Poffenberger 1928) and it was easier to apply it for simpler tasks like the ability to move a finger (Mosso 1890). Nevertheless, Kraepelin discovered quite early that there were two general factors that affected the shape of the work curve: learning and fatigue. Learning improves performance, while fatigue reduces it. The distinction between two largely antagonistic factors was important because it showed that the wide-spread practice of studying learning by using long exercise sessions was confusing. For example, the failure to improve performance may not indicate the inability to learn but simply fatigue. Thus, to study learning in its pure form, the practice session must be divided into shorter intervals separated by pauses that prevent fatigue.

Kraepelin also noticed that it was necessary to distinguish physical and mental fatigue (Hoch, Kraepelin 1896). In order to elaborate on this distinction, Kraepelin collaborated with August Hoch (1868–1919), a Swiss psychiatrist who later immigrated to the United States (Martin 2007). Hoch and Kraepelin noticed that mental fatigue may start independently of body fatigue, which naturally raises a question about the mechanisms underlying fatigue. This means that reduced performance may be caused not just by the depletion of some sort of physical energy, but by what Hoch and Kraepelin called *Anregung* which can be translated as 'suggestion' or 'excitation' (Eysenck, Frith 1977:21). This term was a bad choice, Eysenck and Frith notice, because *Einstellung* (mental set, disposition, attitude), which made the Würzburg school famous, would have been the much better option (p. 22). Thus, *Anregung* is a disposition favouring work in progress, a disposition or set which is gradually lost after cessation of the activity in question (p. 22). The dispositional explanation of fatigue is a precursor of the inhibition which will become prominent in later theories of learning (e.g. Hull 1943).

Kraepelin also published a joint paper with the British polymath William Halse Rivers[7](1864–1922) who is perhaps best known for his participation in the Torres Straits expedition in 1898 (Costall 1999, Rouse, Herle 1998). Rivers and Kraepelin (1896) add another concept, that of permanent work degradation. There are two forms of fatigue. The first one is supposed to dissipate completely over sufficiently prolonged rest pauses. Another type of fatigue, which was essentially mental and related to loss of attention, thus produced a temporary work degradation (Eysenck, Frith 1977:22).

Perhaps one of the most intriguing of Kraepelin's contributions was to the phenomenon which was later known as reminiscence. The term was proposed by Ballard in 1913 to explain that the memory of children for incompletely learned poetry tended to increase for a period of several days following the cessation of

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[7] Claude Lévi-Strauss on cementioned that anthropology found its Galileo in Rivers (Lévi-Strauss 1963:162).

practice (Ballard 1913). More generally, this is increment in learning which occurs during a rest period (Eysenck, Frith 1977). Kraepelin was probably the first to understand that the work curve is a complicated phenomenon which can be understood only by a skilful manipulation of various parameters such as the position and duration of resting period. Edward Lee Thorndike (1874–1949), one of the most eminent American psychologists, began his paper about the working curve with the following recognition:

> *"Kraepelin and other students of the changing efficiency of a mental function under continuous exercise have analyzed the gross course of efficiency into certain supposed features or elements. These are the practice effect, the fatigue effect, the 'warming up' effect (Anregung), adaptation (Gewöhnung), initial spurt, end spurt, spurts after fatigue (Ermüdungsantriebe), spurts after disturbance (Storungsantriebe) and the rhythm of attention"* (Thorndike 1912:165).

Analysis of the working performance is never an easy task because, for instance, an increment in learning may occur after a short rest period while a prolonged resting period may be detrimental for the performance (think about professional athletes whose performance often falls off after being absent from competitions).

Eysenck and Frith wrote their excellent paper "Kraepelin and the age of innocence" with a clear aim to rehabilitate Kraepelin as an innovative experimental psychologist. Although Thorndike was someone who recognized the role of Kraepelin and his students in distinguishing various features of the work curve (Thorndike 1912), later studies largely ignored Kraepelin's significance. Eysenck and Frith have summarized the view that many contemporary researchers have failed to appreciate Kraepelin's significance:

> *"This story may be told in same detail, partly because it is of interest and importance to what follows, but also because it seems largely unknown; thus Geoch and Irion's scholarly work (1952) makes no mention of Kraepelin and his many associates who may be said to have created this branch of study, very much as Ebbinghaus created the experimental study of memory. Bilodeau (1966) is similarly remiss, and so are Osgood (1953) and Hall (1966). Even Boring (1929/1957) fails to recognize the outstanding importance, originality, and thoroughness of the many studies reported in Kraepelin's* Psychologische Arbeiten*"* (Eysenck, Frith 1977:15).[8]

Indeed, it is somewhat surprising that the problem of learning that occupied psychologists for a considerable period of time, especially in the United States, failed to recognize the importance of Kraepelin's studies. The situation was slightly better in the field of industrial and organisational psychology where Kraepelin's studies of fatigue have been more often appreciated (e.g. Koppes 2007:9).

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[8] For the sake of convenience, I've changed some dates of the editions in the cited references.

6. Conclusions

Why was Emil Kraepelin not recognized as a psychologist? One answer seems to be particularly unlikely: because he divided his energy between too many fields of interest. Kraepelin and his students made substantial contributions to research on psychopharmacology (or pharmacopsychology), sleep, word associations, individual differences, and the work curve. Without question, Kraepelin and his collaborators introduced many important methodical innovations in the study of sleep and the influence of chemical substances on psychical functioning (Müller et al. 2006, Schmied et al. 2006, Weber&Burgmair 2009).[9] They also anticipated several discoveries which were made later when more advanced research methods became available (e.g. the use of EEG in the study of sleep). However, in some other fields, Kraepelin's contributions were largely ignored or forgotten.

One possible reason for the neglect was Kraepelin's assumed conservatism. As far as psychology is concerned, he was often perceived as a student of his mentor Wilhelm Wundt. According to some historians, Kraepelin applied outdated Wundtian methods and ideas to explain some practical questions, such as insanity or individual differences. This is clearly untrue because Kraepelin was almost fearless in the study of higher psychic functions – memory and reasoning – which were, as mentioned above, taboos for Wundt. Unlike Cattell, Kraepelin never used sensory thresholds as an indicator of individual differences.

It is also unlikely that the neglect of Kraepelin's works was the result of mistakes in his publishing policy. Kraepelin and his disciples did an excellent job advertising their results in the mainstream psychology journals such as the *Philosophische Studien* or the *Allgemeine Zeitschrift für Psychiatrie.* It is not an accident that two main protagonists, Oswald Külpe and Hermann Ebbinghaus, who helped to establish the new psychology, wrote reviews of the doctoral theses completed in Tartu. Kraepelin also did nothing wrong in establishing the platform *Psychologische Arbeiten* (1896) for publishing his own psychological works. However, special bibliometric research is needed to reveal why the impact of the *Arbeiten* was less than could be expected. It seems that Kraepelin was more recognized early on, soon after the results of his studies were published. Later, as his fame as a founder of the modern psychiatry grew, his psychological achievements tended to be gradually forgotten.

In several cases, Kraepelin made bad choices by selecting weird words to denote theoretical concepts that were later abandoned. Besides *Dementia praecox*, which was replaced by Bleuler's schizophrenia, *Anregung* instead of the more obvious *Einstellung* was a blunder which obviously cost him a much more favourable reception of his ideas. However, Kraepelin's style of research was a more significant reason for the resistance than his missteps in terminology.

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[9] So far I have said nothing about Kraepelin's fairly original studies on handwriting. He even constructed a device for the measuring changes of the writing pressure which allowed him to observe characteristic changes in the writings of psychotic individuals.

Eysenck and Frith keenly observed that quantitative laws in Kraepelin's papers were not worked through very thoroughly:

> *"The reader looking for statistical treatment of data will be sorely disappointed; what little statistics there are, are of a very mundane and elementary kind. In this method of working Kraepelin is very close to Ebbinghaus, whose monumental work on memory was of course carried out with the aid of just one subject-himself; there is also a close correspondence to Pavlov, whose great book constantly gives detailed data for just one or two animals to demonstrate the most far-reaching generalizations.*[10] *Both Pavlov and Ebbinghaus showed that such reliance on extremely careful control and very thorough study of a few selected cases can lead to conclusions which may stand up to the most varied replication, and Kraepelin, too, will be seen to have been led to conclusions which are not contradicted by more modern, statistical methods of research. There is a curious tendency for the wheel to come full circle; Skinner's studies, in their reliance on single case histories and their abhorrence of averages and other statistical devices, strike one as a partial return to the type of research current around the turn of the century* (Eysenck, Frith 1977:17).

Eysenck and Frith are obviously referring here to the distinction between experimental and correlational (testing) psychology which was made by Lee Cronbach in his presidential address "The two disciplines of scientific psychology" (Cronbach 1957). Cronbach observed that for Kraepelin there was not yet a distinction between testing and experimentation: all experimental procedures were tests; all tests were experiments (p. 674). Eysenck and Frith continue:

> *"To say this is not to suggest that Kraepelin's methods are necessarily superior to those of modern psychologists, just as it would be right to say that insistence on complex statistical methods is inevitably superior to the simple approach of Pavlov, Ebbinghaus, and Kraepelin. There are advantages and disadvantages attending both approaches, and both are needed in reaching a proper evaluation of the confusing and contradictory evidence. Means, variances, and covariances can give us important information when their use is appropriate and permissible; but they can also hide important dissimilarities between subjects which only become apparent when other methods of analysis are employed. Kraepelin's results suggested that some people benefit more by short, others by long rest pauses; averaging would completely destroy the possibility of finding such important differences. Modern psychology has not yet found a statistical approach which reconciles the divergent needs indicated in this example; until it is found we would be well advised not to smile at methods which after all produced more fundamental knowledge in the hands of such masters of research as Pavlov, Ebbinghaus, and Kraepelin than have all the*

[10] How close Eysenck and Frith were to the truth in their observation concerning Pavlov was recently demonstrated by Daniel Todes in his titanic "Ivan Pavlov: A Russian life in science" (Todes 2014). Interestingly, Pavlov had also an Estonian connection. For twenty-six years in a row, Pavlov spent three summer months with his family in their summer house, *dacha*, which was located in Sillamäe, Estonia.

> *complex statistics which we so confidently apply to problems which quite often are inappropriate for their use"* (Eysenck, Frith 1977:17).

Indeed, one of the reasons for neglecting Kraepelin was the division of psychology into two disciplines: one stream of research is experimental psychology and the other is correlational psychology (Cronbach 1957). Each of these two research traditions can be identified, Cronbach noted, by many features including their respective philosophical underpinnings, methods of inquiry, topical interests, and loci of application. Kraepelin started as a faithful experimentalist even before Karl Pearson fully developed the concept of correlation in 1904. He and his students attempted to develop individual psychology without appropriate tools which were properly developed only years later. If they used statistics, they did so in a very elementary way. However, the very idea of developing mental tests was picked up by an alternative discipline for which Kraepelin's philosophy, methods, interests, and applications looked inappropriate. Because beginning with Alfred Binet intelligence tests were developed in the framework of correlational psychology, Kraepelin was not perceived as a founder of this tradition. The modern personality tests have very little resemblance with the tests that Kraepelin and Oehrn created to examine their participants. Even in the verbal association test, which is the closest analogue to the modern personality measures, Kraepelin was interested in the reaction times and far less so in the content of the answers.

Even if I partly managed to answer the question of why Emil Kraepelin was not recognized as a psychologist, it is not an excuse for neglecting Kraepelin's true role in the history of psychology. Considering all of these many contributions which I have only hinted at, it is justified to conclude, as Eysenck and Frith (1977) did, that Kraepelin and his many associates created several new branches of psychology, very much as Ebbinghaus created the experimental study of memory and Külpe created the experimental study of thinking.

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