ALFRED BINET (1857-1911)
THEORETICAL AND EMPIRICAL CONTRIBUTIONS TO THE STUDY OF INTELLIGENCE

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by Diana Patricia Faber

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ABSTRACT

The myth that Binet's Intelligence Scales were created "overnight" has already been dismissed by Theta Wolf (1969 and 1973). However, it was felt that there was still more to be explained about the Scales. The aim of this research therefore, was to explore and throw light on the many factors involved in the making of this experimental psychologist and his contribution to the study of intelligence in the late nineteenth and first decade of the twentieth century.

In line with the modern approach that makes the consideration of social factors a sine qua non of an historical account of scientific achievement, the following aspects of France and its culture were explored: the politics which pressed with optimism for free and universal education; the institutional arrangements of the New University of Paris and their implications for Binet's career; the power of medical discourse which provided the framework within which both clinical and educational concerns were articulated; the broader intellectual "climate" in which scientific ideas were disseminated, and the particular intellectual influences on Binet himself.

Binet's work is also seen as operating at the day-to-day level with all its practical demands: for example, his search for subjects, visits to hospices and schools. Binet was essentially a practical and patient researcher, giving particular attention to detail within experiments and in observing subjects' behaviour.

By comparing Binet's views and practice with those of other psychologists of his time, for instance Ebbinghaus, Wundt, Galton, Cattell and Spearman, the originality of Binet's psychology is highlighted.

This research has shown more clearly than elsewhere how Binet came to practise the psychology that he did, and how his flexibility enabled the transformation of a psychological experiment into a test item. It is proposed that the particular social nature of his experiments and use of introspections were contributing factors.

To understand the nature of his achievement it was found necessary to describe the genesis of the Scales through Binet's experimental work in "Individual Psychology" and his studies of children, and to examine the items of the Scales themselves.

Historical accounts of nineteenth century France frequently contain comments on the power of the medical profession. The case of Binet illustrates this finding: I have proposed that the doctors' power created obstacles both potential and actual to the recognition of Binet's experimental work. Within the context of the Pedagogical Society and through a series of events medical power was shifted to allow for the psychologist to construct the diagnostic tool for assessing children's intelligence.

Finally, the Intelligence Scales provoked reactions which generated controversy about the nature of intelligence and its measurement, and these are discussed in this thesis.

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PREFACE

The necessity for seriously considering the cultural context of scientific achievement is becoming more widely accepted by historians of science, and is broadly endorsed in the methodology of this research. Consequently an examination of some of the features of the culture to which Binet belonged - France in the second half of the nineteenth and the first decade of the twentieth century - are presented inasmuch as they relate to Binet's achievement. Any contact with, or investigations into another culture entail a confrontation with a particular aspect of that culture, namely its language. For practical reasons many historical accounts usually give minimal attention to the language if it is other than the one in which the account is written. By convention, citations in the original language are often put into the foot-notes on the assumption that they may be referred to. It is this convention that I would like to challenge.

While it is true that the French language does not enjoy the prestige that it had in the seventeenth, eighteenth and nineteenth centuries, two reasons for considering its introduction into a historical account are as follows. Firstly is the observation that fully translated versions of original names, titles and citations make the account appear acultural, and of course give the impression, which may be false, that translations are cultural equivalents. For this reason, in many instances I have used the original French where the meaning is clear. Most of the citations are given in French from their primary source, with translations immediately following. A second reason for not avoiding the original

language altogether is that, since this research was started we have moved nearer to 1992, and it seems not unreasonable to have a more "accepting" view of at least one other language in the European Community.

One objection may be raised to the repeated insertion of French into what is mainly an account in English. The reader is obliged to engage in "code-switching" which may disturb the flow of the narrative. This inconvenience is acknowledged, but it is felt that the advantages outweigh this objection.

Finally, a few explanations of meaning are required in the following instances: firstly, when historical usage differs from the modern or from the usage in the English language; and explanations with reference to mistranslations that can be found are also needed. The latter are considered first.

For example the word "hardiesse" has been translated as hardiness when in fact it means temerity; "voix" as voice instead of vote; "pénible" as painful instead of irksome; and "alterations" as in "Altératations de la Personnalité" is consistently mistranslated as alterations instead of deteriorations. There are cases too, which show elementary but fundamental lack of linguistic knowledge. For example, Theta Wolf (1969) has translated "L'auteur ne juge pas son oeuvre" (Binet, 1894) as "The author does not judge his (sic!) work" where the reference of "son" is to Stella Sharp. Edith Varon (1936), referring to Binet's statement about intelligence claims that he always talks about the intelligence, but the definite article in French does not imply any emphasis.

Concerning general usage in French, the term "moral" denotes all aspects of the person that are non physical, and does not necessarily have an ethical connotation. The difference in usage between "arriéré" and "retardé" seems to be, in the nineteenth century context, that the former denotes a mental deficiency, while the latter term is used more often in the context of backward in school achievement. "Arriération" is therefore best understood as deficiency, a clinical term. In "L'Intelligence des Imbéciles" (1909) Binet uses the term generically to denote the mentally deficient in general; but this is the only instance that I have found of such use. The word "empirique" was used to denote an approach that was not based on theory, but on practice, particularly with regard to therapy. Therefore lay therapeutic measures were termed "empirique" or "charlatan". Binet used this term too, to mean intuitive or non-scientific. The use of the broad term "abnormal" (anormal, anormaux) in nineteenth century France is introduced and explained in Chapter 3.

Binet's use of the term "faculté" relates to the technical language available: he did not use this term as in faculty psychology to imply entities, but rather as a functional faculty or more often to denote a mental process or operation, or even at times to mean an aptitude.

Finally, with reference to the mental categories, the English terms idiot, imbecile are used as they were at the time, being virtually equivalent to the same French terms. The category of least deficiency was generally termed "débile" or weak in the French. When

the word "moron" was coined by Goddard, it came to be used in both French and English, and alternated with the term feeble-minded which was often used in America to describe this category.

Without having sufficient knowledge of German, I have been unable to refer to original texts as I have done for the French. I have used Professor Danziger's English versions, for which I am grateful. I am also grateful to the Parisian authorities who gave me easy access and welcome to their libraries: to the Salle des Manuscrits at the Bibliothèque Nationale where I read the letters that Theta Wolf (1973) had also found there; to the Institut de France and the Bibliothèque Piéron where I consulted the early Bulletins of the Société Libre pour l'Etude Psychologique de l'Enfant from 1900 onwards.

CHAPTER 1:INTRODUCTION AND METHODOLOGY

Alfred Binet's name is rightly associated with his production of the first real Scales of Intelligence; full credit is usually given to him for the origin of these, yet within the history of psychology little is found which might explain the genesis of the Scales with reference to the particularity of the psychologist himself and of the psychology that he practised. It has been pointed out that this principal achievement of Binet has, in fact, obscured the psychologist and perhaps in the long run rendered him a disservice. Theta Wolf, in her biography (1973) admits to being puzzled by the lack of knowledge about Binet, and the lack of recognition that he has received in spite of extensive applications of his Scales. She finds shortcomings in the thesis of Robert Martin(1925), in Francois-Louis Bertrand's doctoral thesis "Alfred Binet et son Oeuvre" (1930) and in Edith Varon's master's thesis "The Development of Alfred Binet's Psychology"(1935). She recognizes the scholarship of the following two works on Binet:-"Alfred Binet et la pédagogie expérimentale (1948) and Guy Avanzini's "La Contribution de Binet à l'élaboration d'une pédagogie scientifique", but disparages the writers for the narrowness of their scope. Her judgement is, I feel, a little harsh, bearing in mind that their aims were more modest than hers, their intentions not being to present,like hers, an intellectual biography.

Theta Wolf was inspired by Florence Goodenough whose admiration for Binet became evident during the post-graduate course on mental measurement that she taught at the University of Minnesota.

According to Wolf, Goodenough's work itself has been slighted. Wolf had the good luck to be able to research in Paris, and to make the acquaintance of Théodore Simon, Binet's important collaborator who died fifty years after Binet's death in 1911. The presence of Simon until 1961 and his faithfulness to Binet prevented him from making or allowing any modifications to the Binet-Simon Scales. It seems that René Zazzo (Directeur du laboratoire de psychologie de l'enfant at the Institut des Hautes Etudes, Paris), through delicacy of feeling and respect for Simon refrained from publishing a New Scale of Intelligence until the death of Simon. Zazzo might still point to the lack of research on Binet as he did in 1966, and comment upon the lack of recognition that he has received in France. For example, according to Wolf, Binet appeared in the Encyclopédie Larousse as a physiologist; in the 101st edition (1914) there is no entry for him. Furthermore, while Binet was certainly the first experimental psychologist in France, the error persists that the founder of experimental psychology in France was Théodule Ribot.(see Nadine Simon, "La Pitié-Salpêtrière",1986) The error might be explained because Ribot held the first chair in experimental psychology, but he was in fact a philosophical psychologist who was generally more well known and highly esteemed than Binet. Misunderstandings which produce erroneous statements include the following:-that Binet and Simon collaborated to produce the Intelligence Scales within four to five months; that Binet was a pragmatist who, fulfilling a ministerial commission. produced a hotch-potch of tests that happened to work; that his work on intelligence was atheoretical; that he was an instrumentalist, and that he was the originator of the Intelligence Quotient based on a mental age. These errors and misunderstandings demand some rectification and it is intended that

the present research will contribute in some measure to putting the record straight and filling some of the lacunae in research on Binet.

Concerning the reason for the lack of recognition that Binet has received in France as elsewhere, we need to consider the wide range of his investigations; there is a seeming lack of direction and focus in his published work. There was no single monograph, as in Ebbinghaus' case (1885) to ensure memorability, and Binet's work appeared in different journals of the time; some titles themselves were misleading: for example,"La Psychologie du Raisonnement" (1886) is often assumed to be about intelligence, while in fact it deals with associationism. More understandably, "L'Etude Experimentale de l'Intelligence"(1903) is assumed to focus on intelligence, while, strictly speaking, it reveals more about personality and style. However, Zazzo partly attributes the lack of recognition and gaps in research to Binet's style. According to Zazzo: "Binet est un pionnier par son oeuvre, un primitif par son style" - a pioneer in his work, a "primitif" in his style. The clarity and simplicity of his style certainly contrasted with the ponderous and complex psychological writing in German. It is not surprising that the heavyweight, as opposed to the lightweight, should have been deemed more appropriate to the emerging discipline of psychology. According to Zazzo again, Binet's contemporaries viewed him as a "simple d'esprit"(page 14) - ie. intellectually unsophisticated. Perhaps the breadth of his interests has mitigated against him: for his incursions into animal psychology, physiology, theatre, education, pathology, and for his roles as psysiologist, laboratory scientist, experimental psychologist, editor, pedagogue, clinician and critic

of doctors, he has been described as "un expert marginal". Certainly his versatility enabled him to become an expert in many fields, but he mainly worked outside institutions, being neither a professional doctor or physiologist, clinician or teacher.

Both Avanzini and Zuza have described Binet's experimental pedagogy, but in a way, neither has explained the work for which has become renowned. Theta Wolf's biography has filled a large gap in the research on Binet. Indirectly she has corrected some of the misunderstandings about Binet, and most prominently has challenged the assumption of Binet's lack of conceptualizations of intelligence. Her biography gave me some initial impetus, and throughout I have checked my findings, ideas and speculations against hers. However, ours aims have differed. My intention has not been, like Wolf's, to report "the life-long labors of a productive man whose career throws light on the problems involved in creative scientific achievements" (page Xl). My task is more focussed in that it is confined to the explanation of how Binet produced his Mental Scales and his contribution the study of intelligence. A biographer may claim to make a contribution to the history of science, but the biographer, by definition, is working via a personality, or "life-long labors" and "career" to describe scientific achievement. However, by seeking to explain rather than describe, and by narrowing the explicandum, I have been led to consider and explain many more contextual aspects which are not provided by Wolf. In short, my research is more narrowly focussed in what it intends to explain, but is broader in its definition of the means whereby this can be achieved.

For the reasons outlined above, and because historians of science have become more self-conscious about their aims and methods - hence the discipline of historiography - I have included a methodological statement, and this includes a reflexive account. This should serve as a reminder to both the historian and the reader of the difficulties in writing about the past and in another social setting while trying not to let one's own knowledge and assumptions distort perceptions of what was really happening.

Methodology

Firstly I shall outline some of the possible approaches for historians, and give reasons for rejecting or adopting them; this serves to clarify and justify the present method of research. It provides also another service: by showing why certain procedures are adopted, the reader is not expected to take solely on trust the relevance of some information, depth of detail and description.

The "great men"(sic) approach to history is not appropriate for it singles out individuals, and often fails to give sufficient account of preceding events and contemporaneous influences. In addition, a congratulatory approach may overemphasize virtues and originality, and neglect weaknesses in the character studied. It can also undervalue the part played by the social aspects of research.

The idea of using "Zeitgeist" might be seen as an antidote to the "great men" approach. However, it is too vague, for "Zeit" is usually left undefined, as is the spirit or "Geist". Moreover, it attempts to explain scientific achievement by being double-edged. According to Boring (1963), it can encourage scientific progress

through its "consensus of contemporary opinions"; achievement which is "out of phase with the times" can be attributed to the "inertia of the Zeitgeist". In other words, it can be used to explain anything. This consideration, together with its assumption of a consensus makes it unacceptable as a tool for explanation. In its place, I propose to use specifics of culture, institutions, practices, power and accessibility of knowledge. These should provide the frame-work within which scientific achievements are made. This approach is certainly more in line with sociological theory of science.

Two opposing approaches to the history of science have been identified, namely, presentist versus historicist. The former takes the present time as the point of reference, so that the past is seen in relation to the present. Within this general approach belongs the Whig view of history. Here the general assumption is that the achievements of humankind, scientific or otherwise, proceed generally towards higher, and by implication, "better" orders of knowledge. This notion of progress can distort the past because it encourages the selection of events and achievements which lead and contribute to the present point in "progress". Static states, contradictions and tensions may thus be glossed over in the account. The presentist approach, from its often assumed position of superiority, encourages a judgemental attitude. The historicist approach sets out to eliminate the faults of the presentist approach, and asserts that history should not be read backwards, using the present as the vantage point. Rather, the historian should

present as faithfully as possible events as they took place, together with the perceptions of the time. The historian should aim at a reconstruction of events and avoid a rewriting of them.

A further dichotomy in history methodology is that of internalism versus externalism. Internalism involves the assumption that scientific achievement is made independently of external events. The task of the historian is to emphasize and explain the content of a particular discipline and the achievements of individuals within a "closed world". This approach has been referred to by Knorr-Cetina (1988) as "methodological internalism",(pages 8-9). Historians of psychology (eg.Danziger,1985) formally oppose the view that scientific practice lies relatively unrelated to wider social events, cultural factors, states of knowledge and assumptions that are made in relation to these. In discussing theory and research in education and social science, Popkewitz (1987) affirms that-

> "the language of research does not "sit" as a logical artifact outside social discourse and devoid of human interpretation and...manipulation.Theory enters a world in which there are predefined institutional arrangements,linguistic conventions and established priorities.The language of theory contains assumptions and visions that are influenced by the strains and struggles of the larger world.Social sciences cannot be immune from such partnerships."
>
> (page 8)

A broad acceptance of Popkewitz' viewpoint means that in order to understand and reconstruct intellectual achievement in the social sciences the historian must adopt an externalist approach. It should be pointed out, however, that social factors do not tell the whole story; they are not to be used to explain away individual

achievement, but rather should be shown in their interaction with personal factors. An attempt is made in this research to adopt an externalist approach, with proper reference to context.

If we refer again to the biographer's task, we can see the problem that the biographical genre presents in relation to externalism. By definition biography involves the choice of a protagonist, and thereby is more susceptible to internalism. Theta Wolf holds the opposite opinion. There is a tendency to use a chronological structure and to mark out stages of development. These stages (or chapters) may suggest discontinuities where in fact many threads of continuity exist in the scientist's thought and work.

A reflexive account

In planning to explain how Binet produced the first Scales of Intelligence, I realised that a close inspection of his earlier work was needed; insight into the beliefs of Binet and his life also needed to be considered; and, as I was committed to an historicist and externalist approach, this demanded research into the many social and cultural factors that constituted the context to Binet's work. Context is not synonymous with historical background or backdrop. Social, cultural and intellectual factors had to be selected with reference to their explanatory power, and justified. Explanation also entails giving sufficient and specific detail about the nature of the achievement. In the process of this research certain questions came to be posed which provided guide-lines for the selection of contextual factors and the direction of research. These questions were related to the discipline of the achievement; its political definition, its time; its place and its agent. In other words, within what discipline was the work done? why in 1905

and not earlier or later? Why in France and not in either Germany, America or Britain? Why was it Binet and not for example, Ebbinghaus, Cattell or Galton? Who defined the task and its purpose? The opposition of "why not?" to "why?" is important I believe, because satisfactory explanations can only be made with reference to possible alternatives. These are the hallmarks of a relativistic approach which has been deliberately taken. This should dispel the impression of some smooth inevitable process at work. A consideration of alternative possibilities (not mere speculation) helps to illuminate the particular features of the process and genesis of the achievement.

Finally, the question of why this particular achievement took place in France imposes various demands on the researcher: these involve giving an account of national institutions, power structures and political forces, showing how these affected personal ambitions and careers. It is important also to record the way in which such factors were perceived at the time. Intellectual forces need therefore to be presented and described in their French version. For example, it has generally been shown that the French had their own brand of evolutionary theory, and ways of describing and responding to it. What were the sources of optimism in France and of Binet's in particular in the face of the bleak attributes of biological determinism? These questions relate to a French culture in the second half of the nineteenth century. In order to present a national picture some topographical reference and detail are also included. In the interests of realism many terms and titles are left in the original French. Wherever these need clarification or

translation, this is provided. By these procedures a feel for the culture may be given, which will unambiguously fix the Mental Scales in the country of their origin.

CHAPTER 2 : LIFE

Little is known of Binet's childhood except that he was born in Nice in 1857. His primary and early secondary education took place here at the Pension Nache and at the lycee de Nice. He most likely gained his knowledge of Italian at this period of his life for Nice was part of the kingdom of Piedmont and Sardinia. His family also stayed at an English boarding house for three or four summers, where Binet probably acquired some of his proficiency in English. We know that he read English material and he also wrote in English, "On Double Consciousness" (1889). The family moved to Paris in 1869 and Binet completed his secondary education at the prestigious Lycée Louis-Le-Grand. He gained a degree in law in 1878, but later spoke disparagingly of law as a career:-

> "C'est la carrière des oisifs et
> des indécis;de tous ceux qui ne
> savent pas ce qu'ils veulent,et
> qu'on n'a jamais dirigés."
> (1911,page 169)
>
> It is a career for the lazy minded
> and the undecided,for all those
> who don't know what they want,and
> have never had any guidance.

It seems that Binet may have drifted into law, having no paternal guidance, for from an early age he lived with his mother as his parents were separated. Fortunately, Binet was of independent means and through the recommendation of Professor Gaston Paris he gained permission to read in the Bibliothèque Nationale. His reading there started in 1879, for by 1880 Binet had his first psychological paper publishsed in the Revue Philosophique thanks to Ribot who had founded this journal in 1877 and gave Binet encouragement. The early indecision of Binet as to his real vocation was quickly ended by the

discovery that it lay in psychology.It is not known for certain what Binet read during this period, but the two journals "Mind" and "Revue Philosophique" would have provided him with knowledge of areas of interest related to psychology and its directions. He could have read translated versions of German work such as Helmholtz and Wundt. His work on tactile sensitivity showed that he knew the work of Weber and Fechner. Ribot's surveys (1875 and 1879) of German and English psychology would surely have been known to Binet. Through Ribot too, he may have become acquainted with the evolutionary ideas of Spencer; in addition Ribot translated William James' "Principles of Psychology"(1890). At this period too, he may have read some of Galton's current work as well as Bain's, either in translation or in the original. According to Jean Delay (1957, page 86) Binet was a great reader of Hippolyte Taine and John Stewart Mill and was influenced by Ribot and Charcot. Later, in 1907 Binet claimed that Mill had the most important influence on him, calling him his "seul maitre" or mentor. Binet does not seem to have had any explicit support for an extreme environtmental position as associated with Mill, though he favoured an inductive approach to psychological studies. Binet knew the works of the philosopher, Henri Bergson. We know that Binet was acquainted with Taine's "De l'Intelligence"(first edition 1870) because of comments made by Binet in "Idées Modernes sur les Enfants" (1911) and elsewhere. As a lycéen in his final year Binet would have gained a solid knowledge of philosophical thought from the ancient to the modern philosophers, and of the "philosophes" or intellectuals of the eighteenth century. Further reference to intellectual influences on Binet are taken up later in chapter 4.

By 1882 Binet's period of "armchair psychology" came to an end. He was introduced by an old school friend, Babinski (a neurologist who was to become a critic of Charcot) to the Salpêtrière hospital where he met Jean Martin Charcot and Charles Féré. Over the next seven or eight years Binet worked at La Salpêtrière, becoming involved in the practical work of dealing with patients. Charcot's main focus was on the observations, classifications and diagnosis of hysterical patients. In addition, his assistants had the task of hypnotising subjects and Charcot studied the various effects of hypnosis as revealed by post-hypnotic states. It appears that Binet accepted without question both the assumptions and the methodology of Charcot; he even went so far as to defend this position in the debate between the Paris (ie.Charcot's) school and the Nancy school which was supported by Hippolyte Delboeuf of Liège.

There were two main results of his experience at La Salpêtrière and his work with Charcot, one, at an intellectual, the other at a more personal level. Binet came to realize that unconscious mental activity resulted in disassociation. This contradicted his earlier espousal of the associationist viewpoint as set out in "La Psychologie du Raisonnement" (1886). In all, Binet's output of pathological studies relating to hysteria and hypnosis numbered eleven publications. But in defending Charcot's position, Binet was attacked by Delboeuf. (see the biography of Binet by Theta Wolf, 1973). The humiliation caused by Delboeuf's attack on him led him to sever all links with Charcot. The lesson that Binet learned was the power of suggestibility, particularly on the part of patients who complied with the suggestions that Charcot gave him. More generally, it taught Binet to become more skeptical, to take into account the

bias which is brought about by the experimenter's own values and expectations. No doubt Binet felt that he had been duped by Charcot, as had others who assumed that fame was the guarantee or equivalent of greatness and intellectual integrity. Binet made no mention of this painful experience; he simply commented in 1907 however, that hysterics cannot exist without an audience.

In the meantime , in 1884 Binet had married Laure Balbiani, the daughter of the embryologist, E.G.Balbiani. Their first child, Madeleine was born in 1885, and their second, Alice in 1887. These two girls are given the names of Marguerite and Armande in Binet's "Etude Expérimentale de l'Intelligence" (1903) - the result of Binet's experimentation over a period of three years (ie.1901-1903) on his daughters. For Binet the main interest in, and conclusions of his work were the insights that they gave him concerning individual differences in intellectual performance, style and personality.

Binet had a period of practical experience of a very different kind from that at La Salpêtrière. Late in 1887 or early in the year 1888 Binet started to work in Balbiani's laboratory in at the Collège de France, and he worked sporadically there over the following five years. This work was important in various ways. Firstly, He gained training in rigorous experimental methods; and it was probably from this date that Binet formed what was to be a lasting commitment to experimental psychology. In the laboratories of Balbiani Binet also followed a course in botany and entered the zoological section. Here he undertook a specialised study of the subintestinal nervous system of insects which he developed into his doctoral thesis in natural sciences. This "Doctorat ès Sciences" was obtained in 1894. His

experience in the laboratory also brought Binet into contact with evolutionary debates in France. He gained permission from Balbiani to publish in 1888 a summary of his lectures entitled "Les Théories modernes de la Reproduction et de l'Hérédité". It may be concluded that Binet's practical experience in this embryological laboratory complemented his earlier reading of psychology in the Bibliothèque Nationale, and the two experiences together constituted what the French would call his "formation" as a psychologist.

In 1891 Binet approached Beaunis, the director of the psychological laboratory at the Sorbonne with the request to be taken on as an unpaid assistant. Beaunis no doubt knew Binet's published work, and accepted his offer. By 1894 Binet was the sole director of the first psychological laboratory in France. It has been pointed out by Wolf (op.cit.) that the year 1894 was one of enormous output by Binet, for at this time he also became the founder and editor of the first psychological journal in France, "L'Année Psychologique". Among the assistant editors or "collaborateurs" were Ribot, professor at the Collège de France and Henri who spent some time during that year at Wundt's laboratory in Leipzig. The format of the journal was as follows: the first part contained original work under the heading of monographs (memoires); reports on studies done in the Sorbonne laboratory and reviews of topics within or related to psychology. The second part consisted of analyses or reviews of work done over the past year. The third part listed important references. It was in this first part of the journal that Binet was to publish most of his original work. In addition Binet seemed to have been the foremost reviewer of English, American and Italian work, while Henri reviewed German and Russian work - this task being taken over later by

Larguier des Bancels. Binet reviewed journal articles from the Pedagogical Seminary, Proceedings of the Royal Society, the Psychological Review and the American Journal of Psychology. The first volume contained important statements in its introduction. Here were set out the nature and characteristics of psychology, its emergence dating from the break with metaphysics through the work of Hippolyte Taine, Spencer and Bain; then progressing to become "une science naturelle et une branche de la biologie". (L'Année Psychologique, 1895,page 111)

In this year too, Binet entered into another setting for carrying out experiments, this time into schools. He and his co-worker, Victor Henri reported on their studies on memory in school children. In some ways this was the most original of his work, exploring aspects of memory outside the mainstream approach, derived from Ebbinghaus.

In 1895 there was one outstanding event in the lives of Binet and his family. Madeleine reported in her diary (1961) that at the time France and all its intellectual activity were held in very high regard in Romania. Through a former school friend, Take Ionesco, who knew Binet's work, an invitation was extended to him to give a series of lectures on experimental psychology in the University of Bucharest. These were popular and well attended. Binet and his family stayed in Bucharest over the months April to June, and Madeleine described this stay in the capital where they were very kindly received by the Rector, Maiorescu, and by the king and queen. The visit was marred only by the illness of Madeleine and Alice. On the strength of his lectures, Binet was invited to give further

lectures and an invitation to occupy a chair at the University of Bucharest. Binet declined all invitations. He obviously preferred to stay in Paris, and the visit to Bucharest was the only journey that he made abroad. Possibly the motive for refusing lay in his hopes that he could secure a professorship in France. In this same year Binet was elected as a member of the Société de Biologie, probably on the strength of his thesis on micro-organisms and his promotion of biological studies which were prominent in the first volume of L'Année Psychologique.

Between 1883 and 1887 Binet's eighteen publications included eleven on pathological subjects particularly related to hypnotism and hysteria. But by 1894 Binet's range of topics had widened and included the following:-fetishism, comparative psychology, hallucinations, hysteria, hypnotism, animal magnetism, suggestion, perception, visual imagery, extraordinary memories, studies of blindfold chess-players, music, theatre, fear, religion, physical correlates of normality versus abnormality, dementia, manic depression, mental fatigue, handwriting, and deaf mutes. Perhaps it should be noted that his first work on children was reported in three articles in La Revue Philosophique in 1890. They included descriptions of experiments carried out on young children, including his own daughters; Binet's observations give us a fleeting glimpse of his family life.

Ambitions

It becomes clear that Binet was not without ambition, and the least that he expected was some kind of formal recognition in France. In 1901 he took some steps to achieve this: firstly he applied for the chair of "Psychologie Physiologique" at the Collège de France when Ribot resigned from the post, but Pierre Janet was appointed. When Janet's chair as course director of experimental psychology at the Sorbonne thus became vacant, Binet applied for this, with his contender being Georges Dumas. Dumas was appointed.In both cases the successful candidates had studied and worked under Ribot who, it seems, was the "patron" of a cluster of followers. Binet made a further attempt to obtain a professorship at the Collège de France, and this too, was unsuccessful. The philosopher, Bergson was appointed. It was not until Binet became a member of the "Société Libre pour l'Etude psychologique de l'Enfant" (which from now on will simply be referred to as the Société), and its president in 1902 that his work and achievement in psychology received some recognition. The rest of the story is often told - albeit in a summary way - how Binet became a member of the Ministerial Commission to find a means of identifying the "abnormal" children in the schools of the Paris region; how this undertaking with Simon resulted in the first Mental Scales of 1905. These tests were revised in 1908 and 1911, the year of Binet's death.

Interpretations of Events

These events in Binet's life are easily related, but undoubtedly a more difficult task is to discover what meaning and importance should be attached to these various events, that is , how they were perceived by Binet and by others. The key to understanding this may

be found in Binet's personality, his situation and interaction with colleagues and friends and his place within formal and informal settings. In addition, Binet's position vis a vis French institutions, their practices and received ideas also help to provide some interpretation of events.

Little is known about the personal life of Binet. The main features of his character were his dedication to, and enjoyment of work; this, and his reserve made him reluctant to attend social events or associate with any academic community. He saw no merit in the former, stating simply:-

> "Le travail me pousse, le travail m'entraîne...C'est malgré moi,je suis fait pour travailler."
> (cited in Madeleine's diary, 1961,page 204)
>
> Work urges me on, draws me along ...in spite of myself, for I was made for work.

His passion for work was pushed to its limits, according to Madeleine. It was probably this which resulted in an enforced year of rest on the advice of his doctors - according to Bertrand(1930), who offers this as an explanation of Binet's non-contribution to L'Année Psychologique(vol XIII 1907-1908). As to his reserve, Madeleine remarked that he had "une pudeur instinctive à voiler ses propres sentiments." (ibid.,page 205)- natural modesty that made him hide his feelings. We owe these revelations to Georgette and Geraldine, Binet's grand daughters who allowed portions of their mother's journal to be published in the Bulletin of the Société Binet et Simon (1961).

It becomes clear that Binet was of independent spirit as well as of independent means. The result of this was double-edged:the advantages were that he was free to choose the directions of his research, to read in the Bibliothèque Nationale, to receive training in Balbiani's laboratory and to offer his services free to work in the laboratory of the Sorbonne. Yet this latter appointment did not attach Binet to any institution in any profitable way. He still lacked the support and patronage that association with a prestigious establishment (eg. an Ecole Normale,for teacher training) would have given him. In addition his independence of spirit seems to have led him often to take a neutral stance and show a reluctance to commit himself to one side or the other. For example, when the "Dreyfus Affair" (1894) split the French nation into Dreyfusards and anti-Dreyfusards, sometimes dividing families and destroying friendships, Binet remained neutral. In one of his rare letters he simply suggests dividing a page into two columns and listing the pros and cons side by side - a masterpiece of detachment and objectivity when the rest of France seemed consumed with passion and committed to one side or the other! This reluctance to become "engagé" may well have acted against him when his candidature for a professorship was being formally considered.

This habit of detachment, together with the great absorbtion in his work may account for a certain naivety on his part. In 1898 he hoped to gain a Ministerial Commission to investigate mental fatigue in school children. This educational problem had been identified in America, Britain, Germany and France. In Germany Ebbinghaus was commissioned to investigate this. However, in France matters were different in the sense that mental fatigue fell within the area of

Public Hygiene, and more specifically, within "Hygiène Morale". The powers of doctors has been well testified by historians (eg. Nye 1984, and Harris,1989) and their entry into the field of hygiene dated from the 1820's, creating an area of social medicine even before much of their work in asylums and hospitals. Whether or not the doctors, by the nature of their expertise, were the most suited to investigate mental fatigue could well have been challenged. What could not be challenged was their formidable presence and power within public hygiene. The education laws of the seventies and eighties made primary education universal, compulsory and free, thus creating a new section of the population which fell within the concerns of public hygiene.The doctors thus expanded their field of activity and power to include school settings. It seems that Binet was unaware of this. "La Fatigue Intellectuelle" (1898) comprised an exposé of the methods needed to investigate this problem in school children. It was also accompanied by a scathing attack on doctors and their unscientific approach in their investigations and decisions. On the basis of his own proposed careful and rigorously controlled and scientific methods, Binet expected to be given the commission. However, he was not approached. His trenchant criticism of the doctors had been a gaffe, due, I suggest, to his political naivety. The common medical discourse was often in terms of a normal/abnormal dichotomy; this, and other medical discourse relating to hygiene and its pathologies was no doubt comprehensible and persuasive to ministers. On the other hand, Binet was using the less familiar scientific language of psychology. So convinced was Binet of the correctness of his method and views that he had totally misjudged the situation and its possible outcome.

Further Frustrations

Binet's naivety (ie. failure to perceive underlying power relations, but to take terms or rhetoric at their face value) is illustrated again in his complaints about the lack of support for his psychological laboratory. In France in the nineteenth century the term "université" applied to every section of academic education. Higher education in the "Ecoles Normales" and "Facultés" was based on the principles of educating future teachers of the "lycées" - hence the emphasis on disciplines that were taught in schools which included philosophy. The creation of new academic posts and professorships required ministerial approval. The creation of the first psychological laboratory at the Sorbonne was instigated by Liard, and set up by a ministerial decree. What surprised Binet was the lack of support and funds for this institution of which he complained in a letter to Gaston Paris. Binet had failed to distinguish between rhetoric and reality, neither perceiving nor anticipating that the two might not match. Mismatch is illustrated by the titles of the Chairs: the two for which Binet applied both included the term "psychology", but those appointed were a pathologist (Janet) and philosophers (Bergson and Dumas). These complaints would seem to be justified; understandably Binet was disappointed; but he had not anticipated that the lip service paid to psychology might not ensure commitment; nor that personal influence might favour those who were less qualified than himself.

It has been pointed out by Clark (1973), that the ideal type for promotion to a high academic post would fulfill the following academic requirements:- to have had a brilliant school record; to have been a philosophy student and to have taught philosophy; to

have studied in Germany with a state fellowship; and to have a "doctorat ès lettres". Binet met none of these criteria. In addition, the following would have been of advantage: to be of humble "petit bourgeois" origin; to show devotion to the Republic; to be nationalistic, anti-clerical and a socialist. Apart from not being of humble origin, Binet most probably met the other requirements to some degree, though not overtly. In addition, Binet did not belong to a "cluster"(as defined by Clark) of followers as Janet, for example, belonged to Ribot's cluster and enjoyed his patronage. It is not certain that Binet was aware of all these factors - another example of his naivety. If he had, then his failure should have come as no surprise to him.

Binet was thwarted again by medical power in the year before his death. In 1910 Binet and Simon, in collaboration, were feeling their way towards the production of some new tests to be used for the army to diagnose inefficiency and unsuitability among recruits. They approached a certain doctor Simonin, professor of legal medicine at the Val-de-Grace hospital with a view to trying out some items as a pilot test. It seems that, without consulting Binet and Simon, he applied this test and reported on the results as if they were his own to the International Congress of Psychiatrists for approval. The test was rejected by this body which declared a preference for "biological observation".

A Change in Fortune

Fortunately, in the meantime, from 1900 onwards Binet probably enjoyed a better relationship with the doctors, or at least had come to terms with their presence. It happened like this: Ferdinand

Buisson (1841-1902), an ardent Republican and educationist, had been director of Primary Teaching for the Ministry of Public Instruction since 1879 and in 1896 he was appointed to the chair of Science of Education at the Sorbonne. Together with primary and secondary school teachers he held meetings with the intention of forming a pedagogical society. They wished to promote in France something equivalent to the Child Study movement that was founded by Stanley Hall in America. In these preliminary meetings there was some debate as to the methods to be employed. Some opted for the questionnaire method as favoured by Stanley Hall, while others favoured observational methods on individual children. It was at this point that Buisson decided to invite Binet to the first official meeting of the society on the 9th November, 1899 in the amphitheatre Richelieu at the Sorbonne. Buisson knew of, and respected Binet's competence. He had also recently given him permission to experiment in primary schools of the Paris region.Now he wanted to be assured of the quality of the work to be undertaken by the society. It was intended that the society should be open to anyone interested in educational matters, and so it was given the title of "Société Libre pour l'Etude Psychologique de l'Enfant". Binet no doubt, perceived the invitation as an opportunity perhaps of obtaining a ministerial commission of some sort, having failed at his earlier attempt in 1890. Binet was immediately elected as an "assesseur" - an overseer and reporter of the work of the Société.(the abbreviation to be used from now on to refer to this pedagogical society).It appears that Binet took a prominent role almost immediately, becoming its vice president in 1901 and replacing Buisson as president in 1902. He held this post until his death in 1911.

Reference to the composition of the membership of the Société in 1903 shows the wider range of people with whom Binet came into contact: - Inspectors, principals; teachers of primary, secondary and higher education; parents; doctors; laboratory assistants; scientists etc.(see Chapter 10)

Relationships within the Société

Binet first met Théodore Simon in 1899 when both became members of the Société and it was then that Simon offered to collaborate with Binet. For the first time perhaps, Binet came into contact with assertive individuals who were campaigning for the educational interests of children. For example, Dr Baguer was the foremost supporter of children defined as "anormaux", and he pressed for the urgent consideration of their needs. Apart from the internal membership of the doctors, another group became officially associated with the Société: this was the "Ligue des Médecins et des Familles" More interestingly Binet came into contact with the renowned Dr Bourneville who was in charge of the "abnormal" boys at Bicêtre (part of the Hôpital Général in Paris, and the male equivalent of La Salpêtrière). Dr Bourneville has been described as the "médecin-politique type" ie. the epitome of the political doctor, republican and socialist. He was a vigorous campaigner for the secularization of the hospitals and training of nurses. He founded "Le Progrès Médical" which was the official organ of this movement. It is doubtful that any open political conflict took place within the Société: none has been recorded in its bulletins, and article 7 of its constitution forbade discussion of religion and politics. Nevertheless the Société was republican and nationalistic in tone, and progressive in its endeavours to investigate many

psychological aspects of children. It should be seen as what we would now term a "pressure group", but with the advantage of operating within a socially and politically empowered framework.

While there seems to have been consensus regarding the objectives, there was some disagreement concerning methods. Binet was both tenacious and consistent in his views on what constituted modern pedagogy. He dismissed as inadequate and inappropriate the old pedagogy that was full of opinions and precepts ("verbiage"). The only valid scientific pedagogy was, according to Binet, that which was based on observation and experimentation. According to Cousinet (1968), a former minuting secretary of the Societé, certain teachers and others faithful to the traditional pedagogy, were shocked and made anxious by Binet's views. Their attendance became less regular, and some walked out of meetings. But Binet remained firm in his conviction that discussion and opinions were not appropriate, for he demanded only results from observations and experiments. Opposition from the traditionalists was of little consequence to Binet for by 1905 he had, with the help of Simon, fulfilled the Ministerial Commission.

The importance of the Societé to Binet should not be underestimated, for had Binet been striving as an individual (or even with a collaborator), to make both psychology and pedagogy scientific, he would surely have been overlooked; but as a prominent member and president of a politically sanctioned organisation, his work became more formally recognized. The nature and importance of the work that Binet did within this framework is discussed later.

One further advantage was afforded to Binet by the Société: with the authorization of the Director of Primary Education, some premises at the school in the Rue Grange-aux-Belles were given to the Société. The three hundred children of the school with its seven classes could also be used as subjects of pedagogical investigations and for trials or pilot studies for new teaching methods. It was termed "une école-témoin", or show school. This provision and the work that Binet, Simon and its principal Vaney did there, attracted the attention of officials, Heads of schools and training colleges (Ecoles Normales), and inspectors from the provinces as well as from Paris. From further afield came a certain Dr.William from England and a psychologist, Lilie Marten from Stanford, for example. More importantly perhaps, was the visit made by the Swiss psychologist, Edouard Claparède. According to Bertrand (op. cit.), Binet had met Claparède in 1892. Connections with Switzerland and with Claparède in particular were no doubt important for bringing Binet's work to the attention of Jean Piaget. Concerning the contribution of the Société to Binet's work, Binet himself stated that it inspired work in pedagogy, referring to the important investigation by Vaney on the measurement of achievement (1905). Binet's work for the Société and for the laboratory at Rue Grange-aux-Belles continued until his death.

Evaluation

There is no doubt that the last eleven years of his life were especially fruitful in the sense that Binet had found a cause for which to work and thus gained respect and official recognition. His admirers were from many countries. By 1916 his Intelligence Scales were being used in seven countries and had been translated into

eighteen languages. If we seek to evaluate Binet's life and achievement outside official obituaries, and turn to Simon, his friend and collaborator, we find this judgement: Binet was "L'Année Psycholgique"; he was the Societé ; he was the "laboratoire Pédagogique". In other words, Binet dominated or was the driving force within these three official vehicles for psychology and pedagogy in France from 1894 to 1911. There seems to be no reason to challenge Simon's verdict.

Friends and Collaborators

Outside his family Binet appeared to have had only a few close friends, which is explained by his natural reserve and his lack of social ambition. According to Simon, his "fun-loving nature was profoundly and lastingly influenced" by the death of Léon Mariller who drowned in a boating accident some time between mid-1901 and mid-1902. Simon himself seems to have become one of his closest friends. Between 1904 and 1911 his correspondence from Binet amounted to 60 items in letters and cards. But here it was probably Binet's reserve that denied Simon of real knowledge about his friend, for he commented in 1961:

> ..."on connaît très peu les
> personnes avec qui l'on vit.
> On croit les connaître,(mais)
> les souvenirs qu'on en garde
> restent ainsi pleins de lacunes"
>
> We know very little about the
> people we live with. We think we
> know them but our recollections
> are full of gaps.

This may imply that considerations of work and collaboration dominated their relationship. As Theta Wolf pointed out Simon was "the individual who made a difference"(1961). Indeed, any impression given that Binet's output stemmed from the single source of his own insights and endeavours, needs to be qualified. While Simon was very probably right that Binet was the driving force behind the editorship of "L'Année Psychologique", the functioning of the Societé and the Laboratoire Pedagogique, nevertheless, the contribution of his co-workers needs to be taken into account. In chronological order of their first collaboration, the list is as follows: Féré; Vaschide; Courtier; Philippe; Henneguy; Henri; Simon; and Vaney.

The first of these to be of importance was Henri. Binet was pleased to accept the help of this Frenchman who had graduated under Külpe at Wurzburg and had spent the summer of 1894 at Leipzig under Wundt. It was Henri who helped in the importation of German psychological work, method, apparatus and publications. Henri also worked for some years as assistant editor of "L'Année Psychologique" and reviewed German work for this journal. Henri worked with Binet on his investigations in schools, and in his first important incursion into "Individual Psychology" (1896 and 1897) It was in their collaboration that Binet and Henri used rank order correlation for the first time in pedagogy in "La Fatigue Intellectuelle".In the second volume of "L'Année Psychologique" appeared a long article by Henri on the use of probability in psychology; so Binet may have been influenced by Henri's experience in statistics. However, the exact nature of the influence, intellectual or otherwise on Binet cannot be gauged. With Vaschide Binet investigated correlations

between various physiological tests, and with Courtier influences on capillary circulation and blood pressure (1897). Another important collaboration with Henri, Courtier and Philippe resulted in "L'Introduction à la Psychologie Expérimentale" (1894) an important statement about methodology in psychology. It appears that Binet was a hard taskmaster, and accepted help only from the committed and competent. It is only with Piéron that a collaborative relationship did not work out well, but they corresponded, and by 1911 Piéron had twenty-nine items of communication from Binet. Piéron succeeded Binet as director of the Sorbonne Laboratory.

Personal Influences in the Formative Years

There seems to be nothing known about Binet's relationship with Balbiani whose laboratory he entered and who became his father-in-law. Binet also knew Ribot, though he did not seek his patronage. Ribot advised him on at least two points: that he should study blindfold chess-players and that the study of the pathological aspects of memory should throw light on the study of "normal" memory. It is safe to assume that Binet consulted Ribot's "Maladies de la Memoire"(1881).

In his formative years when Binet was at La Salpêtrière (1882-1889) Binet worked under Charcot and attended some of his famous lessons. Whatever reservations and criticisms he may have finally had about Charcot's methods and assumptions, he referred to him as "maitre" or after Charcot's death, as "mon regretté maître" ie. in conventional terms. Nevertheless, the two following judgements on Charcot reveal the existence of Binet's ambivalence towards his master. There is gratitude and admiration:-

> Charcot faisait ses belles lecons
> sur l'aphasie, ses leçons si claires
> et, doit-on ajouter, si systématiques.
> Le grand neurologiste français exçerçait
> sur tous ceux qui l'entouraient une
> influence impressionnante."
>
> (1911,page 194)

> Charcot gave his clear and fine lessons
> on aphasia and one must add, so system-
> atic. The great French neurologist
> had considerable influence on all those
> who heard him.

But Binet also realized that many people were duped by him, and that Charcot also deluded himself. Binet pointed out:-

> "Les maîtres de la science sont, comme
> les princes, entourés de courtisans
> habiles, qui nuancent la verité à leur
> usage...Charcot, vieillissant, s'imagina
> que c'était lui qui avait eu l'idée
> de faire de l'hystérie une maladie mentale."
>
> (cited in Pichot,1950,page 99)

> Masters of science are,like princes,
> surrounded by clever courtiers who
> who operate with shades of the truth
> for their own use. As he grew old
> Charcot imagined that it was he who
> had the idea of conceiving hysteria
> as a mental illness.

It seems that Binet never attended any conferences, though he attended at least one meeting of the Société de Biologie in Paris. He no doubt met anthropologists perhaps at the Société de Anthropologie for he learned to use Broca's method of anthropological measurement. From 1900 onwards Binet came into contact with many different types of people as the membership of the Société in 1903 shows. (see Chapter 10) At a formal level the inspectors Baudrillart, Lacabe and Belot helped to bring him recognition and of these men Belot was a friend of longer standing. It was Belot who gave Binet permission to experiment in the schools

in his area of supervision, and reviewed Binet's work favourably in the review "L'Ecole Nouvelle." (see Chapter 10) Binet came to know Tarde, the sociologist, and they had planned to do research together, but Tarde died in 1904. It was not always Binet's lack of social ambition or reserve that made him avoid people in some circmstances. Alice Binet explained that he had a real disdain for mediocrity; for while he was pleasant and welcoming to men of science, he was "impitoyable pour tout importun qui lui faisait perdre son temps et menaçait son travail"(cited in Bertrand,1930,page 63) - he was pitiless to anyone who waylaid him, made him waste his time or encroached upon his work.

From 1900 or possibly late 1899 when Simon introduced himself to Binet with a view to working with him, until Binet's death, the most close and fruitful collaboration took place between the two men. In all, twenty-seven publications resulted from their work together. Simon was fifteen years younger than Binet and outlived him by fifty years.

Conclusion

While independence was a prominent feature of Binet's life, he was surely influenced by the people that he met in different settings, in laboratories, hospitals, schools, asylums, societies etc. Intellectual influences were not confined to his reading. In collaborative relationships influences are no doubt mutual and interactive; it would be difficult to judge or measure these. In the case of Simon, the reputation of this collaborator's work needs to be safeguarded - as it is to some extent, for the Société now has the official title of "Société Binet et Simon" Furthermore the

example of Simon and other collaborators should serve to qualify any excessive praise that Binet might receive and provide an antidote to hagiology!

CHAPTER 3 INSTITUTIONS AND POLITICS

Before any statements or suggestions about intellectual influences can be made we need to look at the main social events preceding and contemporaneous with the period under review - ie. from the mid-nineteenth to the first decade of the twentieth century. Events on a large scale have their repercussions on institutions and the policies of those who have power to change them. Institutions, in turn have effects on those who work in, or are associated with them. Politics must be widely construed to embrace not just party political alignments; nor just the ideologies of an Empire or Republic, but power relations that operate at different levels - in government, institutions, professions and other social groups, and in relations between individuals.

The main event in this period was the Franco-Prussian war which ended with the defeat of France at the battle of Sedan in 1870, following which the Second Empire disintegrated. A Republic was proclaimed, and one of the first tasks was the repression of the Paris Commune. In 1871 elections were held to appoint a National Assembly. By 1879 Republicans were in control of the Senate and Presidency .Nevertheless there were political tensions between the Left and the Right in the Republican government, with the Left being generally more optimistic and more ready to make radical changes in education and in the care of those who fled to asylums and hospices. Turbulent years of political crises preceded this defeat, and these events resulted in various social problems which affected two main areas of French institutional life, namely, educational and medical.

How the problems were perceived by politicians, by medical and legal professions determined their strategies for reform, and these will now be examined.

Firstly, the defeat at the hands of the German states seemed to create a crisis of confidence. Thoughtful individuals tried to analyze reasons for the defeat, and the dominant contributory factor was identified as an educational one, for it was believed that German superiority over the French lay in the strength of their universities; in fact a certain Paul Bert told the legislature that German universities had been responsible for the German regeneration. The logic of this was that soldiers were products of the schools, and the quality of schools and teachers was the responsibility of the universities and higher educational institutes that trained the teachers. Moreover, it was calculated that the ratio of students to the population in Germany was 1:500, while in France it was 1:2000. Even before the war, according to Weisz (1983),

> "Germany's impressive showing at the Universal Exposition of 1867...made it clear that France was falling behind in both economic and military terms". (page 65)

Following the war it became clear that the regeneration of France was an urgent matter. After the 1870's plans were made to extend primary education, and to reform the Sorbonne in Paris. Those plans were made mainly by the politicians of the Third Republic set up in 1870. The spirit of this republic has been described by the following epithets: nationalistic, socialist, egalitarian, anti-clerical, scientific and optimistic. Of all these descriptions the

least durable and the most fragile was the sense of optimism (see also Chapter 4), given the extent of social problems and how difficult their solutions were perceived to be. However, the most robust elements were the nationalistic, scientific and anti-clerical.

Nationalism gained strength partly because it was encouraged by politicians, and in particular by Gambetta (1838-1882) who is said to have made nationalism into a lay religion. The explanation of this is that a new popular philosophy of the state was emerging in which the state was seen as a sovereign body, independent of the Church and with a unique competence to represent the interests of individual citizens. The anti-clerical element needs to be explained in its French context. It did not necessarily imply an anti-religious attitude on the part of the so called anti-clerics. Their aim was to take both education and charitable institutions (asylums, hospices, hospitals "colonies" and institutions for deaf-mutes, etc.) out of the hands of the Church, and to put them under the protection and aegis of the state. The process of the secularization of education and of the "hospitals" was one of the dominant trends of this period. The process of the secularization of medical care took longer than that of education which was virtually completed by 1886. The Sisters of St. Augustian who gave nursing care in the oldest hospital in Paris, L'Hotel-Dieu, did not leave until 1908.

Educational Reforms

An important aspect of the Republican ideology was a commitment to education. In 1880 a republican electoral victory led to the law of 1880 which created a Conseil Supérieur de l'Instruction Publique - a

body of sixty-two members to consider creations of new faculties, institutions, chairs and all innovations in education. The president of this body and Ministre de l'Instruction Publique, Jules Ferry, an anti-cleric, reminded his colleagues that he had devoted two years of his existence to the problem of education. As a result of his efforts, four laws were passed between 1881 and 1886 which made primary education free, obligatory (for ages 6 to 13 years) and lay. This final law stipulated that religious teaching should be banned from public schools, and that qualified teachers in them should be non-clerical.

An extract from Jules Ferry's speech to the Assembly on the 20th December,1880 illustrates the fervour of those who campaigned for compulsory education in the face of the opposition from the Right. Ferry accused them of holding to the principle that it is better not to be able to read than read books that are not good - meaning, as Ferry pointed out, those books that did not conform to the doctrines that the Right held and defended. For them (the Left), the most important thing was the ability to read, and they invoked the spirit of Rousseau to defend their argument and attack the Right to whom the following was addressed:-

> "Nous croyons à la rectitude naturelle de l'esprit humain,au triomphe définitif du bien sur le mal,à la raison et à la democratie,et vous vous n'y croyez pas!"
>
> We believe in the natural goodness of the human spirit,in the final triumph of good over evil,in reason and democracy,while you do not believe in them!

These impassioned words were followed by repeated applause from the Left and Centre of the Assembly.

Concerning Paris, in 1882 the following plans were made and put into action for a New Sorbonne which was inaugurated in 1889. More money was to be provided and new buildings to be erected. It was not just expansion that was needed, but the establishment of new courses, particularly scientific. In 1883 a Cours de Science de l'Education was initiated, and in 1887 Marion was appointed to this chair, to be succeeded by Ferdinand Buisson (1841-1932) who held the post until 1902. It should be noted that neither Marion nor Buisson were versed in psychology.

Until the later part of the nineteenth century the term "Université" was synonymous with the whole educational system as for example under the title of "L'Université Moderne" (1892), Léo Claretie surveyed the educational provision in the primary, secondary and higher sections. The implicit aim of higher education in France was - and even until recently - remained the training of teachers for the lycees (which were roughly equivalent to English grammar schools, but less specialized). One of the results of this was that it was difficult to introduce into higher education subjects that were not taught in the lycées. While philosopy was traditionally taught in the final year at school, the emerging disciplines of sociology and psychology were not. The creation of new of special chairs needed ministerial approval. The "Cours Pratique" to be included in the "Hautes Etudes de la Sorbonne" was one such addition. It was set up to provide a practical course in science, and later in psychology. So too was the Laboratoire de Psychologie

Physiologique of which Binet became director in 1894. Another appendage was established, the Centre National de la Recherche Scientifique. But, as Clark (1973) pointed out, the directors of such appendages were unlikely to develop a following unless they were linked to some more central institutions (page 49). Perhaps the marginality of these additional institutions explained their lack of funding - about which Binet complained to Professor Gaston Paris. A chair was also created for experimental psychology at the Sorbonne. Unfortunately, it appears that these creations were more lip service than a real response to the call for an expansion in science. The psychological laboratory, set up in 1889, on the instigation of Liard, and directed by Beaunis and then by Binet in 1894 was under-funded which meant that it was open very few hours, and made a miserable comparison with the Leipzig laboratory that was open almost continuously; and students there who undertook research were rewarded with diplomas and doctorates.

Binet and Educational Institutions

Binet's tenuous link with the Sorbonne by working in the psychological laboratory was the only one he had with any educational institution. He had never taught, except on his brief visit to the Univerisity of Bucharest, and he had no degree in medicine. These two factors account, in some measure, for his failure to obtain a professorship. Nevertheless he gained permission from Belot to visit primary schools in the Paris region, which he did on a sporadic rather than regular basis. His first serious incursion into schools was with Henri in 1893 to 1894, and resulted in their report on the development of visual memory among children. This was quickly followed by their studies on memory for words and

sentences (1894-5), published in l'Annee Psychologique. The next important work that he did in schools included experiments on "suggestibility" among school children, to be followed by an extended study in book form, "La Suggestibilité" (1900).

In the meantime, as described in the previous chapter, Buisson had invited Binet to join the Pedagogical Society because he felt that its work would be helped by Binet's expertise. This society did in fact, become a sort of springboard for Binet, giving him impetus and opportunities for collaboration. The work that Binet did in this context is described in Chapter 10.

Binet must have found this society congenial in various aspects. Its tone was republican and optimistic. But Article 7 of its constitution stipulated that no religious or political discussion was to be allowed. Nevertheless the desire to put pressure on the authorities to act in some way to help to solve the problems in the Primary Schools, must be seen as political. Egalitarian motives had led to the legislation for universal education for children of primary school age; and it was reasoned that if there was a section of school children who could not benefit from the education provided, then the Ministry of Education was failing to act in the spirit of the law. Some of the members of the Societe were particularly assertive and persistent in their attempts to make the authorities act: they were Baguer and Bourneville. Bourneville had been a pupil of Charcot, and later became the neuropsychiatrist at the Bicetre hospice for "abnormal" boys where he evolved methods for their education. As already noted, he became famous for his political views on the secularization of the hospitals, and founded

"Le Progres Medical" which became the official organ for this movement. Buisson, a Protestant, was a political figure too, known for his anti-Imperialist views and pacifism. Binet also came into contact with Edouard Claparède whom he had met in 1892, and whose name appeared on the list of members in 1903.

Two other men who were to become important to Binet in the next few years were Victor Vaney and Theodore Simon. The former of these was the Headmaster of a Primary school in a working class area of Paris ("un quartier populaire") in the Rue Grange-aux-Belles. Vaney was particularly sympathetic to Binet's approach, and carried out investigations by himself and in collaboration with Binet on the children under his care. Within Vaney's school was created the first pedagogical laboratory in Europe. It was important because it provided Binet with the necessary space and subjects (children from the school) and thus opportunities for physiological and psychological investigations. Gradually it supplanted the use of the Sorbonne Laboratory. Theta Wolf (1973, pp 297-307) describes in some detail the setting up of this laboratory, Binet's enthusiasm (1905,b) and the work carried out there, as described by Binet, Simon and Vaney (1906). The laboratory was made in a ground floor room of Vaney's school; it measured five by four meters and had some apparatus for physical measurements of children. This laboratory was formally put at the disposal of the Société by the Director of Primary Education of the Seine area.

Simon introduced himself to Binet and offered to help him in 1899. At the time Simon was an intern at the "colonie" of Perray-Vaucluse; later he became an intern at Ste.Anne (1901-1903, and again in 1904-

1908). The advantage for Binet was the number of boys at Perray-Vaucluse was over two hundred, so he would have ready made source of subjects for his experiments. Binet suggested to Simon that he become a member of the Societe. At this point we have evidence of Binet's awarenes of some of the social problems of the children. He and Simon looked at the achievement and physical measurements of children in relation to their home background; for, as he pointed out, teachers had to make decisions about which children were to have free meals, clothing, tonics and holidays in "colonies de vacances". One of the aims of the laboratory was for the testing of children and this was to precede any studies into the best methods of teaching.

Social Problems and Hospitals

The Franco-Prussian war added to the social problems which France was already experiencing owing partly to the urbanization of society. These problems included an increase in the number of poor, homeless, beggars, abandoned children, prostitutes and criminals. Many such victims made their way to the capital where the Health Police had the duty of confining beggars for example, to their "Dépôts de Mendicité". Another duty of the health police was to keep a check on the those people who were known to be giving treatment outside the hospices. These lay healers were known as the "empiriques" or "charlatans", and many were respected for their work.

Thus a whole group of people came to be termed the "population egarée" - those who had strayed from the mainstream of the population (or "population classique"), and these included the

syphilitics, the alcoholics, the insane and the sick. They often found their way to the Hopital General de Paris of which there was an equivalent in London, and what in England were also known as the "workhouses". A list of the "patients" recorded at l'Hopital General in 1862 included the following: - "déments, insensés, fous/folles, imbéciles, idiots, agités, épileptiques, pervers (moraux et sociaux)" etc. The inmates were housed in the various buildings, annexes ("dépendances") which made up the whole. La Salpetriere was one of the largest and one to become renowned in France and other parts of Europe, and its name was often used synonymously with the Hopital General itself. Its fame rested partly on its horrors, and was described as a "cloaque affreux" - a terrible sewer. As a show piece of female pathology it was also known as a "musee pathologique". The following was a record of the inmates of la Salpêtrière in 1862:-

LA SALPETRIERE 1862

Indigentes et épileptiques (non-aliénées)	2635
Aliénées	1513
Expectantes	38
Reposantes	71
Employés, parents	778
	5035

"Expectantes" referred to the women who were awaiting assessment, or probable transfer, for La Salpêtrière was reserved for those women judged to be incurable. The "reposantes" were the very old women who

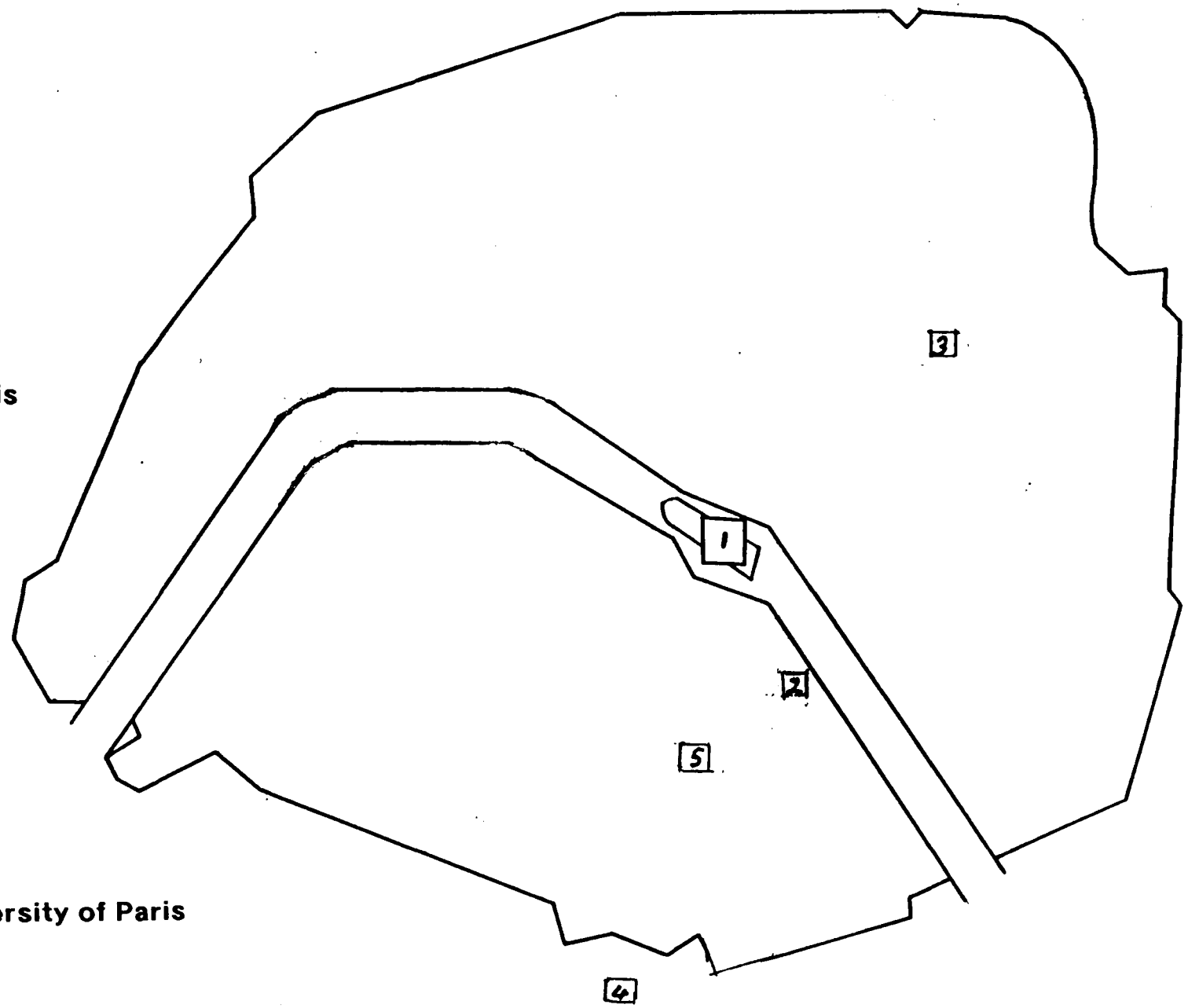
1. L'Hôtel-Dieu

2. La Salpêtrière

3. St. Louis

4. Bicetre

5. L'Université de Paris



Hospitals and the University of Paris

were awaiting death. At first sight there seems to be an omission of a further category - that of the hysterics. Such a category of illness had not at that time been identified. When the building of Sainte Laure, which was part of the "service Delasiauve", had to be demolished, its patients were re-allocated by separating the "épileptiques simples" from the "épileptiques aliénées". The normal or sane epileptics were entrusted to Charcot, who had been appointed to la Salpetriere in 1862, and from that date until 1870 he laid the foundations for a new medical speciality, neurology. He succeeded to the chair of anatomo-pathology in 1873, and in 1882, on the initiative of Gambetta, his friend, a new chair was created for him - the first chair of neurology in the world. Charcot's interest in hysteria dated from about 1872, and the period from 1878 until his death in 1893 is usually described as the period in which he became nearly totally absorbed in the study of hysteria. Modern interpretations of Charcot's work with hysterics have tended to portray Charcot as an "inventor" of hysteria. In this invention, as pointed out by Didi-Huberman (1982), Charcot used the services of artists such as Brouillet (1857-1914) to paint his famous "Leçon de Charcot". Many drawings were also made by the artist Paul Richer(1849-1933); and in addition a whole section of la Salpêtrière was set aside for a photographic service, in which Londe was the principal worker. In perusing the descriptions of Charcot's work and lessons on his female patients it is difficult to avoid the impression that Charcot's "schaulust" outstripped his professional need for observation. There was also a strong element of spectacle in his demonstrations. Didi-Huberman (op.cit.,page 9) defined hysteria as "une douleur mise en contrainte d'être inventée, comme spectacle et comme image" - suffering defined as an invention to

create a spectacle and picture.

More to Charcot's discredit however, was the observation of Delboeuf from Liège: he noticed that Charcot's famous patient Blanche Wittman heard what the doctors planned to suggest to her when she was to about to be put under hypnotic trance. An unsympathetic conclusion that may be drawn from Charcot's work in hypnosis on hysteric patients was that Charcot deceived himself; his patients deceived him; and some visitors or followers were deceived in this web of collusion. Visitors or followers included of course, Binet, and in 1885 Sigmund Freud. Freud had a bursary to study neurology in Paris, so it was not surprising that he made his way to la Salpêtrière, to follow the work of Charcot. In 1891 Freud dedicated his work on aphasia to Charcot. In recording his time spent under Charcot he wrote the following:

> "...Je sors quelquefois de ses leçons comme de Notre Dame,avec une idée entièrement nouvelle de la perfection...aucun être humain ne m'a jamais affecté de cette façon."
>
> (cited in N.Simon "La Leçon de Charcot,1986, page 86)
>
> Sometimes I leave his lessons as if coming out of the Cathedral of Notre Dame, with a wholly new idea of perfection...no other human being has ever affected me in this way.

Medical power in nineteenth century France

One way of defining power historically is by looking at individuals and assessing their responsibility for certain events and their outcomes. A very brief attempt has been made to do this in the

sketch made above of the educational and medical institutions with which Binet came into contact. The power of certain individuals was indicated such as Gambetta and Ferry, political figures; Liard, educational director; Buisson, an academic; and Bourneville, a psychiatrist. In addition Charcot can be seen as powerful in his expansionism - increasing his domain of action through the use of complementary services in iconography in order to portray the full development of "la grande hysterie" in its external manifestations. He was regarded by many who attended his lessons as the "maître". Another influential figure was Théodule Ribot (1839-1916). Though not an experimental psychologist, he occupied the chair of experimental psychology. He had a cluster of followers, including Pierre Janet whom he chose to succeed him when he resigned from this chair in 1901. The cluster of followers also included Georges Dumas, the philosopher.

Extending beyond individuals, powerful groups can sometimes be identified. In the case of nineteenth century France, we must consider the role of the medical profession. Historians of this period (eg.Nye, Harris and Castel) have confirmed that the medical profession became powerful partly because of their appointments in high places, particularly in the 1870's, in the Chamber of Deputies, the Senate and by their earlier entry into public hygiene and legal matters. Nye's view (1984) is that the locus of power is to be found in the group which defines the discourse, for the terms of discourse define and may even be seen to explain social issues in such a way that they become accepted by a wider public, outside the group itself.

Nevertheless, I propose that for their discourse to become prominent and accepted, the doctors' presence would have to be seen and felt in a sufficient numbers of places, and the terms of their discourse and topics related to it, disseminated and popularized sufficiently to make an impact. These criteria were met: firstly, doctors were found in political places; and the reform of the Penal Codes in 1838 led to the individualization of punishment - ie.punishment in accordance with the perceived responsibility of the criminal, and not with reference to the crime committed. This opened the doors for medico-legal experts to give advice in courts for criminal cases where the question of insanity arose. Decisions about subnormality and imbecility in children was also generally seen as a medico-legal matter. The secularization of the asylums, hospices, hospitals and "colonies" (for the distinctions were blurred) meant the transfer of power from the Church to the medical profession within which specialization was increasing. Decisions re. the certification of individuals to allow entry into asylums, and permission for inmates to leave were also the tasks of the doctors.

The terminology of medical discourse was dichotomous: individuals or groups could be described as normal or abnormal. There is, of course, a popular appeal to such terminology, and among the lay "abnormal" was used simply to define people or exceptional cases which were not normally (ie.statistically) encountered. However, the normal/abnormal terminology became an umbrella term by which to describe other dichotomous groups - sane/insane; healthy/sick; whole/degenerate; educable/non-educable; responsible/criminal etc. This medical model of human attributes was persuasive, I suggest, for three reasons. Doctors, even those that were not psychiatrists,

had sufficient knowledge of the specialist study of "alienation" and of degeneracy theory as well as the legal problems of responsibility to speak with some authority on these matters. Secondly, the doctors were perceived as having authority, and probably as knowing more than they did. This suggestion is supported by Binet's observation that the term "malade" acted as a cue for doctors to offer their self appointed expertise. He remarked that the general public had a misconception concerning this expertise and knowledge, ascribing to them an omniscience and infallibility that they did not possess. Lastly, it must be concluded that there was a willingness to accept medical definitions, partly because of the credibility of doctors and partly because of a vast dissemination of scientific knowledge with which the doctors were associated.

Scientific knowledge and its dissemination

Scientific knowledge and its status through the popularity of positivism was not confined to scientists. Non-scientists followed Trousseau's case study lectures at the Hotel-Dieu, Charcot's lessons at la Salpêtrière, and Claude Bernard's course at the Collège de France. The latter included his famous "L'Introduction à la Médecine Experimentale". Such works were applauded by the literary and artistic world to whom they appealed. There was almost an obsession with the pathological in the second half of the nineteenth century in France. The historian and philologist, Ernest Renan(1890), in his "Pensées" of 1848 - his thoughts and ideas of the future of science - pointed out that literature offered material for scientists and psychologists to study. He suggested that the pathological gave

great insight, dealing as it did with the hidden mechanisms of abnormality which lay below the surface of the normal and regular. He claimed that:

> "Il est plus facile d'étudier les natures dans leurs crises que dans leur état normal...la régularité de la vie ne laisse voir qu'une surface."
> (page 179)
>
> It is easier to study people in their states of crisis than in their normal state...in the ordinary way we only see the surface.

So science and pathology offered topics for drama, painting and sculpture, and these in turn served to popularize scientific theory - for example degeneracy, as in the novels of Emile Zola, "La Fammille Rougon-Macquart", and the signs of pathology in the paintings of Géricault depicting portraits of monomaniacs, exhibited at the Salon in Paris in 1877.

Thus in the general atmosphere of scientism and cultural activity in Paris the arts/science distinction was virtually absent. One of the results was a general familiarity with scientific concepts, particularly when expressed in the normal/abnormal dichotomy.

Binet - as a Parisian, a biologist, a former admirer of Charcot, a frequenter of la Salpêtrière and other hospices, an ardent theatre-goer and playwright himself - was in the heart of these scientific and artistic interactions. The pathological was expressed in many forms with which he was familiar. Thus the normal/abnormal or medical model offered a framework for him as for others in which to carry out their investigations. For it was within this frame of

reference that Binet construed and defined the area of psychology - cross-referencing with insights from the pathological to the normal, and vice-versa. He was constrained by the language of this dichotomy into a dialectic view, whereby what appeared to be exceptional to the norm was often designated as abnormal or "malade".

Binet and the doctors

In addition, as was pointed out in the preceding chapter, the power of the doctors was a source of frustration for Binet. In addition to my interpretation of events, a more general point is made by Danziger that:

> "...there are always limitations on the utilization of an experimental approach in the context of authoritatively structured institutions...Not only can experimentation constitute a practical nuisance,but more important, it easily becomes seen as a threat to vested interests and the traditional practices of established power groups."
>
> (1990, page 115)

This statement confirms my argument that Binet was naive in expecting the authorities and doctors to relegate to an experimental psychologist, the commission which they saw as belonging to medical powers within Mental Hygiene. I feel that his attitude towards doctors remained guarded or suspicious, though individual doctors like Simon and Blin in particular, proved to be helpful to him. In any case, once Binet's expertise had been formally recognized, he had less reason to resent them.

Conclusion

In considering which institutions affected Binet most, they must include the Sorbonne laboratory initially where he examined some exceptional people like Diamandi and Inaudi; then the primary schools of Paris; work at the Salpêtrière brought him under the influence of Charcot; there were opportunities for clinical work on regular visits to Bicetre; the embryological laboratory brought him into contact with laboratory scientists. Binet missed out on academic patronage or esteem because he had a degree in science, but which was not medical; and he taught in no institutions. Despite the advantages of being of independent means, he suffered the disadvantages of not being formally attached to an academic institution. However, as will be seen, Binet's membership of the pedagogical society was to compensate, in some measure for the disadvantages that his independent life also held.

CHAPTER 4: INTELLECTUAL INFLUENCES

As suggested earlier, the "zeitgeist" or spirit of the times is too vague a concept or method for explaining, even in part, any intellectual achievement; for there is no unified spirit at any particular time. Nevertheless there are forces, political, social and intellectual which constitute a framework within which knowledge is generated. What is important in an historical account of a particular period is to show where possible, how knowledge and ideas of preceding times are taken up, modified or rejected; how current ideas and knowledge are disseminated, and how they are perceived.

The institutional organizations and political forces that determined, to a certain extent, some events in Binet's life and career, have been described in the preceding chapter. However, it is more difficult to show what intellectual forces help to explain the nature of Binet's psychological achievement, particularly given his independent spirit and lack of attachment to any academic institution, "school" or movement. Nevertheless, an outline of Binet's intellectual characteristics provides pointers to sources of influence, though it should be noted that his intellectual make-up was also a product of his personality, interests and predilections which determined the directions of his attention. Intellectual input also came from his reading, training and experiences. We know that, as a Frenchman whose secondary schooling was at the Lycee Louis-Le-Grand in Paris, Binet would have received a thorough knowledge of his own language in which clarity of expression was emphasized - ce qui n'est pas clair n'est pas français (what isn't clear isn't

French). That lesson had its results in the quality of Binet's clear and simple style, though, at the time such a style was rather unexpected in a philosopher or psychologist. His grounding in philosophy left him with little enthusiasm for the subject: his personal preferences were for real-life observation (d'après nature), rather than for philosophical argument, speculation and theory. He shared these preferences with others, as we shall see. In psychology and in pedagogy he prized observation and experimental investigation with controls over opinions and theory - a product of his practical mind.

His overriding interest was in the individual personality, in its uniqueness, capacities and modes of thinking and acting. Such an interest was satisfied by his psychological portraits and investigations. It was also stirred by his love of the theatre, and found an outlet in his own dramatic creations. Binet was adverse to dropping an interest, once he had taken it up. His early interest in biology was sustained over a considerable period of his life, and the attraction of anthropometrics held for many years in which Binet actively practised its methods. He was, in a semi-professional way, a clinician when he worked with Charcot from 1882 onwards until 1889 and with Dr.Simon, mainly at the asylum of Vaucluse from 1900 onwards. Binet was broadly Comtean in his views, and, if he had been obliged to choose, an environmentalist rather than an hereditarian. What were the influences that helped to shape the intellectual nature of Binet?

The notion of influence is problematic in itself. An information processing model such as Shannon's (1949) could provide a descriptive schema of influence with its three stages of input, processing in the "black box" , and output. The major difficulty is lack of certain knowledge about input, how this is processed in the individual and how output is related to the two previous operations. As to "noise", this can be conceived of in terms of intellectual and cultural constraints in both input and output. Processing in the black box will be determined in part by interpretation of knowledge input, its incorporation into existing schemata, with personal preferences functioning as a selecting device at both input and output stages. There must therefore, be some conjecture in proposing threads which link the work of earlier and contemporary thinkers to Binet's own ideas and conceptualizations. However, some influences may be outlined with confidence; others may be more speculative in cases where evidence is less sure. Even if speculative, the topic of influence must be treated by looking at specific examples and not by making general statements.

Early reading and experiences

On Binet's own avowal Mill was his only master in psychology. This is usually taken as an indication of Binet's espousal of inductive method in science. Certainly this was Binet's favoured method, although it will be seen that the inductive method was to some extent qualified in practice. As for environmentalism, we can probably conclude that he was not an extreme environmentalist, for there were later experiences which may have modified any extreme environmental position that he may have adopted. In Balbiani's

embryology laboratory where Binet worked, he must have been exposed to, and learned of differing scientific views on genetic factors and heredity.

Apart from reading John-Stewart Mill, we know that Binet knew and admired the British Empiricists and Associationists Locke, Berkley, Hume. Hartley, Bain, and James Mill. Another point to bear in mind is that, in the information theory model, the formation of schemata and beliefs is not static: changes may be subtle and indiscernible, and only become noticeable when a particular statement indicates a volte face or rejection of a former position. For example, Binet came to reject the claims of the Associationists as being too wide:

> "Ils ont même cherché à ramener tous les problèmes de la psychologie à l'association des idées, conception theorique que la psychologie experimentale a maintenant abandonnée." (1894,page 96)
>
> They even tried to relate all psychological problems to the association of ideas, a theoretical conception which experimental psychology has now abandoned.

Work of his Compatriots

Among Associationists Binet knew the work of Taine (1828-1893) and Ribot (1839-1916). Both psychological philosophers reacted against "spiritualistic" philosophy, and made their views known. Binet, for most of his life, rejected the spiritualistic and metaphysical approach which shackled philosophical - and consequently - psychological thought. In his period of reading at the Bibliothèque Nationale Binet would have read Ribot's accounts of psychology in England and Germany in "La Psychologie Anglaise"

(1875) and "La Psychologie Allemande" (1879). Ribot introduced British Empiricism into France, and liked to think of himself as a revolutionary by importing, translating and disseminating knowledge of the evolutionary ideas of Herbert Spencer (Spencer was known as the English Lamarckian). If Binet's interest were being caught by psychological works, then he would have read also Ribot's "Les Maladies de la Mémoire", "Les Maladies de la Volonté" and "Les Maladies de la Personnalité", as suggested earlier(see Chapter 2). Ribot, together with Taine were seen as the leaders of empiricism in France. His reading of Ribot must have shown him at an early stage the main direction of psychology in France, namely towards pathology.

Jean-Martin Charcot(1825-1893)

Binet's practical experience in pathology came, as we know from his period of work at La Salpêtrière with Charcot and this period of his life is documented by Wolf (Chapter 1, Prologue) and by Fancher (1990, Chapter 2). As indicated earlier, Binet began his work there when he was introduced to La Salpêtrière by a former school friend, Babinski (1857-1932). Babinski was a neurologist who worked under Charcot at La Salpêtrière and then as head of the neurological clinic there. Like Binet, Babinski also came to reject the validity of Charcot's work on hysteria, claiming that "entre l'hysterie et la fraude il n'y a qu'une difference d'ordre morale" (sic) - the difference between hysteria and fraud lies only in its moral order (cited in Abse). Nevertheless, like others, Binet spoke of Charcot's "belles leçons", and through them, and through Charcot's example, no doubt, learned the art of careful and keen observation. This he would also have learned in Balbiani's laboratory where he

completed his doctoral thesis on the psychic life of microorganisms. This work, according to Wolf, was meticulously carried out, with fine drawings made by Binet himself.

Hippolyte Taine (1828 -1893)

Binet (1903) refers to Taine's work "De l'Intelligence"(1870) For this Taine had drawn on physiology, reports from asylums and from J-S Mill's "Logic". Taine's work was perhaps the earliest to suggest that the concept of intelligence could be studied in its observable aspects. However, for Binet the unsatisfactory aspect of this important work was that it was useful only at the literary level, and lacked explanatory force. To what extent Binet was inspired to make up for the deficiencies by new conceptualizations and experimentation, is hard to gauge. But it no doubt appeared as a challenge - to show to himself and to others that intelligence could be studied experimentally. According to Sigerist (1932), Taine drew his theory of determinism by environment from Comte and Bernard. This theory would surely have been known to Binet.

Henri Bergson (1859-1941)

Binet knew at least some of the work of the philosopher, Bergson for in 1902 he reviewed Bergson's article on the consciousness of effort in mental operations. Binet admired the clarity and comprehensiveness of Bergson's theory, but declared it to be made too much from a philosophical viewpoint. From a philosophical point of view Bergson's analysis of time contrasts with the approach of earlier philosophers for whom time was conceived as a unity of finite and infinite. Bergson's approach was radical in that he disregarded general theories and preferred to present reality

sub specie durationis - ie. in its durational aspects. His doctoral thesis was concerned with this, together with the problem of free will. Binet would surely have known this work "Essai sur les Donnees Immediates de la Conscience" (1880) which was published in English as "Time and Free Will" (1910). One feels that Bergson's more concrete approach to time with its emphasis on duration would have appealed to Binet and to other psychologists. Binet may well have known "Matière et Mémoire" (1896) which dealt with aphasia and the means by which reality is perceived as continuous. From a personal point of view of course, Binet may have felt some resentment as it was Bergson who was appointed to the Chair at the Collège de France, when Binet's candidature was overlooked in 1900.

Paul Broca(1824-1888)

Broca, a professor of clinical surgery at the Faculté de Médecine, founded the Société d'Anthropologie, the Laboratoire d'Anthropologie at the Hautes Etudes at the Sorbonne in Paris in 1859. In 1872 he also founded the Revue d'Anthropologie and the Ecole d'Anthropologie in 1876. Binet learned Broca's methods of craniometry, and between 1898 and 1902 published ten papers on this topic, the first one co-authored with Vaschide. Four of these publications dealt with the measurement of schoolchildren's heads, with the aim of finding in these measurements some indication of a relationship between brain size and intelligence. Binet was, no doubt, impressed by the careful and precise methods of Broca which Binet himself taught to others. Eventually he came to doubt the reliability and value of these measurements, but the appeal of the brain-size/intelligence relationship was an hypothesis which Binet entertained even when he had found other devices for the measurement

of intelligent behaviour (see chapter 8). Binet of course, was not alone in his respect for Broca's methods, nor in his early belief that physical signs might in some way be the correlates of mental powers.

Claude Bernard(1813-1878)

In an address to the Académie des Sciences in 1879 Ernest Renan, the historian, critic and philologist paid tribute to the experimental physiologist, Claude Bernard. One of Bernard's main achievements was his discovery and exposition of the glycogenetic function of the liver. He became known to a wide public through his publication of "Introduction ā la Medécine Experimentale" (1865) which he wrote during a period of enforced inactivity through illness. This work could be summarized as a manifesto for the experimental method. It was widely read by scientists, litterati and lay alike. In France Bernard was hailed as the "Descartes de la Biologie", and the work defined as a literary classic. It is possible that Binet attended some of his later lessons of his course at the Collège de France or at the Museum d'Histoire Naturelle - the whole series taking place from 1857 to 1879; but there appears to be no evidence to suggest that he did. However, it seems highly probable that Binet knew his 1865 work, L'Introduction à la Médecine Experimentale", and its title suggested a similar one for Binet - namely "L'Introduction à la Psychologie Expérimentale". Like Pasteur and Charcot, Bernard was admired because his life served as an example of how a person of humble origins (ie. "fils du peuple") could, through effort and education, achieve so highly in a specialized field of science.

Bernard worked as an "interne" at the Hôtel-Dieu in Paris after qualifying in medicine. His talent was noticed by the eminent physiologist, and founder of experimental pharmacology, Francois Magendie (1783-1855) who took Bernard on as his "préparateur" (demonstrator) at the Collège de France. It was from then onwards that Bernard progressed in his research. He shared with Magendie a belief in the primacy of the experimental method in physiology and a preference for facts and observation over theory.

From "Morceaux Choisis de Bernard" (Extracts from Bernard,edited by Rostand,1938), the following characteristics seem to have been shared by Binet:

Firstly, in Bernard's own words there is the expression of a Cartesian doubt:

> "Le grand principe experimental est donc le doute philosophique qui laisse à l'esprit sa liberté et son initiative."
> (page 95)

> The first experimental principle is therefore doubt, the philosophical doubt that leaves the mind with its freedom and initiative.

> "Les hommes qui ont une foi excessive dans leurs théories ou dans leurs idées sont non seulement mal disposés pour faire des decouvertes,mais ils font aussi de très mauvaises observations. Ils observent avec une idée préconçue"... (page 96)

> Those who have an excessive faith in their theories and ideas are not only poorly equipped for making discoveries,but they also make wrong observations.They observe with a preconceived idea...

Binet was always at pains to point out the necessity of avoiding prejudice or preconceived ideas. Rostand also noted that Bernard set limits to what he thought to be possible to achieve. Bernard himself affirms that in experimental sciences it is not absolute or immutable truths that are promoted. We are reminded of Binet's reference to the possibility of only finding partial truths. In addition both Bernard and Binet advocate the important use of control in experimentation. One can also detect in both a tension between recommendations for the inductive method in principle and the difficulty in practice, of working without some a priori or novel idea. This "idée neuve" , as Bernard terms it comes with the speed of lightning, and is the result of a sort of intellectual presentiment. It is what we might call term the intuitive idea or "hunch". This seems to describe well the method that suited Binet.

A further similarity makes one wonder whether Binet knew the claim of Bernard concerning individuality, for according to Bernard:

> "chaque organisme possède son individualité,voire son unicité. Deux êtres vivants,fussent-ils de même espèce,de même race,de même portée ne sont jamais identiques." (page 11)
>
> Every organism possesses its own individuality,and is even unique.Two living beings,even of the same species,the same breed or even the same brood,are never identical.

A further similarity between Bernard and Binet can be found in their attitude towards the use of mathematics and statistics. Both prescribed their use, yet both also had their reservations. Bernard thought that physiology had not yet reached the stage which necessitated statistical analysis:

> "J'ai la conviction que l'équation générale est impossible pour le moment,l'étude qualitative des phenomènes devant nécessairement précéder leur étude quantitative"
>
> (page120)
>
> I'm convinced that a general equation is impossible for the time being,the qualitative study of phenomena having to precede quantitative analysis.

Binet too, found that, for psychological data qualitative analysis was more suitable and he warned against false or spurious precision.

Science in the nineteenth century no doubt had its specialized language. Whether Bernard drew on this or created some terms cannot be known for sure. But certain statements he made became well known, such as "L'expérience est une observation provoquée" - ie. the difference between an observation and an experiment is the agency of a manipulator or experimenter who sets into motion or stimulates an effect which can be observed. The term "provoquer" was used to mean the induction of certain states as in the patients at La Salpêtrière, where hypnosis and "le somnambulisme provoqué" were practised. Thus for Charcot, Féré and Beaunis it was a key methodological concept in pathology. With reference to Binet, the term "provoquer" became the key to his method of obtaining introspections. It was through his questioning and persistent probing that he was able to elicit the introspections, so central to his psychological experiments.

Finally, as Renan described in his address to the Académie des Sciences, Bernard was loathe to make a prediction; on the rare occasion that he did, and the results contradicted it, Bernard would join in the hilarity with his audience. It reminds us of Binet's

advice that "il faut toujours faire bon accueil aux faits qui sont en opposition a nos theories" - one should always welcome facts that contradict our theories.

Although Binet makes occasional passing reference to Bernard, it may not be possible to conclude that Binet was directly influenced by him ; but it is safe to say that they had affinities, and shared similar views about scientific method. Binet started his career as a laboratory scientist , and Bernard introduced the laboratory method into medicine. They also shared certain linguistic uses (eg. idée préconcue, provoquer etc.) within the available scientific language which was tied to practice. Given these similarities and shared ideas, we may infer that Binet absorbed and appropriated some features of Bernard's approach to science.

Jean-Jacques Rousseau (1712-1778)

In his "philosophy" year at the Lycée Louis-le-Grand Binet would have learned the works and ideas of the French thinkers or "philosophes" of the eighteenth century, often referred to as the Age of Enlightenment. So the ideas of Rousseau on society and education would be known to Binet. Rousseau believed strongly that civilization had a corrupting influence on people by the creation of false needs and the false sense of one's worth ("amour-propre"). Towards the end of the nineteenth century in France such ideas were reexamined in the light of the social problems that were increasing. Rousseau's proposed solution lay in his plans for an ideal education (Emile, 1762) The child, who is naturally good, would be made morally and intellectually self-reliant through an education in close contact with nature, which is also essentially good, being the

work of a divine Creator. Rousseau's ideas on education were influential in France in that they accorded with the ideas of Etienne Bonnet de Condillac (1718-1780) in his empirical approach to education. Condillac's belief in the education of the senses as a means of stimulating complex mental activity underpins the notions of "moral treatment" as advocated by Pinel, "mental orthopedics" by Binet (1911,page 150) and any notion of progress (or "perfectibility") in backward children or adults. Rousseau's optimism and faith in education seemed to be mirrored in the optimism of the Republicans of the early 1870's, and suffused the work of the Pedagogical society in its early years.(see chapter/0).

Optimism and Pessimism

One concession might be made for the use of Zeitgeist to describe context, and that is by reference to the prevalence and popularity of scientific ideas in the second half of the nineteenth century which, following Nye's idea may be termed "scientism" -

> "Scientism is the term which most clearly describes the apparent resurgence of faith in the 1850's,embodying an admiration for science and its methods,to be applied and extended to other disciplines."
>
> (1979,page 9)

Nye is here referring to France, and the prominent ideology there at the time. Nye also pointed out that when scientific discourse becomes popularized and makes a wide appeal to non-scientists, it can, by analogy, be used to describe or explain social issues and suggest remedies. Examples of this will be discussed later, but for the moment we can see that the dissemination of scientific knowledge about evolution and degeneracy coincided with dramatic events in

France: - defeat at the hands of the Germans (1870) with the siege of Paris; the devastation caused by war and its physical consequences in disease etc. and of course, lack of confidence. Conversely, the formation of the Third Republic inspired optimism based on faith in science and education. Later, disillusion set in and problems in education were encountered. So there may be in swing of the pendulum from optimism to pessimism, which creates tension for those trying to interpret events in the light of new scientific knowledge. So scientism in itself, though describing a spirit of the age, really explains very little unless specific aspects of scientific knowledge are examined, particularly in their popular form. The dichotomy of optimism/pessimism is useful in this account because it encourages the search for how events, theories and ideas were perceived at the time.

Roger Smith (1989) pointed out that

> "historians have illustrated in some detail how the dominant conception of the human sciences in Europe and North America,as well as in Britain,was fundamentally biological and determinist."
> (page 296)

Of all forms of scientific determinism, the biological is the most clearly felt by people and can be a source of frustration and pessimism. Two scientific theories which became the most dominant in England and France in the second half of the nineteenth century were those of evolution and degeneracy, with the latter being perhaps more marked in France than in England.

Evolutionary Ideas

One of the fiercest debates in Europe at this time, and into the twentieth century was that provoked by the publication of Charles Darwin's "On the Origin of Species by means of Natural Selection" (1859). On the part of Darwin there was a reluctance to make his evolutionary ideas known, but it was Thomas Huxley who endorsed Darwin's work and strove to disseminate and popularize his ideas. The "revolutionary" aspect of the Darwinian Revolution, as it is often termed, lay in its challenge to the idea of a static universe,created by the great Designer.The Darwinian theory in which humans and all other species are part of nature with Man (sic!) no longer set apart, and where the descent of man can be traced to more primitive or simpler species, shocked many people. Such a theory was seen to lower man's natural and divine right to the highest status in the universe. It was resisted because of its perceived radical and anti-religious nature.

Scientists were not totally unprepared when Darwin's theory of evolution became known in 1859, for evolutionary ideas were abroad before Darwin in the early work of Spencer in England and of Lamarck (1744-1838) in France. Anti-Darwinian debate within evolutionary theory was most often based on a refusal to accept the trial and error aspect of random selection. It was with reference to this that Lamarckism offered an alternative; for the inheritance of acquired characters is the proposal most often associated with Lamarck. His formal theory was put forward in his "Philosophie Zoologique" in 1809. At a popular level the inheritance of acquired characteristics was taken to mean the possibility that a change during the organism's lifetime could be transmitted to the next generation.

Such "hard" Lamarckism was not often defended - a more usual position being that in which only a small proportion of the change would be passed on to the next generation.

The debate to which scientists and intellectuals were exposed was considerably more complex and did not hinge solely on the acceptance or rejection of acquired characters. The nature of the debate is elaborated by Bowler (1983) who points out that there were differences in interpretations of both Lamarckian and Darwinian theories. Bowler suggests five theoretical categories onto which Darwinian and Lamarckian theories themselves cannot be precisely mapped. In addition he cites Gould (op.cit.) as the original proposer of three principles which one may adopt; each principle is dichotomous in that it invites its own opposite alternative. These are: a disorderly or irregular versus orderly process of selection; external versus internal demands upon the organism; and continuity versus discontinuity in the evolutionary process.

However, as Bowler reminds us, the context in which the evolutionary debate took place was quite different in France from elsewhere. He states that Darwinian theory never gained a strong foothold in France. He attributes this French isolation from the impact of Darwinian theory to the conservatism of many French biologists. While Giard taught evolutionary theory in the provinces, in Paris it was ignored. It seems that the laboratory was viewed as the sanctuary for biology and physiology where Pasteur and Bernard practised and laid down the tradition of experimental method in biology and medicine. it is likely therefore that Binet came to evolutionary ideas through his knowledge of cellular physiology and

embryology, disciplines that developed fast between 1868 and 1873. Where a rational image of science prevailed, there is probably little appeal in the notion of random variation or the survival of the fittest in a struggle which implies disorder. The preference for a rational explanation is shown, I suggest, by the title of Clémence Royer's translation (1892) of Darwins's Origin of Species as "De l'Origine des Especes ou des Lois du progrès dans les Etres organisés (emphasis added).

Organization and laws of progress are Lamarckian in tone and mark the tenor of evolutionary ideas in France. The French term for evolution (in its restricted and scientific meaning) is "transformisme", and the provincial evolutionary biologist, Perrier was appointed to a post in the Museum d'histoire naturelle and he gave a series of lectures on "Transformisme et les Sciences Physiques" in 1879; but Nye (1984) claimed that a thoroughly French tradition of "transformisme" had existed since the middle of the nineteenth century in France.

Perrier's lectures therefore might be interpreted as a mark of a revival of Lamarckism which is usually put at around 1870-1873. One of the features of Lamarckism was the "equilibrium model" suggested in the popular phrase: "vivre,c'est s'habituer" ie. accommodating and adapting to the environment as a definition of the task of every living organism. In this view adaptation brings about a new internal organization which is passed on to the next generation. Bernard's proposal of a "milieu intérieur" of vital forces characteristic of living organisms had its source in this equilibrium model.

The next question is how were the evolutionary ideas and the issues they raised perceived by those who had some knowledge of them? As Bowler points out, there were different interpretations of both Lamarckian and Darwinian evolutionary theory. On the whole, the Darwinian view in its perceived deterministic elements would provoke pessimism rather than the Lamarckian view which, by its proposed organized elements and the inheritance of acquired characteristics, at least offers hope through change in the environment. The pessimism/optimism option is complicated however, by religious beliefs and political positions. The Left in politics may favour intervention in order to improve the social conditions of the poor and provide better education - as we saw with the proposals of the early French Socialist Republicans. In such cases Lamarckism is the more appropriate model to adopt and an ally to environmentalism.

Evolutionary ideas and Binet's position

What was Binet's position viz a viz evolutionary ideas? It is unlikely that he was acquainted with the many controversial aspects of evolutionary theories, although he may have read something of the debates published in Mind at the time. The publication of Binet's long resume of Balbiani's lectures (1888) certainly show that Binet had knowledge of recent theories of reproduction and heredity, and these were related to the controversial proposals of the mechanism whereby characters are passed on to the next generation.

In his résumé Binet refers to Weismann (page 559 and passim)who is generally considered to be the originator of neo-Darwinian ideas. The crux of Weismann's theory was in his proposal of a hypothetical substance,"germ plasma" which contained all genetic information and

was isolated from the soma. In opposition, the quasi-Lamarckian, Carl von Nägeli, in 1865 proposed an "idioplasma" which could be affected by changes provoked in the body by the environment. Experimental embryology at the time was thus often concerned with experimental attempts to disprove or prove the inheritance of acquired characteristics - eg. Weismann and Kammerer respectively, the latter, working in the first decade of the twentieth century being probably the best known through Koestler's interpretation (1978).

Characteristically, Binet reports on the current theories from a neutral stance, notes the controversy, but does not express any preference for one of other of the theories. I suggest that his interest in evolutionary ideas was constrained by the laboratory and experimental method in histology and embryology for two reasons: firstly, because in the French view evolution was generally more narrowly conceived, ie. as a projection of embryological evolution; secondly, in France the equivalent of evolutionary theory came under the headings of "Philosophie Biologique", Biologie Philosophique" or "Philosophie de la Nature". Binet's reluctance to pursue philosophy and theory make it unlikely that he would have been conversant with different evolutionary theories and interpretations.

However, Binet may well have absorbed some of the ideas, particularly Lamarckian ones as they were expressed in scientific language - eg. equilibrium, harmony and adaptation. But like Pasteur and Bernard, he probably stressed the speculative nature of the past, and therefore be reluctant to embrace Darwinian views on the

origin of species. An enquiry into whether Binet held deterministic views would require a separate and extended research including his work entitled "La Responsabilité Morale".

Three areas of scientific enquiry came to the forefront in the second half of the nineteenth century in France. These were anthropometry, criminology and theories of degeneracy, and all were related to evolutionary ideas.

Anthropometry

Broca's cranial measurements gave support to biological determinism of race and sex differences, and were endorsed by his conservative followers, of whom Le Bon was the most noted. If we were to judge from a presentist point of view, Broca and Le Bon would be termed radical right-wing, racist and sexist. (See Gould, 1981 op.cit. for extracts of their opinions).

There is no evidence that Binet supported the hereditarian position of Broca and his interest in racial differences. Broca's contribution to Binet's thought and ideas probably lay in the following two considerations: firstly Binet accepted the anthropological assumption that brain size was indicative of mental capacity - witness Binet's anthropometric work over a decade (1899-1910); secondly, Binet's mastery of Broca's methods and techniques, which he probably learned at Broca's laboratory, provided him with the tool he needed in his attempts to distinguish the intellectually abnormal from the normal. It could also be suggested that, at a lower level of operating, Binet was following the fashion of the time, attracted by the promise that like other physical

measurements, head size in particular, could reveal the secret of intellectual power. Such a search was also justified by the use of objective and scientific methods. From his presentist point of view, Gould (op. cit.page 148) comments ironically that "craniometry (was) the jewel of nineteenth century objectivity"!

Criminology

A further by-product of evolutionary ideas was in the evolutionary criminology and determinism of Cesare Lombroso. Briefly, Lombroso's determinism was expressed in his theory or the "born criminal" which is elaborated in his work "L'Uomo Deliquente" (1876). Binet commented on Lombroso thus: never had any author been so often wrong; that he was credulous and confused - yet as a person so "sympathique"! (1911,b, page IX.)

He used stigmata and anomalies to prove his thesis that there was a criminal type. Lombroso's anthropological theory of criminality aroused heated debate. On the whole, in France, there was much resistance to Lombroso's theory. The opposition came mainly from the sociologists and in particular, Tarde who became a friend of Binet.

In 1885 the Academie Francaise des Sciences Morales et Politiques offered the joint prize to Georges Vidal and Louis Proal on their papers on the sociological doctrines on the "natural history" of criminality which opposed Lombroso's theory. By 1889 the Catholic writer Henri Joly was allowed to give a general course, open to the public ("cours libre") at the Faculty of Law in Paris, opposing the biological determinism of the Italian school of criminology. Binet may have well been more in touch with this debate because he

knew of the current use of stigmata as evidence of abnormality in cases of mental retardation and idiocy. He had also learned and used Broca's methods. He did not endorse the view that certain stigmata were unequivocally related to crime. Binet therefore seems to have had more affinities with the French sociologists. His concern for the fate of backward children who needed special attention was one of the social issues in which he was involved. By temperament too, he probably shunned a commitment to a deterministic viewpoint. In "Les Idées Modernes" (1911) he expresses his dislike of prognosis and labelling as they show evidence of a "pessimisme brutal". Finally, promoters of what we might call remedial education, did not want to betray the diagnosis of backwardness that they had made; to give the children hope, therefore, they used the term "perfectionner", and classes for "perfectionnement" indicated special or remedial teaching. This terminology today in French simply indicates "progress".

Degeneracy

Degeneration theories are constructed out of physiological, medical, anthropological, hereditary and evolutionary studies. The "Traité de l'Hérédité" of Prosper Lucas (1830) heralded theories of degeneracy. The most well known theory at this period was that of Auguste Morel (1809-1873). His treatise on degeneracy bore the long title of "Traité des dégénérescences physiques,intellectuelles et morales de l'espèce humaine et des causes qui produisent ces variétés maladives" (1857) - physical, intellectual, and moral degeneracies in the human species and causes that produce these various pathological states. These states or "variétés maladives" that he classified included hysteria, personality defects and "moral

perversions", mental deficits and idiocy in which mental development is very low. The stigmata of the degenerate were identified as facial asymmetry, distortion of ear shape, supernumerary digits etc. Morel found the causes in both the environment and in the action of parents. Morel had been struck by the poverty at Rouen, its factory conditions and the high rate of mortality there. His religious beliefs, his philanthropy and liberal politics, as well as what must have been a Lamarckian theory helped to shape his ideas. At a popular level degeneracy theory was perceived as an explanation of every type of "abnormality" - criminals, prostitutes and other types such as "pervers sexuels", alcoholics, the insane, hysterics, feeble-minded, idiots etc. It was a convenient umbrella term to cover all those who deviated from the norms of health, sanity and responsible citizenship. Binet must have known something of Morel's work, and he had some direct experience of pathology in the patients of La Salpêtrière and Bicetre. After his work with Charcot, the group that Binet had more contact with was that of the "abnormal" children. The allocation of children who could not benefit from the primary education provided, was one of Binet's concerns, particularly after 1900. He saw it as a social problem to be solved.

Conclusion

As we have seen, scientific theories of evolution, heredity and degeneracy could well present a deterministic and pessimistic view of human nature. The rise in crime, suicide and the perceived rise in insanity, together with anthropometric evidence could reinforce this view. But to offset or in counterbalance to this, the advance in hygiene and medicine and the introduction of universal education were cause for hope in France at that period. Moreover, pessimism or

optimism are products not just of scientific knowledge, however interpreted. Personal factors, experiences, ambitions, religious and political beliefs are difficult to disentangle from personal knowledge factors. Binet himself did not like to take sides, but on the whole I think that he leaned towards an optimistic rather than a pessimistic world view.

CHAPTER 5; PHILOSOPHY OF SCIENCE AND EXPERIMENTAL PSYCHOLOGY

Binet identified the age in which he lived as the era which promised progress in science; and Robert Nye (1984) proposes that the term "scientism" best describes the high status of science among scientists and lay alike in the second half of the nineteenth century in France. Binet's unformulated philosophy of science can best be described as broadly Comtean. There was in Comte's philosophy of science a chronological aspect in that he maintained that society had advanced from a theological into a metaphysical era, and that the period then being entered was the most advanced - namely it was scientific. For Comte, this was both a statement of fact and a prescription for practice. A second aspect of his view of science was the proposal of a criterion of generality, ie. the extent to which any of the sciences could provide general laws. In descending order of generality and in order of their emergence, he proposed this scale: mathematics, astronomy, physics, chemistry, biology and sociology. He excluded psychology from this scheme of sciences, believing that it was particularly weak in its provision of general laws. It was perhaps the French orientation towards pathology and individual cases which influenced him in this view. He made one exception, holding that phrenology was scientific. On the other hand, Binet claimed that psychology was a science, at least if it was practised as experimental, and if it abandoned metaphysical or speculative argument. Binet's view of science was therefore Comtean in tone and in its positivism. " Positivist" was a term which had entered popular usage: it referred to scientific in method, and often meant little more than objective - but in the

general discourse of scientism the term was recommendatory. It had entered the vernacular partly through Comte's famous "Cours de Philosophie Positiviste", lectures given over the period from 1829-1842. Binet departed from Comte's views in that, of course Binet believed psychology to be a science.

It appears that Binet did not, however, formulate a philosophy of science himself. The kind of psychology that he practised was what he believed to be scientific, and what was congenial to him. The nature of Binet's experimentation can best be explained by reference to Wundt's philosophy of science, and what this entailed for psychology. The differences between Wundt's position and Binet's are striking, and will be discussed below. There is the cultural French/German distinction which spawns differences at various levels - social and institutional, philosophical and linguistic; the evolution of the Wundtian programme of experimental psychology can be seen as a cultural and social phenomenon. Binet's reactions to some of the features of Wundt's experimentation reveal not just the cultural differences, but also Binet's apparent ignorance of Wundt's philosophy of science and the implications of this in terms of conceptualizations of psychology and experimentation. Personality differences between Wundt and Binet can only be inferred in as much as they result from their differing life situations and training. Binet's lack of knowledge concerning Wundt's philosophical position, and even of the institutional setting in which worked, may have been simply symptomatic of a more general French isolationism. Whatever the reason, his apparent ignorance highlights the divergent path that Binet took in his psychological investigations.

One prominent feature in Binet's case was the atheoretical and aphilosophical stance that he held. It ran deep and its consequences were that it precluded him from the elaboration of a philosophy of science, and it excluded him from the debate about the scientific nature of psychology.

Wundt's Philosophy of Science

Firstly, according to Danziger (1980), Wundt consistently opposed Comte and later the German Positivist, Mach (1838-1918). Wundt did not believe that science progressed through an accumulation of facts and observations, but rather by proposals of coherent connection of facts which were non-contradictory. Nor did he subscribe to Mach's precept of "economy of thought" which expresses summaries of observed regularities, enabling prediction and control. For Wundt these were not the aims of science. The aim should be a theoretical understanding of the coherence of events. So Mach's proposal of functional relationships was not satisfactory either. Wundt believed that science should adopt the principle of causality to guide and justify scientific endeavours. In considering where psychology fits into this scheme, the distinction made first by Giambattista Vico (1668-1744) and elaborated by Herder, provided Wundt with a satisfactory framework for definitions. Vico proposed that science could be divided into two types "Naturwissenschaften" and "Geisteswissenschaften", the former meaning the natural sciences and the other the social or moral sciences. In Wundt's view psychology straddled both, and each, according to this distinction, required different methods of investigation. This theoretical distinction was important because it defined which areas or topics could be studied by experimentation, and which could not. As a result, in Wundt's

view, much of psychology belonged to what he called "Volkerpsychologie" in the study of which he devoted many years of his life. This term referred to a kind of social psychology and included comparative analysis of customs, values and language. This left for experimentation a very limited domain of topics, barely more than aspects of psycho-physics and physiology to be treated by methods drawn from physiology itself.

Induction in Psychology

Binet's approach to psychology can now be understood in relation to how fundamentally it differed from the Wundtian one. Firstly, the Vico distinction, as elaborated by Herder, was unavailable to Binet - given the German/French cultural gap, or at least on Binet's part a possible reluctance to consider such a distinction. This partly explains why Binet was able to assert that "psychologie est une science naturelle, rien de plus." - psychology is a natural science, and nothing more.(1894,page 146) This statement of belief did not mean that scientific or experimental psychology was limited in its topics: there was no need to relegate questions of values and social, cultural or linguistic aspects of behaviour into a separate domain, with its own specific mode of investigation. Binet shared with Wundt the belief in the breadth of psychology, but Binet simply prescribed one legitimate method of investigation, namely through observation.

This belief in the importance of observation and experimentation and the rejection of a priori methods, leads us to consider a further difference between Wundt and Binet. Wundt opposed the inductive philosophy of science and believed that modern science (as

for example, the Galilean) should be based on speculation; so Wundt asserted that "presuppositions must advance ahead of research if they are to be extended and corrected by research"(1903, page 723). Much of Binet's experimentation, on the other hand, was observation-led. More than once Binet was careful to point out that there were no a priori bases for his experiments and no theory to prejudice the outcome - "sans souci de theorie" he declared when impatient to start on the practicalities of an experiment.

Alice Binet described her father's method of working: a list of references relating to his own study would be put to one side, and these would only be consulted after his own investigation was completed. This was his preferred method of working. Furthermore, Binet often tried to put aside and forget his own previous work, and to start afresh.

Experimentation

Wundt was guided in his experimental work by a search for explanation mainly in terms of "psychic causality". As Danziger (op. cit.) points out, Wundt took experimental methods from both psycho-physics and physiology and used them in psychological contexts to answer psychological questions; he also points out that a traditional answer as to what transforms a physiological or psycho-physical experiment into a psychological one has been made with reference to its data base: that is to say, an extension of the data base can be made by the addition of introspections, and thus effect this transformation. Danziger identifies Titchener as holding such a view. But Binet must surely be seen as occupying the same position (even if he did not develop introspections in the same way

as Titchener.) Binet criticized Wundt on the score that his introspections were not sufficiently elaborate or expansive to furnish a psychological experiment. The level at which Binet criticized Wundt suggests that Binet either misunderstood, or was ignorant of Wundt's conceptualization of psychology. The latter is more probable, given that Binet did not read German although the journal "Philosophische Studien" (which was founded in 1883 and reported studies done in the Leipzig laboratory), together with the main works of Wundt were held in the library of the Sorbonne laboratory. Binet also considered that the experiments performed in the German laboratory were also too constricted by their conception of the effects of the stimulus. Binet declared that the "excitant"(stimulus) was not limited in its effects on the subject. He held that effects could be much wider and could also be emotional. Moreover, this could be the case even in experiments of tactile sensitivity such as the two-point threshold. Subjects could report more than the answer "one" or "two" to their sensation. An example of this can be shown when this experiment was made on his daughter, Alice. She came to the judgement that two points were being applied when she felt the pressure to be big. Concerning the stimulus, Binet was not adverse to the use of physical stimuli such as tactile pressure or colours, for example; nor was he adverse to the use of apparatus (Binet himself refined Weber's compass by the addition of "volants" or wings which produced higher accuracy of pressure on the two points). But Binet used other stimuli: these could be in the form of objects or their representations, pictures, lines, digits, letters and isolated words. He even used sentences connected to form a simple narration or a more complex description containing abstract thought. Such stimuli were used to investigate

memory, judgement and comprehension. Wundt, of course excluded meaningful material from experimental work because meaning and values as expressed in language lay within the domain of Volkerpsychologie. Binet seems not to have realised or taken into account the theoretical barrier which, for Wundt, precluded the use of meaningful material in psychological experiments.

Binet also criticized the findings from physiological and psychophysical experiments:he pointed out that their findings, on memory for example, were minimal in spite of the thousands of experiments reported. What Binet failed to understand was that Wundt was pursuing an end consistent with his philosophy of science in that science is defined and justified by a continual replication of experiments.

The Social Nature of the Experiment

More understandably perhaps, Binet was ignorant of the German institutional and academic traditions and the contexts in which psychological experimentation took place. As Danziger points out the traditional link between teaching and research in German universities led to the particular social pattern within experimentation. Students and lecturers were most often engaged in a collaborative enterprise. This meant that the roles of subject (or reactor) were often interchanged with those of the observer or experimenter: role allocation was often a question of convenience. In addition, the collaborative nature of the experiment meant that the roles were more or less of equal status. This arrangement contrasts with the social pattern of the experiments in France, and with general perceptions of experimentation there. This can be

explained briefly by the medical connotations of the experiment. The physiologist, Claude Bernard (1813-1878) prescribed the experimental method for medicine in 1865. Experiments on hypnotized patients were performed by Charcot and others, and these experiments became well known. Binet's first reported experiment (on humans) in collaboration with Charles Féré (1885) was of this nature and was reported in La Revue Philosophique. It follows that power relations within the medical or pathological experiment were far from symmetrical or interchangeable. Given the medical origin of the psychological experiment in France it is not surprising that Binet found that French students were reluctant to act as subjects in experiments in the Sorbonne laboratory. The term "sujet" must have held unpleasant associations. In two cases I have found that the term "patient" was also used by Binet to denote the subject; for example, in 1903, page 4. (This word does not have the meaning of the English equivalent, but in French means the person awaiting surgery, or the condemned person awaiting execution!)

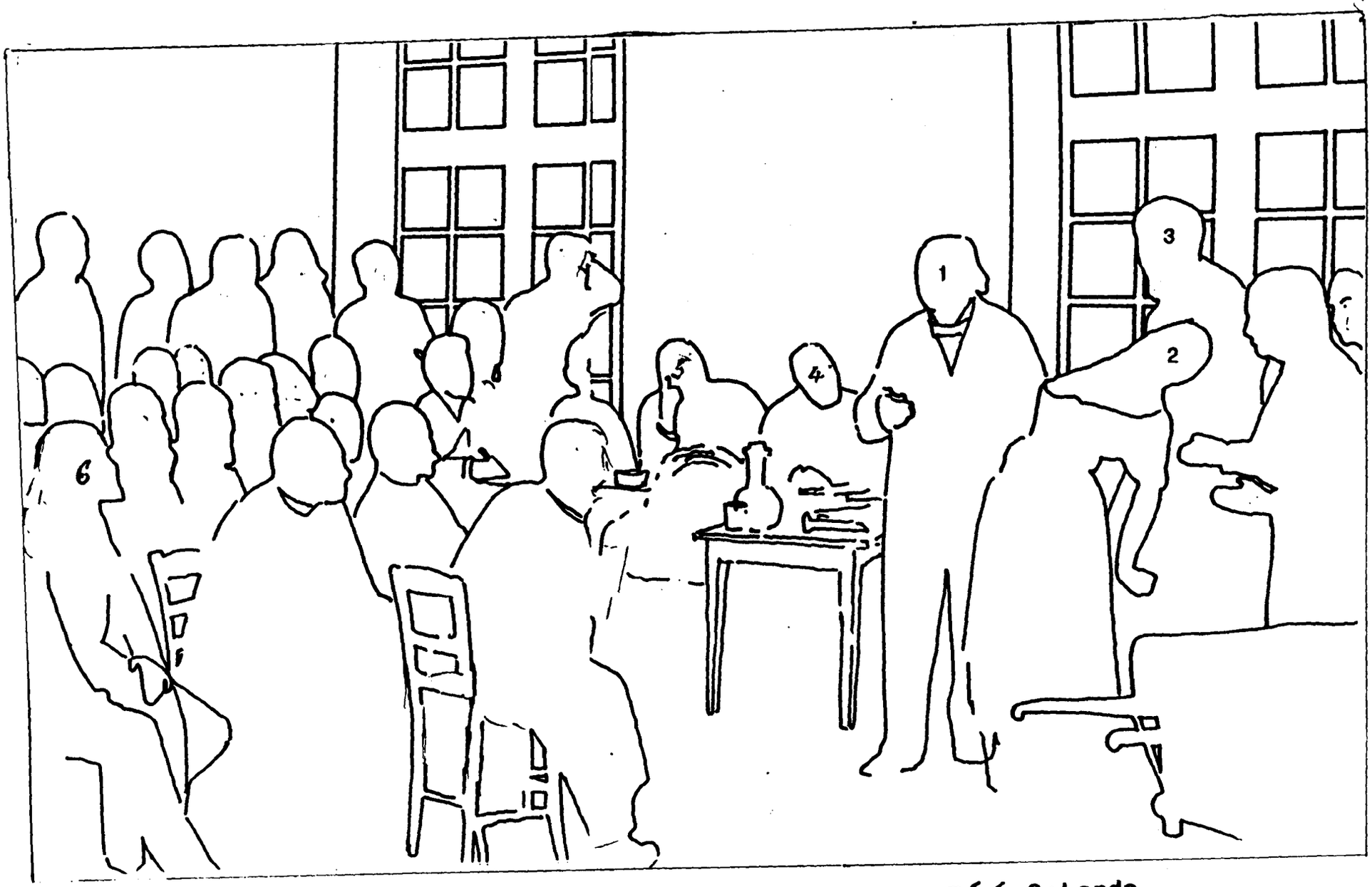
It is probable that Binet did not know the arrangement in German psychological experiments. He noted that the apparatus created a distance between the experimenter and the subject. It is ironic that Binet should have criticized the German experiment because of this, while within his own experiments the experimenter and subject were distanced by the imbalance of power between them.

Binet was however, sensitive to this imbalance, having witnessed the power of suggestion over hypnotic patients, a power which he saw applied also in non-pathological situations. He sometimes viewed this imbalance as a barrier to the production of introspections

which were needed in psychological experiments. This was a concern which never arose in the Wundtian type experiment. But for Binet the nature and the amount of imbalance varied according to the type of experiment that he was undertaking. In the laboratory at the Sorbonne the exceptional calculators Inaudi and Diamandi were tested. As Blanche Wittman was the showpiece for Charcot's lessons in hypnotism (see over for the schema of the famous painting by Brouillet), so Inaudi became the show piece that travelled round the world with the Barnum circus. Such scenarios were a far cry from the serious academic and institution-based experiments performed by Wundt and his students at Leipzig!

The Nature and Uses of Introspection

Wundt generally used introspection for two main purposes - first to explain individual differences in the objective data (differences which were peripheral to the aim of the investigation), secondly, to check the effectiveness of experimental manipulations. Wundt was opposed to the idea that introspection could provide the only means of making an experiment psychological. On the other hand, Binet's ideas concerning the importance of introspection were expressed on more than one occasion, as will be shown. Again Binet probably did not have access to the theoretical views of what defined introspection, as Wundt did. Brentano (1874) proposed that mental phenomena could be obtained by either of two methods, by "Wahrnehmung" (inner perception) which should be distinguished from "Beobachtung" (inner observation). The first is perceiving internal events, and the other means observing them in some methodical way. Wundt preferred to practise the former because observation would draw the introspector away from the immediate and direct perception



1 : Charcot 2 : Blanche Wittman 3 : Babinski 4 : Richet 5 : Féré 6 : Londe

Schema: La Leçon de Charcot by A.Brouillet

of the phenomena which were to be reported. Wundt believed in the control and ordering of experimental conditions so that "the process of inner perception came to resemble in all important respects external, ordinary perception while steering clear of becoming overblown and useless internal internal observation." (Lyons, 1986, page 4). Binet took a much wider and atheoretical approach to introspection. His conviction as to the importance of introspection can be found in his "Introduction à la Psychologie Expérimentale" (1894)

> "L'Introspection, peut-on dire est la base de la psychologie, elle caractérise la psychologie d'une maniere si précise que toute étude qui se fait par l'introspection mérite de s'appeler psychologique et que telle étude qui se fait par une autre méthode relève d'une autre science" (page 18)
>
> One may say that introspection is the basis of psychology; it characterizes psychology in such a specific way that any study which is made through introspection deserves the name of psychological,and every study that proceeds by another method comes from another science.

Binet was less interested in elaborating a formal philosophy of science in which psychology had a fixed place, than he was in putting his convictions into practice. His precept was simple: extend the use of introspections to give the experiment more scope by freeing it from the confines of physics and physiology. From this it follows that Binet would interpret the limited scope of Wundt's introspections simply as an omission or lack of elaboration, rather than a theoretically imposed barrier.

Why did Binet appoint such an important place to introspection? One answer may be found in Binet's curiosity about the human mind in all its different manifestations in different individuals. It was Binet's habit to question, to note responses and observe the manner of responses as well as the contents, in both clinical and non clinical situations. Introspections also included the experimenter's observations of the subjects' behaviour. For behaviour and comments which accompanied the experimental tasks provided Binet with further data. Moreover, the experimenter could make use of additional knowledge that might come to hand concerning the subjects; this knowledge could help in an interpretation of the data. Obviously, such data were particularly suitable for qualitative analysis - but the task was not easy and was long, as Binet noted. Whatever process Binet was investigating, his preference was to capture the active and living quality of the individual.

Binet's first experimental work was on hypnotic patients where introspections were unavailable; but his move into "normal psychology" allowed him to procure introspections from subjects who were "sains" or normal. This led to an expansion of territory in which the psychological experiment could be legitimately applied. Binet was attempting to define scientific or experimental psychology and to claim its territory, and make of it an autonomous discipline. One has the impression from methodological statements, that Binet saw introspections as the means of achieving these aims.

The distance separating Binet and Wundt becomes increasingly evident. Wundt did not believe that psychology could or should become an autonomous discipline. He saw psychology as an integrated

part of philosophy which it enlightened. Moreover, experimental psychology was only one aspect of psychology in general, as has been discussed. In contrast, Binet claimed the autonomous status for experimental psychology and noted:

> "Elle s'est dégagée de cet amas confus et encore mal défini de connaissances auxquelles on donne le nom de philosophie;elle a coupé l'amarre qui l'attachait jusqu'ici à la metaphysique"
>
> (1894,page146)
>
> Psychology has freed itself from this confused and still ill-defined mass of knowledge which is called philosophy;it has cut its links with metaphysics to which it was attached.

The comparison between Wundt and Binet has been made to highlight the specific features of Binet's conceptualization of experimental psychology which influenced his practices. But the comparison has been made not only at the level of individual predilections and convictions, but also at the wider cultural level. Ideas about science and its practice are embedded in cultural settings and traditions; they are therefore, only properly understood with reference to cultural phenomena as well as to the personal experiences and convictions of practitioners.

The Experiment

Binet's curiosity about the human mind led him to study a wide range of topics. Nevertheless, he was aware of limitations. The boundary lines are drawn to contain only what is possible, as he explained:-

> "Les questions que nous devons chercher à étudier, ce ne sont pas les questions les plus belles,

> celles qui nous paraissent les plus importantes,mais bien les questions qui ne sont pas hors de notre portée,et qui donnent l'espoir d'une solution.En toute chose il faut consider la fin."
>
> (1961,page10)
>
> The questions that we are to study are not the biggest,the finest,nor those that appear to be the most important,but questions that are within our reach. In all things we must consider the aim.

Such a viewpoint perhaps encourages the method which seizes upon an observation and seeks a formula whereby it is possible to investigate a particular topic or process. If the finding can be usefully applied (as perhaps in some area of pedagogy), then that study was to be recommended.

Experimental Design and Hypothesis

The inductive method to which Binet was committed was not easy, however, to put into practice, and a discussion with reference to his study "Suggestibilité"(1900) will illuminate some aspects of Binet's experimental method. Binet did not always confine himself to acting upon an observation. For example, he had witnessed the power of suggestion when the subject was hypnotized. From this he conceived the notion of "suggestibility", and speculated that this might operate in non-pathological cases; he also speculated that suggestion could operate at a level different from "l'action morale" (the influence of one person upon another).In other words one's perceptions of events could be seen to influence behaviour in a particular and identifiable way which unequivocally pointed to the relationship between the influencer and the influenced. In his aim to investigate such a process, Binet was led by a sort of micro-

theory of suggestibility. A further observation or "hunch" led him to expect that children would be more suggestible than adults, and that the younger the child, the more suggestible it would be.

Conventions in experimental method and reports at the time did not require a formal hypothesis. Binet sometimes put forward an hypothesis derived from the findings and interpretation of these. He made it clear that getting the experimental design ("formule") right was a difficult task. One of the uses made of the Sorbonne laboratory was for trying out or piloting of experiments on adult subjects. Binet pointed out this use in a study made with Henri on the visual memory of children (1894) where he used adults before he went into a school to investigate on larger groups of pupils. In "La Fatigue Intellectuelle" (1898) he criticized Ebbinghaus (who was a member of a working party to investigate this problem) for not trying out their experiments, but going straight in and getting 12,000 scripts.

Subjects

Binet had a strong preference for using a single subject in a face to face or interview situation, particularly when he needed introspections to provide valuable data. As we have seen, Binet was obliged to go outside the Sorbonne laboratory and into schools where experiments were performed on small groups or whole classes. It should be noted that all the experimental subjects here were boys. This was not a matter of choice, but permission was not given for experiments using girls. Binet was also confined to using primary school boys because as he pointed out in "Psychologie a l'Ecole Primaire" (1898,a) parents of young children were less likely to

object than those whose children were in secondary school, where experimentation might be frowned upon as a waste of time in their full curriculum.

Apparatus and Materials

Binet was acquainted with the growing number, and refinement of apparatus in physiological and psycho-physical experiments. With Vaschide for example in 1898 (b and c) and in 1899, he studied correlations of physical tests and physical strength; in 1899 they studied the relationship between head size and intelligence. The list of apparatus available in the Sorbonne laboratory is given in Appendix 1.

Binet pointed out that experiments could also be done using pencil and paper.

Procedure

Unlike the participants of a Wundtian type experiment where the general aim of the experiment was known to all the participants, such information was not available to the subjects of Binet's experiments, particularly when these were children. In experimenting on the suggestibility of children, for example, Binet told the subjects that he was going to test their skills of observation. In fact it was a test of memory, in which the manipulation of the stimuli was designed to deceive. Among the lines of increasing length that the subjects had to reproduce, were interpolated lines of equal length, which acted as a trap. The boys were mainly directed into perceiving the task as an observation of increasing lengths of lines.

Analysis of Results

Where possible, Binet used tables of percentages and means to present results. He pointed out the usefulness of using means:- in a homogeneous group the mean provided a reference point or point of comparison for an individual score. Whenever the data were extensive and included introspections, then qualitative analysis was also called for: this was true also when stimuli were linguistic. For example in "Mémoire des Mots" and "Mémoire des Phrases" (1895) qualitative analysis as well as quantitative was needed in order to interpret the results. Binet considered interpretation of results to be of vital importance. If this were omitted he claimed that the experiment was no more than a test. Binet's reason for insistence upon replication was that another experimenter might be able to offer a different interpretation which Binet would welcome. Furthermore, differing explanations might co-exist, for the reason that : "nous n'osons choisir entre elles" - we do not dare to choose among them. Binet was skeptical in these matters, and a state of doubt did not seem to worry him. He maintained that an interpretation could remain "flottante" ie. unfixed and moveable.(1903, page 29) He was not adverse to dropping an hypothesis, and mistakes provided a means of learning. "C'est quand j'échoue que je m'instruis" - I learn when I fail. (cited in Bertrand 1930)

Measurement and Statistics

Binet was no doubt aware of the growing use of statistics in reporting on many aspects of social and economic life in France in the nineteenth century. Access to these statistics provided knowledge of social, medical, pathological and criminal matters and

issues. But in psychology Binet scorned what he called "la methode de la statistique" which he viewed an an unreflective method of collecting data, without a clear idea as to its use. He did however, find percentages a useful "coefficient" as he termed them. Apart from arithmetic means, he sometimes found it useful to use the "methode des majorites". This approximates to what we would now name the "mode". For example, when asking a number of people to infer intelligence from a variety of photographs of faces he found it useful to identify the photograph most often chosen because it focussed attention on this stimulus itself. Another statistic that Binet found useful was correlation. As pointed out earlier, Binet made correlational studies with Vaschide on physiological and anthropometric data. According to Singer (1979), Binet and Henri were the first investigators to use a rank order method of correlation in pedagogy. The mathematical adviser of the Societe, See provided them with a formula for a mean of all the possible summed differences between the ranks of two sets of scores. Hence the formula:

$$M = \frac{N^2 - 1}{3}$$

where M = sum of gains expected on average by mere chance
N = no. of Subjects.

Binet gave the example of two sets of ranked scores on memory and intelligence for five subjects: -

Subject	Memory	Intelligence	Difference
1	1	3	2
2	2	2	0
3	3	4	1
4	4	5	1
5	5	1	4

			8

In this case M=8.

The closer M approaches the sum of the ranked differences, the more the results can be attributed to chance. This result indicates an absence of correlation. The main problem as Binet saw it, was to decide upon which value of the sum of the differences indicated a weak correlation or independence. It was not until Spearman (1906) put forward his "Footrule" that a ranked order coefficient could be calculated with precision (see Appendix 2).

Binet put forward the view that mathematics (presumably by their provision of general unalterable laws) gave scientific status to investigations -

> "La science a pour fin de considérer tout phénomène comme une grandeur et d'appliquer a cette grandeur,une mesure. Chaque science progresse plus ou moins vite vers cet idéal mathématique,et celle qui est la plus avancée emploie avec justesse le plus grand nombre de calculs." (1908,page 16)
>
> The aim of science is to consider all phenomena with reference to a size or measurement. Every science progresses at some rate or other towards this mathametic ideal, and the most advanced science is the one which uses the greatest number of calculations.

This is a Comtean-like statement, but it is probably more like rhetoric than reality in Binet's case; for Binet was acutely aware that false precision could sometimes be produced, and that this was worse than no precision at all. He became very skeptical and critical of the value of the correlational studies that were carried out by "mental testers". He was also very careful to point out that the difference between physical measurement which can be precise and psychological measurement,which may be less precise. In psychology one is not always dealing with numbers that are "superposable",ie. of interval scale, but more often with a "classement" or ranking. The distinction was important with reference to the Intelligence Scales, in which one may compare mental levels calculated according to age. The difference, for example, between age levels 6 and 7 was not the equivalent of the difference between age levels 10 and 11, for example. The distinction that Binet was making was between interval and ordinal data, claiming only ordinal status for the Intelligence Scales. The preferred use of ordinal measurement, as shown, led him to opt for the ranked order correlation (supra).

Conclusion

Finally we might ask what kind of researcher was Binet and by what epithet he might be described. Avanzini (1969) and others have referred to his "esprit fin"; by this I understand his discerning mind which scanned the general and detected distinctions and details;that penetrated the surface to find complexities; and a tendency not to take terms and definitions at their face value. The following are some examples of his distinctions, refinements and observations on experimental topics of the time: - that fatigue should be distinguished in its two forms, pathological and normal;

that two forms of attention should be specified - the voluntary and the involuntary; in memory, the spontaneous versus the "provoquée" or stimulated; that in materials for learning interesting should be distinguished from boring (for they differ in the amount of attention they demand); that the outcome of fatigue should not be studied only with reference to speed, but also to errors. He saw also that fatigue masked practice effects, and that one could control for fatigue by the interpolation of rest periods, and thus isolate the effects of practice; that in studying memory one was also studying attention and effort. Such distinctions and observations mark his experimental work. Binet claimed that his work led to partial truths about various aspects of higher mental processes; and all the while these illuminated individual differences, Binet was no doubt content, for from 1896 onwards "individual psychology" became one of his central interests, and this is examined in Chapter 8.

CHAPTER 6:INTELLIGENCE (1)

Definitions of Intelligence

The Intelligence Scales of 1905, 1908 and 1911 represent the outcome of much practical work on the part of Binet and Simon between October 1904 and April 1905; then again between 1905 and 1908. However, it should not be forgotten that this practical work was supported and guided by Binet's conceptualizations and definitions of intelligence that he made several years before he embarked on the task of finding a scientific method for measuring it. These will now be examined chronologically to show their development.

Without a complete reading of Binet's work it is difficult to pinpoint the first instance of Binet's interest in intelligence. It probably first arose when Binet was moving out of the biological and pathological studies and starting to claim some territory for psychology. Family life no doubt fixed his attention on his daughters' behaviour, and he was seduced into trying out simple Cattell-like tests on them - reaction times, perception and then their language development. His interest in intelligence grew probably from that time onward; it came to be implicit in many of the studies made on school children; it grew in particular when he studied his daughters' thinking processes (1900-1903), and it became the dimension to be measured in order to distinguish the educationally abnormal from the normal.

An early definition can be found in "Perceptions d'Enfants" (1890) c,) where he claimed that in the narrow sense of the word, intelligence consisted of perceiving the world, then recalling and working over the perceptions that are recalled (page 580). There also occurred to Binet the possibility that one day a way might be found for measuring intelligence. However, he had no plans for carrying out such a project at that time; but with the development of the anthropometric and mental tests of Galton and Cattell, the possibility of measuring intelligence was certainly being entertained. Teachers' ratings of intelligence and examination results could be used pragmatically, serving as operational definitions of degrees of intelligence. High correlations of mental tests with school success would therefore confirm that the tests developed could be predictive of success. - ie. they measured intelligence.

As we shall see, Binet was never tempted to enter the fray of mental testing a la Galton. He did not believe in a sensory-based intelligence. He never swayed in his conviction that individual differences - and by implication - differences in intelligence were to be found in the higher mental processes. The first evidence that he found to support this view was in his 1890 studies, as discussed earlier. Of the mental processes that Binet investigated in schools, memory, for some time, held considerable importance. This is not particularly surprising given that the method of rote learning was so dominant and widespread in school classes. A lesson was learned by heart, and then recited, and pupils received marks or remarks for their performance. Binet and Henri became curious about the relationship between memory and intelligence. They investigated this

by means of a ranked order correlation (a pre-Spearman type; see Chapter 5 and Appendix 2). What became evident to Binet was that in each task more than one type of mental process was involved: perception was accompanied by judgement, and memory was preceded by perception; memory in turn, depended upon attention and comprehension. Although Binet used the term "faculte", he did not use this to imply entities as in faculty psychology.

The subject of intelligence was implicit in the three articles of 1896, 1897 and 1898 on individual psychology (see Chapter 8). In the first of these articles Binet and Henri outlined topics for the study of individual differences (ie. aspects of intelligence) and these included common sense, judgement, seizing the relevant and penetrating below the surface etc. But in all, it defied definition. So here we see that Binet's conceptualization of intelligence was not in terms of separate faculties, but in the interaction of various processes required by the particular task or experiment. This is no a priori or theory-based conceptualization of intelligence; but the result of Binet's experimental practice which enabled him to observe and discern which mental processes were involved in a particular task. It is essentially an empirical approach out of which his conceptualizations took shape.

Moving on chronologically to Binet's study in 1900 of "Attention et Adaptation", we find that out of two groups of pupils judged by teachers to be intelligent or unintelligent, that the intelligent adapted more quickly than the unintelligent to the different demands of the tasks. We have here too, an indication of Binet's first expressed wish to measure intelligence: -

> "Je tiens à exposer des méthodes qui permettront un jour - prochain, je l'espère - de donner une mesure d'intelligence des individus."
>
> (page 236)
>
> I want to set out methods which will allow me one day - soon,I hope - to provide a measurement of the intelligence of individuals.

In "La Mesure de la Sensibilité" (1903) Binet was scathing in his criticism of the Weberian method of measuring tactile sensitivity. He claimed that it would have been difficult to have deliberately designed experiments so "reduced" to automatism as were those of Weber. Binet objected to the treatment of subjects as automata - a charge which he levelled against the mental testers, as well as those who practised "Weberisme".

Binet's 1903 work on his daughters' modes of thinking etc. provides further evidence of his concepts of intelligence. One of the early conclusions that he made in examing their thought processes was that while mental imagery was a part of thinking it was not coextensive with it; that the mind was not a producer of multiple images ("un polycopier d'images") and that intellectual acts were found in the following processes: - "comprendre, comparer, rapprocher, affirmer, nier" that is, in understanding, comparing and contrasting, affirming and negating.(page105).

There is also a more indirect indication of Binet's conceptualization of intelligence when he speaks of the different use of language by his two subjects. It involves a selective process, thus: -

"Le facteur intelligent est intervenu pour déterminer un choix dans le vocabulaire."
(page 58)

The intelligent factor has intervened to determine a choice from the ambient (and available) language.

Here Binet was using the term intelligent in a meaning close to its original Latin sense of selecting, choosing (intellegĕre) - an active process. The count on which Binet most criticized Taine with reference to his 1870 work, was for his presentation of intelligence as being passive and mechanistic: it omitted the important factors of effort, direction, adaptation, choice and attention (page 69). Changes in Binet's conceptualizations have certainly come about since the narrow definition proposed in 1890. The function of memory was omitted in this latest definition, perhaps because of laws of association which were often put forward to explain memory - a view from which Binet wished to distance himself. Alternatively, we might speculate that the role of memory in the representation of intelligence was becoming at this point of diminishing importance to Binet, though its usefulness for studying other processes like perception, attention and comprehension would not have been denied.

In the article which contained the first Scale (1905,b), there seems to be a further shifting in his conceptualization: he put forward the notion of a fundamental "organ" and added that -

"Bien juger,bien comprendre,bien raisonner,ce sont les ressorts essentiels de l'intelligence."
(page 196-7)
To judge well, to understand and reason well,these are the mainsprings of intelligence.

It is this last assertion that seems to be the most often quoted to illustrate Binet's view of intelligence at this date; but a closer look at what he meant by the "organ" or vehicle throws further light on Binet's view. He was now looking at intelligence from a functional viewpoint: any defect or deterioration (défaut ou altération") in this organ would affect the practical day to day living. Hence judgement he equated with common sense, initiative and the ability to adapt. Here, intelligence is defined in utilitarian or functional terms, an idea which Binet was to extend later. At this point, in 1905, and by way of introducing the Scale, this definition of intelligence seemed to serve as a prior justification for at least some of the test items, representing, as they did, tasks with which children of different ages would encounter in real life.

Intelligence with reference to the Abnormal

Following the 1905 Scale Binet continued his studies of abnormal children and in 1907 gave a clear definition of an idiot, imbecile and a "débile". The first lacks all ability to communicate in language, as a result of intellectual deficiency; the imbecile cannot communicate using the written word - ie. cannot really write or read with understanding; the "débile" can undertake some school work, but is retarded by two to three years, compared to normal children.

In this same study Binet reported the results of an investigation comparing 12 predefined "débiles" with 12 normal children, of the same age, social background, same area of Paris and from the same schools. He gave them a battery of tests, mostly from his own Scale,

and tested them mainly at the Laboratory at Rue Grange-aux-Belles. He found that for the comparison of short lines and memory for pictures, the abnormals came level with the normal, but were weaker on memory for sentences. In terms of school work the child of normal intelligence can sometimes shine in composition work; but the abnormal never can. Moreover, any intellectual work which required abstract thinking was a closed world to the intellectually weak. This latter finding offers a post hoc rationale for the final four items of the 1905 Scale (see Chapter 11). From Binet, the pragmatist, this statement offers a definition, in concrete terms, which specifies what school tasks the teacher can expect children of normal or weaker intelligence to do.

Binet held that there were two ways of conceptualizing the intellectually abnormal: the first related to equating their development with that of normal children of a younger age. But at this point he seemed to favour the view that the abnormal was different in kind, this difference being the result of some lack of coordination of thought - a particular disturbance or "un trouble tout particulier" (page 21). As to the popular view that the term abnormal signified a malady, Binet felt inclined to agree. By implication the mentally normal are characterized by some co-ordinating or equilibrium factor.

In commenting on the test items of the 1908 Scale, Binet and Simon proposed the existence of different kinds of intelligence which,up to that point had not been distinguished. They maintained that a distinction should be made between intellectual ability (the object of their measurement) and what they called a "faculté scolaire".

Here the term faculty refers to an aptitude for school work, due perhaps to the methods employed by teachers. Binet and Simon claimed that intellectual ability was independent of both the product of instruction and aptitude for school work. They observed that the "faculté scolaire" was identifiable in the characteristics of docility, effort, attention, will power, "character"and courage - some of these characteristics also accounting for success after school days. One important consequence of this distinction was that Binet's earlier definition whereby mental abnormality was equated with three years retardation was no longer tenable, for, as now pointed out, the two should not be conceived as equivalent. This was illustrated with reference to attention: in the classroom attention varies in its fluctuations within the individual, and different conditions could cause its disruption. In contrast, Binet claimed that they had never encountered an inattentive child over the age of four years. A further distinction was made between what Binet termed maturity and "rectitude" - the latter term meaning correctness or good judgement. The examples given seem to indicate that maturity relates more to achieving the outer form of operations such as putting words into sentences (synthesizing) describing pictures and making definitions; but success in the tasks could result in absurdities if the subject lacked "rectitude". Lack of rectitude could also be observed when intelligence appeared to be childlike, where events are perceived as they relate to the self. (This notion seems to foreshadow Piaget's concept of egocentrism).

Within this same article (the introduction to the 1908 Scale) a further definition of normal intelligence is proposed - an intelligence which is sufficient to enable people to provide for

their own needs by earning a living. Lastly, a proposal that is somewhat controversial is that of relativity. A child deemed normal in the country, could be described as "debile" in the town; the son of an advocate who worked only as a "petit employe" is "debile" in relation to the social milieu of his parents. This relativistic concept is further illustrated in "Les Idees Modernes" (1909,1910,1911). It seems here, that Binet and Simon, having firmly set their tests in the environment of the poorer areas of Paris were aware that they might not apply elsewhere: in other words, that the Scales were culture specific. In more general terms their now apparent functional view of intelligence meant that the dividing line between the normal and the "debiles" was not absolute, not fixed.

Just as Binet and Simon claimed no prognosis for the test results ie. that they measured intelligence only of the time of testing, so now they could be assured of a measure of intelligence that related only to the place where the tests were administered. This relativistic view of intelligence was inherent in Binet's earlier recommendation (1896) that the tests should be given in an environment familiar to the subjects.

Conclusion

Binet's ideas and definitions of intelligence were still not final. His study of the mentally deficient in 1909 were to offer further insights. In addition some immediate reactions to the Scales brought the question of the nature of intelligence and its measurement to

the fore. It is in relation to these reactions that the theme of intelligence and Binet's conceptualizations of it are resumed in Chapter 12.

CHAPTER 7:MEMORY

The inclusion of a chapter devoted to memory is important in various ways, as follows: Binet's inventiveness in experimental psychology can be illustrated with this material, together with findings and interpretations; Binet's views on the nature of memory and its relationship to intelligence throws light on his conceptualizations of intelligence; experiments on memory also provided him with tests for the Intelligence Scales; and from the pedagogical point of view, which always needs to be considered, his belief in its usefulness, and the value that he attributed to memorization can be found. Finally, with reference to memory studies, a comparison between Ebbinghaus(1850-1909) and Binet will highlight part of the range of differing attitudes and ways of studying memory in approximately the last two decades of the nineteenth, and early years of the twentieth century. Such a perspective throws into relief the particularity, and even originality of some of Binet's work in this area.

Binet's approach and early studies on memory

Binet's first publication (1893) on the topic of memory was "Les Grandes Memoires", a resume of a survey into chess-players. The next year he published "La Psychologie des Grands Calculateurs et Joueurs d'Echecs", and in its introduction Binet says that his research into memory dates several years back. This suggests a date of about 1888 or 1889 - two or three years after Ebbinghaus' "Memory" (1885). Within this period Binet studied exceptional mental calculators and

chess players, with a particular interest in those who were able to play blindfold. He owed his initial interest to Charcot,"mon regretté maître" and also to Taine.

Binet criticized historical and contemporary biographies and case studies as being incomplete. He asserted that in order to understand the mechanisms in memory, studies should be undertaken by interview, observations and experiments using a living person. In connection with blindfold chess-players he had assumed, like others, that these people had extraordinary visual memories; he also had in mind the description of Taine's American friend who had recourse to a powerful visual memory ("De l'Intelligence",1870) Binet was forced to modify his early opinion: some exceptional players maintained that while playing blindfold or with sight, the whole board was not necessarily apprehended and memorized visually, but rather, combinations of moves were formulated. This counter-intuition led Binet to investigate strategies, which he did partly by questionnaire method via "La Stratégie" the current journal for chess-players. An article in this journal by a certain player was used as an appendix by Binet: Groetz,(page 341) cites a Louis Paulsen who could play twenty games blindfold; in addition Rosenthenal claimed that when playing blindfold he "ne voyait ni l'échiquier ni pièces" - he saw neither the board nor the pieces (page 343). For those who did use visual memory, it seems that this was not a simple nor uniform procedure among players: some visualized the move of the hand, others the features of the chess pieces, others the colours etc. Binet was thus shown the complexity of procedures used within visual memory alone. These realizations must have reinforced his conceptualization of memory ie. that it is

a compound or "ensemble d'opérations" whose parts were usually referred to as "mémoires partielles". Binet says that Gall was the first to propose a theory of partial memories, and Taine gave examples of men with great visual memories and others. Binet's debt to Charcot was presumably because he involved him in the study of Inaudi, the famous mental calculator. Binet was present when Charcot made his physical measurements and observations of Inaudi at La Salpêtrière. Binet was also one of the members of the commission appointed by the Académie des Sciences to study Inaudi.

Conceptualizations of Memory

The Commission of the Academie des Sciences' report put forward the proposition that there are only partial memories:-

> "des mémoires partielles, spéciales, locales dont chacune a son domaine propre, et qui possèdent une independance telle,que l'une de ces memoires peut s'affaiblir, disparaitre, ou au contraire, se développer à l'excès, sans que les autres présentent necessairement une modification correspondente." (1893, pp.40-41)
>
> There are only partial memories which are special and localized, each with its own domain; and their independence is such that any one of these memories may weaken, disappear or, conversely become over-developed, without the others necessarily undergoing a corresponding modification.

This is an important statement which Binet said he strongly supported, and this view of memory was thus taken relatively early in Binet's career, and sustained at least until 1909, where it is reiterated in "Les Idées Modernes sur les Enfants". It provides a

rational basis for including more than one type of memory task in the Mental Scales. An important implication is that memory power is not a fixed and limited amount. It was later (op.cit.,page 195) pointed out that the different sorts of memory should be distinguished with reference to the following points - 1) memories differ by virtue of the object on which it is fixed; 2) by the type of procedure used in memorization; and 3) by its procedure in "ideation" or thought processes.

The Experimental Approach:Binet's criticisms and recommendations

One of the most useful sources for a clarification of Binet's position re.the nature of experimental psychology is "L'Introduction à la Psychologie Experimentale" (1894), a kind of credo and explanatory work inspired, no doubt, by Bernard's "L'Introduction à la Medecine Experimentale"(1865),intending it to do for psychology what Bernard had done for medicine. It contains a critique of the methodologies in experimental psychology. His comment on Wundt's "Treatise on Psychology"(1903) was that while six hundred pages were devoted to sensations, only eleven referred to investigations into memory. Moreover, Wundt gave a misleading impression because memory was treated as if it were a simple biological phenomenon, being but the reproduction of an earlier sensation. This is another indication of Binet's lack of knowledge concerning Wundt's philosophy of science (see Chapter 5). Binet rejected this approach of Wundt, and asserted that memory involved a complex group of states of consciousness which included judgement and self- correction. In addition, he pointed out that there were two forms of memory, the spontaneous and the invoked or voluntary, and these two forms needed to be distinguished. The former was impossible to experiment on

because of lack of knowledge of the precise nature of the original event. It was possible to experiment on the second type, for the experimenter keeps the originally presented material; but this precision was a function of the artificiality of the experiment.

Binet insisted on refuting a further principle which was widely accepted, namely that memory was something preserved and saved from destruction. According to Binet, this principle or view of memory was ill-conceived: the original and the reproduced were rarely the same - reproduction being a creative activity and subject to emotional factors.

In this same work Binet reviewed many studies on memory for colours, prehension, as investigated by Jacobs (1887), Munsterberg (1890) and Bolton (1892). Binet referred to it as the "faculte de la prehension de la memoire" He owed to Jacobs the idea of testing what came to be known as "memory span". Jacobs may have taken his idea from Jevons (1871).

Binet's Experimental Studies of Memory

1894 was an important year for Binet , being one of his most productive, and one in which he started collaboration with his student, Victor Henri. In this year too, important experimental studies of memory were made in which he and Henri used primary school boys as subjects. Their entry into schools was probably not motivated primarily by an interest in school children. As he pointed out in "Psychologie a l'Ecole Primaire" (1898) that, finding his own laboratory deserted because of lack of money, and therefore of students, the primary schools provided a ready population of

subjects - when permission could be obtained to carry out experiments there. Binet came to know the disadvantages of working with school children - the problems of discipline and cheating, with success depending on the control of the Head or class teacher. Another disadvantage was that of the unavailability of introspections because of the large number of boys involved. Binet also believed that useful subjective introspections could only be obtained from intelligent people with some psychological insight. This view was modified later when Binet came to appreciate the spontaneity and naturalness of children.

Nevertheless, with an eye for opportunity Binet and Henri went into a primary school of Paris where they used just under three hundred boys for their first experimental study, and seized the opportunity of investigating developmental aspects of visual memory (1894,a) It is possible that the two French psychologists were inspired by Henri's knowledge of some German experiments, following his stay at Leipzig in the summer of 1894. They decided to divide their subjects into three ready-made groups ie. of boys from the Cours Elémentaire (aged 7-9); from the Cours Moyen (aged 9-11) and from the Cours Supérieur (aged 11-13). A mean difference of two years separated each group from the other. The aim of the experiment was to study the visual memory of children by the presentation of pencilled lines of varied lengths of white card. Memory for length was made by presentation of a stimulus line (modèle) which had to be recognized and reproduced. Their insight made them realize that perception needed to be controlled for, if memory alone was to be measured. This was done by using the perceived length - that generally varied slightly from the presented one - which was to be chosen out of an

array of lines; this was named "la méthode des gammes". The subject then reproduced the perceived length, thus giving a measure of memory alone. There were four main findings to this investigation:-

1) The trend in percentage errors decreased with age - error being defined as reproduction of lines being either longer or shorter than the stimulus one.
2) The overall direction of error for all groups was to shorten the long lines, and lengthen the short ones.
3) The direction of error was the same for both perception and memory of lines.
4) Recognition of a stimulus line of 68mm resulted in a choice of a smaller line; in reproduction only of lines of 16mm and above were made smaller.

Binet and Henri refer here to a possilble neutral point ie. non-biassing of recall or perception which the Germans called "Indifferenzelenge". These studies by Binet provided some insight into a developmental factor, and served to show how perception and judgement were involved in the process of memory. These investigations provided material for the test items. In the 1908 version the comparison between two lines appears for age four, and is retained in the 1911 revision.

1894-1895 Studies

Following, it seems, immediately upon these studies were those entitled "Mémoire des Mots" and "Mémoire des Phrases" - memory for words and memory for sentences (1894-1895). These appeared in "L'Année Psychologique" which Binet had just founded, and appeared under the section of original work, "Travaux Originaux" The principal aim of these investigations was to show how, in very simple experiments of memory one could study relatively high mental processes - "fonctions intellectuelles relativement élevées". For the first study three hundred and eighty boys were used aged eight

to thirteen. The materials were series of separate and unrelated words read aloud by the teacher at the speed of two per second. The children were then instructed to write down the words in their correct order. At the end of the series (ie. approximately five minutes later) they were required to recall as many of the words as possible out of the forty-nine. The speed of presentation was determined by the need to eliminate the possibility of visualization of the printed word or of evoking imagery to help recall. Binet and Henri oversaw the procedure, noted and commented upon the different strategies that children used for cheating! - thus explaining some of their lost data.

To complement these large group experiments Binet and Henri used ten adults in the laboratory. The procedure was similar, but in addition they produced some introspections which were not reported.

A variation of this experiment was used to determine whether there was any improvement with increased age. Immediate recall of isolated words was investigated with boys aged seven to twelve.

The mean number of words recalled over the five years showed only an increase of 0.3. Binet did not consider this small increase to be sufficient reason for dropping the hypothesis of improvement with age: he pointed out that the varying conditions of these large groups could, in fact, be masking the effects of age (1895,pp 6-7). Of the five adults tested in the laboratory the mean number of words recalled was 5.7. Binet pointed out that these findings agree

with those of Bolton (1892) and Jacobs (1887). The two sets of experiments outlined supported the hypothesis of improvement with age. We are reminded, however. of Binet's caution in interpretation: that it should be borne in mind that what was being measured was for "memoire immediate" and for voluntary memory which supposes an effort of attention. In drawing the distinction between immediate memory and what he called conservation or "mémoire générale", Binet asserts that the latter was the only useful one. The distinction was also made by William James in his "Principles of Psychology" (1890) which Binet knew. James referred to the two memories as being "primary" and "memory proper". In relation to the differences between these two memories Binet found that in experiments with children only approximately half the number of could be remembered in delayed recall. Binet and Henri also found that forgetting occurred at least for the beginning and end of a series. Finally, in this report on memory for words they point out that memory for this verbal material differs from memory for digits in an important way. The latter evokes only sensations while the former evokes ideas.

Analysis of memorized material

They then report on an investigation into the influence of word meaning on memory. Using just over three hundred pupils in classes 1 to 4 (class 4 being the lowest under the French system) and ages unspecified, but probably ranging from 8 to 13, they found that one word "pupitre" was, across the classes, consistently better remembered than the five other words. This was probably due to its saliency for the children. Analysis of errors showed that in immediate memory errors of sound were predominant; in delayed recall

the exact words were sometimes replaced by words of similar meaning or association, by generic for particular, part for whole etc. Further analysis was made regarding errors of omission and errors of imagination. The latter was judged to be the result of a "trouble" or disturbance in memory, while the former could be explained by a physiological law, as proposed by Ribot (Maladies de la Memoire 1881). Errors of forgetting in Binet's experiments accounted for about four times those made by substitution. Finally, in this report Binet and Henri rejected the two a priori laws of association which were held by Associationists to explain a mechanism of remembering. Subject introspections showed various types of strategy used, but they did not include association.

The second report on Memory for Sentences follows logically from memory for words, but the decision to present them as two separate reports was deliberate. Binet stated that memory for isolated and discrete items had already been studied by numerous investigators, including Münsterberg, Brigham and Calkins; but investigating into memory for sentences was novel, and Binet and Henri were here entering a completely new territory. This domain he referred to as the memory for Ideas. They drew attention to the fact that the presentation of verbal material, ranging from eleven to eighty-six words in the form of sentences, using five hundred and ten pupils in four different schools was relatively quick compared to the long and difficult task of analysing the data in quantitative and qualitative terms. While words presented as discrete items may be considered to have equal value, the same was not true of words combined into sentences. Different words contributed differently to the sense of the sentence : for example, prepositions etc. served to modify and

link words within the sentence; a solution was found by dividing sentences into sense units, but this was admitted to be an arbitrary procedure. The results showed that memory for sentences was twenty-five times higher than that for isolated words. Binet and Henri attributed two main reasons for this: firstly, isolated words may evoke disparate and unconnected images, while there is continuity among words within a sentence, being linked by relations within the sentence. The observed superiority of memory for the most important words in a sentence or passage indicate that material is remembered according to meaning. Binet and Henri concluded that memory for sentences also showed a slight but consistent improvement with age.

The question arises concerning Binet's decision to investigate memory for linguistic material. It has been pointed out that he was critical of the classification of memory studies, as in Wundt for example, with studies on sensations. His observations and insight informed him that a study of memory involved taking other mental processes into account, such as judgement and attention. In other words, memory studies should be classified under the head of complex mental activity. Moving logically from lists of words to sentences made experimentation - or at least analysis of data - more complex. This did not deter Binet, for he was always suspicious of what appeared to be simple, and was prepared to explicate complex factors. The incursion into schools has been explained earlier, and Binet and Henri, once in schools must have become reminded of the role of language in instruction; noted that children were required to recite lessons and that teachers were aware of - even if they

misjudged - children's different capacities for memorizing. Perhaps Binet and Henri enjoyed the challenge, in the knowledge that they were breaking new ground.

Etude Expérimentale de l'Intelligence (1903)

Between 1900 and 1903 Binet conducted many experiments on his two daughters which he reported in the publication of "L'Etude Experimentale de l'Intelligence". Here he pointed out that the early interpretation of the "préhension de la mémoire" had been modified by himself, by Larguier des Bancels and by others (unspecified)-page 241. The new interpretation put forward memory span as a task of attention. No doubt or this reason it was included in the chapter on "La Force de l'Attention Volontaire". When Binet tried this test on himself he experienced the effort in attention that was needed to grasp and repeat the digits. When he tested his two daughters he found that Madeleine (here named Marguérite) could reproduce six digits, while Alice (Armande) could reach seven or eight. It cannot be ascertained exactly what the ages of the two girls were, as experiments reported in this volume took place over three years . Madeleine was therefore, any age between fourteen and a half and seventeen and a half years, while Alice was between thirteen and sixteen years. Out of the five adults reported as tested on this task, a mean of 5.7 had been produced. The memory span task became introduced into the 1905 Scales as items 11 and 19 and in the 1908 scales at ages 3, 7 and 12, with 2, 5 and 7 digits respectively. The question might be asked how Binet came to decide upon the number seven for that age. One reason could lie in Binet's reinterpretation of the task, as involving primarily voluntary attention, and that this was the function of an intellectual effort of control (maîtrise

de soi) - the opposite being a dissipation or scattering of effort (eparpillement). In other words, power of concentration was a manifestation of intelligence. Another reason, I suggest, may lie in Binet's claim that practice facilitates execution (page 230). This would mean that a child of twelve would have had practice in repetition and would therefore 'normally' be able to reproduce seven items. These two reasons relate to Binet's conceptualizations based on this findings and comments and interpretations of them. A further - or different - reason for the decision upon this item and its inclusion in the Scales could be attributed to the findings of Binet and Simon in the months between October 1904 and April 1905, when out of many tests that they tried out, many were rejected, but some retained on the basis of how many children could pass the test at a particular age. Presumably, they must have found that 50-70% of children aged twelve could reach the number of seven digits. Nevertheless,given the interpretation of tests, comments upon them and conceptualizations of intelligence, it becomes clear that Binet and Simon did not work on a wholly trial and error approach, but were guided by studies made as early as 1894.

The chapter entitled "Mesure de la Mémoire" opens with an admission or confession: Binet had observed that Madeleine had a better memory than Alice, and various tasks had confirmed this. For Binet such an observation served as an "idée directrice" which provided the necessary prediction for further tests. Confirmatory results formed an edifice which crumbled one day when a new test (unspecified) put this whole notion into doubt, for on this new test the girls were shown to have equal memories. Suddenly the truth dawned on him that he was investigating both memory and attention, and that his

experiments had been ill-conceived. Binet says that Biervliet was the first to state that memory span tasks had been wrongly interpreted. Memory span increases with age, that is between five and twenty years. This new interpretation however, was that children have a better memory, and adults better powers of attention; as the child's plasticity decreases with age, attention increases even more - hence the adults' better performance on the memory span task. Binet points out that there were no precise data to support Biervliet's assertion, so it remained with the status of an hypothesis. These comments are by way of introducing the problem of trying to control for attention when the factor of memory is under investigation.

In the belief that a great effort of attention would not be required for the learning of interesting material, he made M and A learn by heart poetry from the tragedies of Racine. As predicted, Madeleine consistently showed herself to have superior memory. However, when he gave them unrelated words ie. uninteresting material which required an effort of attention, their results were almost identical. Further tasks, involving different types of text and different instructions showed that these two variables affected the results and revealed the different styles, approaches and task interpretations made by the two subjects. Although Binet does not make an explicit statement about the attention of the two girls, he no doubt assumed the voluntary attention that they exercised to be equal. Why did Binet assume this? Firstly, because they would both try hard in an effort to please a teacher whose strictness they feared - "un professeur dont elles redoutent la sévérité"(page 277). A second reason was that Binet regarded his two daughters almost as

twins, in spite of the age difference of twenty months. Disregard for this age difference between the two marks all the studies reported in this work. Developmental aspects appear to be of minor importance compared with the other differences that he found between them - culminating in the typology tentatively put forward of two personality types with different styles of working and different language use.

Memory and Intelligence

An intriguing question addressed by psychologists, particularly with reference to school children, was the relationship between intelligence and memory. The first study in which Binet discussed the correlates of intelligence can be traced to 1899 in a work in which Vaschide collaborated. It is a historical outline of research into head shape and size and intelligence. Between 1901 and 1902 Binet published ten articles in L'Année Psychologique on cephalometry of which five showed how measures varied across groups of children of different intelligence in the primary schools of Paris and of the Seine-et-Marne region. Two others considered the cranial proportions among the blind and the deaf-mutes. In other words, at that time Binet was much taken up by the question of the physiological correlates of intelligence. In 1904 a study of graphology includes its "revelations" on age, sex and intelligence.

The 1909 edition of Binet's "Idées Modernes sur les Enfants" contained many of Binet's mature deliberations on Memory, Aptitudes, Intelligence etc. The explicit aim of the book was to present a

"bilan" or stocktaking of experimental research undertaken in America, Germany and to a lesser extent, in France, and what this research has told us about education. In the chapter on memory Binet makes his starting point a maxim of La Rochefoucauld: "On se plaint souvent de sa mémoire et non de son jugement": it appears that there is no dishonour in admitting to, or complaining about one's (poor) memory, but on our judgement we are silent. According to Binet this widespread view of memory which makes it independent of personality and intelligence, is a "préjugé" which needs correction. According to Whipple (1915) there is general agreement among researchers about the relationship between memory and intelligence - that there existed a positive association between the two, but with some qualifications eg. it had been found that the association between the two was stronger in the lower school classes, and that it was also generally more marked when delayed recall rather than immediate memory was measured. He also pointed out that the only investigators (up to 1915) who denied a relationship between memory and intelligence were Bolton (1892),Wissler (1901) and Ebbinghaus (1892). The latter's investigation showed virtually no relationship between intelligence and memory for auditory digits. Using 'bright','average' and 'dull' he found that on digits the bright and dull had identical mean error scores (84) and for the summed means on 6-8 digits error scores for the bright, average and dull were 318,319 and 303 respectively. Binet describes how he used school standing to investigate the relationship. In the belief that children differed in intelligence according to the placement in either upper, middle or lower "cours" he was able to find three ready-made groups of children of differing intelligence: by testing recall of poetry by children aged ten across these groups, he did,

in fact, find that there was an association between intelligence and memory power ie. the ten year olds in the upper classes had a better memory than those in the middle, and those in the lower classes had the poorest. Binet's findings here were therefore in general agreement with say, Jacobs' for example and others. He did not however, agree with the interpretation of a high memory span relationship with intelligence that Jacobs found. He pointed out that when the class teacher is delegated to administer the test, the bright pupils are egged on and their test performance is enhanced. Such bias should be eliminated by the psychologist giving the test himself!

Now, if as supposed, memory correlates with intelligence, what interpretation could be made of the cases of exceptional memory? Binet's view was that when memory was in excess of intelligence it was of little use. He cites the example of a healthy, robust girl of eighteen who could repeat ten digits after hearing then - more than Binet could do himself. Yet her intelligence was such that she had been unable to learn to read. He quotes also the famous Inaudi and Diamandi who had extraordinary memories for numbers. Inaudi could repeat fifty after a brief viewing of them. Diamandi learned one hundred after half an hour's study, and his sister could do the same. But Binet found such memories of little use really since they had few applications in every-day life, and did not often contribute to real mathematical ability. Moreover, an exceptional memory encouraged laziness and cheating. It enabled a pupil to recite facts without understanding, thus leaving judgment impaired through lack of practice and effort. Finally Binet cites the case of a young man from the Midi who had an exceptional capacity for memorization such

that he hoodwinked his teachers and obtained his Baccalaureat. He started medical studies, but then changed to law. With some ill-concealed bitterness Binet relates how he succeeded through sheer memorization - and someone should have 'muzzled' his memory and judged him by his true worth.

Binet's final word about the relationship between intelligence and memory was that they should develop together, and be of similar proportions. The assumption of a relationship between intelligence and memory which "normally" develop in step provides a rational basis (which Binet must have used) for including tests of memory in a developmental scale of intelligence.

The Relationship: Mathematical Formulations

From the date of Binet's membership of the Societé Libre, he must have come into contact with its mathematical adviser,Sée. Binet used his formula to obtain a measure of association between memory and intelligence, but it is not clear whether , in the example quoted that Binet provided the data for the formula provided by Sée.(see Chapter 5 and Appendix 2).

The usefulness of a good memory

As anecdotal evidence Binet quotes the cases of Leibniz and Goethe: both had great minds and encyclopedic memories. (Binet was said by Simon to have had an outstanding memory). Binet also agreed with Biervliet that children's plasticity enabled them to memorize better than adults - yet this capacity should not be abused. He agrees with the critics of excessive rote learning in schools, and points out that too much memorization can be at the expense of spontaneity and

judgement. Nevertheless he saw memory as a provider of material upon which comprehension and judgement could be exercised. He compares the memory store and ability to retrieve with a great book:

> ..."la mémoire est comme un grand
> livre animé et intelligent
> qui ouvre lui-même ses pages
> à l'endroit nécessaire"
> (1911, p.163)

This metaphor suggests that there is an active component to memory: that by turning its own pages, and by selection of the appropriate point, memory in itself is one of the directing and judging factors which make up intelligence. So, as Binet emphasizes the exercise of memory brings into play other mental activities. This accounts for the difficulty of experimenting on memory or on other mental operations in isolation; and we have seen some of the attempts that Binet made to do this.

To the question of what was the key to memory and its best use, Binet asserts:

> "retenir un récit intéressant, et le
> retenir longtemps, voilà la pierre
> de touche de la mémoire"
> (1911, p.172)
>
> to remember isolated words,or better
> still to remember an interesting
> story,that is the touchstone of
> memory.

The message to educators abound in this chapter on memory (Idées Modernes sur les Enfants).

Ebbinghaus and Binet

A superficial appraisal of the attitudes of Ebbinghaus and Binet towards experimental psychology shows them to be in agreement: both held the view that it was possible to experiment on higher mental

processes, and neither was deterred by a view that the nature of psychology should prohibit such experimental practice. However, they both came to this via different routes and for different reasons. Both were positivists - which in Binet's case probably meant little more than a faith in scientific method appropriate for an age which had passed beyond the metaphysical era. In other words we might assume that Binet held a general Comtean view concerning the prescribed methods for investigation - ie. he believed that psychology should not be concerned with metaphysics, theories and speculation. Binet's positivism is expressed mainly in such terms, but there is no evidence of a formal theory. As argued by Danziger (1979), it can be shown that Ebbinghaus, like Kùlpe and Titchener, was committed to the new philosophy of positivism mainly through the work of Avenarius (1843- 1896) and Mach (1838-1918). According to this philosophy all true knowledge is scientific, and the task of science is to observe, describe and make an economical summary of descriptions and observations. It also asserts that psychology can aspire to knowledge of complex mental processes, but only insofar as it succeeds in subjecting them to experimentation. On this latter point Ebbinghaus and Binet concur, and it expresses an anti-Wundtian position that they both shared. Wundt's view of psychology was based on two broad defining terms that were available in nineteenth century Germany namely, the distinction between the natural sciences and the social and historical, the distinction being roughly equivalent to the British distinction between natural and moral sciences (see Chapter 5). But on the whole, according to Wundt psychology belonged to the latter which took account of values, meaning and cultural and social factors - hence Wundt's narrow conception of a psychological experiment. Wundt insisted that:

> "We cannot experiment on mind itself,
> but only on its outworks, the organs
> of sense and movement which are
> frequently related to mental processes."
>
> (1907, page 10)

Ebbinghaus' anti-Wundtian stance led him to reject this a priori constraint, and his monograph "Uber das Gedachtnis"(On Memory") was a vindication of his positivism that held that the higher mental processes were amenable to experimentation.

It is most likely that Binet felt no such constraint which was more apparent in the German culture and to those who read German or were perhaps trained in Wundt's laboratory at Leipzig - eg. Cattell, Titchener and Kulpe. Binet's realization of such a constraining principle came post hoc ie. in his comments that so many of the German experiments were confined to investigations into sensory perception, reaction times etc.(1894) - or using Wundt's own words "the outworks" of the mind. It might be wondered how much, if anything at all, Binet knew about Wundt's philosophy of science, and of the rift among German and German-influenced psychologists. I suggest that Binet came easily to the view of psychology as a natural science. His training as a laboratory scientist no doubt helped; his doctorate was in science and he had also produced work on the psychic life of micro-organisms(1887). He therefore felt no need to prove that his view of psychology as a science was a legitimate one. Moreover, much of Binet's psychological work was produced after 1885, when the point had been well demonstrated by Ebbinghaus that higher mental processes were amenable to experimentation.

Binet's incursion into memory studies

Binet came to know Ebbinghaus' work probably in translation and through comments and resumes in contemporary journals. If, unlike Ebbinghaus, Binet did not need to prove a point, what was his motivation for experimenting on memory? It was an old topic, as both realized, and of interest to lay and psychologists alike. Binet's experimental studies on memory began in collaboration with Henri when they were feeling their way in a new direction, that of individual psychology. Lack of subjects in his own laboratory led Binet to use school children, and tests ("épreuves") on memory were not far removed from school learning tasks. Before 1894 Binet had studied cases of exceptional memories; Ebbinghaus knew of these, but they held little interest for him. Ebbinghaus was interested in studying some phenomenon of the general mind, as was Wundt and his followers. So while Binet was interested in memory per se, and explored developmental and individual differences in memory using a variety of subjects, adults and children, Ebbinghaus confined himself to being both experimenter and subject.

Conclusion

Binet's article in 1893 on "La Mémoire de l'Enfant et celle de l'Adulte" suggests that his interest in memory related strongly to his interest in intelligence at that date. He noted that in most cases there was some development in memorizing ability over time, as in the "prehension" task, which also showed a positive relationship with intelligence. It was therefore, not surprising that Binet turned to these early studies (visual memory and memory for verbal material) to use them in 1900 to 1903 on his daughters, and later to incorporate them into test items.

CHAPTER 8: INDIVIDUAL PSYCHOLOGY

Individual Differences

The study of, and interest in individual differences must be distinguished from Individual Psychology which appeared later,for Individual psychology, as Binet came to term it, did not appear full-blown in the late nineteenth century: rather, it developed out of an interest in individual differences which, as a theme can be traced back to antiquity. I propose that we can distinguish three main orders or ways of thinking about individual differences which were important to psychology in the second half of the nineteenth and early decades of the twentieth century - ie.the period to which the study of Binet relates. The first order links personality types to observable (or potentially observable) physical traits. The second order involves classifying individuals on a style of functioning or special talents. Method in the third order of "mental testing" was based on a special way of viewing human performance, and conclusions that could be drawn from tests.

Physical Signs

The notion that personality types are linked to physical characteristics goes back at least to Hippocrates' suggestion (400 BC) that a predominance of any of the four bodily fluids could produce a particular personality. An excess of black bile is responsible for the melancholic; yellow bile, the choleric; blood, the sanguine or optimistic; and phlegm, the phlegmatic or calm type. In the twentieth century Sheldon (1954) proposed three somatypes in which body build was linked to personality. The ectomorph (tall and

thin), described as cerebrotonic, is restrained and reflective; the endomorph (shorter, round and fat) is viscerotonic - relaxed and sociable; the mesomorph (large bones and muscles) is athletic and assertive.In the nineteenth century there was a renewed interest in matching physical signs to particular personalities and some measuring techniques were developed to study these physical signs within the area of anthropology. The types studied were often the socially difficult or problematic people already defined and classified as insane, deficient and criminal - ie. departing from the social norm. The Lombroso school of criminology exploited the existing appeal of a notion that physical signs of many kinds and anomalies or stigmata were indications of an abnormal. (see Chapter 4)

Franz Joseph Gall practised what his associate, Spurzheim (1776-1832) dubbed "phrenology". According to Gall's scheme, the brain surface is divided into thirty-eight areas onto which personal characteristics are mapped by virtue of the specific functions of each area. Predominant areas resulted in different protuberances on the surface of the brain - "bumps" - that could be detected, to produce a description of the personality. Gall rejected studies of a generalized adult mind in favour of a study of how people differ.

Paul Broca (1824-1880) founded the Anthropometric Society in Paris in 1859. Broca's fundamental belief was that brain size determined intelligence, so differences between individuals and races could be assessed with reference to brain size. From then onwards and into the twentieth century craniometry enjoyed great popularity, and this is fully described in Gould's "Mismeasure of Man" (1981,chapter 3).

Individuals and their styles

Francis Galton (1822-1911) was fascinated by individual differences of all types. Binet would have known Galton's "Hereditary Genius" of 1869, and known of Galton's fascination with eminence and with differing mental abilities to create images. Galton also found many variations in the way people conceived numbers or number forms. Binet was not so interested in eminence, but in creative people. He published in 1895 a portrait of the dramatist François de Curel describing the nature of his inspiration and creativity. Later, in 1904, in a portrait of the dramatist, Paul Hervieu, Binet noted the more controlled powers of imagination of this dramatist.

A further example of different individual styles can be found in handwriting. Graphology was mostly taken quite seriously in the nineteenth century, and was generally popular. There was the Société de Graphologistes in Paris whose expertise Binet occasionally consulted, as for example his book of 1906 shows, where graphologists were brought in to bring scientific control (sic) to the study. That through handwriting one could identify the age, sex and, to a certain extent, intelligence of the writer was an hypothesis that Binet found difficult to drop.

Mental Testing

The very idea of mental testing could not have arisen without the following preconditions or convictions: that individuals differ, and yet may be compared with each other; that some external or objective and reliable method can be used to assess mental abilities; and

perhaps most important of all, the perception of a social need or purpose to stimulate the enterprise. How the enterprise of mental testing was undertaken is described in Chapter 9.

Binet and Individual Differences

The tripartite system of describing approaches to individual differences, as outlined above, may help to locate Binet's interests in this area. This is because individual differences in orders one and two were those with which Binet was familiar, and those in which his natural propensities led him to engage. The third order ie. mental testing, was the one, which as will be seen, was the most context-led, given the social requirements of late nineteenth century France. In a final analysis of Binet's achievement it might be useful to assess - or speculate - in which of the three orders Binet felt the most comfortable. But at this point it is preferable to trace experiences which illustrate his interests.

When Binet found his vocation in psychology, he became engaged in an emerging discipline which at one end related to philosophy, and at the other to the sciences of biology, anthropology and physiology. He learned Broca's methods of measurement (anthropometry) and knew of the Italian school of criminology, where physical signs were taken as indicators of anti-social behaviour. An interest in physical signs as indicators, in some measuse, of personality and intellectual differences was never to be totally abandoned, although he held a skeptical view as to the predictive value of physical stigmata.

Binet was fascinated by differences as they were expressed in exceptional people (though without Galton's aim of finding generational and genealogical patterns as evidence for hereditary factors), and consulted dramatists in order to paint their psychological portraits. Another area of interest to Binet was the pathological, that is of the patients (mainly hysterics) at La Salpêtrière hospital, and later with the mentally retarded. A more personal and direct influence on Binet's interest in individuals was provided by his family experience. The presence of his two daughters, Alice and Madeleine lent him opportunities to observe differences between them. In 1890 he published three articles based on some informal experiments that he made on them (1890,a,b,c,). His later investigations using them again as subjects were made in the period of late 1899 to 1903.

The Origin of Binet's Individual Psychology

These considerations of Binet's preferences and his early studies of 1890 did not, in themselves, constitute an individual psychology. The necessity of defining and "creating" it stems from Binet's views of experimental psychology as it was practised at the time.

In the preceding chapters it was described how Wundt and Binet differed with regard to their philosophies, conceptualizations of psychology and their experimental practice. One important difference was that, on the whole, German psychological experiments were made with the intention of throwing light on the processes and nature of the human mind in general. This fundamental tenet of German experimental psychology explains how it was possible from Ebbinghaus' study on memory, 1885,(in which he was both experimenter

and subject) to formulate three general "laws" from his findings - the total time hypothesis, the method of saving and the curve of forgetting. Probable error in Ebbinghaus' experiments was attributed to fluctuations in attention etc.(intra subject differences); in the Wundtian type experiments probable error related to individual differences. This would appear to be an inheritance from the psycho-physical experiments. In "La Mesure de la Sensibilité" (1903)- two point threshold studies - Binet refers to the fact that Weber neglected to take sufficiently seriously the introspections that his subjects gave. A more serious criticism was made of Fechner: subject responses were categorized true or false according to reported sensations of one point or two. Where subjects could not decide (ie.intermediary), their responses were evenly redistributed into the two existing categories: in other words, two doubtful cases were termed as one true and one false - a method for smoothing out the data. In addition, the "Vexirfehler" (illusion) also complicated the picture. It was these doubts, illusions and awkward responses to tactile stimuli that led Binet to the "revolutionary conclusion" that Fechner's results were invalidated by his method of treating the data. On the other hand, intermediary responses and doubts provided Binet with material which illustrated individual differences. Although these arguments were set out as late as 1903, his knowledge of Weber's and Fechner's work predated these criticisms.

One of the origins then, of individual psychology à la Binet is a conviction that an attention to the subjective reports should have a primary place in psychology. A further factor directing Binet towards the study of individual differences lay in his early

experience as a psychologist. Binet stated that it was Charcot who opened the way for individual psychology. It was indeed Charcot who introduced the calculators, Diamandi and Inaudi to Binet. At a cultural level the difference between Germany and France lay in their orientations in psychology. The stage was set for individual psychology in France, given its dominant importance to the exceptional and the abnormal, with a methodology of anecdotes and case histories, within and outside hospitals and asylums. In addition, Binet's predilection for studying individuals as living persons was consonant with this orientation.

It should be noted, at this point, that Binet's emphasis on the individual was not one of the prerequisites for the mental testing approach. In fact, it proved to be orienting him away from the path which led Galton, Cattell and others towards the method of applying simple mental tests to a great number of subjects.

Definition and Scope :"La Psychologie Individuelle"(1896)

In the first of three articles devoted to Individual Psychology (1896, 1897, 1898) Binet with his collaborator Henri, made his first formal claim for a distinctive area within psychology, namely Individual Psychology, as he termed it. Although, in a sense, the psychology of individual differences was already afoot, "La Psychologie Individuelle" shows Binet as a self-conscious innovator, mapping out a domain that had only been roughly sketched out by those who studied case histories and anecdotes. Binet and Henri's opening statement describes the situation:

> "Nous abordons ici un sujet nouveau difficile et encore peu exploré." (page 411)
>
> We are moving onto a new and difficult subject which so far has hardly been explored.

Individual psychology was to be distinguished from general psychology which explores the mental attributes and processes that humans have in common. Binet knew the work of Galton, but did not feel that physical and anthropometric measurement would be as fruitful for a psychology of individual differences. Together with Henri, he identified two main problems for individual psychology. Firstly, how psychological processes differed between individuals and secondly, the relationship between the different psychological processes within the individual (page 412). It is clear that by individuals Binet is not restricting this to single individuals, but is referring also to known groups - eg. men / women; educated/non-educated; sane/insane; children /adults or children of different age groups. With reference to the criminal/non-criminal group he cites the work of Lombroso, and that of Galton and Stern for the first dichotomy, of Dehn for the second, Riccardi for the children. It is clear therefore that Binet knew the studies that already existed on individual differences. But he is obviously aware of the different kind of data that he wishes to collect and the purpose that he sees these to serve. He asks ironically: is it because a person has no sense of smell, has a limited field of vision or a relative insensitivity to pain that s/he is a criminal? Nor does the presence of anomalies or stigmata lead us to this conclusion (here Binet seems to be rejecting the determinism of the Lombroso school of criminology) The most significant differences between individuals are to be found in the higher or complex mental processes. This

conviction, often reiterated, led Binet therefore, to study these - and in this he departed generally from the Galtonian predilection for measuring all types of sensory and physical capacities, and from the Italian method of distinguishing criminals from non-criminals by the identification of the physical signs in the former. So it was probably with reference to the higher mental processes that Binet was claiming to be the originator of individual psychology. The following statement confirms this view:

> "Si on veut étudier les différences existant entre deux individus il faut commencer par les processus les plus intellectuels et les plus compliqués,et ce n'est qu'en seconde ligne qu'il faut considerer les processus simples et élémentaires; c'est pourtant le contraire qu'il est fait par la grande majorité des auteurs qui ont abordé cette question."
>
> (page 417)
>
> If one wishes to study the differences between two individuals,one must begin with the higher intellectual or more complex,and the simple or elementary processes should be relegated to second place; however,this is the opposite of what the great majority of writers have done when treating this question.

Still in this first article (1896), Binet and Henri outline some of the studies that have been undertaken in the following areas: memory, mental imagery, imagination, attention , comprehension, suggestibility, aesthetic sense, moral sense, muscular strength, will power, motor ability and power of observation.

There are several points of interest here in Binet's review of characteristics of memory: it can be weak or abnormally so (amnésie continue); that individuals have different preferences in their

methods of learning; that memory is not unitary but complex, and that analysis of errors , particularly of verbal material reveals the individual strategies for memorizing. The authors also point out that voluntary attention and effort are highly implicated in studies of memory. With regard to the latter, they point out that memory for meaningful, verbal material relies upon, and is subordinate to comprehension. Since 1885 the topic of memory had become very prominent in experimental psychology. Elsewhere (1985) I have discussed the setting up of the Ebbinghaus tradition of memory studies and some of the modifications made to his experiments, and the interest that these held for educators. On the whole, Binet was working outside this tradition whose main practitioners were German and English speaking psychologists or educationists in Britain and America. Binet's contribution to the studies of memory in the last few years of the nineteenth and early years of the twentieth century was discussed in the last chapter (7)

Concerning attention Binet asserted that it was not an operation sui generis but the 'whereby' or the operational means of other processes. He further explains that nearly all other intellectual processes can be carried out serially and thus provide a measure of the regularity of voluntary attention and effort.

Binet puts forward the number of mental processes that are involved in what was generally termed "la faculté de comprendre" (comprehension): these include seizing the significance of a fact, object, idea or sequencies of logical reasoning. Among the terms which define comprehension are observation and the ability to distinguish reality from appearance; and to grasp cause and effect.

In addition an "esprit de finesse" includes common sense, judgement and the ability to perceive shades of difference, intentions and motives. It also includes "le coup d'oeil" or accuracy of observation - all of which guide individuals in their assessments of situations. But because of the infinite variation of accessory processes, comprehension is resistant to a general definition. Binet does not propose any kind of unifying force or process; he is content to leave the definition loose. But what he does indicate are the purposes and functions that are served by the components of comprehensive behaviour, and these appear to be adaptive - picking out the relevant, sizing up a situation or character, an intention or motive.

Finally, Binet proposes that "l'esprit de finesse" can be tested by asking for definitions of words, of finding resemblances and differences between expressioms and by criticizing sentences. In other words, Binet had formed ideas for the measurement of one of the most complex of mental operations.

The authors then devote a section to suggestibilite In this section they refer to his experiments carried out in the years 1892-3 which were published in 1894, ("De l'état de suggestion naturelle chez les enfants") Binet gives a short account of an experiment on the perception of smells. The subject uncorks , one by one, a series of bottles, smells each one and writes down the smell recognized. However, unknown to the subjects, one of the bottles has no smell. On reaching one of these "empty" bottles the subjects are therefore caught between two contradictory tendencies -ie. either to report as they find on the empty bottle and at the same time, to obey and

conform to the perceived routine of the task. In effect, Binet and Henri found that in this test and others like it (eg. memory for lines), that the subjects who succumb to the deception display any one or more of the following features - lack of self-confidence or reflection, impressionablility, superficiality or credulity.

Binet and Henri conclude that the tests outlined in their article could all be completed within an hour or an hour and a half at the most. They propose also that modification should be made if these are to be given to schoolchildren, for they consider that the tests are particularly suited for application to children. They repeat the assertion that individual differences are stronger among the higher mental processes than among the elementary ones and that these "mental tests" can have a practical role especially for the pedagogue and the doctor.

Finally, they lay down six conditions for the administration of tests.:-

1) that they should encompass as large a number as possible of psychological operations
2) that these should test the higher mental processes
3) that they should last no longer than one and a half hours
4) that they should be sufficiently varied in order not to tire or bore the subject
5) that they should be appropriate to the subject's environment
6) that no complicated apparatus be needed.

We see therefore that at this point Binet and Henri have laid down important principles re. the content and method of testing for individual differences among adults or children. An examination of the three versions of the Intelligence Scales will show that Binet and Simon adhered strictly to these principles.

"Description d'un Objet" (1897)

In this second article Binet and Henri point out that the previous work published a year earlier has not made any impact, though it is noted that Ferrari and Guiccardi have used some of their (Binet and Henri's) tests to examine higher mental processes. The authors then refer to Ebbinghaus' criticism (expressed at the latest Congress of Psychology) that memory is given too much emphasis in tests on children, but to reasoning, not enough. Referring to Ebbinghaus' "completion task" or gapped exercise, Binet finds it "une epreuve curieuse" - a strange test, (but we may note that it was to be incorporated into the 1905 Scale as an test item, no. 25.) He disagrees with Ebbinghaus concerning the usefulness of memory tasks for two main reasons. Firstly, memory is one of the more complex mental processes, at least when studied for meaningful material, and it reveals the existence of many individual differences; secondly, investigations into memory provide a means of studying other processes such as attention, aptitudes, tastes and grasp of abstract ideas - in short, a means of studying more important functions.

Considering research over the past year -ie. 1886-1887, Binet comments that studies in fatigue done by Kraepelin reveal very little about the individuals themselves; what Binet would prefer to know are the following: accuracy of judgement, degree of suggestibility, emotivity and one's habitual "orientation d'esprit" Binet explains that the latter term refers to the dominance or preferred mode of mental operation which would reveal itself in the way in which an individual tackles a task. He recalls an earlier study (1893, unspecified) made with Henri in which they asked a class of children to look at a picture ("Les Dernieres Cartouches"

by Neuville) for two minutes and then write a description of it, but Binet had not used or analyzed the descriptions made by the children. Now in three schools, including one girls' school a similar experiment was carried out with the Head Teacher in charge. While one group observed a photograph and then described it, another group kept the photograph for ten minutes for reference when describing it. The aim was to isolate the role played by memory in order to assess observation. In effect it was difficult to control for memory in this "observation" group, for the children, after an initial look at the photograph, tended to write from memory. One of the pictures used was by Duverger which illustrates La Fontaine's fable "Le Laboureur et ses Enfants" (The Ploughman and his Children") The picture measured eighteen by twelve centimeters, pasted onto white card.

Binet asserts that unless he is mistaken, no studies have been done like this before. There have been investigations into visual memory for lines, colours, shapes etc. but not for pictures. He makes the analogy between memory for words and memory for sentences (1894-5) where the composite is more than, and different from the sum of the discrete items, objects or words. Binet names memory for the complex "memoire des idées"

In this latter experiment the median ages for the four classes (where the first class contains the eldest in the French system) are as follows:-

Class 1:	12 1/2	years
2:	12 1/2	..
3:	12	..
4:	11	..

Quantitative analysis showed:

1) that there was little difference in amount written, but with class 1 writing the most.
2) that out of a possible 19 objects to be named, the overall mean was 8.
3) a table of frequencies of the 19 items that could be included in the description, shows that in both conditions every subject included the ploughman. Omissions among the other items shows that attention had been fixed on persons more than on decor, and so the former had been better recalled.
4) the difference between the number of items recalled in each condition was approximately one third, with the total items recalled in the observation condition being 350, and in the memory condition, 245.

The single instruction given to the subjects was "describe", but further analysis showed that through a process of selection there was an overall preference for persons rather than objects, and with a discernible demarcation line between them. Finally, Binet identified what he termed "illusions de la mémoire" - what we now refer to as intrusions. A further point of interest to Binet was that knowledge of the fable had intruded, particularly in the memory condition, showing that gaps in memory for the picture were compensated by accessory relevant knowledge. Qualitative analysis of the scripts suggested four intellectual types which he illustrated with examples of the descriptions:-

1) "type descripteur" with 9 examples
2) "type observateur" .. 4 ..
3) "type émotionnel" .. 6 ..
4) "type érudit" .. 6 ..

Binet allowed himself one value judgement, for he described the erudite as "lazy"! - relying heavily on learning by heart of the fable.

The second part of this article is devoted to an experiment of the same kind, but with subjects as follows: 7 ex-pupils of a primary school, aged 13 - 20; 5 pupils from a mathematics class at a lycée

(brought to the Sorbonne laboratory by their teacher); and 6 students or laboratory assistants aged 30 - 35. The main difference between the three groups, as Binet pointed out, was the amount of education that they had received, and in this they represented the tripartite system of primary, secondary and higher education. The object to be described was a cigarette, and the subjects were given five minutes in which to complete the task. This time Binet used 4 categories again, but the emotional category was replaced by the imaginative or poetic. He provided 5 examples of the "type descripteur", 4 of the "observateur", 1 of the "érudit", and 3 of the "poétique et imaginatif". This last category he described as the most complex, for it ranged from the arid to the very imaginative. A fifth category, named the "type idéaliste" was suggested, but not defined.

Concerning these results Binet was at pains to point out that one test was not sufficient to classify a person,for the two following reasons at least: one description may not represent the habitual style of the individual, and the descriptions vary according to different interpretations of the task. Binet concluded the article with this claim: -

> "C'est le premier résultât, peut-être, qu'ait donné jusqu'ici l'étude experimentale des facultes intellectuelles superieures." (page 332)
> Up to now this is perhaps the first result of an experimental study of the higher mental processes.

"La Mesure en Psychologie Individuelle (1898)

For some reason this third paper on Individual Psychology did not appear in L'Année Psychologique to follow the first in the series,just outlined. It was published in La Revue Philosophique. Perhaps Binet had intended to publish it in the former journal for his footnote here (page 8) refers to an 1898 work in that journal, but untitled. In the light of little reaction to the first two articles, Binet may have thought that a wider readership might be found in La Revue Philosophique. He makes an appeal to "men of science" by invoking the cause of measurement. It becomes clear that Binet is now moving towards a a study of intelligence: firstly, he points out the relative ease with which one can measure auditory and visual acuity, for example. For the study of personality and intelligence descriptions may be used; but as scientists are convinced of the usefulness of measurement, the following question is posed: -

> "Où est la méthode de la mesure? Comment mesurer la richesse de l'inspiration, la sûreté de jugement, la finesse d'esprit?
> (page 111)
>
> Where can we find a method for measuring? How can we measure a wealth of inspiration, a soundness of judgement, a penetrating mind?

Binet makes no claim to having found a satisfactory system, as Individual Psychology is still in its early days; and he suggests that the few "empirical and provisional" procedures that he puts forward may not be adequate for the immense variety of the expressions of intelligence. Whatever the system, one must however, work a posteriore after many facts have been collected.

The two procedures that Binet puts forward will now be described.

The first procedure requires measurement of the results obtained, keeping the task constant. The following examples are given; the reproduction from memory of a sound or of a simple geometric figure, in which departure from the original may be measured. One can also measure suggestibility by measuring the amount by which the reproduced lines differ from the originally presented ones. The subject has been misled by the experimenter's statement that the line will be slightly shorter, while, in fact, it is of the same length. Binet notes here that Scripture and Seashore on one hand and himself on the other, both had the idea independently of measuring suggestibility. Speed of working can be measured and other physical operations have already been measured by Mosso and by himself and Vaschide. Binet points out that measurement by the use of numbers is straightforward; but for the measurement of muscular strength Binet finds that the dynamometer is superior to Mosso's ergograph, for the former works on a spring, and the measurement of strength can be shown on a dial attached to the compressed spring.

For more psychological tasks Binet suggests a simple method already undertaken and now described:-

To 90 pupils a series of numbers (15 in all) were read aloud. Each number had 6 digits which had to be recalled in the original order.The marking scheme is 0 - 15 and the children can thus be graded. Similarly, though with less precision, the task of reassembling scrambled sentences to make sense can produce a range of marks form 0 - 15.

The next example is what Binet terms "une epreuve de moralite" - a test of reactions to an incident in which a violin was accidentally broken. About 100 children were asked what they would do if they were in the position of the owner of the violin. On analysis, the children's suggestions were placed on a scale of 1 - 8, representing 8 different types of reaction. These ranged from the passive or unconcerned through mildly punitive reactions, seeking compensation, to the revengeful. To my knowledge Binet did not develop this approach to study children's thinking or their moral development. But this test brings to mind Piaget's work of 1932, "The Moral Judgement of the Child" (Chapter 3) where he presents seven hypothetical situations to which the child makes responses towards punishment which are graded. Binet did, however, use hypothetical cases to test abstract thinking as in item 27 of the 1905 Scale. In the long article describing how the tests worked in practice, examples of children's responses are given to the the question "What should you do?" - que faut-il faire? in hypothetical cases. Assessment of the children's responses is based, at least partially, on the value judgments held by the testers.

For the test of comprehension Binet takes an abstract sentence from "Logic" by J-S Mill. The subjects are told that it is a memory test, so that poor performance can be attributed to a poor memory, for Binet felt sure that people would mind less about faults in memory, than they would about poor judgement.

The next test is the paper-cutting one (découpage),as suggested by Henri; but no details about scoring are given, except to say that it would be of the classification type.

In the second type of procedure it is the task that is changed or graded to produce results of the maximum simplicity. For example, a series of numbers or digits are to be recalled, and the task is stopped when the maximum number is reached. On a test of suggestibility, such as Seashore's, (cited in this study,page 121) a person can be classified by the number of trials on which he is duped.

Binet admits that grading of tasks is especially difficult in experiments on intelligence, and to his knowledge there are none are to be found. Binet concludes by repeating his opinion that measurement of intelligence cannot be the same as measurement of physiological and physical aspects. The inappropriateness of assuming arithmetical differences between the scores is again indicated: the difference between for example, 6 and 7 is not necessarily the equivalent of the difference between say, 9 and 10. We cannot know the value of the difference; therefore we cannot measure, only classify. Finally, Binet refers to the other way of differentiating people, and this is by qualitative analysis. For example, emotionality can be measured by a change in heart beat and in skin reactions; but these are of secondary importance. It is the qualitative differences between people which when observed, can enable us to allocate individuals into categories, which here Binet terms natural families of characteristics ("familles naturelles de caractères")

So far Binet has remained firm in his conviction that the higher mental processes are the real indicators of individual differences. In addition, the word "intelligence" now appears in association with

mental operations; an interest in, and conceptualization of intelligence is now emerging. In spite of lip service to the use of mathematics in science, Binet has the flexibility to accept that precision is not always possible, and that some psychological data are suitable only for ranking or classification.

Of the three articles described above, the first presents mainly a rationale for Individual Psychology; the second illustrates the task of describing an object - which Binet found then, and was to use again for identifying personality types. Moreover, this type of test furnished ideas for items which he was to use in the 1908 Scale in which children responded to pictures. The third article shows that Binet's prime concern was how different mental operations could be measured. It represents an attempt to answer the question posed at the beginning of the article - "où est la méthode de la mesure? Where can we find a method for measuring the higher mental processes? It is in this article that Binet makes his objective clear: he wants to find the means of measuring intelligence.

While perhaps awaiting reactions to this last article, Binet pursued his interest in individual differences and a growing interest in intelligence in a different way, by studying his own daughters over the years 1900 to 1903. In a sense this study "L'Etude Expérimentale de l'Intelligence" marks a continuation of the three previous articles just described and with Binet's earlier observations and experiments on his daughters in 1890.

He had noticed their personality differences at their earliest age when they were being breast-fed, and later in their first attempts at walking. He now wished to discover whether these differences still existed.

He had noticed that Madeleine was less prone to boredom, and was more cautious that Alice. He came to notice a further difference (perhaps during their tuition) that Madeleine had the better memory, and he brought this assumption into his study, but soon rejected it on further evidence. He judged that his daughters were sufficiently mature (aged thirteen and fourteen) to serve as subjects. Even more importantly, Binet judged that being intelligent, they would provide introspections of their mental processes. In the year 1900 "La Suggestibilité" had just been completed and published. The importance of this work - apart from the findings of suggestibility among a population of "normal" subjects - was the use that he made of introspections. It may not be an exaggeration to say that from the point of view of method ie. the use of questioning to elicit introspections, his daughters offered him an ideal opportunity to use these further; he was therefore, motivated to take full advantage of their good will and patience. Moreover, Binet considered that the knowledge that he had of them, of their environment and activities would be helpful in his interpretations of their introspections. He recognized too, that they would take the tests seriously, and he was able to persuade them not to confide in each other concerning their responses in the experiments.

As far as Binet was concerned, the girls' age difference was insignificant, and their environment was identical, sharing as they did the same lessons at home (with their father as their tutor?), and the same pleasures. They could therefore, be considered almost as twins.

The principal aim of the work was to "étudier dans l'idéation ce qu'il a de personnel à chacun de nous"(page 302) - to show what is personal and particular to each one of us through a study of thought processes. The result was a long and detailed "parallel" study of the two girls' production of ideas, images and words.In 1949 Florence Goodenough identified this work as perhaps one of the earliest and best studies of projective methods:-

> "L'Etude Expérimentale de l'Intelligence" is unrivaled for the masterly way in which facts of seemingly little consequence in themselves are marshaled,one after the other in an array that eventually leads to a remarkably illuminating analysis of the fundamental differences in the attitudes and ways of thinking of the two girls. ...At the end of his studies Binet emerges with one of the most convincing pictures of personality differences that has ever appeared."
>
> (1949,pages 416-422)

Wolf provides an appreciative and fairly detailed account of this work (pages 116-135). The study of thought processes and their contents, both concrete and abstract (idéation) involved looking at the role of language and imagery and the relationship between thought and images. The role of imagery in thought was a popular topic at the time, and images were generally thought to play a dominant role in mental processes. Apart from the main product of these investigations which was the two-fold classification of his

daughters representing different intellectual styles and personality, there were findings that led Binet to reject two widely held views concerning mental activity. Firstly, he rejected Taine's associationism, for Binet found that spontaneous production of words were not made according to the laws of association. In fact there was discontinuity which broke up the train of thought into discrete "thèmes". Furthermore, Binet rejected Taine's conceptualization of intelligence, finding it too mechanistic and passive, a conceptualization in which effort, direction of thought, adaptation and choice are not represented. Moreover for Taine, even attention itself is reduced to intensity of images (page 69). This leads us to consider the other rejection that Binet made - the view that imagery always had a place in thought. From his daughters' introspections Binet discovered the phenomenon of imageless thought (la pensée sans images). This discovery was made independently by the Würzburg school, under the direction of Külpe, and first made known in Mayer and Orth's paper in 1901. Binet's findings were that imagery did not always accompany thought, and that when it did, it was not always with the same richness as thought.

Characteristically, Binet includes a section under the heading "Questions de Méthode". Here, in the first chapter, he defends the use of introspections against criticisms from two quarters: firstly from the Wundtian school for whom the experimental method is inappropriate for the investigation of anything except the simple and elementary processes; secondly, that the use of introspections may be considered a retrograde step and a return to the method of auto-contemplation associated with the old philosophical school of Victor Cousin. The skeptical question is then posed to ask how it

could be possible to experiment on "des phénomènes de conscience qui sont insaisissables - the elusive phenomena of our consciousness (page 2).

In answer to this Binet refers to Ribot's conceptualization of a psychological experiment in which there are only two elements which can be manipulated by the experimenter, that is the "excitations" (which implies physical stimuli) to provoke sensations and "les actes" which reveal states of consciousness. As already discussed in chapter 5, Binet rejects this narrow and constraining concept of an experiment. The stimulus need not be a physical one; in fact language as a stimulus can offer considerable expansion in terms of its effects on the subject. Moreover, effects on the subject should not be confined to the immediate and to the sensory, for according to Binet, a stimulus produces a set of complex reactions (un ensemble de réactions complexes, pages 3-4). Binet admits, however, that some of the tasks fall into the grey area where subjective methods merge into the experimental method -perhaps an inevitable result of his wish to stretch the confines of the traditional psychological experiment.

Conclusion

The interest in individual differences was central to Binet's psychology. Furthermore, he aimed at making the study of individual differences a distinctive area within experimental psychology. The three papers of 1896, 1897 and 1898, together with his investigations into his daughters' thinking are the product of his observations and experiments that date back as far as we know, to at least the late 1880's when he was able to observe his infant

daughters. By 1896 he was clear about the importance of individual psychology, and his work completed over the period of 1895 to 1903 represent his first main achievement in this area. As we have seen, this includes a statement of definition, suggestions about method, and examples of experiments made on the higher mental processes. These were positive contributions to experimental psychology at that period. But they also had their negative aspect, for they contain both implicit and explicit criticisms of other psycho-physical and psychological work - of Weber and Fechner, of Wundt and Cattell, and of others whose replications, in Binet's opinion, added so little to psychological knowledge. Thus Binet dismissed or rejected the following: the study of the general mind; the search for individual differences in physical and sensory tests; the association of ideas; much of Taine's study of intelligence; and the sensory or imaginal basis of thought.

How were Binet's articles received? There seemed to be little response, as Binet himself noted, to the 1896 and 1897 papers, and the "Etude Expérimentale" was probably also little read. One wonders how isolated Binet was in intellectual terms, apart of course, from his valuable collaborators - Henri at first, and after 1900, Théodore Simon.

In answer to this, we know that one investigator, in Titchener's laboratory at Cornell was sufficiently inspired by Binet's and methods to try out some of his types of test on a homogeneous group of seven students. Among the tests that Sharp used were memory span, mental images, attention, observation and description. The tests were applied several times to ensure reliability, and were

considerably time-consuming (1897-1898). Her report was published in 1898 in the American Journal of Psychology under the title of "Individual Psychology: a Study in Psychological Method". Her conclusions were unfavourable to tests and testing. She pointed out that

> "the positive results have been wholly incommensurate with the labor required for the devising of the tests and evaluation of the results."
>
> (page 390)

and concluded that:

> "there is not the slightest reason to desert current laboratory methods for the method of tests "
>
> (page 389)

Binet must have been pleased with her initial response. He reviewed her work in the Année Psychologique (1900) where he commented that:

> "Ses recherches ont fait nettement avancer l'étude de la mémoire et aussi des types intellectuelles."
>
> (page 592)
>
> Her research has clearly advanced the study of memory and of intellectual types.

Binet went on to add that her reservations were praiseworthy, but that she undervalued her work. However, the tenuous link between them was broken.

In Germany, William Stern shared Binet's interest in individual differences and also wanted to give "differential psychology" as he termed it, the status of a recognized problem area in psychology. Binet makes reference to Stern in his 1896 paper, but Stern does not

appear to have advanced any further in this direction, nor to have corresponded with Binet. He was, of course, to intervene later and complete Binet's concept of a mental level by a formula to compute an intelligence age. Simon was to denounce this.

So until 1900 at least Binet's position was fairly isolated, and little response to, or recognition of his work had been shown. In the meantime, the mental testing movement was being pursued in its own tracks, on lines which by inclination and by conviction, Binet judged to be wrong. The development and ultimate failure of this movement is considered in the next chapter.

CHAPTER 9: MENTAL TESTING

In the preceding chapter it was suggested that of the three modes or approaches to individual differences, mental testing was the most dependent on context. Its emergence was due to various factors related to cultural habits, psychological practice and personalities. In the process of describing and explaining the development of mental testing three questions are addressed: firstly, by what route within psychology did mental tests develop, and which factors within and outside psychology affected this development? Secondly, what constituted a test and what was its relationship to experimental practice? Finally, what was distinctive about mental testing as a way of studying individual differences, compared with investigating differing intellectual styles and modes of operating? A convenient way of trying to explain this complex story is to start with the personality of Francis Galton, his background and ideas, for he is usually described as being the "father of mental testing".

Francis Galton (1822-1911)

Galton is often seen as the epitome of the intellectual Victorian gentleman of independent means. Two biographies have been written, the first by Karl Pearson (1914-1930) who was a friend and admirer of Galton, and a later one by D.W.Forrest (1974). This latter work is appropriately subtitled "The Life and Work of a Victorian Genius" (The term genius was widely used at the time to mean great ability or talent). The main features of Galton's personality were his insatiable curiosity, a love of quantification, and he was both

ambitious and competitive. This last characteristic of competitiveness is implicit in a mental testing approach as conceived by Galton.

One of the main social aspects of Victorian England was the way in which life was ordered on a fairly rigid class system. To many religious people this system was perceived as God-ordained. To Galton the eminence and success of the men in the upper class was evidence of ability; and it was this view that he aimed to support in "Hereditary Genius" (1869): -

> "The general plan of my argument is to show that high reputation is a pretty accurate test of a high ability."
> (cited in Benjamin,1988)

Buss (1976) has described English society in Galton's time, with reference to the rise of modern individualism and the growth of capitalism: -

> "The promotion of the diversity of individuals was a necessary step in maintaining the growth of a capitalist economy in an industrial state which had by now become so complex that specialization of human talent was required to keep the machinery running smoothly."
> (page 50)

Furthermore he asserted that a growing division of labour and specialization cried out for a "scientific explanation as to the basis of individual differences" (page 51) If we turn to Galton's own statement, we find that this view is substantiated: -

> "An extended civilization like ours comprises more interests than the ordinary statesmen or philosophers of

> our present race are capable of dealing with,and it exacts more intelligent work than our ordinary artisans are capable of performing."
>
> (in Benjamin 1988, page 250)

In Galton's statement there is a further implication - that the ability of the contemporary population was not keeping up with the requirements of its "civilization" (read "capitalism"), for this view led directly to Galton's proposal for an eugenic programme. He had noticed, with dismay, that the upper classes were not breeding in sufficient numbers to bring about the required rise in the ability of the "race". As a means of identifying the fittest and most able members of society who should be encouraged to breed, Galton had already proposed in 1865 that a "system of competitive examinations (be) developed as to embrace every import quality of mind and body." (page 165). According to Fancher (1985) it was by such statements that the first idea of a mental test was put forward. Perhaps; but at that date it is more likely that Galton was thinking about the existing examination system in England, like those of the Universities of Oxford and Cambridge, and for entry into the Civil and Colonial Services. The concept of a "mental test" - the term being first used by James McKeen Cattell in 1890 - grew out of anthropometry. This was recognized by Cattell who was anxious to make the distinction between psychology and anthropometry. By the 1880's Galton came to find in anthropometry the material for his mental tests, as they came to be known.

Galton's Tests

On the occasion of the International Health Exhibition in London in 1884, Galton set up his Anthropometric Laboratory. He saw this as an opportunity to obtain a large amount of anthropometric data from the

public who visited the exhibition. This data was totally quantitative and it gave the individuals the results of their individual physical measurements, strength and sensory acuity. The last tests were deemed to be measures of mental ability or intelligence, for at the time the general view of intelligence was that is was sensory-based. As Galton asserted:

> "The only information that reaches us concerning outward events appears to pass through the avenue of our senses; and the more perceptible our senses are of difference,the larger the field upon which our judgement and intellect can act."
>
> (1883,page 27)

The tests in Galton's Anthropometric Laboratory were taken by 9,337 individuals, for which each person paid 3d(pence). Galton's motivations for the collection of these data were the provision of statistical information and norms for use in an eugenics programme. So Galton was the "father of mental testing" by virtue of his legacy of tests which had actually been administered, and whose value was seen as obvious at the time. These tests could be used by others with similar interests to Galton, though not necessarily sharing his aims.

This outline of Galton's tests however, still leaves much to be explained about the emergence of mental testing, and how it was taken up by other psychologists and in other settings. In order to address the three questions set out above it is proposed to examine several factors in a cross-cultural context - the notion of applied psychology, the nature of testing, statistics and the social psychology of investigative practice.

Applied Psychology

Firstly, what were the attitudes of psychologists towards the application of psychology to fields which could benefit from psychological knowledge? On the whole, in Germany where psychology was kept closely tied to philosophy in the Universities, it was not encouraged. The academic and conservative tradition kept itself immune from pressure to apply psychological knowledge. There were, however, one or two exceptions. For example Ebbinghaus who worked from Berlin (1886-1894) and from Breslau (1894-1909) used his "completion task" (1897) in schools to investigate mental fatigue. Following the Ebbinghaus study "On Memory" in 1885, psychologists such as G.E.Müller in Gottingen, and those with educational interests used experimental methods to determine the the most economic ways of learning by heart - culminating in Meumann's "Oekonomie und Tecknik des Lernens"(1908),translated under the title of"The psychology of Learning". The cross-fertilization of ideas between America and Germany continued until interrupted by the First World War in 1914. The experiments were made with the specific aim, namely to guide teachers in their class-room practice by promoting the best methods of learning. But wherever the Leipzig model of psychological investigation prevailed, applied psychology was not pursued. Titchener who trained under Wundt for five years held that applied psychology was "technology", to be kept apart from "pure" psychology. He maintained that

> "Science goes on its way without regard to human interests and without aiming at any practical goal".
>
> (1914,page 14)

and science was further defined by him as

> "...a transcription of the world of experience from a particular standpoint, deliberately adopted at the outset and deliberately maintained; the pursuit of a practical end is the earmark of a technology"
>
> (loc.cit.)

Titchener had no doubt preserved this attitude from his time at Leipzig, and as late as 1914 used it to counter Watson's proposals in "Psychology as the Behaviorist views it" (1913).It was therefore probably under Titchener's ruling idea of the inappropriateness of tests on individuals that Stella Sharp conceded defeat.

In France the situation was different, for the major orientation in psychology was toward pathological studies, often closely allied to therapy. Thus therapeutic measures could be defined as a kind of applied psychology. Pressure to solve an urgent educational problem did not face psychologists until the late 1890's and more obviously in the period 1900 to 1905, as we shall see. It was in this last year that the Société received its commission to "track down" (dépister) abnormal children in the primary schools. In response to the commission the Mental Scales were produced, a product different from Galton's tests, and the culmination of Binet's earlier work and intense interest in individual differences.

In America the philosophy of pragmatism, as initiated by Charles Peirce and William James with its insistence on the usefulness of psychological knowledge, prepared the way for applied psychology. In the late 1870's and 1880's in America and in Europe too there appeared one particular educational problem to which the services of psychological knowledge and method could be applied, and this was the problem of mental fatigue or overpressure. This concern was one

of the immediate results of compulsory primary education introduced in England in 1880 and France in 1882, and at about the same time in other countries of Europe. In France "la fatigue intellectuelle" was sometimes known as "le surmenage" - a term taken from veterinary science. The problem of overwork in schools lay in the province of Mental Hygiene in France. As we have noted the authorities were not prepared to take up Binet's suggestion of a psychological approach, but in the other countries this may well have fared better. The following are some of the psychological contributions to this problem: - Holmes (1895),America; Galton (1888),England; Ebbinghaus (1897) and Kraepelin(1897), Germany: A.Mosso(1892), Italy; Herztel(1885), Denmark; Binet and Henri(1898),France; and Sikorski(1879),Russia - this being the first ever test reported in French from that country. This list shows that many of the countries of Europe, like America were at least partially ready to use a psychological method to help solve an educational problem. In England, Jacobs (1886) went so far to assert that

> "Education can never be more than a rule of thumb affair until it can apply psychological principles with a firm conviction of their validity."
> (page 54)

The application of psychology is founded upon a two-way process - a willingness on the part of psychologists themselves to become involved in concerns outside their discipline, and the perception of the usefulness of psychology on the part of those outside. In the case of Galton in England, this two-way process met in one person. Not only did he devise tests and apply them, but he also planned the "market" through his eugenic programme.

The nature of mental tests

What were the services that psychology could offer, or more precisely, what was a "test", and how did it relate to psychological knowledge and practice?

According to Danziger (1985) one of the salient features of Ebbinghaus' seminal work in his experiments on memory (1885) was that the psychological experiment had taken on the attributes of a performance in which the product of memory could be assessed with reference to how it matched up to the original stimuli presented for recall. This measured performance however, was only a means of studying underlying processes(ie. forgetting, association, "saving" and work involved in memorizing) but was not an end in itself. In this respect, it seems to me, that the experimental performance differs from the test performance in which the psychological interest in underlying processes is minimal or absent. Another difference between experimental performance and some test performance lies in the extent to which the criteria for the performance are made known to the subject. For example in most memory tests the criteria are set out in the presentation of the stimuli. However, in some of the anthropological tests, the goals for the testee are less clear. The indicator on the dial of the dynamometer, for example, might show a level of tension, but give no indication of what might be a target. Something similar to this point was made by Binet (1896) when he distinguished a type of test (digit-span), originating in Jacobs' "prehension" (1887) in which measurement is simplified by letting the subjects find their own maximum performance or "threshold" (Jacobs' term). In such cases measurement is related directly to the performer's individual effort

in tests of physical strength, keenness of sight, pitch discrimination etc. The psychological validity of such tests rested probably on two factors: 1) that the tests were assumed to measure ability or intelligence; and 2) that the application of statistics to the data collected from the tests assured their scientific status. This second observation is made by Danziger (op.cit.) and is discussed later.

In the case of Binet and the tests he devised, there was some ambiguity in his usage of the term. He referred to the word "test" as being roughly equivalent to the term "épreuve" - trial or short examination ie. a performance. However, the distinction that he made between a "test" and an experiment was that the experiment needed an interpretation, implying the lower status of the test. In fact, as will be shown later, Binet's tests, as incorporated into his Mental Scales, did require interpretation. In any case, interpretation of results and of subjects' behaviour was the sine non qua of Binet's experimental practice.

The Role of Statistics

Galton's passion for measurement led him to bring statistics to the service of his tests. Moreover, the main focus of his work often became the statistical outcome of the tests. The discovery of the regression line was made by Galton after months of work looking at relationships between physical measurements, namely between the heights of parents and their children. Galton's correlational methods were taken up and refined by Karl Pearson who proposed a formula for the computation of a correlation coefficient (see Fancher.1990). The Galtonian/Pearson method of finding meaningful

relationships between different tests were learned and used by J.M.Cattell, Wissler and others. They looked for relationships between the tests themselves and also between tests and indicators of intelligence - eg.scholastic achievement, class status or teachers' ratings.

Henri, on his return from Leipzig in 1894, published articles in the Année Psychologique on probability in psychology. But the work that he did with Binet was a correlational method - the rank ordering formula provided by Sée (see Chapter 7). Binet's other use of statistics was primarily to show measures of central tendency and frequencies. He did not use statistics in a radical way to change the nature of psychological practice, as was the case with Galton. In Germany Ebbinghaus tried out his test on three thousand school children without having first checked the experimental design - a case which Binet noted and criticized. He noted also that Americans always liked to do things "big" (1903). He disparaged the practice of collecting mass data, and dubbed it the American method, or "la méthode de la statistique".

Galton also liked to do things "big". He collected measurements of brain size of more than nine thousand individuals. His tests of sensory acuity and reaction times were also made on an individual basis at the Anthropological Laboratory. His purpose in this data collection was to find trends and establish norms. He noted that results from these tests, like physical measurements fell into a normal or Gaussian curve of distribution. The individual score was lost, or rather interpreted only as it related to many other individual scores. The nature of these tests therefore related to

their statistical outcome. Binet's preference, on the other hand, was not to lose sight of the individual whose performance was not equated with innate ability and whose score was not destined to become part of a wider statistical description. He felt that with two subjects one was able to gain more knowledge of the human mind than by a vast accumulation of data from hundreds of subjects.

So it seems that Binet criticized the statistical method because he doubted the real psychological validity of the tests. Danziger's view (op.cit.) throws light on this question. He outlines the transformation of social statistics into psychological statistics, and sees in Galton's work a radical break with experimental method in psychology. From Danziger's analysis it would appear therefore that Binet did not share Galton's assumptions about the relationship between the individual and the collective. This assumption was that group attributes were merely the summation of individual attributes, and that individuals were "freely composable" into aggregates. On this assumption, according to Danziger:-

> "Individuals were now characterized not by anything actually observed to be going on in their minds or organisms, but by their deviation from the statistical norm established for the population with which they had been aggregated."
>
> (page 77)

This pinpoints exactly the differing psychological orientations of Binet and Galton with reference to the study of individual differences in which Binet preferred a painstaking study of individuals known to him and in their familiar environment.

The social psychology of investigative practice

Danziger's research into the history of experimental psychology led him to propose three models of investigative practice.(1985 b). They differed with respect to the social arrangement of the participants in the experiment -ie. the relationship between the experimenter and subject.(see Chapter 5) Danziger describes the Leipzig model in which the roles of experimenter and subjects are virtually symmetrical and reversible. He does this, I feel, at the expense of other systems of practice that developed, for example, from the Ebbinghaus tradition. Nevertheless, the power relations that mark the Wundtian model do, in fact, contrast with what Danziger calls the Paris model. This model was built on the doctor/patient relationship resulting from the dominance of pathological studies in French psychology. In this model the power relations show asymmetry, with the sufferer or subject in the passive role. That Binet was able to modify and extend this quasi-medical model of experimental practice will be further considered in Chapter 11.

With respect to the Galton model of testing practice, Danziger makes this comment:

> "Galton's anthropometry was quite radical in its conceptual severing of the links between an individual's performance and the social conditions of that performance. It accomplished this by defining individual performance as an expression of innate biological factors, thereby sealing them off from any possibility of social influence."
>
> (1990,page 57)

This "severing of the links" was not an intended prerequisite of the testing procedure. It was the result of Galton's conceptualization of intelligence and the nature of test performance. For Galton individual performance was the expression of an innate, inherited ability. Given the anthropometric orientation of his tests with appropriate apparatus to provide measurement, the test situation was marked by a lack of social relations. The testees at Galton's laboratory paid their fee for information about their performance. It was a market exchange from which both tester and testee anonymously benefited.

The necessary use of apparatus for the physical and sensory tests and reaction times diminished the interpersonal aspect. As already noted, this negative aspect of the psycho-physical experiment was criticized by Binet, for he saw apparatus as a barrier between the participants in the experiment.

In conclusion, it has been shown that the impetus for mental testing develops in response to a need from outside the discipline of psychology. The test itself is a performance, but differs from a performance in the experimental tradition by becoming an end in itself. Any potential loss of psychological validity can be recompensed by the use of statistics to meet the criteria of science; and the investigation of intelligence, further defines the test as psychological. There remains, nevertheless, a sharp difference between performance in an experiment and in a test, for both are built on different assumptions about the relationship between the individual and the aggregate. Anthropological and mental tests of the Galton type, wherever a vast amount of data is needed,

introduce anonymity into the procedure. On a smaller scale the tests may be more personal, but the use of apparatus and the pursuit of a statistical outcome may exclude the influence of social conditions, but at the same time the test becomes an impersonal procedure.

Testing in America

We have seen that in one area at least, education offered itself as a field of applied psychology. The impetus from within psychology came from Galton's paper of 1888 "Correlations and their Measurement" which gave a description of his latest statistical methods, and these were taken up by American testers. In 1895 in America a committee of the American Psychological Association which included Cattell, Baldwin, Jastrow, Sanford and Witmer agreed that cooperation between psychological laboratories was needed for the collection of mental and statistical tests. In the following year, 1896, the American Association for the Advancement of Science insisted that an ethnographical survey of the white race in the United States should be organized and that this should include psychological tests. In 1899 Carothers for example, recommended that college students' character, intellectual capacity and tastes be measured. In other words there was no lack of a clientele for mental tests. A dominant interest among testers themselves was the search for tests which would provide unequivocal evidence of ability or intelligence. This evidence would be found if the tests were shown to be highly related to school and college achievement. The mental tests could then be used as a quick way of assessing intelligence and making prognoses for whatever purposes might be needed. An outline of the work of some of the most important American testers is given below.

James McKeen Cattell (1860-1944)

Cattell admired and corresponded with Galton, and at Cambridge set up a laboratory similar to Galton's. After graduating at Columbia he spent five years training in Wundt's laboratory at Leipzig where he completed his doctoral thesis. There his work focussed mainly on reaction times in different conditions. But he became interested early in individual differences. His proposal to Wundt that he should study that further obtained the retort from Wundt that such an approach showed him to be "ganz americanisch" - totally American! Cattell's important contribution to the mental testing movement was his 1890 paper, published in Mind, outlining ten main types of test that he used and to which he owed the influence of Galton. The types were as follows;-

1) Test of strength by use of a dynamometer
2) Rate of hand movement
3) Skin sensitivity by use of two-point threshold method
4) Sensitivity to pain in response to pressure
5) Least noticeable difference in weights
6) Reaction times for sound
7) Speed of colour recognition
8) Accuracy in bisection of a 50cm line
9) Accuracy of judgement of 10 seconds
10) Recall of consonants to test digit span

There were fifty tests in all , of which thirty-eight measured different forms of sensory acuity.

Jastrow used similar tests to Cattell's on students at the University of Wisconsin (1892), and in 1893 he set up a laboratory similar to Galton's, at the West Columbian Exposition in Chicago. Results of these tests on school children were compared with teachers' estimates of ability by Boas whose findings were analyzed by Bolton (1892). Gilbert's publications of 1894 and 1897 followed,

and these included anthropometric measurements. In addition these tests were given to fifty children of each sex at every age level from 6 to 18 years. On comparing mean scores with teachers's estimates of bright, average or dull (in intelligence) very little relationship was found.

In 1901 the results from Cattell's tests on Columbia University and Barnard College students were taken up by Charles Clark Wissler for statistical analysis. He had learned Pearson's method of finding correlation coefficients and applied this statistical test to school standing and scores on the tests that Cattell had administered. He found, for example, that college standing correlated at r=-0.02 with reaction times, and -0.08 with dynamometer strength. The only high coefficients were found to be between Latin and Greek where r=+0.75. The scores on the academic subjects were found to have various positive correlations, but the results were disappointing for the mental testers, for it seemed that an impasse had been reached.

In 1902 in L'Année Psychologique Binet reviewed Wissler's "The Correlation of Mental and Physical Tests" (op. cit.) and declared that the results were unsurprising; he challenged the effectiveness of the two principles adopted by mental testers, namely the use of simple tests on the body and mind and the use of very large numbers of subjects to find a relationship, its strength or a relationship due to chance. He insisted that the use of many subjects tended to reduce the investigation into a "travail automatique" Moreover, if the individual variations were weak, the idea of looking for a relationship was simply fanciful ("chimérique") Instead Binet expressed his view that it was better to study only a few subjects who were known to the experimenter, and on whom one had "une foule

de renseignments, qui sont de notre famille, de notre intimite" - a host of information on those who are members of our family or of our close circle.(page 509).

In the meantime Jastrow obviously wanted to give a further impetus to the waning enthusiasm of the testers. In his President's address to the American Psychological Association he asserted that -

> "The study of intelligence with reference to its status and the method of testing it in the normal individual is, to my thinking,one of the lines of investigation most deserving of increased attention..."
>
> (cited in Jenkins and Paterson, 1901,page 29)

Charles Spearman later offered a more optimistic interpretation of these coefficients by the application of a correction formula (see Fancher 1985, Chapter 3) From the application of his own correlation methods, Spearman was thus able to show that the Galton type tests had some validity for assessing intelligence. In 1904 he put forward his theory of intelligence and this will be discussed in relation to Binet's Mental Scales and the main differences between their views on intelligence (Chapter 11).

Conclusion: Galton and Binet

Given that we accept Galton as the first promoter of mental tests, and that it was Binet who produced the first Intelligence Scales, it will be useful to examine what they had in common, and in what ways they differed; for a comparison makes it easier to detect the

special and particular nature of Binet's achievement. The comparison is made at the personal level which includes their predilections, aspirations, experiences and orientations in psychology.

Both Galton and Binet were men of independent means which enabled them to pursue their interests without the constraints of having to earn a living. Neither was closely attached to any administrative or academic institution, and at the outset were not committed to any particular movement or school. Both had great curiosity, particularly about individual differences, but it was focussed on rather different objects, and operated in different ways. Galton's passion for measurement was realized in his anthropometric work, and in particular in the Laboratory where he collected data from thousands of people between 1884 and 1888. Binet too, was attracted to anthropometrics which flourished from the 1860's into the first decade of the twentieth century. (see Gould, op.cit.chapter 3). Thus they shared a similar interest in anthropometrics, both in the belief (firm on Galton's part, but tentative on Binet's) that measurement of physical characteristics could reveal something about intellect, or at least correlate with intelligence. Both became particularly interested in intelligence, but this shared interest hid differences too. Galton firmly believed that intellectual ability was inherited, and it was one of his aims to formulate a theory to explain the inheritance of ability and "genius". The assumption that underlay his work was also that inherited ability was fixed, and that for each individual there was a limit beyond which one could not pass. Binet held no such deterministic viewpoint: given his admiration for J.S.Mill Binet's views were probably environmentalist, with some qualifications. From the point

of view of devising tests to measure children's intelligence, Binet was better equipped than Galton, for as we have seen, he made many studies in his own home and in schools to investigate children's mental activities.

Binet spent most of his life in Paris, which at the time was considered to be the centre of European intellectual life. Galton was an explorer and geographer, and his interest in anthropology for example, operated on a wider geographical sphere. Binet had none of Galton's competitive spirit, nor his interest in eminence. Galton probably came to anthropology through an interest in the evolutionary ideas of Darwin. Darwinian evolutionary theory was also more compatible with Galton's competitive spirit: the "struggle" analogy was probably favoured by him, as it was in the pioneer spirit of America. As Jastrow pointed out in 1901 (op.cit.)

> "intelligence must first be realized as an advantage-gaining factor in the evolutionary struggle"
>
> (page 28)

The cultural difference was that in France a Lamarckian view was more favoured than a Darwinian, for the former supported a more optimistic and environmental position with regard to the determinants of human action. Cultural differences influenced to a certain extent, their viewpoints concerning social problems. If Darwin's and Galton's perceptions were accurate, there was a decrease in population among the upper and middle classes in England. Fear of a debilitated nation therefore, led Galton to develop a eugenics programme in which the able and talented were to be encouraged to breed and with financial reward. In France there

was the problem of under-population, but this was not seen as being differentiated by class; and as far as I know no programme for selective breeding was proposed. The social problem to which Binet addressed much of his energy in the last few years of his life was an educational one. Binet perceived how the problems of the poor affected the scholastic achievement of their children through poor health and consequent absence from school. He was more in touch with a wider range of people than Galton. He talked with patients, teachers and children, and from 1900 onwards his contacts were widened to include parents, inspectors, politicians, doctors and others. It is recorded that Galton visited two asylums for idiots in 1886 in order to draw out some of the boys as a sample on which to administer Jacobs' digit-span test. Binet's approach was more clinical in nature. Simon described how much pleasure Binet took in visiting with him the patients at Bicetre, Vaucluse and La Salpetriere. In spite of Binet's ambivalent feelings about his experience at la Salpêtriére with Charcot, he must have learned there the method of observing very many differences in the symptoms and manifestations of pathology.

Concerning their mutual interest in individual differences, we have seen how the different assumptions led to different views about the use of statistics. While Galton was concerned mainly with the statistical outcome of tests on individuals, Binet was more intent on finding out, through experimental method, the way in which subjects differed with respect to their mental processes, their styles and their personalities.

According to Binet the fatal flaw in the Galtonian tests was that they did not differentiate between individuals' ability, and that only tests on the higher mental processes could achieve this. Binet's conviction was strongly held, and led by this conviction he continued in his experimental method.

Would Binet have found the appropriate test items for his scales if Galton had not proposed the idea of mental testing in the first place? I think that the answer would be in the affirmative. Even if the American testing movement had not existed, Binet would surely have come to the same method of assessing intelligence, given his belief that it was to be found in many forms of expression, and given the final impetus to find a practical solution that was required in 1905 in France. In the next chapter the final and crucial stages of Binet's work will be examined in the context of the Société and the close collaboration with Simon during the years 1900 to 1905.

CHAPTER 10: THE PEDAGOGICAL SOCIETY

As described in Chapters 2 and 3, on the invitation of Buisson, Binet became a member of the Société Libre pour l'Etude Psychologuque de l'Enfant. The society was conceived as a way of drawing together those interested in scientific psychology and educators, so that psychology and pedagogy should meet and complement each other. The society was open to any interested individual or group, but was to remain unattached to any particular institution. The venue for the meetings on every second Tuesday of the month was at the Musée Pédagogique in the Rue Gay-Lusac. It was decided that the society should have its own journal or Bulletin to bring existence of the society to the notice of as many people as possible, and publicize its activities. The Bulletin was founded with initial funding of 500 francs from the Minister of Education; it was published quarterly for four years, and from October 1904 it appeared eight times a year to coincide with the academic term dates. The publication of this Bulletin provided Binet with an additional vehicle through which his work could become known. The general tone of this society must have been agreeable to Binet, as he too liked to take a neutral stance politically, yet by 1900 had come to realize that a problem about the education of abnormal children needed to be addressed.

Binet's position in 1900

Until 1900 Binet had worked independently of any institution, choosing his collaborators and using his psychological laboratory

as he saw fit. In the difficult task of trying to assess the possible influence of the society on the work of Binet and identify any perceptible shift in interest or orientation, it is useful to take stock of Binet's work a few years before 1900, and describe his position.

We have seen how Binet defined Individual Psychology as a distinct area within psychology and his proposals and examples of method in his papers of 1896, 1897 and 1898 (see chapter 8). His proposal for the experimental investigation into mental fatigue in 1898 was ignored by whoever within the medico-pedagogical or mental hygiene domain might have offered him the commission that he proposed. The conclusions drawn by Stella Sharp concerning the usefulness of his types of test, may have disappointed him and incidentally they also had a negative effect on the mental testing movement in America.

Looking at the more positive side of Binet's work, we can see that he had made some innovatory studies in memory for words and sentences (1894-1895). In other experiments he attempted to control for memory in order to assess observation (Description d'un Objet,1897). He had controlled for involuntary attention in order to study adaptation (1900), and by then he was also beginning to challenge the role of imagery within, and accompanying thought. He was driven along his search for individual differences by his conviction that these differences lay in the higher mental processes. By the experimental study of these processes, Binet was, in effect, studying intelligent behaviour. It seems also that he was drawn into choosing intelligent subjects because of their ability to provide introspections. He had discovered this ability in his

collaborator, Henri. His experience in prompting introspections in children is exemplified in his work of 1894, and more fully in "La Suggestibilite" (1900). In this year he began his experimental studies on his two daughters who could also provide him with valuable introspections, in Binet's broad definition of the term.

It is somewhat in contrast to these experiments in "idéation", for example, that Binet was also pursuing from about 1897 onwards in collaboration with Vaschide, correlations between physical tests and between tests of physical strength. He made a historical review of research into the relationship between head size and intelligence in 1899 and published a further nine papers on cephalometry between this date and 1902.

So by the time he joined the pedagogical society, Binet was involved in the differences between individuals in their intelligent behaviour; but in parallel, he had what must have been a passion for measurement: from 1897 until 1905 he appears to have been tantalized by the prospect that one day there would be revealed some certain physical signs or stigmata indicative of intellectual capacity.

The Société: its organization and composition

There are many and various ways of examining and describing the society, even over the brief period of 1900 to 1905, and sufficient detail is needed in order to portray it as faithfully as possible from the contents of the Bulletins - 25 in all. This examination will focus mainly on Binet, his place in this social context and the

development of his work in collaboration or otherwise, but not losing sight of the collective nature of the enterprise and how this may have affected Binet's work.

Once founded, the society seemed to have no particular difficulty in extending its membership. By 1902 there were 389 members; a further count of the records showed that in 1903 there were 436 members and in 1904 there were 525; and the name of Claparede appeared at this point. A breakdown of the membership in 1903 gives us an idea of the people with whom Binet came into contact:-

SOCIETE LIBRE POUR L'ETUDE PSYCHOLOGIQUE
DE L'ENFANT

Membership in 1903:-

Academic		
Inspectors	43	
Rectors, Principals, etc.	8	
Teachers (Higher, Secondary)	32	
Teachers (Primary)	145	
Teacher Training	102	
		330
Non Academic		
Parents	54	
Doctors and Directors of Scientific Laboratories	27	
Miscellaneous (including one graphologist)	25	
		106
		436

Recordings of the proceedings at each meeting were made and read at the following one. The Bulletin, as far as one can judge, recorded main events, decisions taken, proposals and reports on work undertaken, of conferences outside the society, and of talks or

lectures given at the meetings themselves. Buisson was the first president, but Binet succeeded him in 1903. It is not clear whether there was a lack of direction, or feeling of this in the first two years of its existence; but Binet proposed that the work should be systemetized by setting up "commissions" or working parties, each consisting of a group of members sharing the same research interest. The commissions were to be autonomous, to carry out research and report on this at the meetings. This decision proved to be an important one, for it gave identity to the society by defining it research topics and indicating members involved in the investigations. The term "commission" also had a ring of authority to it. The first ones to be set up in 1903 were to investigate: 1) l'éducation physique; 2) la mémoire; 3) les aptitudes; 4) les sentiments moraux; 5) les anormaux; and 6) la graphologie. The "commission des anormaux" included Baguer, Granier and Philippe - and later Binet. In 1904 another commission was set up for "la sociologie scolaire" and in December of the same year for "la fatigue intellectuelle".

The tone and general orientation of the meetings seemed to be set at the first one, reported in the Bulletin of the 15th October, 1900. Here it was pointed out that prior to the work of Rousseau (presumably a reference to his work "Emile") the child had been viewed as "un petit homme" - ie. the "reduction" of an adult. When viewed as such, there seemed to be no need to study childrem for themselves. But child development for Rousseau was seen to take place within the span of childhood itself, and not with reference to

the adult that it would one day become. This idea, expressed in "Laissez mûrir l'enfance dans l'enfant", was quoted in the first issue of the Bulletin.

The work of the Société

A division of the work done by members of the Societe can be made by examining separately the pedagogical work - ie. the concerns, issues and research undertaken which directly related to experiences of children as distinct from anthropometric work. The two types existed in parallel, and the pedagogical will be discussed first.

In the spirit of Rousseau it was decided that childhood should be studied by asking people for their childhood memories, by observing children themselves, and by consulting them directly or through their achievements, activities and expressions (eg. their drawings). It was also proposed to use the questionnaire method, following Stanley Hall's example. So questionnaires were devised to investigate teachers' definitions and descriptions of rebellious and undisciplined children, their anger and their lies ("altérations volontaires ou involontaires de la vérité par l'enfant")

In 1901 Larguier des Bancels experimented on memorization using both part and whole methods, typical of experiments made in the Ebbinghaus tradition, in efforts to find the most economical method of learning by heart. In 1902 it was reported that of the 277 questionnaires sent out on difficult children, 141 had been returned; and one of the main findings was that punishment seemed to be useless. The questionnaire on childrens' own attitudes to reward were to be returned by March, 1903. A short report on teaching

language to deaf-mutes with a demonstration by Baguer was given. A short history of the care of deaf-mutes was referred to in the same issue. But most important of all were the extracts of a lecture given by Baguer entitled "L'Education de la Raison". "Irrational teaching" was defined as that which makes insufficient demands on the individual,by the use of memorization of meaningless ("vides") words and formulae. In contrast to this "Rational teaching" was that which made the child active: -

> "...l'écolier s'habitue à penser par lui-meme,qu'il ait le desir grandissant de connaitre,qu'il cherche en toute occasion le pourquoi et le comment des choses: lorsque nous réservons la première place à l'observation et à la réflexion;lorsque nous employons les méthodes actives,qui traitent l'enfant non pas en simple auditeur,mais en collaborateur effectif..."
>
> (page 279)

> the child gets used to thinking for itself, has an increasing desire to know and at every opportunity seeks the why and the how; when we keep priority for observation and reflection;when we use active methods which treat the child not just as a listener,but as an effective collaborator...
>
> (emphasis added)

This credo was endorsed as a formal resolution by the society (reported in March, 1903) In the July Bulletin of the same year, it was recorded that 40 000 copies of the children's views on rewards had been received (see Appendix 3 for an example of this questionnaire). In the October issue reference was made to the lecture given by Mme.Fuster on "Rousseau et la Pédagogie Moderne". She stressed the importance of Rousseau, but found his approach too passive and too reliant on the idea of the child's education developing only through the senses: there were questions still to be settled about Rousseau's ideas. Nevertheless she admitted that:

> "en matière de la psychologie de l'enfance nous vivons presque entièrement sur les grandes données de J-J.Rousseau."
>
> (page 320)
>
> concerning the psychology of childhood, we exist solely on the great contribution of J.J.Rousseau.

In the December issue of 1904 Binet reported on the work of three commissions - of "la graphologie", "les sentiments moraux" and "la mémoire". Of these Binet pointed out that the easiest on which to experiment was memory.

The next important work to be reported was from the "commission de la memoire", headed by Parison, a Primary school teacher. Two questions had been addressed: the persistence of memory and the relationship between memory and intelligence. Twenty-one numbers and Latin verse were used as material; four school classes had been used for the experiments, three of them from two girls' schools. The correlation formula used was that proposed by See.(see chapter 7). One out of six showed a correlation only, and in the youngest class of the girls there was no correlation. Binet's note to these inconclusive results was that rather than use teachers' ratings of intelligence, it would be better to use children of equal ages at different class levels, on the assumption that the youngest children had reached higher classes through their ability. This is possibly the first indication of Binet's insight into the role of development -ie. the brightest children in a class are those in advance for their age. And what about the retarded? He concluded that each case needed its own examination. In short, the task would be long and complex. It was a recognition too, that this was a

problem for psychology, for he affirmed that "nous sommes là en pleine psychologie" - in this, we are in the heart of psychology (page 488).

One of the next steps in this direction was taken by Vaney, and a full report of his work was published in L'Annee Psychologique (1905). He calculated what arithmetic knowledge a child in a certain class (he used classes 1 to 7) should be expected to have. He called this the "degré présumé". He found how may children in each of the seven classes were average or "regulier" and how many were behind or advanced. He then set out frequencies of different degrees of retardation of 1 - 3+ across the seven classes, and commented upon the severity of degrees of retardation at each level (see Appendix 4 for tables). Two degrees of retardation in the middle years (classes 4 - 2) and higher (class 1) were not sufficient to merit the term "arriere" or backward; but 2 degrees in the lowest (7 - 5) would be a bad symptom, as would 3 degrees of retardation in the middle and higher classes.

Binet appreciated Vaney's work: he must have realized that this study had extended the notion given by his own insight into a possible developmental viewpoint. His praise of Vaney was recorded in the Bulletin 23 of May 1905.

> "Son travail a des qualites remarquables de méthode,de précision,de clarté, et d'ingéniosité.C'est une des meilleures contributions à la pedagogie que notre Société ait inspirées,et je suis tout à fait heureux d'exprimer a M.Vaney combien je l'apprécie."
>
> (page 653)

> His work has remarkable qualities in method, precision, clarity and ingenuity. It is one of the best contributions to pedagogy that our Society has inspired, and I am very pleased to convey to M. Vaney how much I appreciate it.

In parallel with the pedagogical considerations and experiments outlined above, Binet started working with Simon on cephalometry, and Simon presented his doctoral thesis on this topic. Ten articles on cephalometry were published in l'Année Psychologique between 1900 and 1902. In the Bulletin of 1904 it was announced that Binet and Voisin would demonstrate their methods in cephalometry, for their "vast" plan was to establish scientifically, and with precision the mental and physical differences that separated the normal from the abnormal. In addition the interest in outward signs of non-physical attributes remained and were to be continued. Photographs of faces were given out from which members were to write their judgements on the person's degree of intelligence, pleasantness ("sympathie") etc. Similarly, judgements were to be made on the evidence of handwriting. In the May 1904 issue of the Bulletin Binet reported on his "Frontières Anthropométriques des Anormaux" For this study Binet used measures from idiots, imbeciles and backward children from Vaucluse, Bicetre and from children of Paris. Binet came to the following conclusion: that there were four signs distinguishing the normal from the abnormal: -1) anatomical features of height and weight etc. 2) physical stigmata and deformities 3) facial expressions, and 4) health problems. He found benchmarks in the children's development. For example, if a child of 14 was no taller than 140cm this gave a strong suggestion (une forte présomption) of abnormality; and any child with two measures inferior to the

benchmark or "frontière" would be in an even more serious position. These inferior physical attributes would also be indicative of idiocy if accompanied by spectacular, indisputable and patently obvious mental deficiency. Binet points out that the easy recognition of idiocy was not of interest, as it was not the extreme cases that were being investigated. The physical signs did not provide the criteria needed. In any case, if mental deficiency were so obvious, then somatic verification would not be necessary. An impasse had been reached. Binet then considered the question of stigmata: in this case "les stigmates de dégénérescence"; but these presented a similar problem. He found that 18 out of 58 children had some stigmata. Again stigmata might help in the identification of idiocy, but it was those of weak intellect that Binet wanted to identify by a method of diagnosis suitable for individual children. However, aware that physical signs in themselves were not always sufficient, Binet expressed the hope that in the next year other mental indications would be found. However, in spite of these negative results, Binet's proposal of "frontières" was important in that he was able to apply this diagnostic method of finding boundaries to separate "débiles" from the normal, and from the imbeciles, and in turn these from the idiots for the 1905 Scale.

The next year, as Binet promised, mental signs would be examined.

Binet's place within the Société

From the beginning Binet was appointed as an "assesseur" to overlook the work of the society. From 1903 onwards, when he was President, there seems to have been a marked increase in his contributions. In

the January issue of 1904 his ideas about experimental method were set out, explaining that the question to be investigated must be precisely defined and after that:

> "Il est nécessaire de donner à une question sa forme expérimentale avant d'aborder l'expérience."
> (page 337)
>
> One must put the question into its experimental form before tackling the experiment.

Then deciding upon the method, procedure and controlling for error, all this adding up to a total of half of the time needed for the investigation.

It was on such points of method that Binet needed to win over other members of the society to his views. He took his membership of the Société as an opportunity to publicize his views on scientific method. His advice to those who wanted to learn how to make a psychological study of children was that they should not rely on reading , but to come to grips with reality ("la nature"), be prepared to make mistakes, correct one's own errors and seek advice from others with more knowledge. (Bulletin,Dec. 1904, page 249) In addition, he wanted, of course, an experimental method to be applied to pedagogy, and thus create a new or scientific pedagogy. There was not a consensus on this, as Cousinet's comments reveal (1968) - some members walked in disagreement with his views.

Another function of the Société from Binet's point of view was that he saw the commissions as providing research areas in which questions could provide what we now term the experimental hypotheses.

Theta Wolf (1973) pointed out that:

> "He (Binet) was both an experimental psychologist and an experimental pedagogue. Without seeing the two roles within the same framework,his discovery (the Scales) cannot be understood."
>
> (page 139)

This was indeed the case for Binet as an individual psychologist; but the Société did not provide a ready-made institutional framework, for there seems to have been some mismatch between the original aim of the society, and Binet's interpretation of it: experimental psychology and pedagogy were intended to complement each other in the work of the society, and not to mix. But in effect, what Binet was trying to impose, in some areas, was experimental psychology as a method onto pedagogy and thereby convert the traditional into a new pedagogy. He admitted that the old pedagogy could provide questions, but these were not to be studied in discussion, but investigated through experiments. It was therefore perhaps inevitable that there would be disagreements. Danziger's comment (see Chapter 3) about the threat of an experimental method to those who have traditional positions to preserve, may well apply here. It seems, however, that Binet's views were supported by Liard, for example, who pointed out that: "une

pedagogie plus neuve et plus forte" - a newer and stronger pedagogy was emerging from the psychological study of the child. (October,1903).

Medical Influence

Analysis of the membership in October, 1903 showed the number of doctors in the society to be probably about twenty. It was reported in 1901 that Dr Boyer of the Institut Medico-Pedagogique at Vitry-sur-Seine presented a case study of a seventeen year old boy who was diagnosed as being an "idiot moral" and slightly backward intellectually; it was claimed that hereditary antecedents included suicides, tuberculosis and paralysis in the family. At his entry into the Institut he was judged to be lazy, hypocritical, irascible, selfish and "antipathetique". Boyer pointed out that teachers should be initiated into psychopathology in order to catch symptoms early.

In the October issue in 1903 Boyer's experiments on the illusion of weight among the abnormal was reported. He had set up a binary classification of idiots into "idiots moraux" and "idiots intellectuels". The latter category included the "debiles" or feeble-minded, imbeciles and retarded; the physical conditions to be found among the 11 to 19 year olds of this group included meningitis, microcephaly, retarded development of speech and congenital imbecility. Among the idiots with non-physical abnormalities, he listed instability, kleptomania, masturbation, alcoholism and smoking etc. among the 16 to 19 year olds.

In the same year it was announced by Dr Le Gendre that an important society wished to become formally associated with the Société. This was the "Ligue des Médecins et des Familles" the League of Doctors and Families. This provides another example of medical incursion into pedagogical matters.

In 1904, while reporting on the commissions, Binet noted that the "commissions des anormaux" consisted of Primary and Secondary-school teachers and, needless to say,("cela va sans dire") several doctors. Again Dr Boyer was involved in the cephalometric studies, using Binet's technique taken from Broca to investigate idiots at Bicetre and at a private establishment.

Binet's last comment seems to make the point that the presence of doctors was to be expected, at least in connection with the subject of the abnormal - a further indication of their presence and entrenchment in the Société. Their contribution was also found in their report of the Congrès d'Hygiène Scolaire which had made a call for special classes for the abnormal. In addition, this Congress had approved of two creations: "un livret scolaire physique" - a record book of the child's health and measurement during the school years, and a "Diplôme de Médecin Scolaire" - a qualification to become a school doctor.

The Société was set up for the psychological study of the child, and formally admitted of two disciplines, namely psychology and pedagogy; but it appears that the medical profession staked their claim partly through hygiene and by working in tandem with pedagogy as exemplified in the title of "Institut Médico-Pédagogique".

The Abnormal

As pointed out in Chapter 3, the term "abnormal", in opposition to normal, had a wide definition embracing various types of deviance from the socially and medically perceived norms. The medico-pedagogical point of view was particularly concerned with idiocy and what appeared to be minor manifestations of this - eg. in the malady of imbecility and weak intellect. Non-intellectual manifestations of idiocy were seen in the asocial behaviour of some children. These were pointed out by Dr Boyer, for example, in his capacity as director of the Institut Médico-pédagogique (see above). The teachers of the Société no doubt construed abnormality more narrowly in line with their own professional interests. In 1903 it was argued that the undiscplined or abnormal children disrupt and hinder the progress of the normal. One of the first questionnaires to be sent out by the Société was concerned with difficult children or "indisciplinés"; and the problems of definition and identifying the sources of disruptive behaviour were noted.

When Binet entered the Société he was preoccupied with finding physical indications of, and correlations with intelligence. He taught Broca's methods of anthropometrics to Boyer and compared Boyer's measurements on 101 idiots at Bicetre with those of a normal population of children in some Paris schools. The identification of idiots in the population was almost taken for granted: In France Esquirol is usually credited with having isolated idiocy as being the profoundest of mental deficiency, with the terms imbecility and weak in intellect as "débiles" of feeble-minded. The term idiot was

also used in England (see Galton, 1887). But the last two terms were not clearly defined, and there was considerable confusion in their use.

Concern with the abnormal was a recurrent theme in the Société from different points of view, and, as pointed out earlier the topic had its own commission, and in 1904 its members included Rollet, Abanel, Dr Voisin, Mme Meuzy, Baguer and Binet. The Socíété itself at this time noted that the question of the abnormal was a growing preoccupation. In 1903 it had reaffirmed the importance of the study of the abnormal, not only out of charity, it was admitted, but also for the light that the study of the abnormal might throw upon the subject of the normal children.

In May of 1904 Mme Fuster's travels to Brussels and Germany were reported; she told members that Dusseldorf with 200, 000 inhabitants had a school of 300 abnormals, and that nearly every town in Germany had a special school, whereas in France these did not exist. She posed the question that needed to be asked before any action could be taken to set up special schools ie. -

> "Quelle démarcation, en effet, sépare les normaux des anormaux,les aveugles et les sourd-muets mis à part?
>
> (page 387)
>
> Putting aside the blind and the deaf-mutes,what demarcation separates the normal from the abnormal?

In the same issue Baguer declared that he had been interested in the case of the abnormals since 1874. It was agreed that the report of the commission for the abnormals should be endorsed. This report included the statement that:

> "Les enfants anormaux...dont la place n'est ni dans un service hospitalier, ni à l'école primaire,soient soumis à un examen médico-psychologique,et deviennent,s'il y a lieu l'objet d'une organisation pédagogique spéciale."
>
> (page 406)

> That abnormal children whose place was neither in a "hospital" nor in a Primary school should undergo a medico-psychological examination and be admitted,if the case may be,into a special educational establishment.

It was unanimously agreed that a show or special school be set up in the Rue Jenner near to la Salpetrière.

At the same time, Binet was becoming more convinced that the anthropometric studies were not not going to provide the solution to the problem of identifying intelligence or its defects. There were differences in the measurements of the idiots of Bicetre which Boyer had found and his own of a normal population. But Binet doubted the sufficiency of these results for providing an individual diagnosis. Any individual child with two inferior measures would be in a more serious position. These inferior physical attributes would also be indicative of idiocy if accompanied by spectacular, indisputable and patently obvious mental deficiency. Binet points out that the easy recognition of idiocy was not of interest, as it was not the extreme cases that were being investigated.

At about the same time, Binet concluded that the study of individual differences would probably progress no further than the method of providing a psychological portrait, similar to that of the dramatist Hervieu, published in l'Annee Psychologique(1904).
Matters were not much advanced when the pressure from members of the Societe was beginning to have an effect. Protests began through a report from the Pedagogical Circle of Teachers from the Lower Loire department. In this the teachers recommended that the responsibility for teaching the abnormal be transferred from the Minister of the Interior to the Minister of Public Instruction who at the time (1905) was Chaumie. As the Minister he was ready to entrust a group of scientists, doctors, educators and administrators to study the whole question of the abnormal. It seems that in the name of the Societe, Abanel, a magistrate, Voisin, a doctor and Baguer persuaded the authorities to act. It appears too that Bourneville had been tireless in pressing the authorities to set up special schools. Chaumie instituted by decree a Ministerial commission which included Leon Bourgeois as President, Baguer, Binet, Lacabe and Malapert. The first task was to get a census of the number of abnormals in the Paris schools by means of a questionnaire, which Bourneville devised. The task was to track down every child incapable of benefitting from the Primary education provided in Paris. It appears, however, that some teachers were not willing to cooperate: they said that it was not their concern, but that of the doctors.

The announcement of the Ministerial Commission of October 1904 was published in the Bulletin, no.18 in November of that year. It was made by Binet under the heading of "Avis" - Notice. It stated simply:-

> "Nous sommes heureux de porter à la connaissance de nos collègues qu'une décision ministerielle toute récente qui est la preuve que les questions auxquelles la Société travaille, présentent un haut intérêt pratique et qui est la preuve aussi que les efforts faits par notre Société pour faire aboutir d'importantes reformes n'ont pas été inutiles."
>
> (page 506)
>
> We are pleased to bring to the attention of our colleagues a very recent ministerial decision which proves that the questions that the Society is working to solve,have a strong practical interest and also show that the efforts made by our Society to bring about important reforms have not been in vain.

Binet's realization that the work of the Societe was of important interest and could lead to reform must have become increasingly clear to him. He shared the concern of his colleagues about the position of abnormal children in schools, of the children who did not need to be put into asylums or, for example, into Institutions for the Deaf-Mutes or the Blind. Moreover, Binet realized that the distinction had to be made between the normal and the "debiles" (the feeble-minded or backward) rather than the idiots whose deficiencies were more obvious. Mme Fuster had already posed the question (see above), but now there seemed more urgency to try to solve it.

The Ministry, in addressing the Societe seemed to have in mind an administrative task for the Commission. The construction of the questionnaire that was sent out to the teachers in Paris schools was the first step in this task. They were asked to estimate the number of abnormal children in their schools. The results were rather startling as their estimates ranged from zero to 70 %! This clearly could not be the case. But in the meantime Binet and Simon had

interpreted their task as a psychological one. It appears that this judgment, in Binet's estimation, needed clarification and justification. One aspect of Binet's justification was implicit: he was defining the area of psychology, removing the task of identifying abnormal children from the domain of medicine or psychiatry and schooling itself, and appropriating it in order to apply a psychological method. This intention, although not explicitly stated as a territorial one, may nevertheless, be read into the article that Binet and Simon published in 1905, immediately preceding the article containing their Scales - namely, "Sur la Necessite d'etablir un diagnostic du niveau intellectuel des Anormaux" (1905 a.), which is discussed below with reference to the problems of categorization.

Categorization of Mental Deficiences

The authors saw the task of identifying the feeble-minded as part of a larger question, the problem of categorization of the insane, the mentally and morally deficient. As a semi-clinician himself, and through his collaboration with Simon, Binet probably became increasingly aware of the unsatisfactory nature of the categorization system at the time. A brief historical review of the system is made, with comments upon Esquirol and Seguin. To illustrate the confusion that reigned ("le desarroi des nomenclatures"), the following case is cited from Blin (1902):-

> "Tel enfant qualifié imbécile par un
> premier certificat est appelé idiot
> sur un second,débile sur un troisième,
> dégénéré sur un quatrième"
>
> One child,for example,designated as
> imbecile on a first certificate,is

idiot on a second,feeble-minded on
a third,and degenerate on a fourth.

Moreover, when terminology was agreed upon, there was still no guarantee that clinicians, among themselves, agreed upon the meaning of the terms. What was needed, according to the authors, was a consensus to be reached by means of a scientific method which should replace the reliance on subjective and impressionistic and subjective judgements (the latter method being termed "empirique")

The authors then shift from clinical considerations to the psychological. This is done rather indirectly, that is, partly through criticisms of the work of others - of Sollier, Blin and Demaye. The gist of their criticisms is as follows: Sollier's work has the merit of taking a psychological topic - attention - but it is treated in a literary rather than a scientific manner. Binet and Simon saw the merits of the work of Blin and Damaye (which will be discussed later) and acknowledged them. But one of their main criticisms was that their questions, arranged around themes, were too much related to knowledge acquired in school, and somewhat arbitrarily chosen. In short, this article by Binet and Simon contains a reasoned account of why a scientific method within psychology was needed in order to make a diagnosis of inferior intellectual conditions.

From October 1904 Binet and Simon directed their efforts to achieve the aim of finding this scientifically based criterion for identifying intellectual deficiency.

A mistaken view is sometimes conveyed to readers that between the time of the announcement of the Ministerial Commission and April 1905, Binet and Simon both started and completed their task - the construction of the Scales! The preceding chapters have already given evidence that this was not the case, and the account of the genesis of the Scales is continued in the next chapter. This will be done with reference to Binet's earlier work with children and from the insights from his experimental method.

Personal Implications

Finally we might ask: what did the Ministerial Commission mean to Binet in personal terms? He must have seen it as a reversal of his position in 1898, for in that year he openly requested a commission to investigate by the best method (ie. psychological) the problem of mental fatigue in children; but his offer was ignored. Now in 1904 his services were being sought, and his expertise recognized through the Societe. His membership of this pedagogical society drew him out of the "wilderness", out of his virtual isolation as an experimental psychologist in France. Perhaps, as I suggest here, the Societe provided a period of socialization to Binet. He had to rub shoulders and converse directly with people of different interests, jobs and professions from his own. Perhaps he also came to terms with the power of the doctors, or at least to a more practical understanding of their presence in different areas. Whatever the processes of this socialization within the Societe, or difficulties that Binet may have encountered, there is evidence that Binet was highly respected; and he remained its president until his death in

1911. But just as the Mental Scales were not the end-point in Binet's achievement, nor was the date of 1905 the end of Binet's work within the Société.

CHAPTER 11: THE INTELLIGENCE SCALES

"Il n'est rien de tel que la nécessité
pour faire surgir les méthodes nouvelles"
1911,page 124.

Necessity is the mother of invention.

In the preceding chapter an outline was made of Binet's work in the context of the Société, the task set by the Ministerial Commission; and how this was defined by Binet and Simon as being psychological and diagnostic. They wanted to provide a measure whereby school children could be identified as "abnormal"; and the diagnosis was to be based upon an individual assessment. Yet at that stage (ie. the end of 1904) at the time of the publication of the psychological study of the dramatist, Paul Hervieu, Binet felt that he could not see his way to finding the solution to the problem of the measurement of intelligence, and of finding a boundary separating the normal from the abnormal.

However,the groundwork for solving the problem was to some extent prepared in two ways. Binet had already ruled out the use of tests of sensory and physical measures as inappropriate, for they did not reveal individual differences in any decisive way. He saw the demise of the mental testing movement in Wissler's correlations of Cattell's tests in 1901, and he did not recommend the testing of hundreds of children in an impersonal way which he declared provided only a "résultât brut" - or crude measure. He was also at this time beginning to doubt the validity of using teachers' ratings of children's intelligence as a criterion measure to be employed in correlational studies,ie. to find relationships between the results

of mental tests and children's intelligence. He also had a mistrust of certain accomplishments that were products of schooling, testifying only rote learning without understanding and judgement. He was skeptical too, of the common observation that there was a certain unity, or homogeneity in our mental constitutions; he viewed this as simply a "présomption vague", a vague assumption (1902,page 509). Therefore by the end of 1904 these rejections had cleared the ground, which was prepared in other positive ways by Binest's earlier conceptualizations and experiments on both adults and children. It is in his studies of children that we find the key to his development of a measuring device that was both scientific in his terms, and practicable.

The psychological Study of Children

The psychological study of children and of Binet's in particular can be seen as receiving their impetus from three levels or spheres:- at the cultural level; for expediency; and because they could be carried out, in the intimacy of his own family life. It has already been noted that the dominant interest in experimental psychology in Germany was in the mind of the adult in general, partly perhaps because the child was deemed incapable of making introspections. In France there was some precedence for the psychological study of children. This can be found in the work of Itard (1802) and Seguin, in the case history of "The Wild Boy of Aveyron" (see also Lane,1976) - thus establishing a tradition of helping the physical, social and intellectual development of children; and a continuation of such work was carried out by Bourneville at Bicetre school for abnormal boys; and this work gained Binet's praise. Binet knew the work of Itard and Seguin, and as we noted in Chapter 9, he surely

endorsed the ideas of Rousseau. In 1902 Binet concluded that at the physical level, the child was not a reduced version of the adult, and in 1904 he distinguished the child and adult as qualitatively different in their thinking, the child being an entity sui generis.

Binet and Henri went into schools as a matter of expediency, for Binet never seemed to have had more than a handful of adult subjects, though these did include at least two persons skilled in giving introspections, namely Marbe the German psychologist (who later went to Würzburg) and Henri himself. In the primary schools studies were made on memory, attention, adaptation, perception and suggestibility, using mainly boys between the ages of eight and fourteen. Two features of children's mental operations were found to contrast with those of adults: these were the plasticity of the child's mind, enabling faster memorization than adults; and the other was the poorer attention of the child. As for development in the mental operations in children, Binet noticed an improvement over time - though not dramatic - in memory, and a decrease in suggestibility.

Binet's Studies on his own Children

There can be little doubt that the presence of his two daughters provided Binet with a source of observations as well as opportunities of using them as subjects. The three articles which appeared in the Revue Philosophique in 1890 on movements in young children and their perceptions are usually identified as Binet's first published work on children, these being his own very young daughters. Binet observed their first attempts at walking and noted a difference of personality and also in their attentional behaviour

when they were being breast fed. Binet confirmed that Madeleine (or Marguérite) was more attentive, calm and less "turbulente" than the younger daughter, Alice (or Armande). In 1890 the girls were aged approximately two and a half and four years. Binet noted that the personality differences between them were still evident. Ten years later he was to find that these differences could still be observed in several of their mental operations which he reported in "L'Etude Expérimentale de l'Intelligence" (1903).

The first article (1890,a) shows that Binet knew the work of William Preyer whose articles were published in the Revue Philosophique, and Binet refers to his "L'Ame de l'Enfant" translated from "Die Seele des Kindes" (1882), the child's mind. It becomes clear that Binet was less interested in the dates of the appearances of certain infant behaviours than he was in the nature of the behaviour itself. For his experiments Binet used four children, the youngest being Marguerite, aged 43 months and two girls aged 4 and 7, and one boy aged 7 and a half. He found that the minimum reaction times of the children were always higher than those of the adult's minimum, and he attributed the variation of reaction times among the children to their fluctuations in attention.

In the second article (1890,b), "La Perception des Longueurs et des Nombres" Binet reported on experiments that he made on M and A, aged 4 and 2 and a half, in whom the two different personality features are noted again - calmness and low distractability in the elder, with the younger being "plus gaie, plus turbulente." One experimental task required the subjects to judge which of two lines was the longer over a series of lines varying in ratios of

24:40....38:40, and controlling for the pattern of variations of length. For both children the limit of their discriminating power was between lines of a ratio of 38:40. The results for the adults whom Binet tested on the same materials were similar: their discrimination was no better than the children's. Using Beaunis' semi-circular instrument for the discrimination of different sized angles he found that M could discriminate in the smallest angle in the ratio of 40:43. In comparison the range for adults was between 40:41 and 40:43. Binet concluded that other four year old children probably shared M's "finesse de perception remarquable", and that this acuity of perception was in fact little different from that of an adult. Acuity of perception could therefore, in no way be an indication of the difference between an adult's and a child's intelligence. The result of this experiment was surely one of the deciding factors which led Binet to reject the use of sensory tests as an index of intelligent behaviour. He asserted at this point that the measurement of intelligence in children would bear no relationship to that of adults. By way of speculating on the possibility of measuring intelligence, Binet offers a definition which includes "le raisonnement, le jugement, la mémoire et le pouvoir d'abstraction" - reasoning, judgement, memory and power of abstract thought.

Binet's close observations of his daughters as reported in the last of the three articles (1890,c) gave him further insight into the particularities of children's thinking and language. In the latter he noted that children's language did not necessarily result from imitation, but that the child had its own particular language. In contrast to the normal adult, the child defines with reference to an

object's use; the long list of definitions provided gives a charming picture of children's life and feelings. For example, "eau" is defined as "C'est pour baigner; c'est pour boire avec le vin" - for bathing in, for drinking with wine.(page 602). "une maman":ça gronde les petits enfants" - she scolds little children. But, "une petite maman": elle est belle; elle gâte les enfants" - she's lovely, she spoils children (page 604). "un loup: ça veut dire il mange tous les petits enfants et puis toute la chair" (loc.cit.) - (the wolf) it eats all the little children and then all their flesh.

We see in the above examples that words are defined by their use, or by actions related to them; or, as Binet also remarks, a young child is in fact, incapable of defining, for defining implies a certain amount of reflection, comparison and elimination. The definition task was to be incorporated into the 1905 Scale, in item 14; in the 1908 Scale at age 6; and in 1911 developmentally at ages 6, 9 and 12 as well as the mental operation of comparison for identifying either similarities or differences.

About ten years later, and at the time that he began his work in the Societe, Binet turned to make some formal studies of his daughters over the period 1900-1903. No doubt he had been informally observing them throughout their childhood, and it seems that he may have also been their tutor. The schema that Binet had outlined for the experimental study of individual differences (1896,1897 and 1898) had produced little reaction. Perhaps it was for this reason that he included really only one of the experiments proposed then , namely, "Description d'un Objet" and preferred to investigate the individuality of M and A by exploring in particular their "ideation"

or thought processes by making appeals to their imagery, language production, associations etc. He felt able to do this because his daughters were sufficiently adult and trained (dressé) in giving the introspections that he needed. Binet considered it an advantage to have additional information about his subjects' personalities and lives in order to interpret their introspections. Therefore, when studying higher mental processes it was better to have as subjects, not laboratory students, but rather members of one's family and friends.

In this study (1903) M and A were treated as if they were adults. Age difference was not taken into account. Binet claimed that they were like twins, sharing the same environment, lessons and pleasures. In other words, any developmemtal aspect was overlooked. This aspect never seems to have been of central interest to Binet, and certainly always subordinate to his interest in individual differences. The end product of his investigations was entitled, as noted earlier, the experimental study of intelligence. Its importance vis a vis the genesis of his Intelligence Scale lay predominantly in the use of introspections and the prompting of thought processes. What emerged from this study was not a difference in intelligence between the two girls, but differences between their styles and modes of thinking. These differences he saw as tied to the different personalities: for in Binet's view, intelligent action and thinking were inherent in the personality.

The Practical Work

We saw, in the preceding chapter, that Binet gained the developmental insight that was needed; that he saw that scholastic tests would not provide a measure of intelligence; nor would tests of discrete mental operations (facultés) reflect intelligence as revealed in every day thinking and behaviour. The tests needed to be of a different order, and some had already been formulated by Binet - visual memory, memory for sentences, comparing, describing, making definitions and using language. In addition, Binet and Simon already had a framework for the classification of the abnormals, the most defective being the idiots, and ascending towards normality through the imbeciles to the feeble-minded. The most elusive distinction was between the latter and the normal. As late as March, 1905 (a) Binet admitted that: -

> "la distinction,si difficile,et cependant si intéressante,entre les formes légères de débilité mentale et l'état normal reste aussi complètement inabordable."
>
> (page 178)
>
> The distinction,so difficult yet so interesting,between the mild forms of feeble-mindedness and the normal state still remains completely intractable.

In addition to their doubts, there were other difficulties. In a letter dated 24th March, 1905, Binet wrote to Claparède about these. It appears that at the same time as trying out their tests, Binet was also trying to find measures and degrees of degeneracy; this was in addition to his work on 100 defective school children. He wished that the task (of the Commission) were over for he was encountering resistance of all kinds - "résistances de toutes sortes". Claparède's interpretation was that this resistance came from

medical quarters where doctors would resent the intrusion of a psychologist outside their ranks, usurping their power by suggesting criteria which had not come from the orthodox "mental medicine". This judgement supports my earlier suggestion (see Chapter 2) that the power of the doctors constituted an obstacle to the projected task of the experimental psychologist when he appeared to be encroaching on their territory. Binet had more power to hold his ground this time, compared with the last instance in 1898. He did concede that the medical approach, like the pedagogical one, could indicate some probable signs of abnormality, but that the psychological method could produce reliable criteria. So in spite of doubts and some practical difficulties, Binet and Simon persevered with their task of finding suitable items for the Scale. Of the test items that they tried out many times some were retained and many were eliminated. They were tried out on "abnormals" in la Salpêtrière, and on normal children in the primary schools of Paris.

At the Fifth International Conference of Psychology, held in Rome in April Beaunis presented the paper of Binet and Simon which contained their first Scale, and which then appeared in the Année Psychologique in June. The breakthrough had been made, and the Scale appeared in the form of thirty items which will be described and discussed below.

THE SCALE OF 1905 - (see Appendix 6 for the French version)

The first three ITEMS are conceived to test the coordination of eye and head movements directed towards a visual stimulus, or if the child is blind to the sound of a bell; to show coordination by

grasping an object and putting it to the mouth, either in response to the feel of the object or to the sight of it. ITEM 4 is the first to assess knowledge, requiring the child to discriminate a piece of chocolate from a piece of wood. The following ITEM 5 requires the child to remember that the chocolate has been wrapped as a sweet; when it is handed to the child, it should be observed to attempt to remove the wrapping. This item tests simple memorization with coordination of movements. ITEM 6 initiates the first element of "inter-psychology" ie. some interaction between the tester and the child, the child being asked to carry out a simple command or imitate a gesture. An immediate question concerning these items is why Binet and Simon included items at such a low level, considering that they were to be given to school children. The explanation is that, given the assumption that the defective was behind in development, the 1905 Scale was not conceived with a view to indicating levels in the development of normal children, but rather as an instrument for making a rapid diagnosis of the abnormal. The inclusion of the first six items reflect the interest that both Binet and Simon had in the different degrees of mental retardation, and the opportunities offered to Binet for the study of these in the asylum of St Anne where Simon was an intern from 1901 to 1903. Furthermore, we have evidence from the 1890 studies that Binet was a keen observer of infant behaviour, from its earliest movements, attempts to grasp, walk and use language. He learned through experience with his own children and from visiting the crèches, the patience that was needed in dealing with very young infants.

The following ITEMS 7, 8, and 9 constitute a "frontiere" (see Chapter 10 and above), and are variants of a test of comprehension and knowledge of language for referential use, and for communication between individuals. The test requires the child to point to the parts of the body as named by the tester; then as the tester names familiar objects the child must hand them to him . For ITEM 8 the child must point to named objects as they appear in a picture. ITEM 9 is the inverse: the child names the objects to which the tester points. These three items are equivalent in degree, but stand together as a "frontiere", the line dividing the idiot from the imbecile. But later Binet admitted that naming was more difficult than pointing to a named object. They further point out, "il est utile que cette frontiere soit solide." - it is useful (for our purpose) to have this solid boundary. The initial comment with ITEM 11, the task of comparing two lines of different length is that we are now entering into true psychological testing. This test seems to require so little from those who can do it, but analysis of the task shows it to be complex, involving understanding, perception and differentiating. The origin of this item may be found in "La Perception d'Enfants"(1890,b), "Le Developpement de la Memoire Visuelle chez des Enfants" (1894)

ITEMS 11 an 19 require the child to repeat digits, 3 for item 11, but the number of digits is not specified for item 19. It would probably be either 4 or 5 because it appears as 5 in the age level 8 in the 1908 Scale. The origin of repetition of digits is to be found in Jacobs (1887), as a test of "prehension", and is discussed in Chapter 6. ITEMS 12 and 22 require the child to compare weights of cubes of equal volume. This is to test attention, the notion of

comparison and muscular strength. ITEM 13 is to test the suggestibility of the child, and is not a measure of intelligence as such, Rather, it tests strength of judgement, for suggestibility disturbs judgement, probably because the child may be too timid or afraid of being wrong. The test item requires the child to search for an object that is not there , or to force the child to invent an object; or thirdly to fall into the trap of expecting two lines to be of unequal length, following as they do, a pattern of three pairs of unequal lines. The source of this item is to be found in "De la Suggestibilité Naturelle chez les Enfants".

ITEM 14 requires children to define certain objects, when asked what they are. This is to test knowledge of voabulary and to be able to express a simple idea. ITEM 15 requires the repetition of a fifteen word sentence to test immediate memory, attention and language. The oldest imbeciles can sometimes repeat this, but probably cannot progress beyond this item. Therefore ITEMS 13, 14 and 15 constitute a "frontière" between imbeciles and the "débiles" or feeble- minded. ITEM 16 requires the child to differentiate between two objects which are named by the tester who first confirms that the objects are known to the child. This task involves the notion of difference, thinking and some observation. ITEM 17 requires attention and visual memory of three familiar objects which are shown, one at a time for 30 seconds and the child names them. ITEM 18 requires also visual memory, attention and some analysis, for 2 drawings are shown to the child for 10 seconds and he is then asked to draw them from memory. There are three grades of response - exact, approximate and no resemblance.

For ITEM 19 see 11. For ITEM 20 the child is asked to say in what ways two, three or four objects are alike. This is a more difficult version of ITEM 16, for children find it more difficult to to identify similarities than differences. ITEM 21 requires a rapid comparison to be made, and tests accuracy of perception. Over fifteen pairs of lines the child is asked to indicate which is longer. The differences are of the ratios of 101 to 103. These items originate in Binet's study of 1890,a, and 1894 with Henri. ITEM 22 requires the child to arrange in order of weight five cubes of the same volume, and this task tests focussing of attention, memory and judgement. It is a more difficult version of item 12. There are three degrees of correctness. ITEM 23 requires the child to judge which weight has been removed from the five, if these had been put into their correct for the preceding test. ITEM 24 requires the child to find rhyming words, to test for spontaneity, flexibility and language. ITEM 25 requires the child to fill in gaps by completing a sentence. The origin of this item is the Ebbinghaus "combination" or completion task (1898). For ITEM 26 the child must compose a sentence which includes three given words, testing the child for spontaneity and knowledge of sentences. This item represents the top limit of a "débile". The theoretical problem here is whether this "frontière" would apply to a child or adult "debile". ITEM 27, like ITEM 30, require the use of language. For the former a hypothetical situation is given and the child is asked "Que faut-il faire? - what should you do? As this requires abstract thought, it is deemed to be one of the most important for diagnostic purposes; and ITEM 30 requires the child to give the differences between abstract terms such as "estime" and "amitié" - estime and friendship. ITEMS 28 and 29 require no use of language or knowledge

apart from understanding the instructions. The former item requires the child to invert the small and large hands of a clock. This task tests reasoning, attention and visual imaging. ITEM 29 is the paper-cutting task, in which the child has to indicate the shape of the cut-out portion of the twice-folded paper. It tests visual memory, voluntary attention and reasoning. These last four items all test types of abstract thinking and in Binet's conceptualization of intelligence, constitute the highest levels of this developmental scale.

In summary, many of the items of the 1905 Scale test three principal mental operations, attention, memory and judgement. Items 5, 17. 22, 28 and 29 test attention; items 5, 9, 11, 15, 17, 18, 19 and 22 test memory; and items 13, 22 and 23 test judgement,with item 13 also testing suggestibility.

Evaluation of the Scale

One important feature of this first scale is that age levels are not indicated. This relates to the intention of Binet and Simon which was to assess degrees of abnormality rather than the development of the normal child. It also explains the inclusion and proportion of items devoted to detecting the intellectually weak. As both investigators had done considerable amount of work in the asylums - and Simon in particular - they came ready armed with knowledge of the behaviour of the abnormal and their responses to test items. In addition their knowledge was sufficient to allow them to work on three main assumptions: firstly, that the "débile" has no ability in dealing with the abstract; that the "imbecile" has little or no

ability in written language; and thirdly, that the idiot is inept at language. These assumptions provided the rational basis for the dividing lines or "frontieres" between certain items. It will be remembered that the notion of "frontieres" had been proposed one year earlier in connection with anthropometric measures. As described above, the first "frontiere" is provided by items 7, 8 and 9. The second "frontiere" (presumably less solid) is provided by items 12 to 14, with item 15 being the highest on which both child and adult imbecile can perform adequately. The third dividing line is after item 26, the last four items testing power of abstraction.

Behaviour of the Abnormals

The knowledge that Binet and Simon had of the behaviour of the abnormal is shown by the comments on some of the items. For example, ITEM 7 requires the child to point to named objects, but abnormals often point to any of the objects and are quite content with this response. The response made by the "debiles" to Item 8 shows that they often rush into the task through lack of attention, and unwillingness to suspend their judgement: these features are characteristic of the INTELLECTUALLY weak. In addition, absence of judgement can also be observed in performance of item 11 when a child, instead of repeating 3 numbers, repeats 5, or starts counting from 1 onwards. An expression of contentment with their performance again confirms a lack of judgement. The "debiles" also reveal a measure of their suggestibility through compliance, instead of exercising judgement by admitting that they do not know. They may succumb to an illusion of similar weights because the cubes or boxes

are of the same volume. Suggestibility, according to Binet, distorts judgement, and various responses to item 13 reveal different degrees of suggestibility.

Administration of the Scale

For each item the procedure to be followed is given, and failure to follow it would invalidate the exercise. For example, in item 16, without having first established that the child knows the objects, the task of comparing cannot properly be undertaken. The procedure for rating the responses is also given. As early as 1894-5, in "La Mémoire des Mots" and "La Mémoire des Phrases", Binet practised a qualitative analysis of errors in memory, which helped to show the processes involved in memorizing meaningful material. In "La Suggestibilité" Binet proposed some means of measuring or showing degrees of suggestibility. Attention to the type of error made thus enables responses to be graded, and this is recommended with regard to item 18, where reproduction of the figures may be either perfectly exact; inexact, but following the model; or bears no resemblance to the model. A scoring method of degrees of correctness is also given for items 22 and 28. For item 29 (paper- cutting), it is simply indicated that the degrees are easy to determine! For item 25, the gapped exercise, the degrees of correctness or acceptability of a reply (missing word) is left to the tester to determine. It is probably for this item that the need for qualitative analysis is most required: there are "all degrees", and Binet indicates four types - good; bad; of wrong meaning; and absurd. For item 27 Binet indicates that interpretation is generally easy because "on sait déjà a peu près à qui on a affaire" - you already know the person that you are dealing with. Another caution is put forward with

regard to type of error made: - for item 11 one must be careful to distinguish between an error made through lack of attention or adaptation and an error of judgement.

The Social Psychology of the Scale

Binet and Simon's Scale outlined here and its administration contrast sharply with the impersonality of the mental tests as discussed earlier in Chapter 9. In this first scale the tester and child are involved in an interactive situation more personal than that of a Reagent or subject with the experimenter in a mental test. Obviously tester and testee are not in a symmetrical relationship with regard to power; but sensitivity to the feelings of the child or the patient in pathological cases has been gained through experience of interviews in clinical situations and in experiments carried out in schools. Binet and Simon were aware of their authority, as perceived by patients and children, and Binet saw that this authority could affect performance; he was very much aware of the influence of the context as well. In the case where they tested army recruits they found that the austere military hall and the intimidating presence of their superiors must have accounted for the nervousness and the absurd responses that they had from some of the soldiers (1911,pp.133-4)

Concerning context, Binet had already noted earlier that context and composition of a group could affect performance by a process of contagion. When, on the other hand, the child is alone, the slightest event - eg. the sight of a fly, a cock crowing or a door closing can distract a child (1905c,page 215). Through experience with his own children, Binet came to be familiar with young

children's behaviour and to make allowances, particularly for inattention and distracability. As in clinical interviews, patience and gentleness were needed. The term "douceur" is a reminder of Pinel's method, "la voie de douceur" - the gentle way as a means of therapy. In the Scale this method acts as a means of encouraging the child. To overcome the unwanted effects of authority, Binet makes one or two general recommendations: on first meeting the tester, the child should be reassured by the presence of a known person ; that the child should be greeted in a friendly way, shake hands and be asked to sit down. The outcome of the test depends upon the good will of the child and on his cooperation. In this sense, the tester is in the subordinate position, though this might not be perceived by the child whose fear of the authority figure results in timidity and embarrassment which shows itself in "mutisme" - (stubborn) silence. Binet had observed the effects of these emotions also in the children's rationalizations, for example, for explaining why they made errors of judgement. (see "La Suggestibilité",1900). It seems therefore, that Binet and Simon probably did what they could to attenuate the unwanted effects of authority thus setting up a silent negotiation between the tester and the child. This testing method, implicating human relations is a basic component of the Scale, in addition to the content of the items.

A long article in L'Année Psychologique (Binet and Simon, 1905,c) followed the publication of the Scales, and in this the authors described how the tests worked in practice, using normal, hospitalized abnormal and abnormal children in schools. Their aim was to establish what we would call external concurrent validity ("légitimer"), for in some instances their results were compared

blind with Vaney's ratings of children's achievement. In order to make some analysis of the test results, they categorized intelligence into three sections:- 1. memory; 2. sensory intelligence; 3. abstract and language based intelligence. As well as calculating the child's age level, the testers could also see where the child's strengths and weaknesses lay. Together with observations of the child's behaviour they could produce "petites biographies psychologiques" or observations. (see Appendix 9 for three examples) On some of the items children were asked about their own performance: was it all right? - ça y est?, or not? - ça n'y est pas? Presumably they were looking for indications of self-criticism, for the child who was too "optimistic" was the one who had a deficiency in this respect.

The whole article illustrates the patience of the testers in their careful and detailed observations and analysis of the responses made.

THE SCALE, OF 1908 (see Appendix 7 for the French Version)

The 1905 Scale was found to be adequate for a diagnosis of the abnormal; and it was not expressedly designed to find the levels reached by normal children. It showed that idiots could not go beyond item 6; that imbeciles could not go beyond item 15; and "débiles" mostly not beyond item 26. The limitations of this first Scale were apparent to Binet and Simon. Its standardization was inadequate for only 10 children at each of the five age levels (3, 5, 7, 9, and 11) were tested, these children being rated by their teachers as having average intelligence.

It is therefore, not surprising that Binet wished to modify, extend and improve standardization for the purpose of providing a revised version. It has been judged, for example, by Theta Wolf (1973), that the 1908 Scale represented a radical revision of the 1905 one. In a sense that was the case, for Binet and Simon were ready to make modifications based on their own critical judgments.

The changes they made in order to produce the 1908 Scale show a shift of focus related to their new objective, that of finding the measurement of intelligence among normal children at different age levels, and hence the title "Le Développement de l'Intelligence". Certain items from the 1905 scale were dropped: - numbers 30; 28; 27; 25; 23; 13 and the first six items. Age levels for the items were suggested, ranging from ages 3 - 13, but with the number of items to each age varying from 2 to 8. The items retained from the 1905 scale were the naming of objects, the comparison between two weights and two lines, the paper-cutting exercise, putting three words into a sentence, and finding three rhymes. New items include copying a square, a written sentence, a triangle and a diamond ("losange"); doing the "patience game" of putting two pieces together, and counting.

Other items were modified and/or extended. For example, the repetition of digits (digit span) item came to be included four times, 2 digits at age 3; 3 at age 4; 5 at age 7; 7 at age 12. This increase thus samples the development of immediate memory and power of attention. Similarly, memory for sentences is assessed in more items (4) from those of 6 syllables at age 3 to 26 at age 12.

Another mental operation that is sampled developmentaly now is that of definitions. In Binet's 1890 a, paper it was seen how he amply illustrated the young child's way of defining with reference to use and personal experience. At age 6, an item tests definitions according to use, and at age 9 definitions superior to use is tested; and finally, at age 11 abstract definitions are required. Another mental operation which has three defined stages of development is the description of a picture. At age three the child enumerates objects; at age seven the child can describe; at age twelve he interprets. This latter test is derived from "Description d'un Objet" as an example of a test in La Psychologie Individuelle. (1897). The inclusion of items on counting can be traced to the 1890,b article. Here Binet in devising simple experiments on very young children found that the child could not count. The ability to count depended upon an operation involving abstraction which developed later. Hence counting is tested at age 5, at age 7 twice, and at age 8 where the digit exceeds the number of coins. At the same age counting backwards from 20 is tested.

The 1908 revised version therefore samples five mental operations developing (or developed, as in the case of counting) over the age period of 3 to 13.

The gapped verbal exercise based on Ebbinghaus' test (item 25 in 1905) was replaced by an incomplete figures test for age 7. Items were included relating to the child's sense of self and to common or general knowledge - naming coins, giving dates etc. The knowledge of one's own surname (age 3) was suggested by Dr.Blin of Vaucluse. These items were extra-scholastic, and probably related to Binet's

changing view of intelligence in which the adaptive element was more emphasized, enabling a person to cope with requirements of everyday life. Therefore, a child would be judged as showing some intelligent behaviour if this general and useful knowledge had been acquired.

This revision involved Binet and Simon in a great amount of work, by the extension of the items to 56. All items were standardized at various age levels, using about 300 children in all between the ages of 3 and 12, and tested within 2 months of their birthday. Each child was assigned to a level on which he passed all the tests except one. Above the level where all tests are passed one year may be added for a further 5 test items passed; for ten extra items two years may be added, and so on.

The testers noted that out of 70 children tested, in not one instance had a reversal of order been encountered; and that all the children were found to have different intelligence levels. (We would interpret this today as two criteria for validation: that the test items discriminated between individuals, giving content validity; and that the hierarchy was correctly ordered or ranked, thus providing construct validity. The term used by Binet was "confirmation expérimentale de l'ordre que nous avons établi dans nos tests", page 71)

The testers' comments on various items and how the children performed on them provides us with further understanding. On analysis they found that items could be placed into four groups. In group 1 - the naming of colours, days of the week etc., they found

some precocity: they attributed this to knowledge gained in the home and/or at nursery school through memorization. Items in group 2 did not rely on knowledge. These were arranging weights, definitions superior to use only, abstract definitions and interpretation of pictures. Group 3, consisting of counting backwards, of putting words into sentences and remembering from reading showed no precocity. Into the last group fell one item only, the rank ordering of weights. This was the test most often failed, and the testers attributed this to the existence of something independent - but they did not specify - of the other test requirements.

In summary, Binet and Simon asked themselves what the Scale measured, and concluded that it measured a composite of: 1) Intelligence, pure and simple; 2) possible extra-scholastic achievement precociously; 3) scholastic achievement "on time"; and 4) language and vocabulary learned at school and/or in the family. In answer to the question about the intelligent but unschooled child, intelligence would be detected by memory span; ranking of weights; reproduction of sentences; paper-cutting; interpretation of pictures etc. - all of which tested "intelligence native". On the other hand, the "débiles" cannot succeed in ranking weights; answering difficult questions; putting 3 words into a sentence; defining abstract terms; interpreting pictures or finding rhymes.

Binet and Simon cited two items in particular that they valued highly. The first was for describing and interpreting a picture at ages 7 and 12 respectively. The other, at age 8 was reading for recall. ("lire un fait divers avec conservation de 2 souvenirs) This task of reading a short news item was to confirm that the child

could read; to test speed of reading and for analysis of errors made. It was found that at age 8 nearly 100 per cent could recall two items, and that this was rarely found at age 7. It is interesting to notice that Binet's foot-note to the Scale includes a point of self criticism: that others wishing to improve on the Scale would eliminate more severely the tasks which were influenced by learning ("instruction"). In fact, Binet eliminated this test item from the last revised Scale of 1911 himself!

The empirical nature of the test items is illustrated with reference to the following tests. At age 7 a child is required to copy a triangle and a diamond ("losange"). The latter was invented at a hospice where it was found that imbeciles could copy a triangle, but not a diamond. With reference to the digit span test, they had not expected that it would require a passage of four years (ie. from age 3 to 7) for an increase in immediate recall of 2 digits; and again five years (age 7 to 12 for the recall of 5 digits to increase to 7) By a priori or intuitive estimation they had not expected either that most children of age 6 could not count their own fingers. It was therefore put at the age 7 level.

These comments also illustrate how Binet and Simon noted the different rates of development of the various mental operations over childhood. It was no doubt on the basis of such observations that Binet insisted that the age levels did not provide a measurement in a mathematical sense. We could describe the Scale by analogy to a ladder whose rungs are unevenly spaced.

THE SCALE OF 1911 (See Appendix 8 for the French version)

The 1911 Scale appeared under the authorship of Binet alone, but he offered thanks to four Head teachers, including Vaney who had helped him to make the modifications to the 1908 Scale. In fact most of the items remained unchanged: the tests up to the age of 6 stood as they were. The main changes involved the transfer of items to a later age, because they had been found too difficult at the level prescribed in 1908. For the age level of 15 all items had been previously at age 12. Copying a sentence and dictation were dropped too, probably because they were deemed to be scholastic. On the other hand, 2 items from the 1905 Scale were reinstated: copying 2 designs from memory, and resistance to suggestion Two new test items were added and assigned to the adult level: giving 3 differences between a monarch and a president; and summarizing a passage from Hervieu, published in the Revue Philosophique. The other 3 items in the adult level were transferred from the age level of 13 of the 1908 version.

While the content of the Scales varied as a result of further testing to standardize and validate the Scales, the principles underlying them and the method prescribed for their administration remained the same. The tasks set by the items were diverse in order to sample the many aspects of intelligent behaviour; they involved the tester and testee in a one-to-one situation in order for the tester to make as full a diagnosis as possible. This involved allocation of degrees of correctness of responses and by noting the subject's behaviour in responding (See below)

The observations made about the social nature of the 1905 Scale applies equally to the two subsequent revisions. But one further aspect of Binet's practice needs to be elaborated and shown how it underlay the tests he formulated.

Binet and Introspection

According to Simon in 1968, Binet's genius lay in the way that he modified and used introspections. Elsewhere (1991), I took as a starting point Simon's judgement to look at Binet's claims and practice. Binet claimed that introspection was the basis of psychology (See also Chapter 5). This claim does not seem exaggerated when it is considered in conjunction with Binet's broad interpretation of both introspection and the nature of the stimulus in the psychological experiment. The stimulus (generally referred to as the "excitant" or later as the "inducteur") was extended by Binet to include language. For example, when he wanted to elicit an image in the thought process of A, or M, he presented them with a word - eg."tempete" (storm), and they reported their responses, namely their introspections. In this case, the experimental procedure is reduced to the manipulation of a stimulus, and what becomes important are the introspection and how this is interpreted by the questioner. For in these cases the experimenter's role is modified into that of a questioner and interpreter. This is no doubt what Simon had in mind when he referred to Binet's method of "introspection provoquee" or "la methode du questionnement". This method is embodied in the test items which ask for definitions, absurdities, differences etc. Furthermore in infuses the whole tone of the Scales: the tester or administrator prompts or elicits behaviour which can be observed and interpreted.

It should also be noted that in the intervening years from 1905 to 1908, Binet and Simon learned what they thought to be important lessons from their experience in testing. Moreover, they wanted to pass on their experience. The strong recommendations about administration of the tests reflect this wish. They suggested that about 5 to 6 sessions, testing a total of 20 children were needed in order to pass a sort of apprenticeship; that one should solve the problem of diagnosis alone, that is, without recourse to other information about the child; errors were seen to be unavoidable, but with self criticism and patience, the tester would gain a well-founded confidence; finally, the tester would come to appreciate his power and its limitations ("le sentiment de son pouvoir, et aussi celui de ses limites",1908,page 58).

In addition to the lessons learned through practical experience, other work undertaken by Binet and Simon between 1905 and 1911 seems to have effected a change of emphasis in Binet's conceptualization of intelligence, and brought a clarity of vision concerning the differences between the normal and the abnormal. These will be considered in the next chapter, together with the reactions of other psychologists whose interest lay in the psychologieal measurement of intelligence.

CHAPTER 12: INTELLIGENCE (2)

In 1909 in "L'Intelligence des Imbéciles" Binet took up the notion of thought again, this time without reference to coordination, but by analysing it into its three distinctive elements:

> "La pensée,à notre avis,se compose de trois éléments distincts, une direction une adaptation et une critique"
> (page 128)
>
> In our opinion thought is composed of three elements,direction,adaptation and criticism.

"Direction" refers to the ability to judge what is relevant or the issue in question, to hold this in mind, and sustain it; "adaptation" involves choosing appropriate aims, and "critique" refers to a process of censorship. Binet elaborated on the last two elements. He seemed to be equating adaptation with thinking, with the latter consisting of constantly choosing ("penser c'est constamment choisir" (loc.-cit.) The abnormal is characterized by a paucity of effort in choosing and trying out, as for example in doing a sort of simple jigsaw puzzle (jeu de patience) and in describing a picture. The term "critique" was also termed "correction"; Binet commented that "jugement" was the psychological term, while "auto-censure" was the clinical. It may be recalled that Binet had already noted and commented on the impetuous and inappropriate responses of the "débiles" which points to their lack of self criticism. He termed the source of this behaviour "n'importequoisme" - anything will do!

In the same year in the first edition of "Les Idées Modernes", a book designed for a wider readership than most of his other work, Binet reiterated some definitions of intelligence and maintained that intelligence could be defined by four words - "l'intelligence tient dans ces quatre mots", and they were "invention", "compréhension", "direction" and "censure" (1911 ed. page 118) This definition has some similarity with the thought schema, although the one cannot be mapped directly onto the other. What they have in common is that they denote action. Binet used this new schema as a way of identifying the mechanism involved in mental development, and to distinguish superior from inferior intelligence. He pointed out that these elements could be represented by the "facultés" and that the schema of thought represented action, with adaptation in particular transcending the notion of faculties. Moreover, he intended the schema to be viewed as performing a function:-

> "C'est,peut-être,dans ce dernier mot, celui de fonction, que réside la principale originalité du schéma nouveau de la pensée." (page 145)
>
> It is in this last word, function,that the principal originality of the schema of thought resides.

At this point one could refer to Binet's earlier references to comprehension on which he elaborated in "La Psychologie Individuelle" (see Chapter 8) and in the earlier studies of memory (Chapter 7) or in "Les Idées Modernes", Chapter 6.

In 1910 Binet and Simon published "L'Arriération" -Retardation - in L'Année Psychologique. In this work are reported several studies of mental deficiency, mainly in adults. Comparisons are made between these adults, aged between 25 and 30, and children of normal intelligence, aged 5 to 6. They found that the two groups answered questions in similar ways; but the differences that they displayed led the authors to describe development in the following metaphor:

> "Tout être qui se développe est comme un flot qui bat contre une barrière, avant qu'une structure nouvelle soit acquise,qu'un certain acte soit devenu définitif,l'organisme fait une foule d'efforts d'apprentissage."
>
> (page 357)
>
> The developing human being is like a wave that beats against a barrier; before a new structure can be acquired,before a certain act is truly accomplished the organism makes a great number of efforts in its apprenticeship.

This description brings to mind a Piagetian type of development involving a restructuring and reorganization of the intellect; but Binet's dynamic model emphasizes the child's efforts.

In addition Binet reasserts a non-equivalence between the feeble-minded adult and the child with reference to the differences in their personal perspectives: the normal child might share the same mental level as an adult abnormal or ament, but they differ in that the abnormal has not enjoyed the same past and does not prepare for the same future ("n'a pas joui du même passé et...ne prépare pas le même avenir", page 360). The preparation for the future is made through play, and Binet points out that lack of play activities characterizes the abnormal.

Conclusion: Tensions

On the whole, Binet took an optimistic view with regard to progress in skills and mental activities. He pointed out that whenever a task can be measured there is always an upward curve ("une courbe de progres, 1911,page 142) Yet he noticed and admitted that a point comes where progress is practically reduced to zero: a limit has been reached, for there is a limit and that is indisputable - "on a atteint sa limite, car il y en a une, c'est incontestable" (loc. cit.) Yet Binet did not seem to entertain the idea that intelligence was fixed, for that leads to a label and can invite "un pessimisme brutal" - and here Binet was referring to the harsh judgements that could be made with regard to the children who needed special teaching. Moreover, his proposal of mental orthopedics described in "Les Idées Modernes" testified to his optimism.

A second tension can be found between Binet's proposal of some kind of mental unity and the multiplicity of its functions (page 117). He wished to find some organizing or synthesizing principle guiding intelligent behaviour in different situations. This idea does not sit easily with his growing recognition of aptitudes that may be more or less independent of each other, or of a guiding principle. Moreover, he described human beings as "bundles of tendencies"; these tendencies, together with aptitudes account for differing performances of individuals in the test items. However, as we shall see, Binet preferred to tolerate this tension rather than commit himself to a theory which would explain the existence of a general intelligence or of independent functions. One becomes accustomed to the fact that Binet's concepts and definitions of intelligence

shift, merge into each other, overlap, and in which different components receive different emphases as his conceptualizations evolved.

REACTIONS TO THE INTELLIGENCE SCALES

Binet's views on intelligence came to be, and are generally judged by his Scales, rather than with reference to definitions scattered in his various works. So it is appropriate to look at the various reactions that his Scales provoked.

How did Binet himself judge the worth of the Scales,and how did he perceive his achievement?

In 1908 Binet and Simon wrote: "Nous sommes loin de prétendre que ce sont les meilleures..." we are far from claiming that they are the best. But in the following year concluded that:

> "... ce n'est pas que la méthode est parfaite;mais c'est bien la méthode qu'il fallait employer"
> (1911,page 125)
>
> It is not that the method is perfect but it is certainly the method that we had to use.

In other words, he felt that the method they had used was the correct one, presumably for pragmatic reasons, and because they were preferable to impressionistic and subjective judgments of intelligence. Moreover, he had witnessed the failure of other tests (see Chapter 9) and because their own Scales had shown some practical worth. Binet and Simon pointed out that no etiological suggestions were attached to the Scales; nor did they provide any

prediction of future intellectual performance. They gave only an estimate of the present level of intellectual functioning. Nor was the age level a measure in the arithmetic sense, given that children's development was uneven. What the Scales provided therefore, was a hierarchical scale, a classification based on age levels only, and not providing a label to be attached to the child. Binet felt that if the Scales were seen to provide a label, there was a danger that this diagnosis might be taken as definite and fixed.

It has been suggested that Stern was one of the first to react to the Intelligence Scales, and this was because he was already cognizant with Binet's work. Like Binet, Stern was interested in individual differences and in defining an area of differential psychology and giving it the status of an independent theoretical problem (cited by Fancher, 1985, page 99, as a "psychological problem"). Stern and Binet shared similar views in that Stern maintained that "there never is a real phenomenological equivalent between the intelligence of two persons" (cited in Fancher,page 101). Nevertheless, test scores could be taken seriously because they denoted a functional or telelogical equivalence. Stern replaced Binet's concept of a mental level by a mental age ("Intelligenzalter") which could be compared with the chronological age, for he noted that these two did not progress pari pasu. He suggested that the ratio between mental level and chronological age provided a measure of intelligence. Terman's idea of multiplying this ratio by 100 to express an intelligence quotient (I.Q.) was quickly taken up. This contravenes Binet's conception of his scales as an hierarchical classification. An account of the use made by

researchers and testers of Binet's Scales can be found in Gould's "Mismeasure of Man" (1981, Chapter 5) where, with apparent outrage, and in defence of Binet he described the "dismantling" of Binet's intentions in America.

Terman was impressed by the Scales, and his first revision of these, the Stanford-Binet version was published in 1916. He recognized that "one of Binet's sources of success was that he had abandoned the old laboratory approaches for the more dynamic method." (1961, page 18) One of the more dramatic reactions to Binet's Scales came from Charles Spearman, who, like Stern probably anticipated the appearance of this work.

Binet and Spearman

Binet did not claim a theoretical breakthrough for his Scales: he saw himself as an experimental psychologist who on principle, avoided a theoretical position, and was critical of those who worked on a priori bases. Binet was reluctant to commit himself to a theory of intelligence. Theta Wolf(1973) for example, pointed out that Binet's work left a theoretical void which was crying out to be filled. The most prompt response to fill this void came from Charles Spearman (1863-1945), who published near the end of 1904 two articles in the American Journal of Psychology. These were "Proof and Measurement of the Association between Two Things" and "General Intelligence objectively determined and measured". In these two papers Spearman set out his position, which was fundamentally different from Binet's in ways that will now be considered.

The starting points were different in that Spearman held a theory of science that was defined by the presence of Uniformities of two kinds, functional and conceptual. According to this view, conceptual uniformities might be revealed through introspections (in psychological method), but Spearman deemed them to be "lamentably fallible" (1904 a). On the other hand, functional uniformities might show themselves in what he called tendencies. Spearman believed that it was the task of "Correlational Psychology" to determine psychological tendencies, and in particular those which connected "mental tests" with psychical activities of a more general nature. Binet did not adhere to a theory of science which admitted uniformities; rather, he was attached to a general positivist position which encouraged commitment to a scientific method, primarily of experimentation. Correlational Psychology, in Spearman's terms, was therefore to be used where possible, to demonstrate the functional uniformities in psychical activities. Spearman also had the ambitious project of being able to measure intelligence as a way of justifying experimental psychology. In contrast, Binet did not propose the search for a measurement of intelligence as a means of justifying experimental psychology: his work in experimental psychology was already justified as a means of identifying individual differences - these being most marked in personality,intellectual styles and in the higher mental processes. Moreover, he hoped that one day all experimental psychology could be used in the service of finding these differences. It follows from this that the measurement of intelligence would be achieved through a method of diagnosis of the individual subject, based on performance on the test items of the Scales.

Correlational Method

In 1896 Binet and Henri proposed a rank order correlation formula to investigate the relationship between memory and intelligence as estimated by teachers. Binet also used correlational studies on anthropometric data with a view to finding, not only their interrelationships, but also the relations between these measures and intelligence. Binet, like Spearman and others (eg. Bolton,1891) used teachers' ratings as criteria of intelligence, pending the discovery of a scientific method of measurement. Although Binet continued to investigate possible physical and mental relationships after the Scales had been developed, these were -according to his own explanation - a way of pointing out difficulties and deficiencies to those who might still be committed to their possible explanatory power. Correlational studies for Binet were therefore mainly of a provisional interest with regard to intelligence, a useful method, but with limitations. In fact, by the beginning of 1905 Binet was of the opinion that correlational studies, as well as being popular, were a lazy way of carrying out investigations. Furthermore, he repeated his criticisms by pointing out that:

> "malgré toutes les promesses de ces recherches,elles donnent jusqu'ici des fruits assez mesquins."
> (1905,a,page 72)
>
> In spite of all their promise,these researches have up to now produced very little.

For Binet, moreover, this methodological tool was not grounded in theory, as was the case with Spearman. For Spearman, performance in school subjects, teachers' ratings and the opinions of the children's peers provided measures of psychical activities of life

outside the Laboratory. The correlations between these real life measures and those on performance on the sensory tests in the Laboratory would provide evidence of functional uniformities through the connections between the types of data they produced. Hence correlations would demonstrate the function of "general intelligence", or as Spearman termed it, "g". Inspired by Galton, Spearman carried out a study on boys from an "upper class preparatory school". He used class ranks in three school subjects, Classics, French, Mathematics and a composite of other subjects taught in English. In addition he corrected the ranks to counteract the influence of age. The resulting correlations were presented in a matrix which shows an hierarchical order of correlation coefficients (see Appendix 5). All correlations are positive, and from the different average level of correlation Spearman inferred that different school subjects were differently saturated with "g". Subjects with low "g" contribution owed their high performance measures to some specific requirement of the task which Spearman later termed "s". These inferences led him to develop his two factor theory of intelligence in which "g" represented a general mental energy of which some is relegated to other groups of neurons and determines performance on specific tasks. No more detail about Spearman's theory or method is needed to illustrate the basic divergence between Spearman's and Binet's ideas and methods. This divergence is shown by Binet's criticism of the so-called Laboratory or mental tests - that they were liable to error, and revealed very little about individual differences. What Binet ignored, or chose to ignore, in his review of both Spearman papers (1905 e.) was the theoretical basis of Spearman's correlational studies. In Spearman's view, surely, the relative lack of individual

differences shown by mental tests would not have invalidated his method: provided that high functional relationships were found between the measures of intra and extra laboratory activities to support the theory, minimal individual differences in mental test performance could be ignored.

Given the differences between Spearman and Binet's positions, it is not surprising that they each viewed the story of mental testing up to 1901 in divergent ways. For Binet, Wissler's failure to find correlations was symptomatic of the general failure of such tests, a failure which added fuel to his own conviction that mental testers were using the wrong kind of test. Spearman, on the other hand, was amazed that other psychologists had not been disturbed by the very low correlations they found. Spearman needed the demonstration of high correlations in order to boost his theory. The problem was partly solved by Spearman's proposal of a correction formula which compensated the attenuation of the correlation coefficients resulting from error and variability in the administration of the tests.

With regard to Binet's Scales, Spearman admitted that they were successful in measuring intelligence. He attributed their success to the fact that the test items all showed positive correlations. Presumably he used this as evidence to support his theory of general intelligence. Binet's reaction to Spearman's conclusion was that the tests were bound to intercorrelate because each test included more than one mental operation. Their views on the value of what psychologists in the study of intelligence were doing also contrasted. Binet perceived a superfluity of correlational studies

made often on the basis of tests which were hurriedly executed and not replicated. Spearman commented that Thorndike, like Binet were using hotchpotch methods without knowing why. Furthermore - and sounding bemused - Spearman added:

> "There was this curious spectacle of everyone enthusiastically adopting this hotchpotch procedure,and yet no one making even a pretence at understanding why he did so."
> (1930,page 325)

The differences between Binet and Spearman ran deep. "Hotchpotch" for Binet was the requirement of a variety of tests in order to sample the many manifestations of developing intelligence. For Spearman the content of tests was less important provided that the functional relations could be found between performance in real life tasks (mainly scholastic) and those tested in the laboratories; and Spearman held on to this position. For Binet, on the other hand, correlational studies of performance on tests with ratings of intelligence had become superseded or made redundant once his "scientific" measure of intelligence had been found. A simple remark that Spearman's psychology was theory-led while Binet's was led by observation (in its widest sense) still does not encompass their divergence. For Spearman psychology was legitimated as scientific because it presupposed underlying uniformities of mental activity which the application of statistics could support. For Binet psychology was scientific by virtue of controlled experimentation. Statistics, in his view, should be used with caution for they tended to produce spurious precision. It was probably for this reason that Binet made only a rapid perusal of Spearman's article on "General Intelligence" (1904,b), and dismissed it as being crammed full of equations -"bourré d'équations" (1905,a).

It also becomes clear that Spearman had misunderstood Binet's work, accusing him of inconsistency in using the hotchpotch "procedure utterly discordant though it was with his cherished faculties" (1930, page 324).

Given the various conceptualizations of intelligence that Binet evolved, and which have been examined, it is not surprising that he did not formulate a theory of intelligence. It is therefore, even less surprising that he refused to commit himself by endorsing either Spearman's theory or Thorndike's: the former for his theory of a general factor, and the latter (Thorndike, 1903) for the proposal or rigorously independent "faculties". Binet's reluctance to commit himself to one party or another has been shown in relation to the Dreyfus affair. Binet claimed that commitment could be avoided this time by finding truths in the golden mean, which are unaffected by extreme positions "des vérités de juste milieu que de telles controverses laissent debout"(1911, page 242)

It is not the place here to examine further the nature of the debates, but to note that the publication of Binet's Scales generated them. What has been shown are some of the events, both public and private that account for Binet's contribution to the study of intelligence.

Conceptualizations and Theories in relation to Binet's Scales

Spearman admitted the practical value of Binet's and Ebbinghaus' tests - presumably he was referring to the "combination" test of the latter - while no doubt noting their lack of theoretical bases. It has been shown, particularly in the preceding chapter (11), that

Binet had not worked blindly in his experiments on mental operations. His observations led him to a conceptualization of intelligence as manifesting itself in a variety of tasks. On this conceptual basis the sum of performance measures on the test items indicated a provisionally defined level of intellectual functioning. Provided that there were sufficient items, the method was judged to be adequate because failure on a few items were compensated by success in others. It was Binet's remark that "peu importe les tests, pourvu qu'ils soient nombreux" - it matters very little what the tests are provided there are many of them - was probably the reason for his being judged as an instrumentalist, which he was not! He believed in the possibility of some organizing principle which directed behaviour, but he was reluctant to specify what this was.

Spearman interpreted the success of Binet's Scales by applying his method, and found that the items did correlate with each other, and those high in "g" and others low in "g" cancelled each other out. On the basis of this theory, high performance in Binet's test items could be attributed to good "g" and average "s" or to good "s" and average "g". In other words, for Spearman, Binet's success lay in the manner in which it embodied his own (Spearman's) theory of intelligence.

Binet refused to subscribe to such a theory, though he believed in the possibility of an organizing principle, together with some special abilities, or dominant orientations. He was aware of the tension between these two considerations, and felt unable to resolve it. Such a tension is resolved by the view of "g" as an energizing factor. Such an energy model may explain more easily the

existence of two factors, whereas the proposal of an organizing principle is more difficult to describe unless its precise operations can be shown.

The conceptual problem of intelligence was unresolved: for there was a tension between some directing element in mental operations and the notion that we are all bundles of tendencies ("faisceaux de tendances").In 1909 Binet's plans were to investigate the aptitudes of children, and their relative independence from each other. We might predict that Binet's findings would still provide no solution, given his propensity to suspend judgment and avoid clear-cut answers or theories.

CHAPTER 13: CONCLUSION

The focus of this study has been on the development of Binet's Intelligence Scales of 1905, 1908 and 1911 as a way of demonstrating his theoretical and empirical contributions to the study of intelligence. In Chapter 8 a tripartite system of analyzing different modes of conceptualizing individual differences was suggested. The first related to physical differences; the second to different personal styles of operating; and the third was mental testing. We can now briefly consider which mode Binet appeared to favour, and with which he appeared to be most comfortable.

It seems that Binet could not give up the hope that one day physical signs might be shown to relate to intelligence: his many anthropometric studies testify to his persistence. However, as a psychologist his preference was to study the totality of an individual, his personality, styles of thinking and intelligence. It becomes clear that from 1900 onwards Binet became more concerned about how psychology could be applied, particularly to solve educational problems. He became convinced of the need to find a diagnostic tool with which to measure the intelligence of children. The method of mental measurement that he devised departed nevertheless from the "mental testing" method a la Galton in both the content of the test items and in the social aspects of their administration. In a sense the Intelligence Scales represent a blend of the psychological portrait and the mental test. This is shown by Binet's insistence on interpretation after an analysis of the child's total behaviour over the test period, and is illustrated by

the portraits he made when applying the 1905 test items. (see Appendix 9). Perhaps in Binet's view the Scales were a compromise between these two modes of investigating individual differences. He was adamant that the mental level found by the application of the test items should not be issued like a ticket from a weighing machine! His reiteration of this point suggests that he may have had some foreboding about the misuse of his Scales. In any case, Binet and Simon did not believe that they had made definitive versions, but that others might wish to improve them.

Overview of Binet's Achievement: Internalist and externalist explanations

In the mesh of many interelated factors one tries to discern the strong threads, the factors or events that appear to have determined the final outcome, the measurement of intelligence. These threads were of four kinds, psychological, clinical, pedagogical and social. At the personal level, we saw in Binet the patient and dedicated experimental psychologist: his interest in experimentation; and the conviction that it leads to "truths", even if only partial or fragmentary, guided most of his research work. Concerning experimental psychology, Binet had a broad definition of what constituted an experiment, a stimulus and an introspection. Building a practice on his methodological principles led him to the following activities: qualitative analysis of data, grading of responses and observations of Subject behaviour in the experimental or test situation: in short, the ingredients of his test items. The personal situation of testing was derived from his clinical experience. When Binet applied this to a pedagogical situation the result was an "inter-view" (using Farr's term, 1991) ie. the social

definition or form of the child's performance in response to the tester's instructions. All this was a far cry from the impersonal mental test situation. Binet perceived this contrast. While Spearman recommended the simplicity of the laboratory testing, Binet scorned the modern method, alluding to their:

> "expériences sèches,étroites,partielles, bien souvent inutiles,imaginées par des gens de laboratoire qui n'ont pas le sens de l'école et de la vie,et qui semblent ne jamais mettre leur nez à la fenêtre du laboratoire."
>
> (1911, page341)
>
> sterile,narrow,incomplete and very often completely useless experiments,thought up by laboratory men who have no feeling for school or for life and seem never to have even looked out of the laboratory window.

Binet was a harsh critic of approaches that did not do justice to the individuality, complexity and intelligence of the Subject - approaches that he identified in the psycho-physical experiments and in the associationist explanation of mental life (eg. Taine). In other words, it was, so to speak, Binet's humanity and contact with individuals that also determined his method.

Some processes or events external (though related) to Binet's work provided the impetus that was needed for the production of the Scales. It has been discussed how the doctors had power in various domains, and how this power was seen as legitimate by the doctors, and also by those who held them in high esteem. Any problem concerning the abnormal was seen as belonging to their province. When the specific problem of the abnormal children in existing

schools arose, this was considered to be a matter of medical concern, and became the responsibility of the Minister of the Interior.

Ultimately two major shifts were effective in dislodging - to some extent - the site of power in this matter. Firstly, as we have seen, responsibility for the abnormal in schools was transferred to the Minister of Public Instruction (Education). The problem then became, by definition, an educational or pedagogical one. The second shift was brought about by Binet: he had introduced to the Société Pedagogique his method of psychological experimentation. Thus when the Société was addressed by the Minister with a view to appointing a Commission, Binet and Henri could define the nature of the diagnostic tool - a psychological one. In this sense therefore, Binet effected a shift of power away from medical to a psychological diagnosis.

The two types of explanation outlined above relate respectively to internalist and externalist approaches to the history of science.

The focus of this study has not diminished the task of explanation which entails an account of cultural context, in terms of politics or power relations, institutions, frames of reference and language. This methodological principle has been followed, and accounts for the inclusion of sections devoted to them, together with the influence of events and cultural factors on Binet's life. The relativistic view which is implied in externalism, accounts for the various cross-cultural references and differencies that have been noted. Binet has been compared with Wundt in relation to his view of

psychology as a science; with Ebbinghaus as they both contributed to the experimental study of the higher mental processes; with Galton as they both became engaged in testing; and with Spearman in the way that each reacted to the other's work. Comparisons have helped to highlight the specifics of Binet's approach and achievement. In these comparisons cultural differences seemed to contribute more or were easier to identify than personality factors!

Finally, an externalist approach accommodates speculation. In this matter we may refer to Binet himself, and how he perceived the situation:

> "Sans doute,nous serions restés longtemps dans le statu quo des tests fragmentaires, si nous n'avons pas été obligés...dans un intérêt véritablement social,de faire des mesures d'intelligence par la méthode psychologique." (1911,page 124)
>
> Doubtless,we would be still in the status quo of fragmentary tests if we had not been obliged,in a truly social cause to produce some measurements of intelligence using a psychological method.

An internalist approach requires a close study of, and emphasis on the content of the scientific work itself. For this reason, the specific elements in the genesis of Binet's work and the product itself have constituted a substantial part of this study: it has to be made as clear as possible the nature of the achievement. To this end, some of Binet's work preceding the Scales, together with an examination of the test items themselves, have been described in some detail. Externalism and Internalism as guiding principles in

the history of science are usually put forward as opposing methods. In this research the two principles have been followed, but it is felt that a balance has been achieved.

Research on Binet

Theta Wolf's biography of Binet is, I believe, the only existing one in either French or English. For this study, no attempt has been made to give such an extensive account of his work and life. There are disadvantages to the biographical method, particulary with regard to explanation of achievement. For the biographical approach is prone to the distortion caused by trying to trace chronological line. For example, in Brett's "History of Psychology"(1923) the following statement illustrates this distortion:

> "The transitions which mark the different stages of Binet's career have an obvious logical sequence." (Page 252)

The obvious logical sequence is only there if one neglects to take into consideration Binet's wide ranging interests, often pursued in parallel, and also resumed at later dates. In Wolf's account the peril of finding a smooth sequence in his career is avoided, for she points out the discontinuities in his life and work. Nevertheless, her claim that "Such a study (of his career) also clarifies the influence of social forces" (page 113) is not substantiated. Context and social factors are often underplayed in a biography unless it is a very comprehensive work. A biography per se does not necessarily entail the inclusion of social factors.

On the other hand, undertaking a research topic which is limited in its scope, has the advantage of not requiring a chronological order and allowing some aspects of the topic to be presented in depth. The research reported here is, in no way, a kind of shortened version of a biography; it is intended to complement other work on Binet that has been referred to.

In order to explain Binet's contribution to the study of intelligence, the research field was broadened to encompass the many aspects relating to Binet as an experimental psychologist and pedagogue. More attention has been paid to the social world that Binet inhabited; to the intellectual traditions that he inherited; his predilections and reading; and his experiments in schools. Cross-cultural references and comparisons with psychologists and testers contemporary with him have thrown light on the nature of Binet's psychology and its practice. It is further explained how, given the impetus for constructing the Scales, he could turn to the results of his earlier experiments and ideas, and together with Simon, in difficult circumstances, fulfil the Ministerial Commission within a period of six to seven months.

While this account is complementary to other work on Binet, it is felt to be both more comprehensive in terms of explanation, giving more detail of the social factors which are missing from other accounts. Accuracy and detail have shed light on the many aspects which explain the genesis of the Scales and Binet's contribution to the study of intelligence.

REFERENCES

"Bulletin" refers to the "Bulletin de la Societé Libre pour l'Etude Psychologique de l'Enfant" (which in 1911 became known as the "Société Alfred Binet" and in 1962 the "Société Binet et Simon")

Abse,D.W. (1987) Hysteria and Related Disorders, 2nd edition, Wright, Bristol.

Avanzini,G. (1969). Alfred Binet et la Pédagogique Scientifique: La Contribution de Binet à l'Elaboration d'une Pédagogie Scientifique Paris:Vrin.

Avanzini,G.(1974).Ecrits Psychologiques et Pédagogiques de Binet. Toulouse:Privat.

Barnes,B.and Edge,D. (eds) (1982), Science in Context, Open University Press.

Benjamin,L.T.,Jr. (1988) A History of Psychology: Original Sources and Contemporary Research, McGraw-Hill Book Co.

Bergson,H. (1880) Essai sur les Données immédiates de la Conscience translated as "Time and Free Will" (1910)

Bergson,H. (1896) Matière et Mémoire, Paris:Alcan.

Bernard,C. (1865) L 'Introduction à la Médecine Expérimentale

Bertrand,F.L. (1930) Alfred Binet et son Oeuvre, Paris:Alcan.

Binet,A. and Féré,C. (1885) L'Hypnotisme chez les Hystériques: le transfert, Revue Philosophique, 19 pp.1-25.

Binet,A. (1886) La Psychologie du Raisonnement, Paris:Alcan.

Binet,A. (1887) La Vie psychique des micro-organismes, Revue Philosophique 24 449-489, 582-611.

Binet,A. (1888) Resumé of Balbiani's lectures on "Les Théories modernes de la Reproduction et de l'Hérédité", Revue Philosophique 26, pp.529-559.

Binet,A. (1889) On Double Consciousness, Chicago: Open Court Publishing Co.

Binet,A. (1890,a) Recherches sur les Mouvements chez quelques jeunes enfants, Revue Philosophique 29, pp.297-309.

Binet,A. (1890,b) La Perception des Longueurs et des Nombres chez quelques jeunes enfants, Revue Philosophique 30 pp. 68-81.

Binet,A. (1890,c) Perceptions d'enfants, Revue Philosophique 30 pp.582-611.

Binet,A. (1892) Les Altérations de la Personnalité, Paris:Alcan.

Binet,A.(1893) Les Grandes Mémoires: Résumé d'une enquête sur les joueurs d'échecs, Revue des Deux Mondes, 15 pp.826-860

Binet,A. and Henneguy L. (1894) La Psychologie des grands Calculateurs et Joueurs d'échecs, Paris:Hachette.

Binet,A and J.Philippe, J.Courtier, V.Henri (1894) L'Introduction à la Psychologie Expérimentale, Paris:Alcan.

Binet,A. and Henri,V. (1894,a) Recherches sur le Developpement de la Mémoire visuelle des Enfants, Revue Phisosophique 37, pp.348-350.

Binet,A. and Henri,V, (1894,b) De la Suggestibilité naturelle chez les Enfants, Revue Philosophique 38 pp.337-347.

Binet,A. and Henri,V. (1895,a) La Mémoire des Mots, L'Année Psychol. 1 pp.1-23.

Binet,A and Henri,V. (1895,b) La Mémoire des Phrases, L'Année Psychol. 1 pp.24-59.

Binet,A. and Henri.V, (1896) La Psychologie Individuelle, L'Année Psychol. 2 pp.411-465.

Binet,A. and Henri,V. (1897) La Psychologie Individuelle - Description d'un Objet, L'Année Psychol. 3 pp.296-332.

Binet,A. Courtier,J. and Vaschide,N. (1897) Five articles on the influence of several conditions on capillary circulation and blood pressure.

Binet,A. (1898) La mesure en Psychologie Individuelle, Revue Philosophique 46 pp.113-123.

Binet,A. and Henri,V. (1898) La Fatigue Intellectuelle, Paris: Schleicher Freres.

Binet,A. and Vaschide,N. (1898) La Psychologie à l'Ecole Primaire, L'Annee Psychol. 4 pp.1-14.

Binet,A and Vaschide,N. (1898) Corrélation des épreuves physiques L'Année Psychol. 4 pp.142-172.

Binet,A. and Vaschide,N. (1898) Corrélations des tests de force physique, L'Annee Psychol. 4 pp.236-244 (summary of pp. 1-235)

Binet.A. (1900) La Suggestibilité, Paris:Schleicher Freres.

Binet,A.(1902) La Croissance du Crâne et de la Face chez les normaux entre 4 et 18 ans, L'Année Psychol. 8 pp. 345-362.

Binet,A. (1902) La Mesure de la Sensibilité, L'Année Psychol. 9 pp. 79-128.

Binet,A. (1903) L'Etude Expérimentale de l'Intelligence, Paris: Schleicher Freres.

Binet,A. (1904,a) Les Frontières Anthropométriques des anormaux, Bulletin 16 pp.430-438.

Binet,A. (1904,b) Avis: La Commission ministérielle pour les anormaaux, Bulletin 18 page 506.

Binet,A.and Simon,Th. (1905,a) Sur la Nécessité d'établir un diagnostic scientifique des états inférieurs de l'Intelligence, L'Année Psychol. 11 pp.163-190.

Binet,A. and Simon,Th, (1905,b) Méthodes Nouvelles pour le diagnostic du niveau intellectuel des Anormaux, L'Année Psychol. 11 pp.191-244.

Binet,A. and Simon,Th. (1905,c) Application des Méthodes Nouvelles au diagnostic du niveau chez des enfants normaux et anormaux d'hospice et d'école primaire, L'Année Psychol. 11 pp.245-336.

Binet,A. (1905) Analyse de Spearman, "The Proof and Measurement of Association between two things" and "General Intelligence Objectively Determined and Measured", L'Année Psychol. 11 pp.623-624.

Binet,A. (1905) Allocution de M.Binet a l'Assemblée Générale de la Société Bulletin 16 nov,. no.27 pp.21-27.

Binet,A., Simon,Th. and Vaney,V. (1906) Le Laboratoire de la Rue Grange-aux-Belles, Bulletin no.30 pp.10-24.

Binet,A. (1906) Les Révélations de l'écriture d'près un contrôle scientifique, Paris:Alcan.

Binet,A and Simon,Th. (1907) Les Enfants Anormaux, Paris:Armand Colin.

Binet,A. and Simon,Th. (1908) Le Développement de l'Intelligence chez les Enfants, L'Année Psychol. 14 pp.1-91.

Binet,A and Simon,Th. (1909) L'Intelligence des Imbéciles, L'Année Psychol. 15 pp 1-147.

Binet,A, (1909,1910,1911) Les Idées Modernes sur les Enfants, (1911 edition used) Paris:Flammarion.

Binet,A and Simon,Th. (1910) L'Arriération, L'Année Psychol. 16 pp.349-360.

Binet,A. (1911) Nouvelles Recherches sur la Mesure du Niveau intellectuel chez les Enfants d'école, L'Année Psychol. 17 pp.145-201.

Binet,A. (1911) Le Bilan de la Psychologie en 1910, L'Année Psychol. pp.VII-IX.

Binet,Madeleine (1961) Souvenirs d'Alfred Binet, Bulletin no 503 pp.201-207.

Blin (1902) Les Debilités Mentales, Revue de Psychiatrie, août,(1902)

Bolton,T.L. (1892) The Growth of Memory in School Children, American Journal of Psychology, 4, pp 362-380.

Boring,E.G.(1963) History, Psychology and Science:Selected Papers, John Wiley and Sons.

Bowler,P.J. (1983) The Eclipse of Darwinism, John Hopkins University Press.

Buss,A. (1976) Galton and the Birth of Differential Psychology and Eugenics, J. of Hist. of Behav. Sciences pp. 47-58.

Brentano,F. (1874) Psychologie vom Empirischen Standpunkt vol 1, rep. Hamburg:Meiner 1955.

Brett,G.S. (1923) A History of Psychology vol.3. London;New York.

Castel,R. (1976) L'Ordre Psychiatrique: l'Age d'or d'Aliénisme, Paris: Minuit.

Cattell,J. McKeen (1890) Mental Tests and Measurements, Mind, 1890,15. pp.373-383.

Claparède,E, (1911) Alfred Binet et son Oeuvre, Archives de Psychologie 11, pp.376-388.

Clarétie,L. (1892) L'Université Moderne, Paris:Delagrave.

Clark,T.N. (1968) Emile Durkheim and the Institutionalization of Sociology in the French University System, European J.of Sociol. 9, pp.37-39.

Clark,T.N. (1973) Prophets and Patrons, Harvard University Press.

Cousinet,R. (1968) Souvenirs, Bulletin, Societé Binet et Simon

Danziger,K. (1979) The Positivist Repudiation of Wundt, J. of Hist. of Behav. Sciences vol. 15 pp.205-230.

Danziger,K (1985 a,) Hermann Ebbinghaus and the Psychological Experiment, Symposium in Honour of Hermann Ebbinghaus, University of Passau, May-June,1985.

Danziger,K. (1985 b,) The origins of the Psychological Experiment as a Social Institution, American Psychologist Vol 40,no.2 pp.133-140.

Danziger,,K. (1990) Constructing the Subject, Cambridge University Press.

Darwin,C. (1859) On The Origin of Species, New York: D.Appleton,1892

Delay,J. (1957) La Vie et L'Oeuvre d'Alfred Binet, Psychologie Francaise pp.826-860.

Didi-Huberman,G. (1982) L'Invention de l'Hystérie, Paris:Macula.

Dottrens, (1968) Allocution, Bulletin, 503, pp.147-154.

Ebbinghaus,H. (1885) Uber das Gedachtniss.

Ebbinghaus,H. (1897) Uber eine neue Methode zur Prufung geistiger Fahigkeiten in ihrer Anwendung bei Schulkindern, Zeitschrift fur Psychologie, 13, pp.401-457.

Faber,D. (1985) Aspects of the Growth of the Ebbinghaus Tradition (1885-1914) M.A. Dissertation,(unpublished)

Faber,D.(1990) Binet and Introspection, Paper given at the British Psychological Conference (History and Philosophy section), Lincoln, April 1990.

Fancher,R. (1985) The Intelligence Men, Norton and Co.

Fancher,R. (1990) Pioneers in Psychology, 2nd edition, Norton and Co.

Farr,R. (1988) Interviewing: The Social Psychology of the Interview, in C.L.Cooper and P.Makin, Psychology for Managers, B.P.S., Macmillan.

Forrest, D.W. (1974) Francis Galton: The Life and Work of a Victorian Genius, London:Paul Elek.

Galton,F. (1869) Hereditary Genius, London:MacMillan and Co.

Galton,F. and Bain (1887) Supplementary Notes on "Prehension" in Idiots, Mind 12, pp. 78-82.

Galton,F. (1883) An Enquiry into Human Faculty, London.

Gilbert,J.A. (1894) Researches on the Mental and Physical Development of School Children, Studies of Yale Psychological Laboratory. vol.2 pp. 40-100.

Gilbert,J.A. (1897) Researches upon School Children and College Students, University of Iowa Studies in Psychology, vol.1 pp.1-30.

Goodenough,F.L. (1949) Mental Testing, New York: Holt,Rinehart and Winston.

Gould,S.J. (1981) The Mismeasure of Man, Penguin Books.

Harris,R. (1989) Murders and Madness in Nineteenth Century France, Oxford University Press.

Herztel (1885) Overpressure in the High Schools of Denmark, London.

Holmes, (1895) The Fatigue of the School Hour, Studies from the Psychological Laboratory of Leland, Stanford University, Oct. 1895, vol.3.

Husson,Prof. (1968) Lettre à Claparède, Bulletin, Societé Binet et Simon 503,pp.133-146.

Itard,J-M. (1902) Mémoire et Rapport sur Victor d'Aveyron, Paris:Goujon.

Jacobs,J. (1886) The Need of a Society for Experimental Psychology, Mind Vol, 11 pp. 49-54.

Jacobs,J. (1887) Experiments in Prehension, Mind Vol 12, pp.75-79.

James,W. (1890) Principles of Psychology, New York: Henry Holt and Co.

Jastrow,J. (1901) President's Address to the American Psychological Association, in J.Jenkins and D.Paterson (eds.) Studies in Individual Differences, (1961) Apple Century Crofts.

Jevons,W.Stanley, (1871) The Power of Numerical Discrimination, Nature, Feb. 9th pp.281-282.

Knorr-Cetina K.D. and Mulkay,M. (1983) in K.C Knorr-Cetina and M.Mulkay (eds) Science Observed: perspectives on the Social Study of Science, Sage.

Koestler,A. (1971) The Case of the Midwife Toad, Hutchison and Co. Ltd.

Kraeplin,E. (1897) Zur Hygiene der Arbeit.

Lamarck, J-B. (1873) Philosophie Zoologique, Paris:Savy.

Lane,H. (1977) The Wild Boy of Aveyron, Allen and Unwin.

Lombroso,C. (1876) L'Uomo Deliquente, Milano:Hoepli.

Lucas,P. (1847-50) Traité Philosophique et physiologique de l'Hérédité Naturelle dans les états de santé et de Maladie

Lyons,W. (1986) The Disappearance of Introspection, Bradford Book, M.I.T.

Martin,R. (1924) Alfred Binet. Thèse complémentaire, présentée à la Faculté des Lettres de l'Université de Paris.

Mayer,A. and Orth,J. (1901) Z Psychol. und Physiol. d. Sinnesorg,26.

Meumann,E. (1908) Oekonomie und Technik des Gedachtnisses, Leipzig: Klinkhardt.

Morel, B.A. (1857) Traité des Dégénérescences Physiques, Intellectuelles et Morales de l'Espèce Humaine, Paris:Baillière.

Mosso,A. (1892) La Fatica, Milan: Fratelli Trèves.

Nageli,C. (1884) Mechanische-physische Theorie der Abstammungslehre

Nye,R. (1984) Crime, Madness and Politics in Modern France, Princetown University Press.

Pearson,K. (1914-1930) The Life, Letters and Labours of Francis Galton, Cambridge University Press.

Piaget,J. (1932) The Moral Judgement of the Child, London: Kegan Paul.

Pichot,P. (1950) Alfred Binet et la Psychopathologie, Psychologie Francaise pp. 96-104.

Piéron,H, (1957) Quelques Souvenirs personnels, Psychologie Francaise, vol 111, part 2 pp.89-95.

Popkewitz,T (1984) Paradigm and Ideology in Educational Research:the Social Functions of the Intellectual, Falmer Press.

Preyer,W. (1882) Die Seele des Kindes, Leipzig:Grieben.

Renan,E. (1890) L'Avenir de la Science: Pensées de 1848, Paris: Calmann-Levy.

Ribot,Th. (1875) La Psychologie Anglaise, Paris:Baillière.

Ribot,Th. (1879) La Psychologie Allemande, Paris:Baillière.

Ribot,Th. (1881) Maladies de la Mémoire, Paris:Baillière.

Rostand,J, (ed.) (1938) Claude Bernard, Morceaux Choisis, Paris: Gallimard.

Rousseau,J-J. (1762) Emile, Paris:La Renaissance du Livre.

Sée (1904) Une Formule Mathématique applicable aux Recherches sur la Psychologie, Bulletin no. 17, juillet 1904.

Shannon,C.E. and Weaver,W. (1949) The Mathematical Theory of Communication, Urbana:University of Illinois Press.

Sharp,S. (1899) Individual Psychology: a Study in Psychological Method, American Journal Psychology, 10 pp.329-391.

Sheldon,W. (1942) The Varieties of Temperament, New York: Harper.

Sigerist,H.E. (1943) Civilisation and Disease, Ithaca, New York.

Sikorski (1879) Sur les Effets de la Lassitude provoquée par les Travaux intellectuels chez les Enfants de l'âge scolaire, Annales d'hygiène publique, Paris 111 serie, tome 2.

Simon,Th. (1961) Souvenirs d'Alfred Binet, Bulletin

Simon,Nadine (1986) La Pitié-Salpêtrière a Paris, Paris:Editions de l'Arbre à Images.

Simon,Nadine (1986) La Leçon de Charcot: Voyage dans une Toile Exposition au Musée de l'Assistance Publique de Paris, Paris:Cahors.

Singer,B. (1979) Distribution-free Methods for non-parametric Tests, British Psychological Society, Leicester.

Smith,R. (1989) Expertise, Procedure and the possibility of a comparative history of Forensic Psychiatry in the Nineteenthg Century, Psychological Medicine, 1989, 19 pp. 289-300.

Spearman.C. (1904,a) The Proof and Measurement of association between two things, The American Journal of Psychology, vol 15,pp. 73-101.

Spearman,C. (1904,b) "General Intelligence" objectively determined and measured, The American Journal of Psychology, vol 15, pp.201-20.

Spearman,C (1906) Footrule for measuring correlation, Brit. Journal of Psychology 2, pp.89-108.

Spearman,C. (1930) Autobiography in Murchison,C. (ed.) History of Psychology in Autobiography, pp.299-333. Clark University Press.

Stern,W. (1900) Uber die psychologie der Individuellen Differenzen, Leipzig:J.A.Barth.

Stern,W. (1930) Autobiography, in Murchison,C. (ed.) History of Psychology in Autobiography vol. 1.pp.335-388.

Sutherland,G. (1984) Ability, Merit and Measurement, Clarendon, Oxford.

Taine,H. (1870) De l'Intelligence, Paris:Hachette.

Terman,L.M. (1961) Stanford-Binet Intelligence Scale, 3rd Revision, Terman-Merrill.

Thorndike,E.L. (1903) Educational Psychology.

Titchener,E.B. (1914) On "Psychology as the Behaviorist views it", Proc. Amer. Philo. Society Vol. L.III, no.213 pp.1-17.

Trousseau, (1861-64) Leçons de Clinique à l'Hôtel-Dieu.

Tuddenham,R.D. (1962) The Nature and Measurement of Intelligence,pp.469-525 in L.Postman, (ed.) Psychology in the Making. New York: Alfred A.Knopf.

Vaney,V. (1905) Nouvelles Méthodes de Mesure, Bulletin no.23, 1905 pp.146-162.

Varon,E. (1935) The Development of Alfred Binet's Psychology, Psychol. Monogs. 46, pp.1-129.

Varon,E.(1936) Alfred Binet's Concept of Intelligence, Psychol. Rev. 43, pp.32-58.

Weisz,G. (1983) The Emergence of Modern Universities in France, 1863-1914, Princetown University Press, N.J.

Whipple,G.M. (1915) Manual of Mental and Physical Tests, part 2. Baltimore:Warwick and York Inc.

Wissler,C. (1901) The Correlation of Mental and Physical Tests, Psychol.Rev. Monograph Supplements

Wolf,T. (1961) An Individual who made a Difference, American Psychologist no.16 pp. 245-248.

Wolf,T.(1969) The Emergence of Conception and Measurement of Intelligence: A Case History of the creative process. Parts 1 and 2 J. of the Hist. of Behav.Sciences 5 pp.118-134, 207-237.

Wolf,T. (1973) Alfred Binet, University of Chicago Press.

Zazzo,R. (1958) Alfred Binet et la Psychologie de l'Enfant, Psychologie Française, tome 3 no. 2. avril 1958.

Zazzo,R. et al.(1967) Nouvelle Echelle Métrique, 2nd edition, Paris:Armand Colin.

Zuza,F. (1948) Alfred Binet et la Pédagogie Expérimentale, Louvain: Nauwelaerts.

APPENDIX 1

Laboratoire de psychologie physiologique de la Sorbonne

Taken from "Les Laboratoires de Psychologie" in "'L'Introduction a la Psychologie experimentale" (1894,pp 1-16).

Instruments for registering physiological measures include dynamograph etc.

Electrical apparatus include: points, sockets, Marey's chronograph. tuning fork with 100 vibrations etc.

Instruments for psychometry include: Wundt's pendulum, Hipp's chronoscope etc.

Instruments for the study of sensations include: Esthetometer, audiometer, weights etc.

Materials for the study of memory include: skeins of wool from Les Gobelins tapestry works, oil paints etc.

Instruments for anthropometry include compass, Chinese gong, dynamometer etc.

Miscellaneous items include: Chemical glassware, stove and weighing scales etc.

Cont/....

To the interested reader is recommended the full account of the laboratory and its equipment: graphic materials; the library and its holdings; lists of investigations carried out in the laboratory; details about Wundt's laboratory at Leipzig, and information about the other laboratories in Europe and America.

APPENDIX 2

Spearman's Footrule for using Correlations

$$R = \frac{1 - g}{M}$$

R = Correlation for ranked scores

where $M = \frac{n - 1}{6}$ g = gains

The Formula by Sée for calculating M to be compared with the sum of ranked differences between 2 sets of scores,

$$\text{where } M = \frac{N^2 - 1}{3}$$

and N = no. of subjects

Sée (1904) Une formule mathématique applicable aux Recherches sur la Psychologie, Bulletin 17, pp.492-498.

APPENDIX 3

Example of a Questionnaire to be answered by children concerning their thoughts about rewards

1. Quelle récompense avez-vous reçue la dernière fois que vous avez été récompensé?

2. Quelle est la personne qui vous a ainsi récompensé?

3. Pour quelle action cette personne vous a-t-elle récompensé?

4. Pensez-vous que vous avez mérité cette récompense?

5. Si vous pensez que vous l'avez merité expliquez pourquoi?

6. Si vous pensez que vous ne l'avez pas meritée, expliquez pourquoi?

7. Auriez-vous mieux aimé une autre récompense?

8. Dans le cas où vous avez merité une autre recompense, dites laquelle et expliquez pourquoi.

1. What was the reward that you received the last time you were rewarded?

2. Who rewarded you like that?

3. For what action were you rewarded by this person?

4 Do you think that you deserved this reward?

5. If you think that you deserved it, say why.

6. If you think that you did not deserve it, say why.

7. Would you have preferred a different reward?

8. Supposing that you were offered a different reward, what would it be? Explain why.

Questionnaire reported in the Bulletin, 8th January 1903. Teachers were to return the questionnaires by 1st March, 1903. 4000 were returned.

APPENDIX 4

Table to show frequencies of degrees of retardation in years 1-7 of primary school education

Class		Retardation in degrees			
		1	2	3	3+
7	Lower élémentaire	18	-	-	-
6		7	1	1	1
5		4	5	1	-
4	intermediate moyen	7	6	2	-
3		9	12	1	-
2		9	7	-	-
1	high supérieur	6	2	-	-
Totals		60	33	5	1

Interpretation: 2 degrees in "moyen" and "supérieur" not sufficient to merit the term backward. 2 degrees in "élémentaire" is a bad sign. 3 degrees in "moyen" and "supérieure" is a bad sign.

From: Vaney,V. Bulletin no. 23.

APPENDIX 5

Matrix of Correlations found on results in the following school subjects and discrimination

	Classics	French	English	Maths.	Disc	Music
Classics		0.83	0.8	0.7	0.66	0.63
French	0.83	-	0.67	0.67	0.65	0.57
English	0.78	0.67	-	0.64	0.54	0.51
Maths	0.70	0.67	0.64	-	0.45	0.51
Disc	0.66	0.65	0.54	0.45	-	0.40
Music	0.63	0.57	0.51	0.51	0.40	-

22 boys (aged 9.5 - 13.7) from a high class Preparatory School, near Oxford.

From Spearman,C., General Intelligence Objectively Determined and measured, Americal Journal of Psychology, vol.15, pp. 201-220

APPENDIX 6

L'ECHELLE METRIQUE (1905)

1. Le regard. Mouvement de la tête ou des yeux pour suivre le déplacement lent d'une allumette enflammée.

2. La préhension provoquée par une excitation tactile.

3. La préhension provoquée par une perception visuelle.

4. La connaissance de l'aliment (discriminer entre chocolat et cube de bois)

5. Recherche de l'aliment compliquée par une difficulté mécanique.

6. Execution d'ordres simples (s'asseoir, ramasser un objet) et imitation de gestes simples (frapper les mains, lever le bras, etc.).

7. Connaissance verbale des objets (désigner parties du corps, montrer objets familiers: ficelle, tasse, clef).

8. Connaissance verbale des images (désigner objets sur une gravure).

9. Nomination des objets designés (épreuve inverse de la précédente).

10. Comparaison de deux lignes, de longueur différente.

11. Répétition de trois chiffres.

12. Comparaison de deux poids (cubes de 3 et 12g, 6 et 15g, 3 et 15g).

13. Suggestibilité (plusieurs épreuves dont le test des lignes)

14. Définitions (maison, cheval, fourchette, maman).

15. Répétition de phrases composées de 15 mots.

16. Différences entre objets de souvenir (papier-carton, papillon-mouche, bois-verre).

17. Exercice de mémoire sur des images apres 30 secondes d'exposition.

18. Deux dessins de mémoire.

19. Répétition immédiate de chiffres (par omission typographique le nombre de chiffres à répéter n'est pas indiqué...).

20. Ressemblance entre plusieurs objets de souvenir.

21. Comparaison de longueurs.

22. Mise en ordre de cinq poids.

23. Lacunes de poids (si l'épreuve 22 est réussie on enlève un des poids, l'enfant ayant les yeux fermés et on lui demande ensuite de soupeser ceux qui restent pour deviner lequel a été enlevé).

24. Trouver mots qui riment avec obéïssance.

25. Exercice à trous: lacunes verbales à remplir.

26. Trois mots en une phrase: Paris, rivière, fortune.

27. Réponse à une question abstraite ("lorsque...que faut-il faire?)

28. Inversion des aiguilles d'une montre.

29. Découpage d'une feuille pliée en quatre (deviner forme de la découpe).

30. Définition de termes abstraites (différence entre estime et amitié, entre ennui et chagrin).

Binet et Simon.(1905) L'Année Psychologique

pp.199-223.

APPENDIX 7

L'ECHELLE METRIQUE (1908)

3 ans

Montrer nez, yeux, bouche.
Enumérer une gravure.
Répéter 2 chiffres.
Répéter une phrase de 6 syllabes.
Donner son nom de famille.

4 ans

Donner son sexe.
Nommer clef, couteau, sou.
Répéter 3 chiffres.
Comparer 2 lignes.

5 ans

Comparer 2 boites de poids différent.
Copier un carré.
Répétez une phrase de 10 syllabes.
Compter 4 sous simples.
Récomposer un jeu de patience en deux morceaux.

6 ans

Comparer 2 figures au point de vue esthétique.
Définir par l'usage seul des objets familiers.
Exécuter 3 commissions simultanées.
Donner son âge.
Distinguer matin et soir.

7 ans

Indiquer des lacunes des figures
Donner le compte de ses 10 doigts.
Copier une phrase écrite.
Copier un triangle et un losange
Répéter 5 chiffres.
Décrire une gravure.
Compter 13 sous simples.
Nommer 4 pièces de monnaie.

8 ans

Lire un fait divers avec conservation de 2 souvenirs.
Compter 9 sous (3 simples, 3 doubles).
Nommer 4 couleurs. Compter à rebours de 20 a 0.
Comparer 2 objets par le souvenir.
Ecrire sous dictée.

9 ans

Donner la date du jour complète (jour, mois, quantième, annee).
Enumerer les jours de la semaine.
Faire des definitions superieures a l'usage.
Conserver 6 souvenirs apres lecture d'un fait divers.
Rendre 4 sous sur 20s.
Ordonner 5 poids.

10 ans

Enumerer les mois.
Nommer 9 pieces do monnaie
Loger trois mots en 2 phrases.
Répondre à 3 questions d'intelligence.
Répondre à 5 questions d'intelligence.

11 ans

Critiquer des phrases contenant des absurdités.
Loger 3 mots en une phrase.
Trouver plus de 60 mots en 3 minutes.
Faire des définitions abstraites.
Mettre des mots en ordre.

12 ans

Répéter 7 chiffres.
Trouver 3 rimes.
Répéter une phrase de 26 syllabes.
Interpréter des gravures.
Répondre à des questions nouvelles.

13 ans

Découpage.
Triangle à completer.

APPENDIX 8

L'ECHELLE METRIQUE (1911)

3 ans

Montrer nez, yeux, bouche
Enumer une gravure
Répéter deux chiffres
Répéter une phrase de six syllabes
Donner son nom de famille

4 ans

Donner son sexe
Nommer clé, couteau, sou
Répéter trois chiffres
Comparer deux lignes

5 ans

Comparer deux boites de poids differents
Copier un carré.
Répéter une phrase de six syllabes
Compter 4 sous simples
Récomposer un jeu de patience en deux morceaux

6 ans

Distinguer matin et soir
Définir par l'usage
Copier losange
Compter 13 sous simples
Comparer 2 figures esthétiques

7ans

Main droite. Oreille gauche
Décrire une gravure
Exécuter 3 commissions
Compter 9 sous simples et doubles
Nommer 4 couleurs

8 ans

Comparer 2 objets de souvenir
Compter de 20 a 0
Indiquer lacunes de figures
Donner date du jour
Répéter 5 chiffres

9 ans

Rendre sur 20 sous
Définir supérieurement à l'usage
Reconnaitre les 9 pièces de notre monnaie
Enumérer les mois
Comprendre des questions faciles

10 ans

Ordonner 5 poids
Copier dessin de mémoire
Critique de phrases absurdes
Comprendre des questions difficiles
Loger 3 mots en 2 phrases

12 ans

Résister à une suggestion de lignes
Loger 3 mots en une phrase
Dire plus de 60 mots en 3 minutes
Définir trois mots abstraits
Comprendre une phrase désarticulée

15 ans

Répéter 7 chiffres
Trouver 3 rimes
Répéter une phrase de 26 syllabes
Interpréter une gravure
Résoudre un problème de faits divers

Adultes

Comprendre un découpage
Construire un triangle
Résoudre la question du Président
Distinguer des mots abstraits
Résumer la pensée d'Hervieu

Binet, A. L'Année Psychologique (1911 page 147)

3 years

Shows nose, eyes and mouth.
Repeats two digits.
Enumerates objects in a picture.
Gives family name.
Repeats a sentence of six syllables.

4 years

Gives own sex.
Names key, knife and penny.
Repeats three digits.
Compares two lines.

5 years

Compares two weights.
Copies a square.
Repeats a sentence of ten syllables.
Counts four pennies.
Game of patience with two pieces.

6 years

Distinguishes between morning and afternoon.
Defines in terms of use.
Copies a losenge.
Counts thirteen pennies.
Compares faces from the aesthetic point of view.

7 years

Right hand; left ear.
Describes a picture.
Executes 3 commissions
Gives value of 9 sous, three of which are double.
Names 4 colors.

8 years

Compares two remembered objects.
Counts from 20 to 0.
Indicates omissions in pictures.
Gives day and date.
Repeats 5 digits.

9 years

Gives change from 20 sous.
Defines in terms superior to use.
Recognizes all the pieces of our money.
Enumerates the months.
Understands easy questions.

10 years

Arranges five weights.
Copies drawings from memory.
Criticises absurd statements.
Understands difficult questions.
Uses 3 given words in two sentences.

12 years

Resists suggestion (length of lines).
Composes one sentence containing 3 given words.
Says more than sixty words in 3 minutes.
Defines abstract terms.
Discovers the sense of a sentence the words of which are mixed.

15 years

Repeats 7 digits.
Gives three rhymes.
Repeats a sentence of 26 syllables
Interprets a picture.
Solves a problem from several facts.

Adult

Solves the paper cutting test.
Rearranges a triangle.
Gives differences of meanings of abstract terms.
Solves the question of the President.
Gives a resume of the thought of Hervieu.

Translation by Clara Harrison Town (1915)
Chicago Medical Co.

APPENDIX 9

3 "Observations" or "Petites Biographies Psychologiques"

1. **Martin, aged 12**

Memory: normal for repetition of sentences (on 2 trials); characterized by speed. Excellent memory for pictures.

Sensory Intelligence: weakness is shown in this.

Abstract Intelligence and Language: deficiency is more marked in this area. Rated himself too highly - ie. he is "optimiste". Presumably Binet and Simon were witnessing lack of "censure" or self-criticism.

Mental Level: Approx. 7 years.

2. **Reynaud, aged 11.**

Memory: rather weak and slow. Can repeat only 4 digits.

Sensory Intelligence: very good.

Abstract Intelligence: weaker - cannot find any rhymes.

Mental Level: unspecified. Binet says that good teaching could take advantage of his sensory intelligence.

N.B. There is a certain mismatch with Vaney's finding that his achievement age was 5 years.

Was Reynaud hampered in scholastic work by his slowness and poor memory?

3. **Ernest, age unspecified.**

Class Teacher and Head Teacher in disagreement about his intelligence. In the same class as children aged 7 to 9 - a factor not taken into account by his Class Teacher.

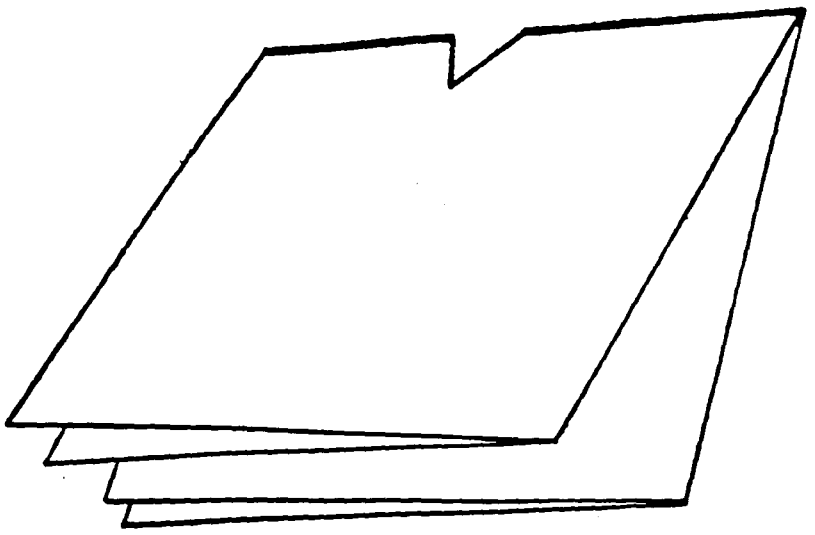
Memory: weak.

Sensory Intelligence: normal.

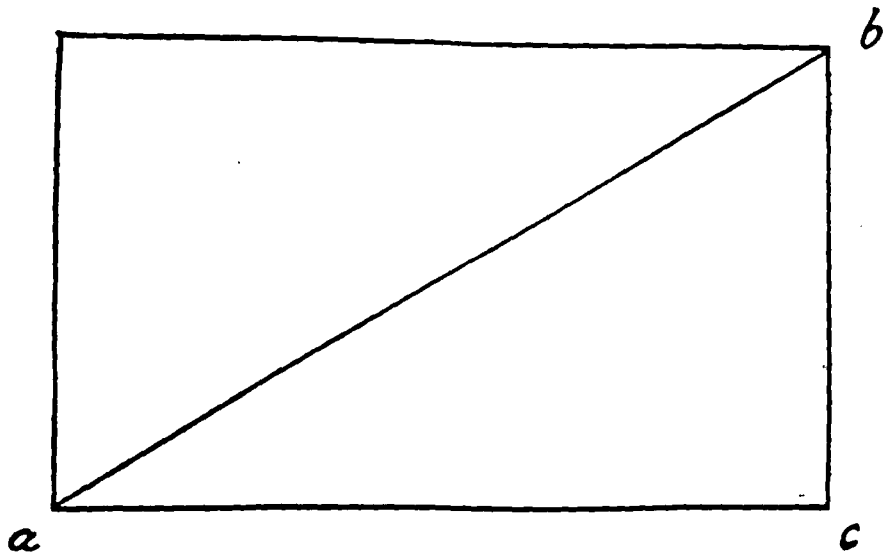
Abstract Intelligence and Language: weak. In answer to abstract questions, he made 3 absurdities, 1 silence and 10 poorly rated responses. Not as poor as Reynaud, but did not realize when he could not understand!

From Binet, A. and Simon, Th. (1905) Application des Méthodes Nouvelles au Diagnostic du Niveau Intellectuel chez des Enfants Normaux et anormaux d'Hospice et d'Ecole, Année Psychol. vol 11, pp. 245-336.

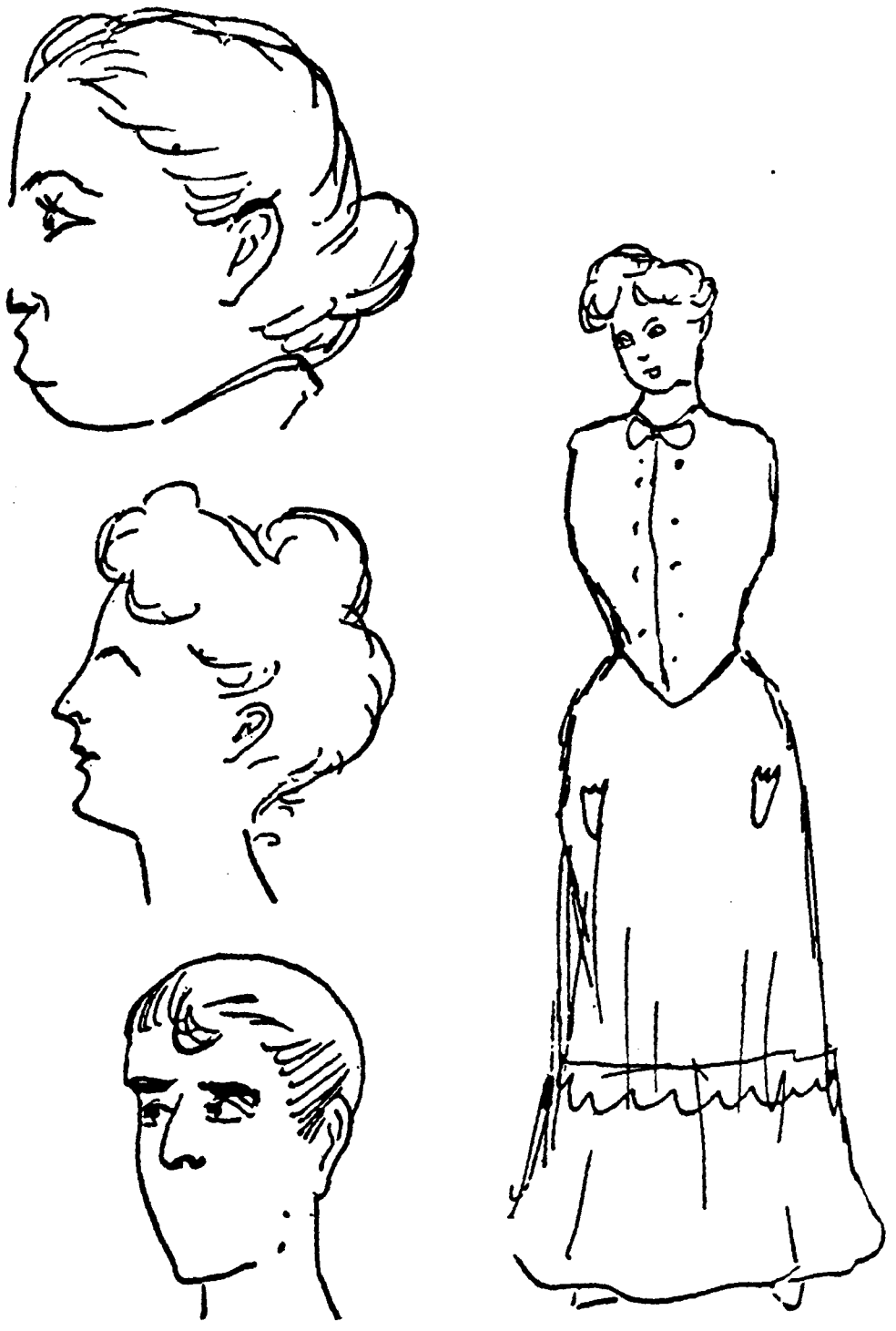
APPENDIX 10



Paper cutting task

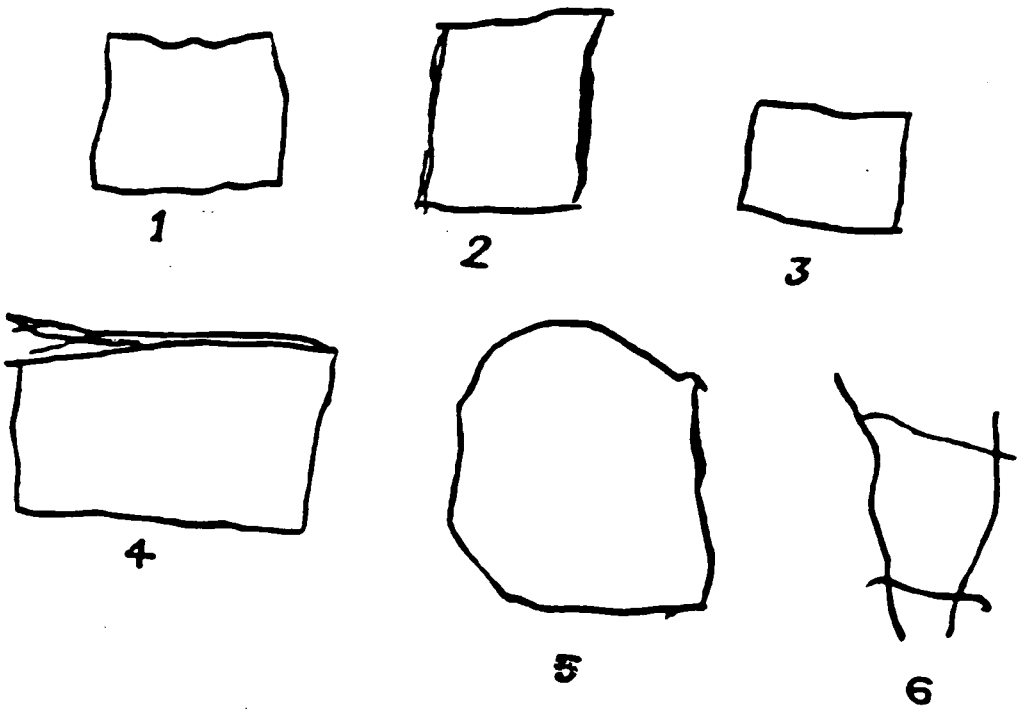


Arrangement of Triangles (Adult) 1911 version

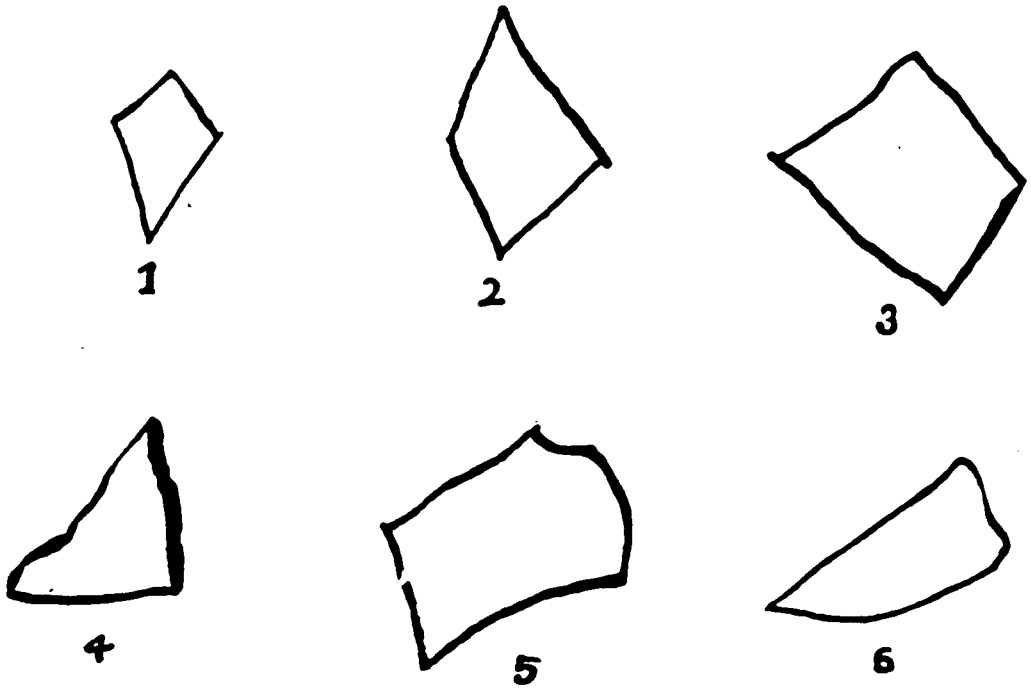


Omissions to be indicated (age 8)

1911 version



Examples of Childrens Copies of a square (age 5)



and a diamond (age 6)

1911 Version

1,2,3 are acceptable

4, 5, 6 are unacceptable