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ESTABLISHMENT OF INTELLIGENCE NORMS FOR  
BEIRUT SCHOOL CHILDREN  
OF SIX YEARS

By

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## ABSTRACT

Aim of our study: The establishment of norms for an intelligence test for six-year-old Beirut children.

The Detroit First Grade non-verbal Intelligence Group Test was adopted for the purpose because a thorough examination of its pictures has shown its possible suitability for Beirut children.

The trial: The test was tried on 604 children of six years of age: 316 girls and 288 boys. These numbers represent approximately the tenth of the Beirut school population of this age.

Schools of every type were selected: private, public and foreign. 33 schools were chosen distributed as follows: 15 private, 13 public and 5 foreign.

Because of the heterogeneity of Beirut schools, care was taken that our distribution contained in the proper proportions schools of different religious affiliations, schools of Anglo-Saxon as well as French educational schedule and methods of teaching; schools from conservative sectors as well as modern ones, schools for poor, middle and superior social classes.

Cooperativeness prevailed everywhere and inspite the difficulty met with in gathering data the study was conducted under the most favorable conditions.

After grading the children's tests, their mental age was determined according to the table of norms attached to the test instructions. IQ's were computed which were then tabulated in step intervals of 5.

A special table was prepared for every type of school, for boys and girls separately as well as a general all-inclusive one.

The means, medians and standard deviations were computed and are shown in the following table.

Table I

General Comparative Table

| <u>Type of School</u> | <u>Number of Subjects</u> | <u><math>\bar{x}</math></u> | <u>Median</u> | <u>s</u> |
|-----------------------|---------------------------|-----------------------------|---------------|----------|
| Public Schools        | 185                       | 92.3                        | 90.74         | 12.35    |
| Boys                  | 73                        | 92.18                       | 91.54         | 12.15    |
| Girls                 | 112                       | 92.33                       | 90.16         | 12.5     |
| Private Schools       | 303                       | 102.17                      | 101.72        | 12.85    |
| Boys                  | 176                       | 103.5                       | 103.1         | 13.2     |
| Girls                 | 127                       | 100.36                      | 100.41        | 12.1     |
| Foreign Schools       | 116                       | 104.93                      | 106.56        | 11.45    |
| Boys                  | 39                        | 107.3                       | 107.69        | 11.10    |
| Girls                 | 77                        | 103.77                      | 106.23        | 11.45    |
| Public & Private      | 488                       | 98.43                       | 97.85         | 12.85    |
| Boys                  | 249                       | 100.17                      | 99.61         | 12.75    |
| Girls                 | 239                       | 96.6                        | 95.29         | 13.9     |
| Whole Group           | 604                       | 99.67                       | 99.37         | 13.4     |
| Boys                  | 288                       | 101.12                      | 100.63        | 13.1     |
| Girls                 | 316                       | 98.35                       | 98.23         | 13.65    |

Histograms, frequency polygons and percentage cumulative curves were then plotted in order to give a clearer idea of the results, as well as to facilitate comparisons of the groups.

Study of the results have yielded the following conclusions:

1. There is no sex difference in mental development.
2. The social, cultural and educational factors play a great role in the development of intelligence.

The validity of the test was then established by two means:

1. The correlation of the mental age of the children of two schools (A.U.B. Elementary School and <sup>the</sup> French Protestant College) and their school grades. They yielded respectively the following coefficient: 0.61 and 0.42.

2. The agreement of our results with the generally admitted criteria of a good test:

- (a) The general median and means approach 100.
- (b) I.Q.'s are almost regularly distributed from feeble-mindedness to genius or near genius.

Though the test has yielded quite satisfactory results, the percentage of success in the different items has shown the necessity of modifications: in some tests the order of the items only should be altered; in others some items must be changed because they are not as familiar to Lebanese children as to Americans.

Conclusion: Our results, tend to support the hypothesis with which we started the study. They indicate that a test, though determined to a large extent by local environmental conditions, ~~it~~ is not necessarily limited to the narrow limits of local boundaries.

On the other hand, two most instructive, though negative lessons, are gained:

1. Psychological testing which intends to reach universal, standardized norms exceeds individual efforts. No positive, constructive and continuous activity is to be expected in the Arab world before governments become aware of the help they can expect from psychological testing, i.e. before they start seeking a scientific explanation of their educational and psychological problems.

2. A test must be locally adopted and standardized before being used for it is not a manufactured object which can function uniformly everywhere. Though suggestions may come from any part of the world, experiment on the spot is the foundation stone on which the edifice is to be erected.

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INTRODUCTION

The aim of this study is the establishment of norms for an intelligence test for Beirut children entering the first grade.

The reason of this choice is the urgent need of the Arab countries for an intelligence scale.

We do not pretend that the present experiment fills this need. Rather, we have attempted to explore, by our modest means this almost untrodden field in order to acquaint ourselves with its promises, its wealth, as well as the obstacles it erects in the way of the explorer.

But fortunately for us, our investigation, though far from being complete, has been most edifying and has yielded results beyond our expectations.

The validity of the test is later to be established by the correlation of our results with the grades of two selected groups. The agreement of our findings with the generally accepted criteria for a good mental test is also to be considered.



PART ONE

**A HISTORICAL SUMMARY**

## CHAPTER I

### INTELLIGENCE TESTING

#### BEFORE BINET

1905 is, in many respects, a landmark in the history of pure, as well as applied psychology.

It is the year when Binet, with the collaboration of Simon, launched, the first scale of Intelligence.

With this scale we can say that psychology had turned a corner. By introducing number in the evaluation of mental phenomena Binet had hit two marks by the same blow.

1. With the advent of testing, child psychology became a science in the same sense as chemistry and physiology; and the instrument with which Binet endowed it has played a role comparable to that of the thermometer and the barometer in physical sciences.

2. On the other hand psychology was definitely liberated from the grip of philosophy. The contemptuous sarcasm and the re-  
criminations of the traditional thinkers who were shocked by the idea of transmuting qualitative differences into quantitative terms, were definitely hushed up. Binet showed them that "measuring the human soul" is not an impossible matter. So he had strengthened the efforts of psychology in its firm determination to throw away the tutelage of philosophy and become an experimental science.

The Antecedents of Binet's scale

But a science does not spring spontaneously out of nothing. A scientific discovery is not a sudden outburst which can be said to have taken place on such and such a date. Though a particular event may be the starting point of a new era, it is itself only the consummation of a brewing process, whose subterranean work lasts some times for ages.

This was the case with psychometric and the Binet scale which was described by some psychologists to be the outcome of 25 centuries of philosophic speculations and pedagogical training, crowned with 20 years of scientific research.

As a matter of fact, if we go back to the days when knowledge was still undiversified, that is before philosophy split up into the various sciences, we may recall how Pythagoras and his disciples in the 6th century B.C. sought to deduce every thing from number. The final truth is according to them quantitative not qualitative.

Differences between individuals have always been of prime interest for man. He has always been aware of the presence of distinct traits that differentiate one individual from the other, and he has always been eager to disclose them. At first he appealed to physiomy, palmistry and fortune-telling.

Speculative thinking shows in many instances that philosophers were very early conscious of individual variation: "No two persons are born alike", says Plato in his Republic and so he proposes "a series of performances for use as tests of military aptitude on those who are to be soldiers of his ideal state. These performances

are designed to sample the various traits considered essential to military prowess and represent the first systematic description of an aptitude test record.<sup>(1)</sup> In the Renaissance period Brubacher mentions Vittorio de Feltre (1376-1446) "who encouraged none to expect education for careers beyond their capacities."<sup>(2)</sup> In the XVIIth century John Locke remarks that "children have such different natures that little or nothing may be done to make the pensive child gay or the sportive one restrained."<sup>(3)</sup>

#### The Rise of Scientific Attitude

But these were only philosophical considerations deduced from speculations on the nature of the mind. "It was one thing," says Brubacher "to note these differences, but quite another to assay them."<sup>(4)</sup> As a matter of fact, objective observation of the individual played no part in them, and they were all along overshadowed by other schools of thought where individual differences were absolutely neglected and where the "general" the "absolute and universal", engulfed the particular. This is evident in the scholastic philosophy of the middle ages where the individual and the particular were not only ignored but even despised and shunned. The same may be said of associationism which flourished from the XVIIth to the XIXth centuries. And we shall wait till the last quarter of XIXth century and the first two decades of the present one to witness

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- (1) Anastasi, Ann, and Foley, John P. Jr., Differential Psychology, The Macmillan Company, New York, 1949, p.5.
  - (2) Brubacher, John S., A History of the Problems of Education, New York & London McGraw Hill Book Co., Inc., 1947, p.160.
  - (3) Brubacher, John S., Op. Cit., p.160.
  - (4) Brubacher, John S., Op. Cit., p.160.

an unyielding, systematic and constant effort to apply the scientific method to the exploration of the human mind, which led later to differential psychology and psychometry.

Factors which contributed to the rise of the testing movement

As if by a concerted effort, many forces, incidental to psychology as well as inherent in it, converged, at the turn of the nineteenth century and the beginning of the twentieth, so as to give mental testing an unprecedented uphill pull. These forces may be grouped under three main trends: the sociological trend, the educational, the psychological and allied sciences.

I. The sociological contribution:

Modern time has witnessed a manifest change in the attitude of people towards the insane and the feeble-minded. In the past this group of people were regarded as the children of Satan and thus considered responsible for their misdeeds. Consequently they were exposed and submitted to a strenuous, inhuman treatment in order to drive out the devil from them. But in the late XIXth century, people, moved by a feeling of sympathy and pity on the one hand, and a deeper feeling of social justice on the other, gave a better treatment to the unfortunate. Gradually the attention of physicians and psychologists was directed to a scientific study of insanity and feeble-mindedness. Psychological clinics were opened. The first was that of the university of Pennsylvania: "Here for the first time we see that the emphasis was placed upon the necessity of a careful diagnosis of the nature of the mental deficiency together with an attempt to

treat such deficiency, as far as it may be amenable to treatment".<sup>(1)</sup>

On the other hand the spread of education had brought to schools a heterogeneous population, in which separating sheep from goats was more and more imperative. So emerged the movement for the separation of the backward and dull children into special classes in the public schools. At the same time, instruction did not spread only horizontally. It has been systematized and organized into different stages of mental difficulty. This led to the discrimination of stages of intelligence in school population. But what criterion should be adopted for this sifting? The conventional method of assaying differences through recitation and examination has proven to be subjective and inaccurate as well as slow. The possession of an accurate, objective and efficient instrument for the measurement of intelligence was more and more felt as a social need.

## II. The contribution of Educational Philosophy

Simultaneously educational theory entered a new era whose roots may be traced back to the "naturalistic" educators of the late eighteenth and early nineteenth century. These thinkers have done a great deal to bring about a change in the attitude of society toward children.

Traditional thought was not interested in childhood itself. The child, being an imperfect adult, statesmen and philosophers concentrated their interest not in the child as a growing being, but in what he should become as an adult. Their field of study was not the child and his nature but the ideal pattern according to which the

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(1) Pinter, Rudolf, Intelligence Testing, Methods and Results., New York, Henri Holt and Company, 1923, p.13.

child was to be modelled.

Gradually and through the influence of modern educational thinkers like Rousseau, Pestalozzi, Herbart and Froebel, interest shifted toward the child. So a child-centered education emerged, <sup>and</sup> ~~but~~ the methods of teaching could no more be devised arbitrarily, but were to be determined by the direct observation of the child and his capacities. But, ~~at~~ its start this movement emphasized childhood as a "species", and the individual child was studied as representative of children in general. And we must still wait for the scientific trend in psychology and the beginning of the XXth century to see the attention of educators directed to the differences between individuals.

### III. Psychology and allied sciences

At the end of the XIXth century a fresh gust blew into psychology. Tired of the perennial and futile issues of speculative philosophy, such as the substantiality of the soul, the freedom of the will etc., and stimulated by the scientific climate of the century, some thinkers wanted to tear psychology away from its idle armchair practice of analyzing thought and feeling, and embark instead on the experimental method.

#### Influence of physiology

But the weaning away of psychology from philosophy was not wholly achieved, as Roback remarks, without the formation of a new attachment "and physiology or neurology was the old sister guiding

(1)  
its fortune".

As a matter of fact the first experimental psychologists were physiologists and both, the viewpoints and the methods of physiology were adopted by psychologists in their investigations of the human soul.

Like all experimental sciences psychological research needed laboratories. The first to be devoted exclusively to psychological research was established in Germany by Wundt in 1879. It acquired such a reputation that students from many parts of the world flocked to it, and upon their return to their native countries opened new laboratories. The triumph of this first laboratory rested chiefly in developing objective psychological laws comparable to those of physics.

But researches in this laboratory as well as those which emerged from it still felt the strong impact of physiology and their field of study was limited to visual and auditory sensation and other simple functions of the organism. Anyway they played a great role in the development of differential psychology by demonstrating that "psychological phenomena are amenable to objective and even quantitative investigation; that psychological theories can be tested by actual data; that psychology, in short, could become an empirical science."<sup>(2)</sup>

But the main mistake of these investigations was to ignore the peculiar characteristics of the psychological world and to con-

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(1) Roback, A.A., History of American Psychology, George Allen & Urwin Ltd., 40 Museum Street, London, W.C., 1952, p.123.

(2) Anastassi, Op. Cit., p.9.



sider it in structure and nature like the physical. Faithful to their rigorously scientific education, their ultimate end was to analyze mind into its simplest elements and to formulate, in general laws, like physics, the results of their investigations. Uniformity, rather than variations was their focus of attention. Differences in behavior were ignored by them, or attributed to experimental errors.

The Dawn of differential psychology and the tutelage of eugenics

Later, under the influence of Darwin the center of interest shifted toward child, animal and differential psychology.

In order to support their hypothesis that man evolved from animals, the evolutionists turned to the study of infants which they considered as the missing link between man and animal and to variation and heredity which provided the key to evolution. The most famous studies along this line are those of Galton, founder of the science of eugenics. More influenced by biology than psychology, Galton, however, did much, though indirectly, to promote interest in child study and differential psychology. For, Galton was struck by the great hereditary differences in men, and in order to establish the exact degree of resemblance between parents and offsprings, brothers and sisters he needed systematic anthropometric records. Thus he encouraged educational institutions to gather records

on their students. Later on, in 1882, he established his anthropometric laboratory in London, where individuals were tested for keenness of vision and hearing, for muscular strength and reaction time.

Thus the study of individual differences emerged, but its main concern was biological, not psychological. For, Galton believed, like most of his contemporary psychologists that psychological behavior is only an aspect of the physiological; thus, the measurement of sensory processes would necessarily lead to an estimate of intellectual capacities: "The more perceptive the senses are of differences, the larger is the field upon which our judgment and intelligence can act"<sup>(1)</sup> says he. And since he noticed a defect in idiots in discriminating sensory changes he concluded that sensory discriminative capacity would be on the whole "the highest among the intellectually ablest."<sup>(2)</sup>

The other most important contribution of Galton to differential psychology was his application of statistical methods to the analysis of individual differences.

#### Psychological emancipation

So, we see that psychology by throwing away the yoke of philosophy, had fallen under the tutelage of other

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(1) Anastasi, Op. Cit., p.10.

(2) Anastasi, Op. Cit., p.8.

sciences which threatened to do away altogether with psychological studies, per se. And we shall wait another decade before psychology becomes the master of its own destiny. The indirect architect of this self-contained structure is Sigmund Freud, who through psychoanalysis, not only re-directed the attention of the people to psychological data per se, but also stimulated in his followers a direct interest in infant psychology. In his emphasis on the part played, by repressed, unfulfilled primitive desires, in building up adult character, he gave to childhood and infancy a dominant role.

#### The rise of psychological testing

But the originator of psychological testing is the American psychologist James McKeen Cattell. "What the English eugenicists did to point out hereditary biological differences," says Anastasi, "McKeen Cattell did to call attention to psychological differences in reaction time, keenness of eyesight and hearing, perception of pitch, etc." (1)

Trained in Wundt's laboratory, but much influenced by Galton, he proposed to the great disappointment of his master, that individual differences among people in their responses to the same stimuli, "far from being negligible as forms of error, might be of even greater psychological importance, than the study of the typical effect upon people in general of a measured physical change in the stimulus itself." (2)

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(1) Brubacher, Op. Cit., p. 161.

(2) Brubacher, Op. Cit., p. 161.

Upon his return to America Cattell championed the work on differential psychology. We are indebted to him for the use of the term "mental test" which first appeared in an article published in 1890 pleading for the standardization of the methods of research and urging the establishment of norms.

But Cattell, still under the influence of Galton maintained that a measure of intellectual function could be obtained through the tests of sensory discrimination and reaction time. His preference to this kind of tests is due to his supposition that only simple functions can be measured objectively, while the measurement of higher intellectual activities, because of their complex and fleeting nature, is an impossible task.

However, an examination of the test he devised, and which he administered, to school children and college students, does not only show the impact of the past but also reveals an effort to measure more complex psychological functions. His series may be summarized as follows:

(1) strength of grip, (2) rate of arm movement, (3) two-point threshold on the back of the hand, (4) amount of pressure required to produce pain on the forehead, (5) least noticeable difference in weights, (6) reaction time to sound, (7) speed of color naming, (9) reproduction of a ten seconds time interval, (10) auditory memory span.

A careful examination of these tests would be most helpful to understand the turn which mental testing took

with Binet.

### Binet

A more promising approach to mental measurement was undertaken by the French psychologist Alfred Binet, and his collaborator Simon.

From the outset, his attitude was different from that of his contemporaries and his revolution may be summarized in three main contributions:

1. While psychological investigators followed in their laboratories the step of physical scientists i.e. confining their activities to laboratory research and concentrating on analysis of simple phenomena in order to draw out general laws which could be applied universally, Binet was mostly interested in the psychological fact in its complexity. He was more and more convinced, through his investigations, that mental qualities can only be judged by mental symptoms. Intelligence is not, as the associationists believed, and under whose influence the first psychological experimentalists worked, the sum of simple qualities acquired through sense impressions but the sum of many mental abilities.

Moreover the analysis of data had led him to the realization that individual differences lie much more in the higher processes of mind than in elementary sensory-motor reactions. Consequently these differences can better be detected in the complex tasks of every day life than in laboratory, artificial analysis. And though he admits that

the simple mental functions of mind are easier to be measured objectively, he sustains that they do not lead to any practical and fruitful result.

So, one of the most important consequence of this attitude was to replace the many complicated procedures "and artificially simplified tasks of the formalized laboratories " by the more complex realistic problems encountered in life as it is lived.<sup>(1)</sup> This led him to try a greater variety of tests which specially emphasized purely psychological functions such as memory, sensory discrimination, linguistic ability, ability to compare, power of comprehension, time orientation, power to combine ideas into a meaningful whole, esthetic appreciation, wealth of ideas, knowledge of common objects.

This rapid enumeration shows eloquently the divergence of Binet from the traditional conception of testing, of which we already mentioned as sample the Cattell's.

2. Binet's second contribution was his metric scale of intelligence, which played such a central role in intelligence measurement that "a history of mental testing," says Cronbach, "has become, in large part, a history of Binet test, its antecedents and its descendants."<sup>(2)</sup>

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(1) Carmichael, Leonard, Manual of Child Psychology, 2nd Edition, New York, John Wiley & Sons, Inc., London, Chapman & Hall Limited. p.460.

(2) Cronbach, Lee J., Essentials of Psychological Testing, Harper & Brothers, Publishers, New York, 1949, p.101.

For a long time, as we have seen, psychology was in search of norms, but here too, Binet's predecessors engaged themselves in the wrong path. Always under the influence of physical sciences, as we already mentioned, they were after a pure, abstract unit, to which all mental processes can be reduced and, by which they can be measured. As a result the individual under examination was submitted to many unrelated performances; his sensory acuity, his reaction time, his memory and attention spans were measured; numbers were obtained; but they unfortunately added to the confusion of the investigators because they did not possess a yardstick to measure these results: "They worked with subjects" says Terman, "the degree of whose intelligence was unknown and with tests the difficulty of which was equally unknown. An immense ingenuity was spent in devising tests which were used in such a way as to preclude any very meaningful interpretation of the results."<sup>(1)</sup>

Binet's attitude was altogether different. He gave up the search for arbitrarily fixed standards and started on the classification of individuals in reference to the performance of other comparable individuals: "It is not measurement, in the physical sense" says Binet, "that we should seek, but a classification of individuals with reference to others."

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(1) Terman, Lewis M., The Measurement of Intelligence, Houghton Mifflin Company, 1916, Boston, New York, Chicago, pp.40-41.

3. The concept of mental age

The scale launched by Binet in 1905 had as its first aim to fix standards for the discrimination of normal from subnormal children. So it consisted of thirty problems arranged in ascending order of difficulty. Age standards were not yet available; scale distinctions were established only for idiots, imbeciles and morons.

In 1911 the scale was definitely worked out so as to measure the intelligence of normal as well as subnormal children and the concept of "mental age" made its first appearance.

The "mental age" does not inform us about the quantity of intelligence a child possesses but about the place he occupies among the children of various ages.

Thus the scale items of 1911 were not only arranged in order of difficulty, but according to the age at which they are usually passed. A test was assigned to a certain age of a certain proportion of the children of this age passed it.

However, the percentage level used in placing a test varies from age to age. Tests <sup>passed</sup> placed by about 77% of two-year-olds are placed at two years; tests passed by 63% of eight-year-olds are placed in the year eight; tests passed by 60% of thirteen-year-olds are placed at the year thirteen.

"The idea of mental age" says Pinter "is one of



Binet's most important and valuable contributions to the problem of mental testing."<sup>(1)</sup> and it is one of the most useful tools for the psychologist and the psychiatrist.

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(1) Pinter, Op. Cit., p.32.

## CHAPTER II

### The development of Testing movement after Binet

The testing movement then took on greater proportions. Binet had given to its development a definite turn. He had sunk a shaft which was to be most feverously exploited, he had laid the foundation stone of an enterprise of which we will witness a phenomenal growth in all dimensions and which will have ramifications in every direction.

But, curiously enough, this work of Binet passed almost unnoticed in France or was received with playful humor and contemptuous smile, while it was translated abroad into most of the languages of the world and its use spread over every continent. But, it was in America that it met the most fertile ground. The reason can be traced back to a number of conditions, whose roots had taken hold at the end of the XIXth century, and of which we have had a bird's-eye-view in the preceding chapter.

Since the testing movement was from then on to be particularly developed in the United States, it is of the greatest interest to have a glance at the social background on which it developed. This is described by Goodenough in her article: The measurement of mental growth<sup>(1)</sup> as follows:

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(1) Carmichael, Op. Cit., p. 459.

1. Compulsory school attendance. The testing movement appeared at the most opportune moment, when many states had extended the age of school attendance. Because of this, adequate methods of dealing with school retardation were more and more needed.

2. Juvenile courts. The first juvenile court was established in 1910 and scientific interest in juvenile delinquency became more and more active. Thus it was natural to use the new instrument as means of securing more valid information on the mental level of delinquent children.

3. The rapid increase of organized agencies for social welfare. Till 1910 social work was in the hands of untrained volunteer workers affiliated with different churches. Then appeared special agencies with professionally trained personnel and "a scientific tool for a better means of separating the cases for whom there was a hope for rehabilitation from those who were unlikely ever to be able to manage themselves, was more and more needed".<sup>(1)</sup> Mental testing as a means of improving the efficiency of social welfare became increasingly utilized.

4. World War I. But the factor which gave the strongest impetus to the testing movement was World War I. Then the United States found themselves in the urgent need of building up an army at an explosive rate. The need was

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(1) Carmichael, Op. Cit. p. 459

then felt to select and classify the recruits so that every one be given the appropriate training and be assigned his proper place in the army. Here psychologists came to the rescue, and a group including Terman and Yerkes devised a group test which became famous as Army Alpha. Army Alpha is a practical test, easily administered and containing simple reasoning, arithmetic and information questions. A million and a half recruits were subjected to testing for the purpose of determining their capacities for the various types of services. The good results which the experiment yielded convinced people that adequate prediction concerning the "human soul" was possible, and that it could be done by mass processing, in a speedy way. Then, following the war, schools and industries demanded tests which emerged and which we shall examine later on.

Laying much stress on the help which testing provided us in the practical field, Goodenough concludes that "the development of mental testing .... was, by no means, a result of the abstract curiosity of the 'pure' scientist. First and primarily, mental tests, as we know them today, are practical instruments devised to meet some specific and immediate social needs".<sup>(1)</sup>

But though it is clearly evident that tests are currently used in the solution of a wide variety of practical

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(1) Carmichael, Op. Cit., p.463.

problems, we should not lose sight that testing began as a tool to satisfy the curiosity of some speculative thinkers and that the role it plays as a research implement is not of less importance than its practical use. As illustration Anastasi mentions the studies on the nature and extent of individual differences, the identification of psychological traits, the measurement of group differences and the investigation of biological and cultural factors associated with behavioral differences.<sup>(1)</sup>

#### Terman's Contribution to the testing movement

If we turn now to the work of particular psychologists in America, special mention should be made of Lewis Terman, not only because of the world-wide reputation he actually enjoys, but also because of the role he plays in the continuation of the trend which preoccupies us here and to which he gave a noticeable impetus.

As a matter of fact, Terman is most famous by his revision of the Binet scale, a revision which marks a distinct advance in intelligence measurement and which made two main contributions:

1. The extension of the Binet scale: Being devised to detect deficiency in school children, the Binet scale has kept this imprint, though it was later revised by the author himself so as to be adopted for the mental measurement of

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(1) Anastasi, Op. Cit., p.4.

normal children. But Terman's revision first presented a scale intended specially to measure normal children.

On the other hand the distribution of the items for the different ages was not, in its primitive form, very appropriate to those age levels indicated by Binet. Some items were misplaced and the whole scale was too easy in the first years and too difficult after age ten. Terman himself summarizes as follows the imperfections of Binet's scale: "Many of the tests were not correctly located, the choice of tests was in a few cases unsatisfactory, the directions for giving and scoring the tests were sometimes too indefinite, the upper and lower ranges of the scale specially stood in need of extensions and corrections".<sup>(1)</sup> Terman then worked in the redistribution of the tests and enriched the scale so as to include a wider age range in its measurement.

2. The adoption of the I.Q.: But the most important contribution of Terman to the testing movement, was to add to the notion of mental age advanced by Binet, the intelligence quotient. The intelligence quotient was first suggested by the German psychologist Stern; but it is to Terman that we owe its practical adoption in psychological testing.

Advantage of the I.Q.: The notion of mental age

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(1) Terman, Op. Cit., p.104.

advanced by Binet could inform us only of the absolute amount of acceleration or retardation of the tested subject. A child was reported to be so many years above or below his normal age. This statement is not sufficiently accurate because it yields no constant and predictive statement of the mental development of a given child. As a matter of fact, the absolute amount of acceleration and retardation is not constant, but varies with age. For instance a child who, at the age of four shows a retardation of six months would treble this retardation at twelve. So, it was discovered, that intelligence decreases or increases proportionally to chronological age.

The I.Q. being a ratio between the mental age and the chronological age, it provides us with a more constant instrument of measurement: "Knowing a child's I.Q. we can", says Terman, "predict with a fair degree of accuracy the course of his later development."<sup>(1)</sup>

This simple and broad way of measuring the mental performance of a child has played a great role in propagating the use of the Stanford-Binet scale. And though innumerable scales appeared after it, its conception of intelligence stays the standard and it is still considered the yardstick by which other tests are judged.

The Merrill-Terman scale: In 1937 the Stanford-Binet revision was replaced by the Merrill-Terman which is

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(1) Terman, Op. Cit., p.68.

only a revised form of the former. It follows, in its main, the traditional trend, but it offers the advantage, of two comparable and equivalent forms: L and M. Both forms are more extensive than the original in range and number of tests. Each offers the advantage of retesting a subject at a brief interval with the same scale without risking any appreciable alteration of the results by reason of practice effects.

### The Appearance of other Scales

I. Aptitude tests: World War I gave to the testing movement a phenomenal popularity, so that after 1917 tests were constructed at such a rapid rate that it has become extremely difficult to count them and catalogue them.

But tests did not increase only in number. Many other technical improvements were introduced. And while at the beginning they were accepted uncritically, the period between the two wars developed a more objective attitude on the part of the psychologists. The tests were submitted to more accurate analysis, and it was soon discovered that the so-called intelligence tests did not really measure intelligence in general, but a number of separate intellectual factors. Thus emphasis shifted to the measurement of special aptitudes: many tests labelled "Intelligence tests" were given more specific names; on the other hand, tests for the measurement of special abilities such as, mechanical, clerical, musical abilities, were more and more developed.



II. Group testing: A group test is a test which can be given to a number of subjects at the same time by the same examiner.

We have already seen the impetus which was given to such a type of test during World War I. Another chance will offer itself during World War II where we witness a feverish activity in this field of psychological measurement.

This second experiment in the army showed the great value of group testing and suggested innumerable fields in which it could be used. In all fields, such as the army, schools, industries, where investigation of large samples is needed, group tests are most helpful. They offer the advantage not only of being far more rapid since they can be applied to many subjects at the same time, but also of not requiring from the examiner the same training, the same skill necessary in individual testing. And, under the same conditions they are as reliable and have as high predictive validity as the individual ones.

III. Performance tests: They mark a departure from the Binet-Simon type and were first devised by Pinter and Paterson. They consist of a series of problems in manual manipulation in which the use of language is almost entirely excluded.

Performance tests are devised for groups with language handicap and are specially used in clinical practice.

IV. Non-verbal group tests: With this type of tests we are mainly concerned since it is the category to which our test belongs like the Army Alpha test and the Performance tests. They were first intended to measure adults who were linguistically handicaped. Later they were extended to children and specially to those of pre-school age.

The non-verbal tests may be divided into two groups: The performance tests, already described, and which require the performance of some task by means of certain actual manipulation, and the others which require from the subject to work with geometrical designs, figures and pictures.

Another distinction may be made also between non-verbal tests: There are those where instructions are given verbally though they don't require a linguistic response from the subject, and there are others where language is not used at all and where demonstration, charts and pantomime are used instead of verbal instructions. Our test belongs to the former group.

Though the Binet scale includes tests which do not require verbal expression from the subject, it was criticised because in the main it predominantly reflects the child's ability to use language and thus gives a

"warped and partial measure of his real degree of intelligence."<sup>(1)</sup>

(1) Chan-In Line Herman, Non-Verbal Intelligence Tests for Use in China, published by Teachers College, Columbia University, New York City, 1922, p.8.

Importance of Intelligence testing for School Practice

In 1916 Terman wrote: "Binet testing is destined to become known and practiced in schools, prisons, reformatories, charity stations, orphan asylums and even ordinary homes." (1)

The later developments of intelligence testing have fulfilled this prophecy and the use of mental measurement was even extended to additional fields. But our main concern will be the ways in which the teaching profession can expect help from these researches.

"By means of his tests", says Hamley, "The psychologist seeks to discover causes and conditions, to predict consequences and achievements and to prescribe preventive and remedial treatment. Like the physician he seeks to realize this aim by the application of scientific principles rather than by haphazard or even by 'inspired guessing.'"(2)

Let us see now how the 'study' of children has given up "haphazard guessing" and to what extent the use of testing has contributed to the improvement of school practices.

1. The problem of school retardation: The first and most important contribution that testing has made to educational practice was to do away with the "frontier borders" which tradition had traced between the feeble-minded and the normal child. The advent of scales of

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(1) Terman, Op. Cit. p. 5

(2) Hamley, H.R., The Testing of Intelligence. The University of London Institute of Education, Evans Brothers Ltd., Russell Square London, p.24.

measurement has shown that the mentally deficient do not form a distinct class marked off from the rest of the population by well defined divergence in their intellectual and emotional life; it has shown that children do not fall into two well-defined groups, "the feeble-minded" and the "normal". On the contrary, the distribution of intelligence falls in many grades, ranging from idiocy on the one hand to genius on the other. Statistics have shown that when large numbers were taken into account, differences were distributed in a continuous gradation from one extreme to the other. Consequently the concept of feeble-mindedness, was so extended as to include milder degrees of defect which would not have been discovered by ordinary observation of school children.

Then the concept of normality was no more strictly defined. Among school children classed as normal "vast individual differences have been found to exist in original mental endowment". Hence the capacity to profit from school instructions was unequally distributed.

Previous to this discovery school retardation was thought to be due only to wrong methods of teaching and individualized instruction was suggested as the only remedy. This attitude was based on "the assumption that under the right conditions all children would be equally capable of making satisfactory school progress."<sup>(1)</sup>

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(1) Terman, Op. Cit., p.4.

The inequality of children is now definitely accepted. So instead of wasting money to re-teach children what they cannot learn, schools should differentiate their course of studies in such a way that "each child will be allowed to progress at the rate which is normal to him, whether that rate be rapid or slow." (1)

Thus it is suggested that school children be grouped, not according to their chronological age but according to their mental abilities. It is interesting to mention here Adler's experiment who tested seventy first grade children and divided them into two sections, of thirty five each, on the basis of their test records. The superior section completed two terms work in one term. (2)

2. The discovery of superior children: The other most important contribution of mental testing was the discovery of the school child of superior intelligence. Before the use of intelligence testing interest in superior children centered in main around some "prodigies."

As a matter of fact, if we judge by the amount of literature, we meet far less interest in superior children than in feeble-minded. And, as in the case of feeble-mindedness it was necessary to wait for the advent of intelligence testing to give us a better definition of superior intelligence and to show us that it is not as uncommon as people seemed to have imagined.

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(1) Terman, Op. Cit., p.4.

(2) Pinter, Op. Cit., p.232.

Till the advent of mental testing the superior child was considered as the most uncommon thing, as "something apart, unhealthy and slightly abnormal." (1)

As with feeble-mindedness, mental measurement has extended also our concept of superior intelligence. Superiority is not a well-defined word, cut off from normality by a clear borderline. There is a gradation between normality and superiority such as that existing between normality and feeble-mindedness. The number of children with very superior ability is approximately as great as the number of feeble-minded.

The selection of such a superior class is the task of the psychologists, for the teachers have failed, in spite of their long contact with children, to recognize exceptional superiority, while the psychologist would perform the task after a one-hour examination, says Terman.

The incompetence of teachers in this task has lead to the misunderstanding of children of superior abilities. These children were often lost in the masses through the levelling influences of the educational lock-step: "The common saying that genius 'will out' is one of those dangerous half truths" (2) says Terman, and it is of the greatest importance to explore the nation's hidden resources of intelligence for "the future welfare of the country hinges in no small degree upon the right education of these superior children." (3)

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(1) Pinter, Op. Cit.  
(2) Terman, Op. Cit.  
(3) Terman, Op. Cit.

Hence the more and more felt need for special classes, which when tried have yielded the most edifying results.

3. The ordinary school child: Here the role of testing is twofold:

a. Mental testing may be of the greatest help in the classification of average school children as we have already seen in Adler's experiment.

b. Their effectiveness in predicting pupil's future success in school work is nowadays unquestioned.

4. Test discoveries in research: Last but not least are the great discoveries that mental testing is realizing in its exploration of the factors that influence children's mental development most.

The most interesting topics for education are heredity, sex and environment.

We are going to cast a glance on these last two because of their importance for our study.

a. Influence of socio-economic factors: Binet was aware of the effect of environment on mental development and in his researches he had classified a group of 492 children according to their environmental standard into the following five groups: very inferior, inferior, average, superior and very superior. A comparative study of these groups had given the following result:

The median I.Q. for children of the superior social class is about 7 points above, and that of the inferior social class 7 points below the median I.Q. of the average social class.

The dependence of the I.Q. on social conditions has been confirmed later by more extensive studies. As a sample we mention Neff's various studies on school children where a range of about 20 points in I.Q. has been found between children of the highest and lowest socio-economic group. Other researches in this field in public schools have shown that the mean I.Q. of a number of subjects ages 8 to 18 remains fairly constant around 108 for children of higher social standard, while the I.Q. was similarly constant around 96 in families where the father was an unskilled or semi-skilled laborer.

So Harold E. Johns concludes that "in general children tend to acquire the intellectual status characteristic of the environment to which they are exposed."<sup>(1)</sup>

It will be of the greatest interest to see later how these findings compare with those which we obtained in our experiment on Beirut school children.

b. Sex difference: Intelligence testing has done away with the ancient hypothesis which places males at a higher mental level than females. After a lengthy study on the subject Anastasi concludes: "In personality

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(1) Carmichael, Op. Cit., p.646.



as in intelligence, we cannot speak of inferiority and superiority but only of specific differences between the sexes .... These differences are largely the result of cultural and other experimental factors." (1)

Does our experiment confirm the equality of the sexes? This also will be discussed later and will be of the greatest interest for us.

### Limitations of Mental testing

Mental tests should be used judiciously. Though they are valuable instruments for the practical guidance of human affairs, they are not, as it was supported in the thirties by their enthusiastic advocates "magical instruments".<sup>(2)</sup> In the application of tests:

1. We must guard ourselves against hasty generalizations. For, mental tests do not pretend to have reached exact measurement as we have already mentioned. They do not measure native intelligence in the abstract. They are only instruments for classification of subjects sharing the same social and cultural opportunities. "Binet's caution against the use of tests for purpose of comparisons when the environment and the background of the subjects differ should not be disregarded." (3)

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(1) Anastasi, Op. Cit. p.682.

(2) Freeman, Frank W., Mental Tests, Houghton, Mifflin Co., The Riverside Press Cambridge, Revised edition, p.15.

(3) Encyclopedia of Educational Research, Revised Edition, 1952.

On the other hand, though the I.Q. has proven to be fairly constant, intelligence testing do not pretend to have any predictive conclusion. For the future failure or success of subjects is determined as much by personality qualities, such as perseverance, emotional stability, social intelligence, till now refractory to measurement, as by native intelligence.

2. We must be careful not<sup>to</sup> exaggerate the accuracy of the measures which mental tests <sup>yield</sup>, for as Freeman said: "The nature of the capacities which they measure are known to us only in a rough way.... and the chief problem in the development of mental tests at the present time is the need of more precise definition of the abilities or traits which are to be measured."<sup>(1)</sup>

So, though mental tests are the most refined and the most accurate instruments available, they must not be considered as "infallible guides" and "finished instruments", and must be supplemented by the judgments of teachers and that of those who are well acquainted with the tested subjects.

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(1) Freeman, Op. Cit., p.16.

PART TWO

INTELLIGENCE MEASUREMENT IN LEBANON

## TESTING RESEARCH IN LEBANON

In 1916, Terman, speaking of the uses of mental testing, raised the problem of school retardation in America. Basing his remarks on statistics collected in hundreds of cities in the United States he pointed out that between a third and a half of the school children fail to progress through the grades at the expected rate; that from 10 to 15 per cent are retarded two years or more, and that from 5 to 8 per cent are retarded at least three years. More than 10 per cent of the \$400,000,000 annually expended in the United States for school instruction is devoted to re-teaching children what they have already been taught but have failed to learn.<sup>(1)</sup>

In the school year 1954-1955, exactly 39 years after Terman, Dr. Sadaka, Director General of the Ministry of Education in Lebanon, raised this same problem of school retardation in terms, which remind one word by word of those of Terman.

In a speech delivered in West Hall at the American University of Beirut, he mentioned figures on school retardation in Lebanon, more startling, by far than those given by Terman.

On the basis of statistics gathered from information on 90% of the schools in Lebanon, of every type: private as well as foreign, he declared that 69% of the

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(1) Terman, Op. Cit. p.3.

total elementary school population of Lebanon fail to progress through the grades at the normal rate. This retardation varies with children and reaches 8 years in some cases.

This means that in the 5th grade for instance, children of 11 years and less sit side by side with adults of 19 years of age. The average amount of retardation is of 2 years 10 months.

The percentage amount of retardation increases gradually, as we go up the grades. While it starts with 46.45 percent in kindergartens, it rises up to 58.77 in the 1st grade, 81.42 percent in the 2nd, 84.81 percent in the third and 91.41 per cent in the 5th.

This high rate of retardation is common to all types of schools though it is higher in the public. The over-all rates are as follows:

|       |     |      |    |       |         |                        |
|-------|-----|------|----|-------|---------|------------------------|
| 77.62 | per | cent | in | Boys  | public  | schools                |
| 70.51 | "   | "    | "  | "     | private | schools                |
| 66.37 | "   | "    | "  | Girls | public  | schools                |
| 62.17 | "   | "    | "  | "     | private | schools <sup>(1)</sup> |

This lengthy, detailed examination of this problem is intended to put into relief the gravity of the situation in Lebanese schools in contrast with what it was in the United States half a century ago and in order to contrast it with the remedy proposed by the Lebanese Ministry of Education:

Let us turn first to the solution proposed by Terman in 1916. It is not enough, according to him to notice retardation, but its causes must also be traced back in order to prescribe the remedy. "Just as in the case of physical illness, we need not merely to know that the patient is sick, but why he is sick... so in the case of a retarded child, we need to know the exact degree of intellectual deficiency, what mental functions are chiefly concerned in defect, whether the deficiency is due to innate endowment, to physical illness, or to faults of education and what lines of mental activity the child will be able to pursue with reasonable hope of success." (1)

And the tool for such a scientific diagnosis is not a school examination, nor a teacher's estimate, but intelligence testing which is far more accurate and far more rapid than both former means. A well-trained psychologist does not need more than 60 minutes to disclose the original endowment of a child.

This was Terman's remedy which is nowadays more and more adopted in America's school and which offered an inestimable help to an incalculable number of children's problems.

It was a scientific progressive, constructive approach.

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(1) Terman, Op. Cit., p.23.

The solution proposed by the Lebanese Ministry of Education is different in nature and is summed up in a drastic law refusing admittance into public schools of children who are too old for their respective grades.

This solution was based on four assumptions:

1. That retardation is due first and foremost to the negligent, irresponsible attitude of parents who fail to register their children at school at the right time.

While this may explain in part retardation in kindergartens and first grades, it is far from explaining the tremendous increase in retardation as we go up the grades.

2. It takes for granted that examinations and teachers' estimates are sufficiently accurate instruments for school promotion. Such confidence is put in teachers and examiners that they are given full liberty to discriminate between those children who are intelligent enough to be given more schooling, and the 'dull' who don't deserve the care and sacrifices of both states and parents.

These latter it is said should thus be thrown out of schools in order:

a. To earn their living and thus become active members in a society which needs 'their working hands' because it has judged most arbitrarily that 'manual work' is all that suits them.

b. To give up their places in schools to those who were arbitrarily judged to be more fitted for advanced intellectual studies.

It is really too serious a decision to be taken so rapidly and to be entrusted to unreliable methods of sifting.

3. It mistakes school achievement for natural endowment.

4. It presupposes that under the right conditions all normal children would be equally or almost equally capable of making satisfactory school progress; those who don't are necessarily dull and, thus should be refused admittance to schools. We have seen how the psychological studies of children have refuted this supposition. They have shown that children do not fall into two well defined groups, the 'feeble-minded' and the 'normal'. Hence the necessity of a more accurate instrument than teachers' perspicacity in order to disclose a child's degree of intelligence.

The reason for this divergence of attitude between Terman and the Director General of the Lebanese Ministry of Education is very easily explained.

When Terman raised the question of school retardation he had already endowed America with a scale of intelligence measurement. Does such a scale exist in Lebanon?



This question leads us to an investigation of what has been done in Lebanon in this field.

UNESCO's Groupings: Many cultural institutions in Beirut, such as the Education and Psychology Departments of the American University of Beirut, and the French "Ecole Superieure des Lettres" show a great deal of interest in the subject and many trials have been undertaken by them. Mention may be made of the investigation conducted by Professors J.D. Keehn and E. Terry Prothro, from the American University of Beirut, Psychology Department, on students from the Preparatory Section and the French Section Secondaire of the International College of Beirut: Four group tests were used in this trial: Cattell's Culture-Free Test (1944), Raven's Progressive Matrices (1938), The French Dominoes Test D48 (1952) and a ten-minute number series test. Correlations between the tests results and the years' average grade for school work were computed. The teachers' estimate of children was also correlated with the test results. In both cases the correlations were rather low. (1)

No information is available on the work going on in the Ecole Superieure des Lettres.

But whatever the results obtained by these two institutes may be we should not expect from them a final,

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(1) Educational & Psychological measurement - A Quarterly Journal Devoted to the Development and Application of Measures of Individual Differences - Reprinted from: Volume fifteen, number four, winter 1955.

definite standardized test since they are mostly concerned with the preparation of students in this kind of work rather than with the construction of appropriate tests for Lebanese Children.

We must rather turn to the semi-official agency, financed to some extent by the State for such a task, and from which we have the right to expect and require positive results in this field.

In 1951 an agreement was signed between the Lebanese Government and UNESCO according to which this latter sent a commission of experts whose function it was to assist the Ministry of Education in its educational and psychological researches.

A center was then erected under the direction of Professor De Costere, who resides six months in Lebanon and six months in Belgium, and Melle Grange, another expert appointed by UNESCO. The Lebanese Ministry of Education had on its part appointed some of its officials trained in Europe and America in this field of research, to assist these experts in their work.

In 1954 four non-verbal tests were tried on 2,000 subjects taken from every kind of schools in Lebanon: public, private as well as foreign. These tests were:

The French Dominoes Test D48

Cattell's Culture-Free test

Raven's Progressive Matrices

Numerical Series of Coetsers

The results are still unknown by the personnel of the center, Professor De Costere having taken them with him to Belgium. (1)

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(1) No written documents on UNESCO's activity in this field are available. We owe this information to an oral interview with Melle Grange and her Lebanese collaborators.

PART THREE

OUR EXPERIMENT

## CHAPTER I

### THE ADOPTED TEST

Instead of constructing a special test for this purpose, the Detroit First Grade, non-verbal group test was adopted for trial, with the idea that if it proved valid for Beirut first graders, it would be more valuable than a locally devised one.

The reasons for this preference may be summarized under two main points:

1. The results obtained would offer a ground for comparison between the mental age of Beirut first graders and that of other first graders living under different environmental and educational conditions. Consequently these results would be far more valuable than those obtained from a test locally devised in a country which has yet no tradition for mental testing.

2. If the Beirut norms are found to approximate the American norms, it would give to the Detroit Scale more solid ground, for it would tend to prove its objectivity for measuring native intelligence independently of environmental and cultural influences. Likewise this would confer greater confidence to the norms obtained by our experiment.

#### Description of Detroit First Grade test

It is a group non-verbal test: Instructions alone are given verbally, but answers do not require any verbal response from the subjects. Seven out of ten tests which

form the scale require only the making of a mark. The other three consist of: picture completion, drawing lines and geometrical figures.

The scale consists of 10 short tests all of which are of the picture type. It is designed for children entering the first grade and whose age range varies between 4 years 6 months and 8 years 6 months. So the items of each test are arranged in order of difficulty.

The purpose of this test being to help in the proper classification of the children entering the first grade, it was devised so as to measure native intelligence, not school knowledge nor home training.

Since intelligence is not homogeneous, as Binet said, but offers many aspects, this scale too is varied and contains tests of many different types designed so as to display differences in: (1) the capacity to acquire information about the world, (2) the subjects awareness of differences and similarities, (3) the memory span, (4) ability to notice absurdities, (5) capacity to recognize the proper use of objects, (6) number concepts, (7) manual dexterity, (8) space orientation.

It is an untimed test so that the children do their best without being hurried. Anyway it is recommended not to wait too long for slow children so that the rest of the group loses interest.

The test is easy to administer and like every group test does not require from the examiner any special qualities except the capacity of establishing rapport with children.

It is also easy to score. Apart from test 8 where evaluation is somewhat difficult for lack of samples, the scoring is strictly objective and does not allow any difference of opinion between one examiner and another.

The norms of the test are based on over five thousand first grade pupils. Letter rating A, B, C<sup>+</sup>, C, C<sup>-</sup>, D and E is proposed.

The aim of this scale being to aid in the classification of first graders for instruction purpose, as we have already said, it is suggested that the pupils be classified into at least three groups X, Y and Z. Pupils in the X group are the brightest and may be given an enriched course of study, Y is the normal group. The Z group is the lowest and so, should be allowed to progress more slowly than the normal group.

A table of age norms accompanies the scale and it is specially with this table that we compared our results.

#### Reasons for the adoption of this scale

A thorough study of this scale has shown its possible suitability for Beirut school children and this for the following reasons:

1. It is non-verbal: so it excludes the difficulties set up by language.

2. A careful examination of the pictures used show that they should be as familiar to Beirut first grade children as to American youngsters. However, some very slight modifications were introduced which will be mentioned later.

3. The test excludes school training as much as this is possible and so could be tried out on all school children of the first grade in Beirut whether the schools are modeled along American, French or local national lines. This is of prime importance in a city like Beirut which has a quite large number of schools of different affiliations: French, Anglo Saxon, local, confessional, non-confessional, lay, etc.

4. Its method of scoring is objective as we have already mentioned.

5. Time required for testing is relatively short. Though there is no time limit to the test, the period of examination does not exceed 35 minutes. This played a great role in reducing the objection of school principals who were very zealous about school routine.

6. Test material is very simple and inexpensive. As a matter of fact, it consists only of a booklet, a pencil and an eraser for every subject. The booklet was reproduced at a very low price and every school child possesses



a pencil and an eraser. However a collection of pencils and a number of erasers were always with us as "spare pieces." They were lent to the child whenever he broke his pencil or lost his eraser. This helped a great deal to avoid spoiling the atmosphere of the class and saved time and energy both on the part of the children and the examiner.

7. Instructions for testing and scoring are very simple: This also spares energy and time.

This is also most important in a country which lacks specialists in mental measurement. Thus the use of the test by teachers and principals, is possible if, it proves valid for Beirut first graders.

#### Modifications introduced to the test

We have already mentioned that a careful examination of the different pictures forming the tests showed its suitability for Beirut children.

The only item called in question and then modified was item 7 test 4 which consisted of a misplaced postage stamp which the child is supposed to remark as an error.

But a misplaced postage stamp may pass absolutely unnoticed by a Lebanese child for the practice of stamping at a definite place is not yet as imperative in Lebanon as in America.

This item, was then modified so that the postage stamp protrudes beyond the edges of the letter, thus making the absurdity more noticeable.

### Preparation of the testing material

The testing material consists of a booklet for every tested subject, as we have already mentioned.

To begin with the pictures of the test were stenciled. But before trying the test it appeared that they were in many instances indistinct and difficult to recognize. Then tests 1, 2, 4 and 5 for which clarity was indispensable, were reproduced by photolithography which gave a very faithful reproduction of the original tests.

Since absolute identity was not strictly imperative for the success of the other tests, the imperfection of the stenciled form of the other tests was judged of minor importance and thus the stenciled form of some tests were combined with the lithographed forms of others.

### The experiment

Age range of tested subjects: Our work was concerned with first graders. The usual age range for this class was formerly between 5-0 and 6-11. But the Ministry of Education, in order to make room for older students, had passed a law, at the beginning of the present school year, fixing the lower age limit for admission in public school to 6 years at the registration date.

So in order not to exclude from our study the population of public schools we limited our age range to 6 year olds.

This limitation of our field of study, far from being disadvantageous has led to a better estimate of the group studied. A more intensive investigation was made possible by the reduced area. The 604 cases, instead of being extended over two years of age were concentrated in one. So what our investigation has lost in horizontal extension it gained in depth.

### The Field of Study

In order to secure a representative group for our study we had to take into consideration the composite, heterogeneous nature of school population in Beirut. The most conspicuous aspect is the confessional distribution of school children. Every religious group has its schools which sticks jealously to its particular characteristics.

But, in the course of our investigation we were struck by not a less distinct and pronounced cultural and economical segregation.

At first, we started with the idea of limiting the field of our study to public and private national schools as sufficiently representative of Beirut school population. But, as we proceeded we felt the necessity of including the foreign schools too, and this for three main reasons.

1. The most startling discovery was the almost clear-cut distribution of school children according to

economical and educational standards of their parents. Most of the population of public and national schools belonged to the lower class or lower-middle class, while most of the well-to-do and educated families sent their children to foreign schools (See table No. XVII, <sup>appendix</sup> p. 93 ). So in order to include the middle and higher socio-economic class in our investigation it was necessary to extend our field to foreign institutions; else our group would be far from being really representative of Beirut school population.

2. The population of public and private national schools was predominantly Moslim, so in order to have an adequate sample of Christian children investigation in foreign schools became imperative. (See table No. III, IV, and V, <sup>appendix</sup> p. 52-94).

3. Statistics obtained from the Ministry of Education showed that the proportion of children in foreign schools is high enough not to be neglected (See table No. I, p. 50 ).

## Procedure

### Selection of Subjects

Before fixing the number of subjects to be studied we had to know the total number of children of the age under consideration actually in schools. To obtain this information we addressed ourselves to the Department of Statistics of the Ministry of Education. Figures for 1955-56 were not available because they were not yet compiled

and computed. But since no noticeable change in educational policy was perceived this year, nor had there been an impressive increase of the number of schools we adopted the figures of the school year 1954-55 as fairly approaching, if not absolutely identical, with those of the present one.

Since our investigation deals only with six-year olds, those who had the required age were born either in 1949 or in 1950 following the date at which the test was performed.

So figures for those born in these two years and who are actually registered in the different schools of Beirut were obtained from the Statistics Department of the Ministry of Education and are shown in table I.

Table I

Number of children born in 1949 and 1950  
who were in the schools of Beirut for the  
school year 1954-55

| <u>Year of birth</u> | <u>Public Schools</u> |              | <u>Private Schools</u> |              | <u>Foreign Schools</u> |              |
|----------------------|-----------------------|--------------|------------------------|--------------|------------------------|--------------|
|                      | Total - 1,800         |              | Total - 3,089          |              | Total - 1,593          |              |
| 1949                 | <u>Boys</u>           | <u>Girls</u> | <u>Boys</u>            | <u>Girls</u> | <u>Boys</u>            | <u>Girls</u> |
|                      | 837                   | 963          | 1750                   | 1339         | 565                    | 1029         |
| 1950                 | Total - 1,330         |              | Total - 2,898          |              | Total - 1,643          |              |
|                      | <u>Boys</u>           | <u>Girls</u> | <u>Boys</u>            | <u>Girls</u> | <u>Boys</u>            | <u>Girls</u> |
|                      | 606                   | 724          | 1612                   | 1285         | 549                    | 1094         |

It was desired to test approximately 10% of all 6-year-olds in the Beirut schools. In order to find the desired number in each column of Table I the figures in each column were added and their mean divided by ten.

A comparative examination of the figures of Table II will show that we approached a 10% sample and have in some cases exceeded it.

But unfortunately the strikes which foreign schools have gone through toward the end of this school year has cut down our numbers there and we thus fell short of 10% of the pupils of foreign schools.

Table II

Distribution of the tested subjects according to the types of school to which they belong

|       | <u>Public</u>          |  | <u>Private</u>         |  |
|-------|------------------------|--|------------------------|--|
|       | <u>Tested Subjects</u> | <u>10% of School population of 6 years</u> | <u>Tested Subjects</u> | <u>10% of School population of 6 years</u> |
| Boys  | 73                     | 72.15                                      | 176                    | 168.1                                      |
| Girls | 112                    | 84.35                                      | 127                    | 131.2                                      |
| Total | 185                    | 156.50                                     | 303                    | 299.3                                      |
|       | <u>Foreign</u>         |  | <u>Total</u>           |  |
|       | <u>Tested Subjects</u> | <u>10% of School population of 6 years</u> | <u>Tested Subjects</u> | <u>10% of School population of 6 years</u> |
| Boys  | 39                     | 55.6                                       | 288                    | 296  |
| Girls | 77                     | 106.1                                      | 365                    | 321.7                                      |
| Total | 116                    | 161.7                                      | 604                    | 617.7                                      |

Table III

PRIVATE SCHOOLS

Distribution of tested subjects according to their schools  
and religious denomination

| <u>French Lines<br/>of Studies</u>    | <u>Orth</u> |    | <u>Mar.</u> |    | <u>Gr.Cat.</u> |   | <u>Prot.</u> |   | <u>Chi</u> |    | <u>Sunni</u> |    | <u>Druze</u> |   |
|---------------------------------------|-------------|----|-------------|----|----------------|---|--------------|---|------------|----|--------------|----|--------------|---|
|                                       | F           | M  | F           | M  | F              | M | F            | M | F          | M  | F            | M  | F            | M |
| 1. Sagess                             | -           | -  | -           | 19 | -              | - | -            | - | -          | 1  | -            | 2  | -            | 1 |
| 2. Notre Dame du Liban                | -           | 1  | 7           | 2  | 1              | - | -            | - | -          | 1  | 1            | -  | -            | - |
| 3. Patriarcal College                 | -           | 1  | -           | 2  | 1              | 3 | -            | 1 | -          | -  | 4            | 2  | -            | 1 |
| 4. Ecole du Perpetual Secours         | -           | 1  | 4           | 3  | 1              | 1 | -            | - | -          | -  | -            | -  | -            | - |
| 5. Zahrat Al Ihsan                    | 14          | 8  | -           | 1  | -              | 1 | -            | - | -          | 1  | 1            | 2  | -            | - |
| 6. Bechara College                    | -           | 13 | -           | -  | -              | 1 | -            | - | -          | -  | -            | -  | -            | - |
| 7. National School Nursery            | 11          | -  | -           | 3  | -              | - | -            | - | -          | -  | 1            | -  | 3            | - |
| <u>American Lines of Study</u>        |             |    |             |    |                |   |              |   |            |    |              |    |              |   |
| 8. Al Ahlia                           | 2           | -  | -           | -  | -              | - | 3            | 3 | -          | -  | 7            | 4  | 1            | - |
| 9. Evangelical National School        | 1           | 2  | -           | -  | -              | 1 | 3            | 5 | -          | -  | 4            | 4  | 1            | - |
| 10. Rawdat Al Alfal                   | 2           | -  | 1           | -  | 1              | - | 1            | 2 | -          | -  | 4            | 6  | 1            | 1 |
| 11. Elementary School                 | -           | -  | -           | -  | -              | - | -            | - | 7          | 4  | 7            | 5  | -            | - |
| <u>Mixed</u>                          |             |    |             |    |                |   |              |   |            |    |              |    |              |   |
| 12. Al Makassed Elem. Schoo.          | -           | -  | -           | -  | -              | - | -            | - | 1          | 5  | 5            | 23 | -            | 1 |
| 13. Al Makassed College               | -           | -  | -           | -  | -              | - | -            | - | -          | -  | 1            | -  | 3            | - |
| 14. Amilia College                    | -           | -  | -           | -  | -              | - | -            | - | 4          | 21 | -            | 1  | -            | - |
| 15. Daoudia College (Druze Orphanage) | -           | -  | -           | -  | -              | - | -            | - | -          | -  | -            | 3  | 5            | 2 |

Girls ( Moslim - 74  
(Christian - 53

Boys ( Moslim - 102  
(Christian - 74

Total of tested subjects - 303

10% of total children of 6 years  
in Beirut Private Schools - 299.3

Table IV

PUBLIC SCHOOLS

Distribution of tested subjects according to their  
religious denomination

| <u>Schools</u>                             | <u>Orth.</u> |   | <u>Mar.</u> |   | <u>Gr.Cat.</u> |   | <u>Prot.</u> |   | <u>Chii</u> |   | <u>Sunni</u> |    | <u>Druze</u> |   |
|--|--------------|---|-------------|---|----------------|---|--------------|---|-------------|---|--------------|----|--------------|---|
|  | F            | M | F           | M | F              | M | F            | M | F           | M | F            | M  | F            | M |
| 1. Ras Beirut<br>Public School             | 6            | - | 1           | - | -              | - | -            | - | 2           | - | 6            | -  | 5            | - |
| 2. Basta Public School<br>for girls        | -            | - | -           | - | -              | - | -            | - | 3           | - | 30           | -  | -            | - |
| 3. Ashrafie Public School<br>for girls     | 9            | - | 7           | - | -              | - | -            | - | 6           | - | -            | -  | -            | - |
| 4. Rmeil Public School<br>for girls        | -            | - | 7           | - | 1              | - | -            | - | 2           | - | -            | -  | -            | - |
| 5. Ain Mreisse Public<br>school for girls  | -            | - | 6           | - | -              | - | -            | - | 4           | - | 14           | -  | -            | 1 |
| 6. Furn ElChaba Public<br>sch. for girls   | -            | - | 2           | - | -              | - | -            | - | -           | - | -            | -  | -            | - |
| 7. Furn ElChabac Public<br>sch. for boys   | -            | - | -           | 5 | -              | - | -            | - | -           | 2 | -            | -  | -            | - |
| 8. Ras Beirut Public<br>sch. for boys      | -            | 4 | -           | - | -              | - | -            | - | -           | 3 | -            | 7  | -            | 2 |
| 9. Ashrafie 1st public<br>sch. for boys    | -            | 4 | -           | 3 | -              | - | -            | - | -           | 3 | -            | -  | -            | - |
| 10. Ashrafie II public<br>sch. for boys    | -            | - | -           | 4 | -              | - | -            | - | -           | 3 | -            | -  | -            | - |
| 11. Basta Public school<br>for boys        | -            | - | -           | - | -              | - | -            | - | -           | 2 | -            | 23 | -            | 2 |
| 12. Mazra'a boys Public<br>school          | -            | - | -           | - | -              | - | -            | - | -           | 1 | -            | 2  | -            | - |
| 13. Haoud el Wilaq public<br>sch. for boys | -            | - | -           | - | -              | - | -            | - | -           | 3 | -            | 1  | -            | - |

Girls ( Moslim - 73      Boys ( Moslim - 53  
(Christian - 39                      (Christian - 20

Total of tested subjects - 185

10% of total children of 6 years  
in Beirut Public Schools - 156.5



Table V

FOREIGN SCHOOLS

Distribution according to Religion of tested

| <u>School</u>                  | <u>Subjects</u> |   |             |   |                |   |              |   |             |   |              |    |              |   |             |   |
|--------------------------------|-----------------|---|-------------|---|----------------|---|--------------|---|-------------|---|--------------|----|--------------|---|-------------|---|
|                                | <u>Orth.</u>    |   | <u>Mar.</u> |   | <u>Gr.Cat.</u> |   | <u>Prot.</u> |   | <u>Chii</u> |   | <u>Sunni</u> |    | <u>Druze</u> |   | <u>Jews</u> |   |
|                                | F               | M | F           | M | F              | M | F            | M | F           | M | F            | M  | F            | M | F           | M |
| 1. Elementary School AUB       | -               | 4 | -           | 1 | -              | 1 | -            | 1 | -           | - | -            | 10 | -            | 4 | -           | - |
| 2. American Sch. for girls     | -               | - | -           | - | -              | - | -            | - | -           | - | 9            | -  | 1            | - | -           | - |
| 3. College Protestant Francais | 6               | 5 | 4           | 2 | 4              | 4 | 3            | 3 | -           | - | 15           | 1  | 3            | - | 2           | 2 |
| 4. Pensionnat Ste Therese      | 1               | - | 10          | - | 2              | - | -            | - | -           | - | 7            | -  | 1            | - | -           | - |
| 5. Pensionnat St. Joseph       | 1               | - | 6           | 1 | 2              | - | -            | - | -           | - | -            | -  | -            | - | -           | - |

|         |           |      |        |           |      |
|---------|-----------|------|--------|-----------|------|
| Girls ( | Moslim    | - 36 | Boys ( | Moslim    | - 15 |
| (       | Christian | - 39 | (      | Christian | - 22 |
| (       | Jew       | - 2  | (      | Jew       | - 2  |

Total children tested - 116

10% of total children of 6 years  
in Beirut Foreign Schools - 161.8

### Schools Selected

Given the heterogeneity of schools, mentioned above, we had to take into account in the choice of our sample, not only the different sections of the town but also the religious denomination of the schools, their teaching practices, their socio-economic and cultural standards.

Thus, care was taken that our distribution contained in it in their proper proportions, i.e. relatively to their distribution in the whole population of Beirut, schools of different confessional affiliation, schools of Anglo-Saxon as well as French educational schedule and methods of teaching, schools from conservative sectors as well as modern ones, schools for poor, middle and superior classes.

Testing was done in 33 schools distributed as follows: 15 private, 13 public and 5 foreign. The tables on the opposite page give a detailed presentation of the subjects in regard to type of school and religious affiliation.

### Encouraging and Understanding attitude of Authorities and Schools:

Thanks to the understanding attitude of the Ministry of Education a permission was immediately granted for testing, thus facilitating our admittance into every public school.

Though most of the schools visited had never had any experience in psychological or educational testing, their help was most heartening. Every possible assistance was offered by them to make the study a success. Some were so interested in the work and were in such a hurry to know "how intelligent their students were", that we had to use every possible skill to escape their persistent curiosity. Given the ignorance of most teachers and principals on the subject, we wanted to escape any definite answer in regard to the children's mental abilities for fear of creating on their part an ungrounded biased attitude toward their children. Though we made it explicit that we were "testing" the test, not the children's intelligence they still insisted on wanting to know our results and many even suggested filing them in the child's records.

Regardless of prevailing cooperativeness, obstacles were not altogether non-existent. Interviews with some principals were really laborious. Recourse to an Archbishop's authority was in one instance necessary to overcome a principal's obstinacy. However, only two out of the 35 schools we visited offered an unyielding resistance. The first, a principal of a foreign school, gave a categorical 'no', because the experiment would interfere with the school routine. She wouldn't hear of this "American non-sense" which would lead to no result except disturbance in classrooms.

The second one, was a Lebanese principal whose school enjoys a high reputation in some sections of the town inspite its medieval methods of teaching. The most eloquent discourse would not convince her that a child might be intelligent but underestimated because he is handicapped and that school grades are not a sufficiently accurate tool for intelligence measurement. "Non-sense" she said. And dismissed us with the most contemptuous smile, convinced that whatever be the obstacle intelligence "will out". A stick is all that is needed to make a child succeed.

Another principal, a Lebanese too, couldn't understand "what all this fuss was for" and these "roundabout" ways. Intelligence is, according to him immediately perceived. "A smile" or a "glance of the eye" suffices to disclose it. Though our discourse left him skeptical he condescended to "let us try our way". By and by, as the experiment went on he was more and more interested and very anxious to discuss the results.

#### Gathering data

Though teachers and principals were ready to cooperate, much labor was required on both sides in order to gather the necessary data on subjects to be tested.

In most schools records and school census reports were non-existent.

Public schools only possessed the desired information concerning the religion of the child, his father's occupation and his nationality. As to his age, the year of birth only was registered in most schools. The day and the month were lacking.

Two foreign schools and two national ones only possessed complete records and yielded immediately all required informations on the subjects tested.

Where data were available the children's records or the school's registers were kindly put at our disposal and from these we copied by ourselves the desired data: the birth date of the child: year, month and day, his religion, his nationality, his father's occupation.

Progress was much slower where records were lacking. A short note was sent by the school's administration to the parents asking for necessary information. Sometimes children were required to bring in their identity cards from which their exact age was copied.

#### Administration of the test

After gathering the data, described above, a test-booklet was prepared for every child and a date was fixed with the principal of the school for the administration of the test.

In order to avoid the influence of accidental selection in choosing the subjects to be tested all Lebanese children of six years of age were tested to whatever grade they belonged.

Usually testing was conducted in class-rooms, sometimes the dining room or the assembly room was the only available place and it was specially prepared for the purpose through the courteous help of teachers and principals.

The size of the testing room as well as its equipment and comfort varied according to the economic standing of the school. So every child was tested according to the conditions under which his school work was done.

Every effort was displayed in order to put the child at ease so that the atmosphere of testing be the same everywhere, whatever be the conditions under which the child lived and worked.

The children were tested in groups varying from 7 to 12 subjects according to the size of the class-room available. They were seated apart from each other in order to avoid the possibility of copying.

#### Establishing rapport

To win the confidence of children was not a uniform task. The time and the effort required for this purpose varied tremendously from school to school. The attitude of the child toward testing indicated conspicuously the policy of his school towards him, as well as the home atmosphere under which he lived.

To overcome the timidity, nay, even the fear of the child was difficult in poor schools and particularly so

in public schools. This again differed tremendously as between girls and boys schools. Fear and even terror predominated in these latter, specially when the school is located in poor districts. Here one could immediately feel that a "smile", a "word of encouragement" would be absolutely ineffectual.

So we usually profited from the time spent by the teachers in preparing the room for testing to have a 'chat' with the youngsters, to tell them jokes and to ask them 'puzzles'. Then, once they were seated, we used to ask them: Do you remember the kind of puzzles we just did? Well, now we are going to do more of the same. I am not a teacher, and this is not a lesson. <sup>f</sup>We have only come to give you puzzles.

But, in some cases, the children, unaccustomed to kindness and 'flattery' were spoiled <sup>and</sup> because absolutely untamed, and it required the most tactful art to quiet them without "showing the stick" and awakening again their mistrust. Order and discipline were usually well established and the atmosphere of work was generally satisfactory.

In foreign and middle-class private schools, even the most conservative, the task of administering the test was much easier, and thus, much more agreeable. The children immediately engaged in 'talks' with us: "What are you going to teach us? What is it that you have in your hands? Are you going to give these booklets to us, and to keep?"

The children were more easily managed and their attitude was more friendly and spontaneous. Here testing went on without great effort in an informal and pleasant yet stimulating and searching atmosphere.

#### Reaction of children to the test

Everywhere the reaction of children was satisfactory though it varied too from school to school. The response was most genuine in schools which follow more or less modern methods of teaching. At every new page an exclamation of joy was heard all through the class: Oh how nice! Oh the kitty runs after the mouse!

Most of the children wanted to keep their booklets, many asked us to 'come again'. In one of the schools, the children while entering their class-room showed such a joyous attitude that their classmates, who did not have the age required in order to be tested, went out crying.

#### Instructions

The instructions were given in colloquial Arabic in its most simple form. (See appendix) It was understood by all children tested even those of non-Arab origin, the Armenians for instance, and for whom Arabic was not their home language.

The instructions of the author were followed as nearly as possible word by word. However a slight modification in test 2 was introduced. For children of European culture, the first object of a row of objects is immediately



understood to be the one at the left side. But in Lebanon the term first leads to confusion. It may mean the one to the left or to the right. For according to Arab handwriting and reading the beginning is to the right. But given the two-fold aspects of education in Lebanon, the same child may understand the first item to be either at right or left. So instructions of test two which in English are: "Mark the first window " were modified this way in Arabic: "Do you see the first row of pictures? Show me the picture standing alone in the corner, behind the thick black line. Put your finger on it. That's right." And we made sure in the case of first and second items that each child indicated the correct one. After the second item it was assumed that the children have had enough training to understand the instructions and no further corrections were made.

#### Nationality of the Subjects

Only children of Lebanese origin were tested. The test being given in Arabic, instructions could not be understood by foreigners. Some Arabs from Iraq, Kuwait and Saudi Arabia were given the test but their scores were not included in our computations. For, the test being in colloquial or Lebanese Arabic, it was noticed that instructions were not as easily understood by non-Lebanese as by their Lebanese classmates. The scores of Palestinians and Syrians were included because their colloquial Arabic is

much the same as the Lebanese. But their number is so limited (5 in all) that we can say that the norms established are norms only for Lebanese Beirut population of six years of age.

## CHAPTER II

### Scoring and Tabulation

The children were graded according to the instructions; their mental age was determined according to the table of norms attached to the test instructions. IQ's were then computed. The IQ's were then grouped in step-intervals of 5. A special table was prepared for every type of school, for boys and girls separately, as well as a general all-inclusive one. (See tables ~~at~~ *in the appendix opposite side*) But because testing in foreign schools was not as complete, as we desired, a separate study was made of Public and Private schools excluding the foreign groups.

### Computation of Central Tendency

"One of the most important tasks of descriptive statistics" said Anastasi, "is to render mass data comprehensive by providing certain single values which can serve as a family type to represent the entire group."<sup>(1)</sup>

The most important measures of central tendency are the Mean and Median.

So after the tabulation of the results the mean and the median for every group separately, as well as for the whole one, were calculated and are shown at the end of each table.

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(1) Anastasi, Anne, Elementary Statistical Methods, p.91.

### Measures of Variability

But in order to have the right idea of a distribution it is not enough to know averages. It is most important too to know how this distribution varies around the mean.

So in order to judge about the homogeneity of the subjects forming our different groups standard deviations were computed too and are shown at the end of our tables.

### Measures of relative position

We have seen that the great contribution of Binet to mental testing was to give up the idea of measuring a child's abilities according to absolute values.

As a matter of fact, what does it mean to have a score of 29 or 50 if we don't know the distribution of grades of a given group? "It is difficult" said Anastasi, "to think of any human trait in which amounts are interpreted without reference to what is usual of individuals of a given type".<sup>(1)</sup>

In order to judge the mental age of a child consideration may be taken of the distribution of intelligence in his group.

A percentile states the percentage of persons a given individual of a group exceeds. A table of percentile norms for Beirut school children of six years was constructed out of scores obtained by our trial.

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(1) Anastasi, Op. Cit. p 91 .

The tables which accompany the graphs No. IX, and X, p. 78-79 give the value of every fifth percentile for the whole group as well. But because our test was not completed in foreign schools as we already mentioned another table of norms was constructed separately for public and private schools together.

Histogram, Frequency polygons and percentage cumulative curves were then plotted in order to give a clearer idea of the results, as well as to facilitate comparative studies between the groups.

## Results

### I. Frequency Distribution of various groups

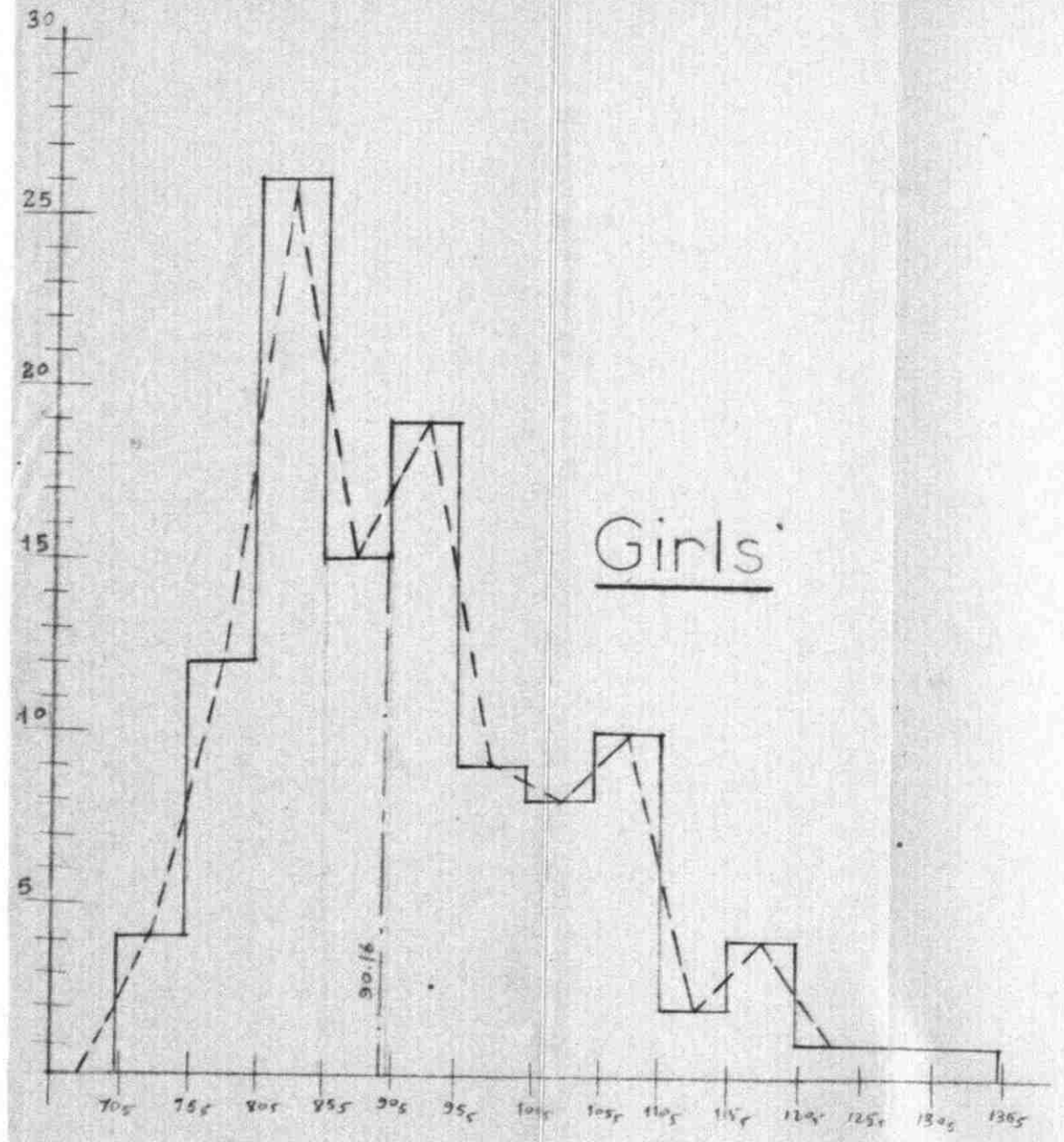
A histogram representing the frequency distribution of scores was drawn for each group, giving thus a clearer idea of the results.

In each histogram on the ordinate axes each two cases are represented by one half centimeter in the small groups, and by one fourth of a centimeter in the bigger groups, so that the resulting curves are small enough to be inserted in standard pages of our study and yet big enough to be clear to the reader.

The unit for the x-axis representing the scores intervals was taken to be invariably equal to one centimeter.

#### A. Public Schools

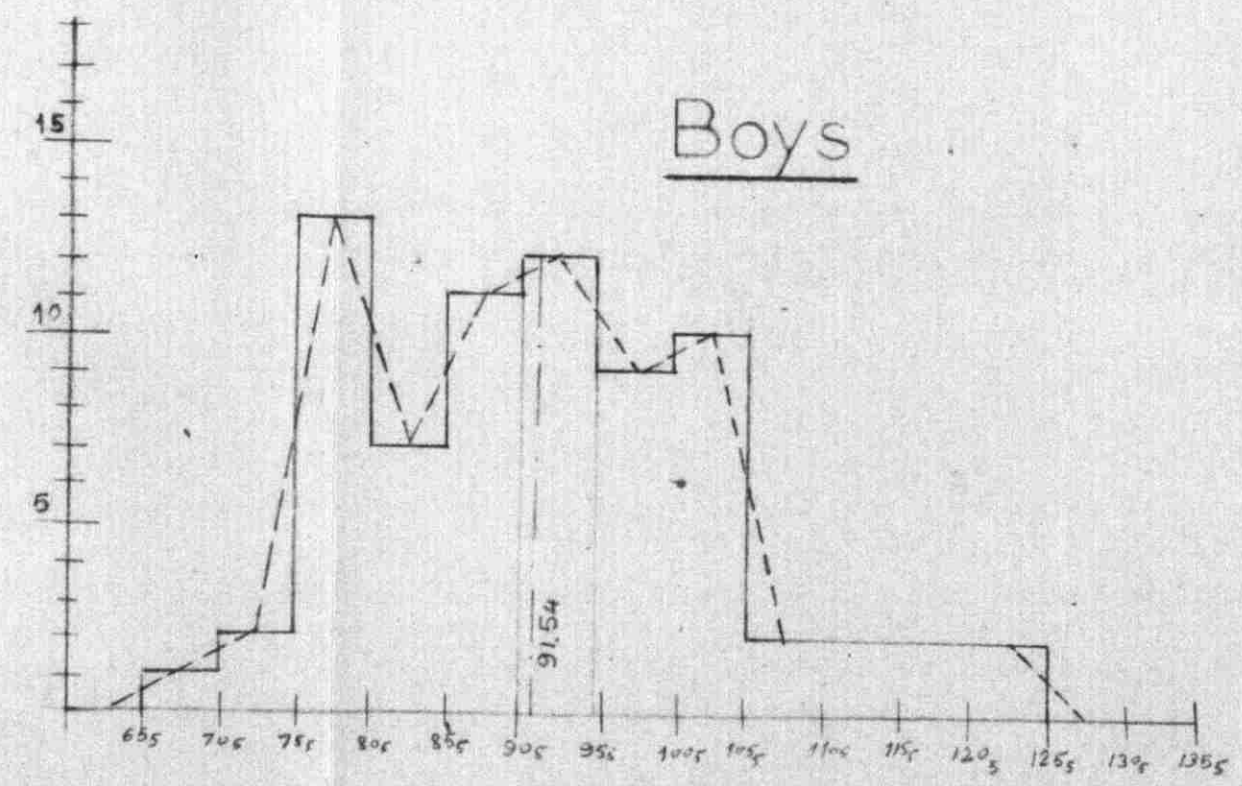
Histogram No. I represents the frequency of scores



Girls

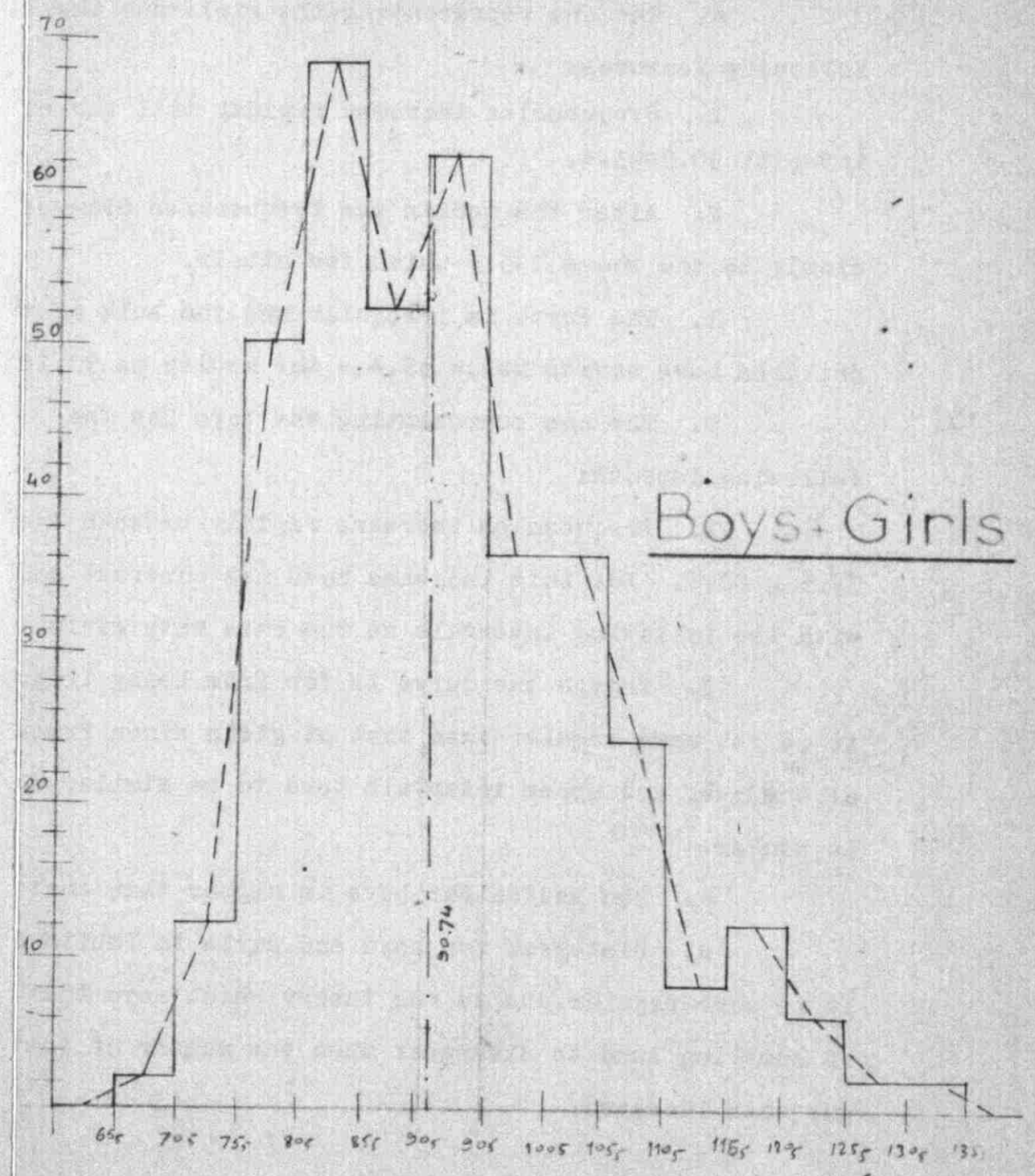
Median 90.16

Public Schools  
Graph N° I



Boys

Median 91.54



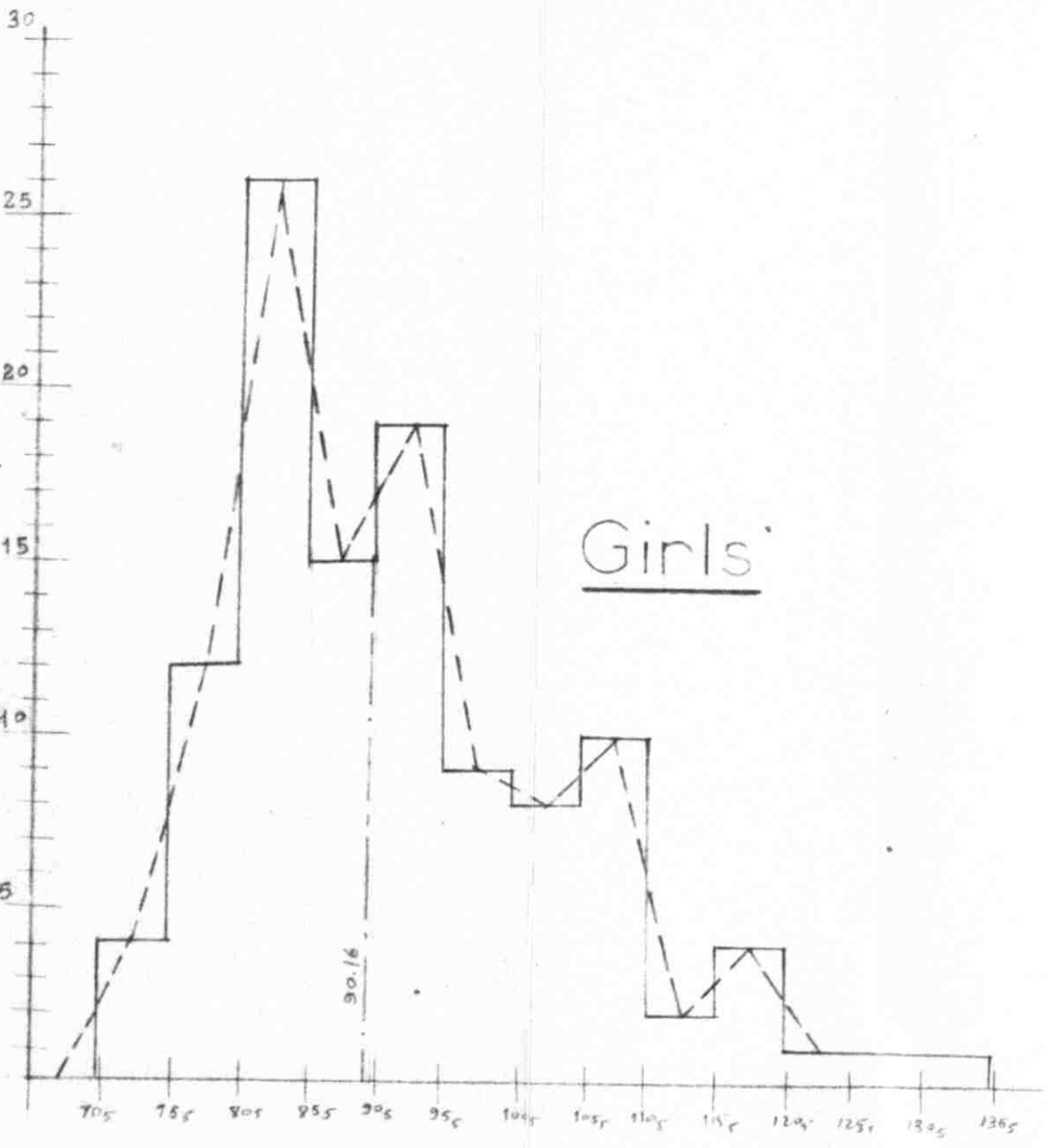
Boys-Girls

Median 90.74

Public Schools

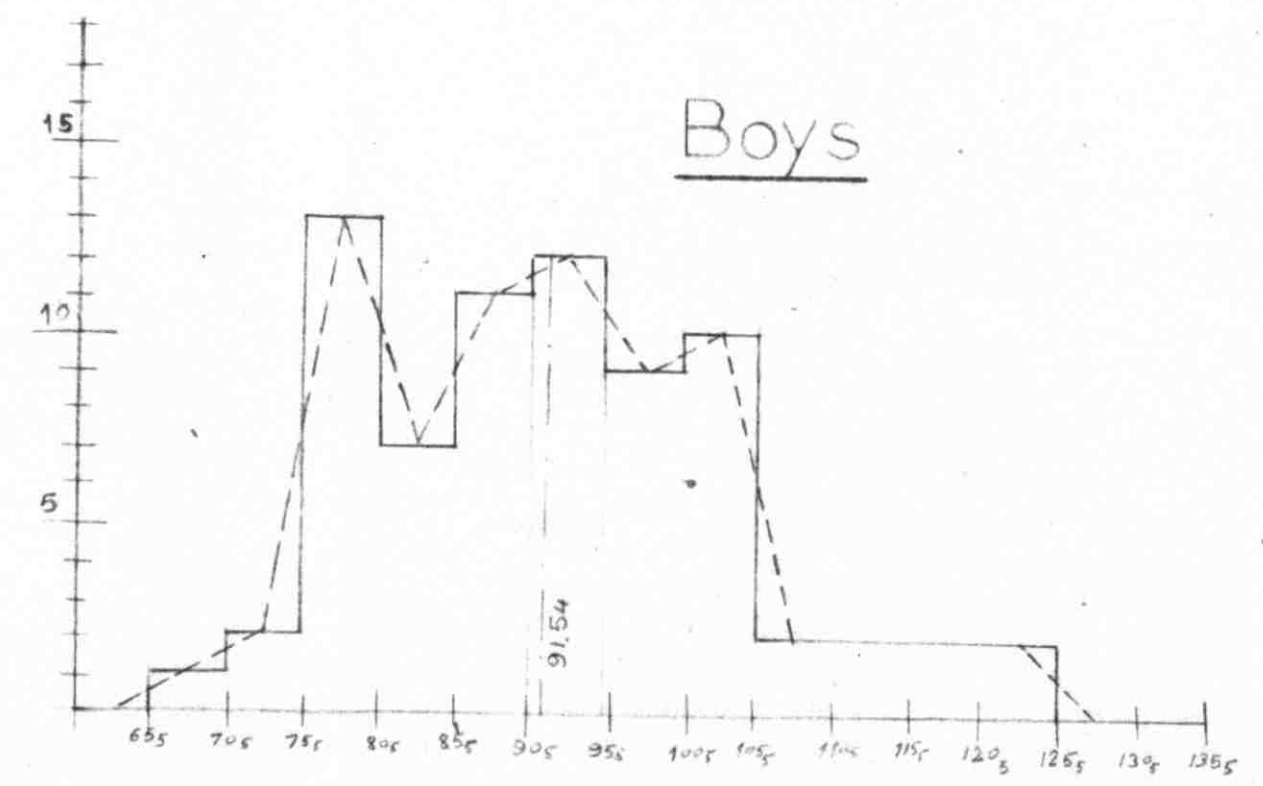
Graph N°I

Girls



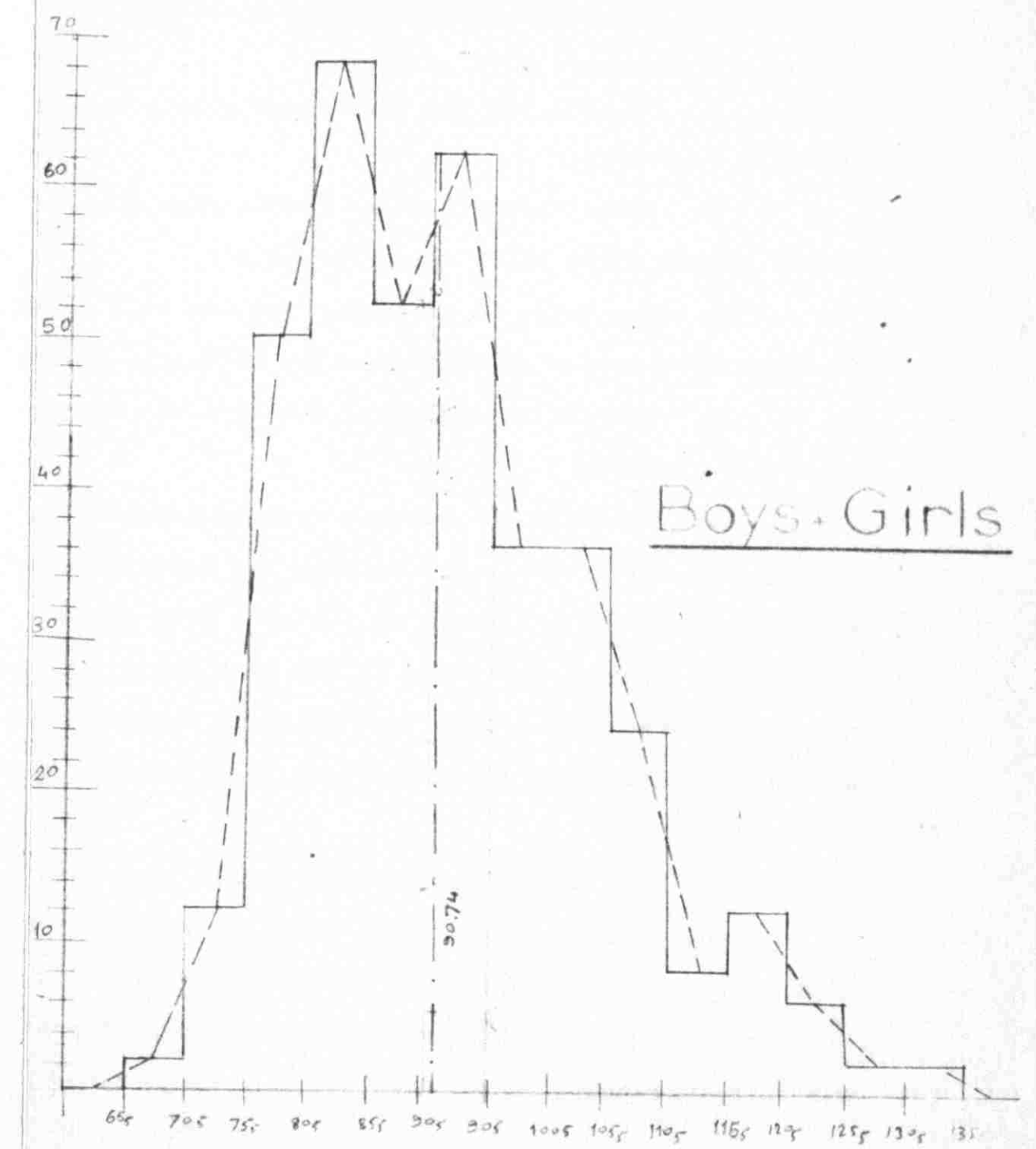
Median 90.16

Boys



Median 91.54

Boys+Girls



Median 90.74

of girls and boys in public schools.

a. The one representing the girls has the following features:

1. Frequencies increase rapidly till the score interval 90.5-95.4.

2. After the median the frequencies decrease slowly to the score 135.5 which few attain.

3. The curve is irregular and the bulk of the children have scores below 95.4 - the median is 90.16.

b. The one representing the boys has the following aspects:

1. Frequencies increase rapidly between scores 75.5 - 80.5. But this increase does not contrast so much with the following intervals as the case with girls.

2. Though the curve is far from being irregular it is yet more regular than that of girls since frequencies at the lower and upper intervals tend to be similar and few in number.

c. The Median for boys is higher than that of girls.

d. Histogram for boys and girls in Public Schools:  
It is more regular due to the theory which says that errors of sampling tend to disappear when the number of tested subjects increase.

#### B. Private Schools

Histograms here are more regular and tend to approach the bell-shape.



of girls and boys in public schools.

a. The one representing the girls has the following features:

1. Frequencies increase rapidly till the score interval 90.5-95.4.

2. After the median the frequencies decrease slowly to the score 135.5 which few attain.

3. The curve is irregular and the bulk of the children have scores below 95.4 - the median is 90.16.

b. The one representing the boys has the following aspects:

1. Frequencies increase rapidly between scores 75.5 - 80.5. But this increase does not contrast so much with the following intervals as the case with girls.

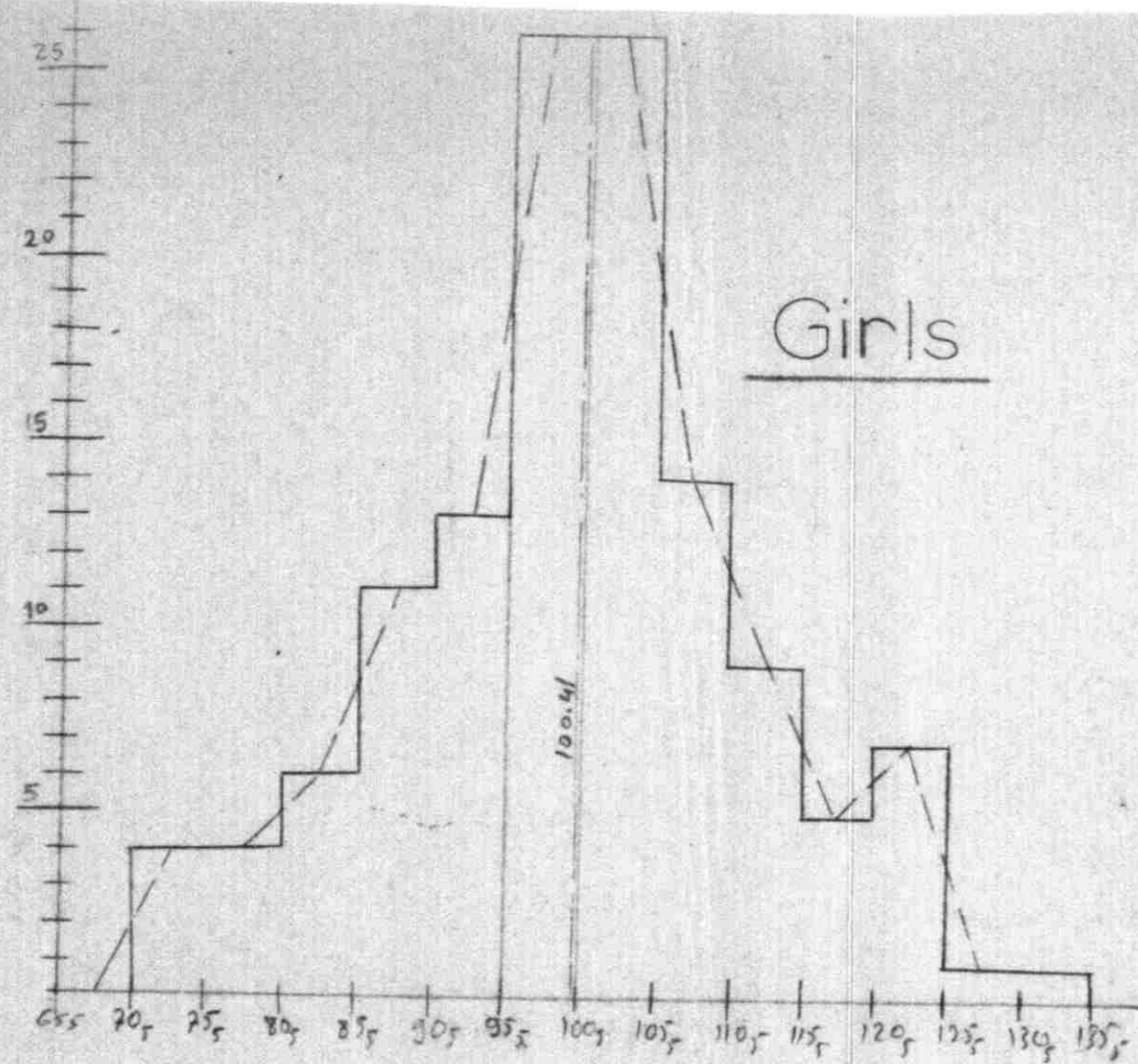
2. Though the curve is far from being irregular it is yet more regular than that of girls since frequencies at the lower and upper intervals tend to be similar and few in number.

c. The Median for boys is higher than that of girls.

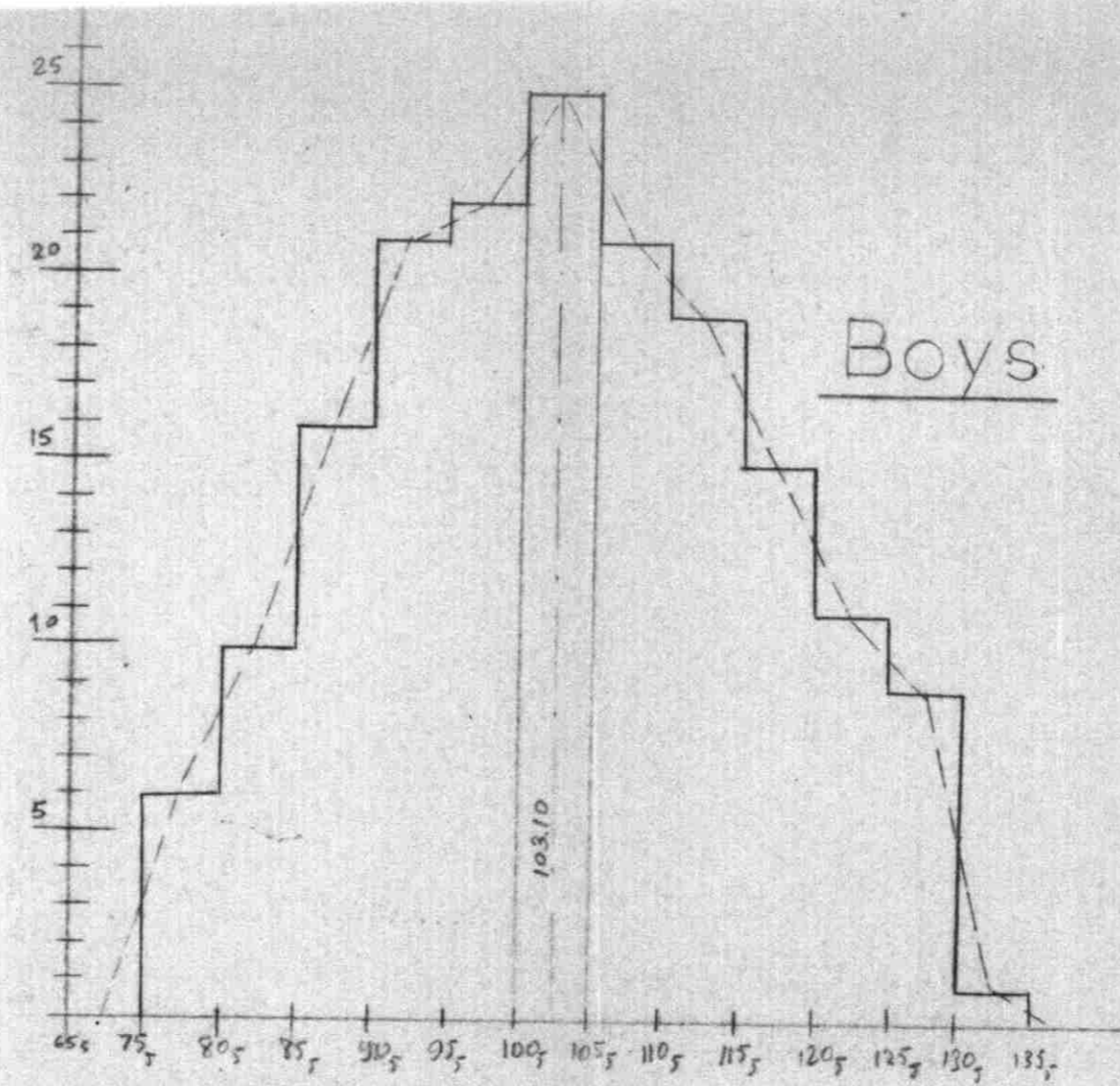
d. Histogram for boys and girls in Public Schools:  
It is more regular due to the theory which says that errors of sampling tend to disappear when the number of tested subjects increase.

#### B. Private Schools

Histograms here are more regular and tend to approach the bell-shape.

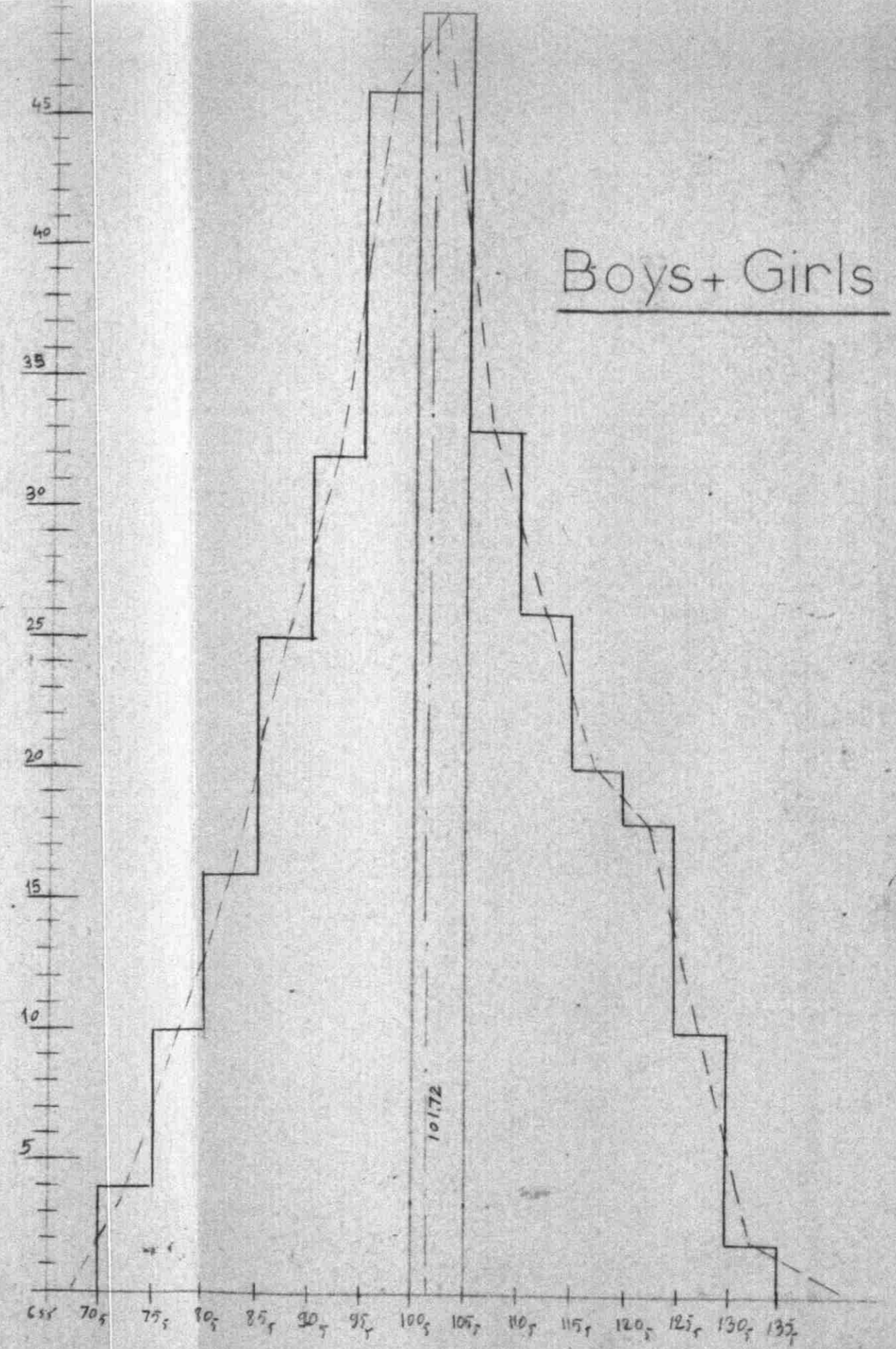


Median 100.41

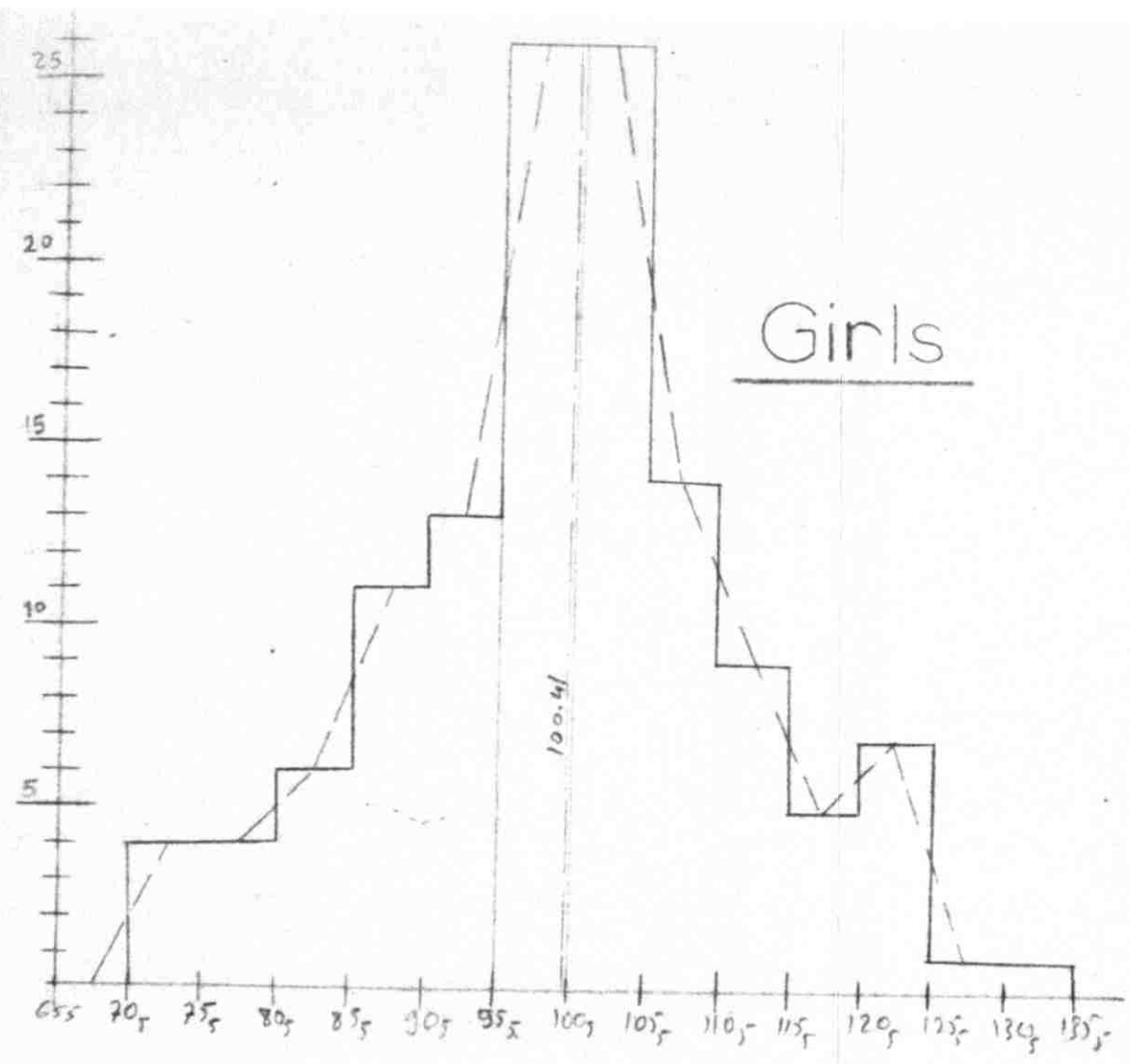


Median 103.10

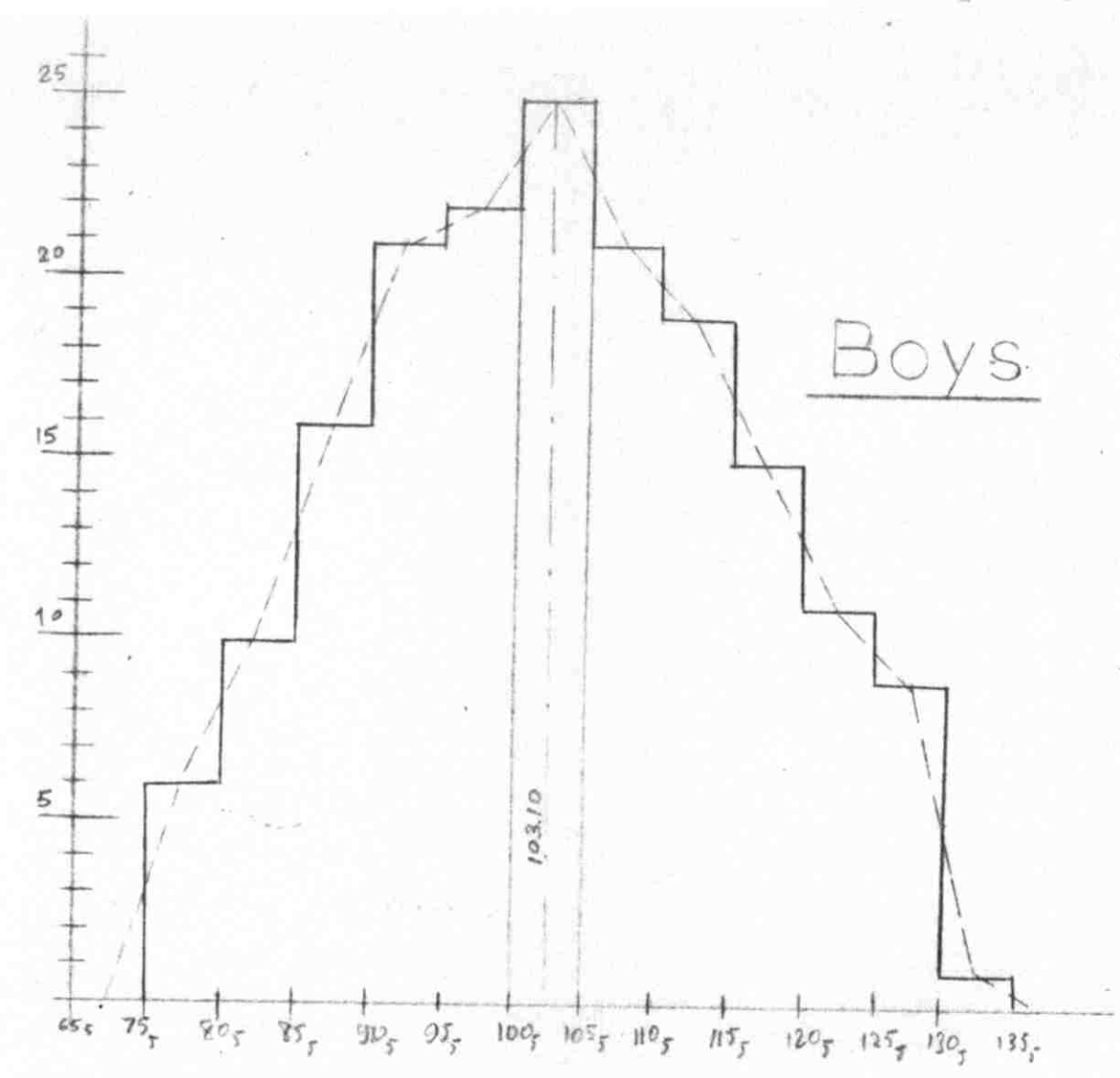
Private Schools



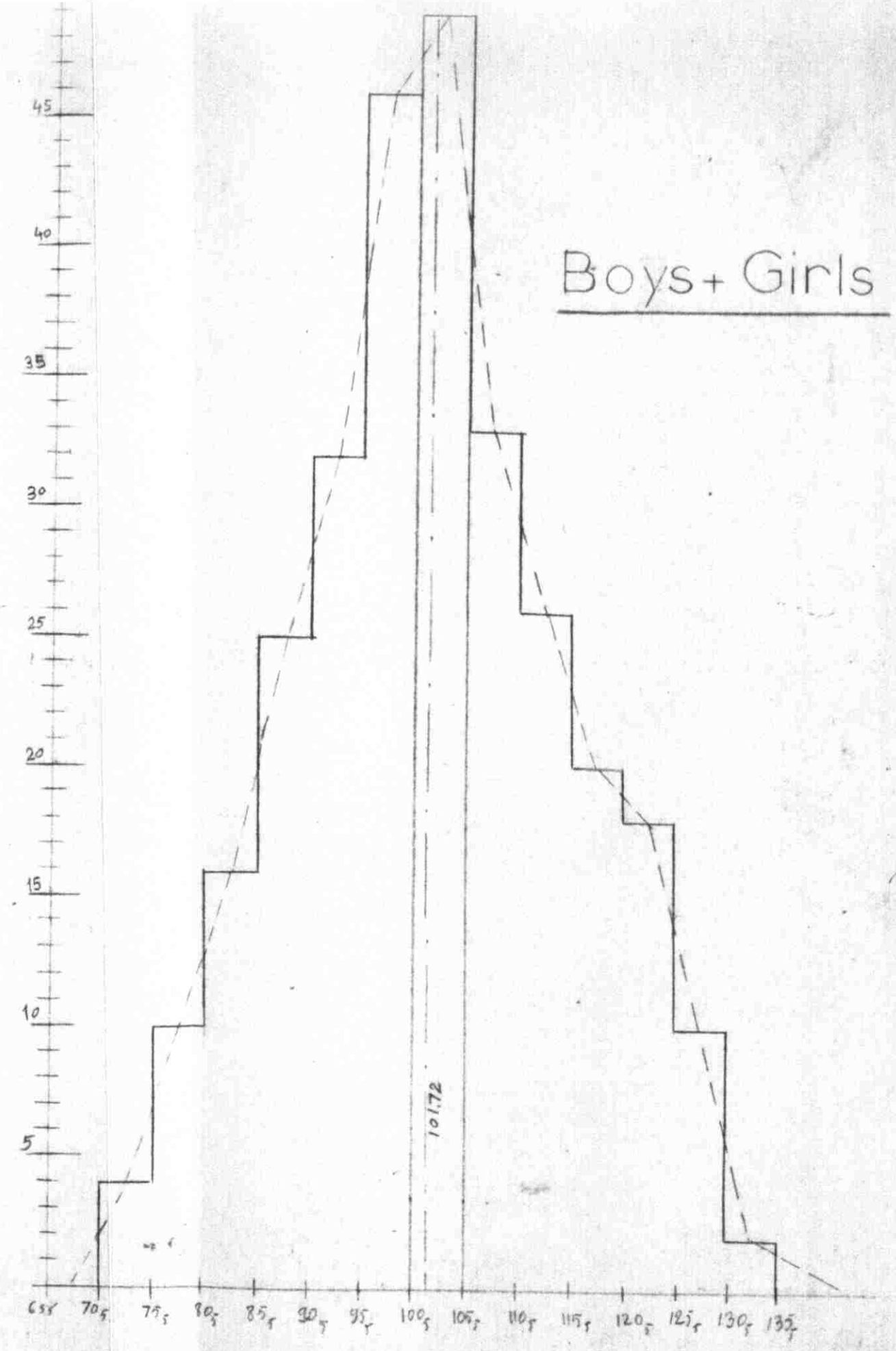
Median 101.72



Median 100.41



Median 103.10

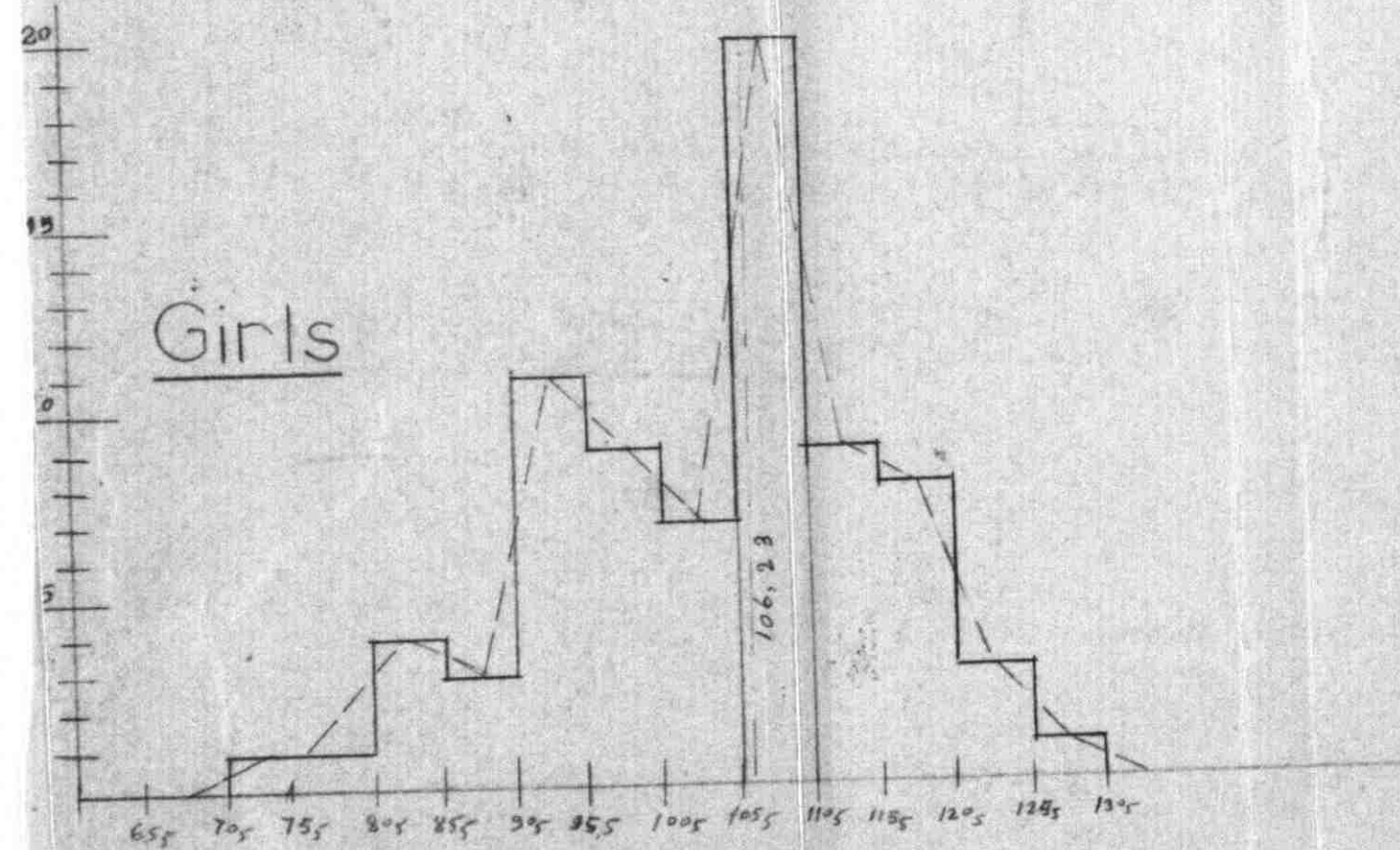


Median 101.72

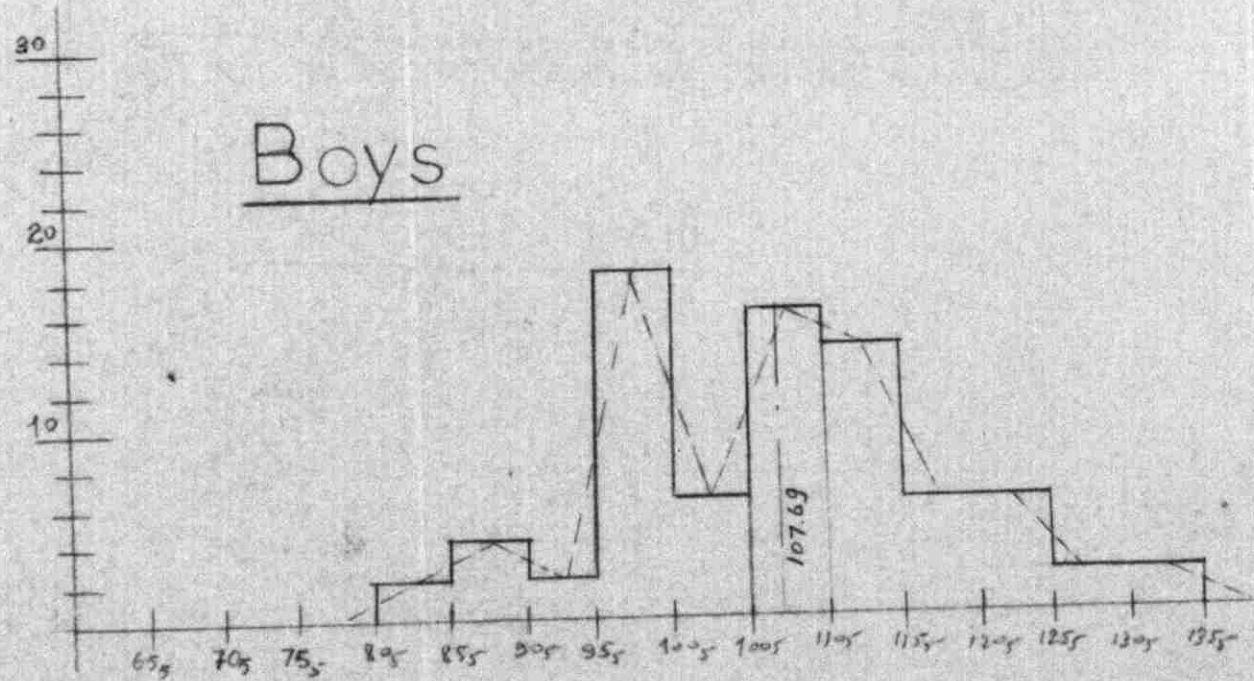
Private Schools

Foreign Schools

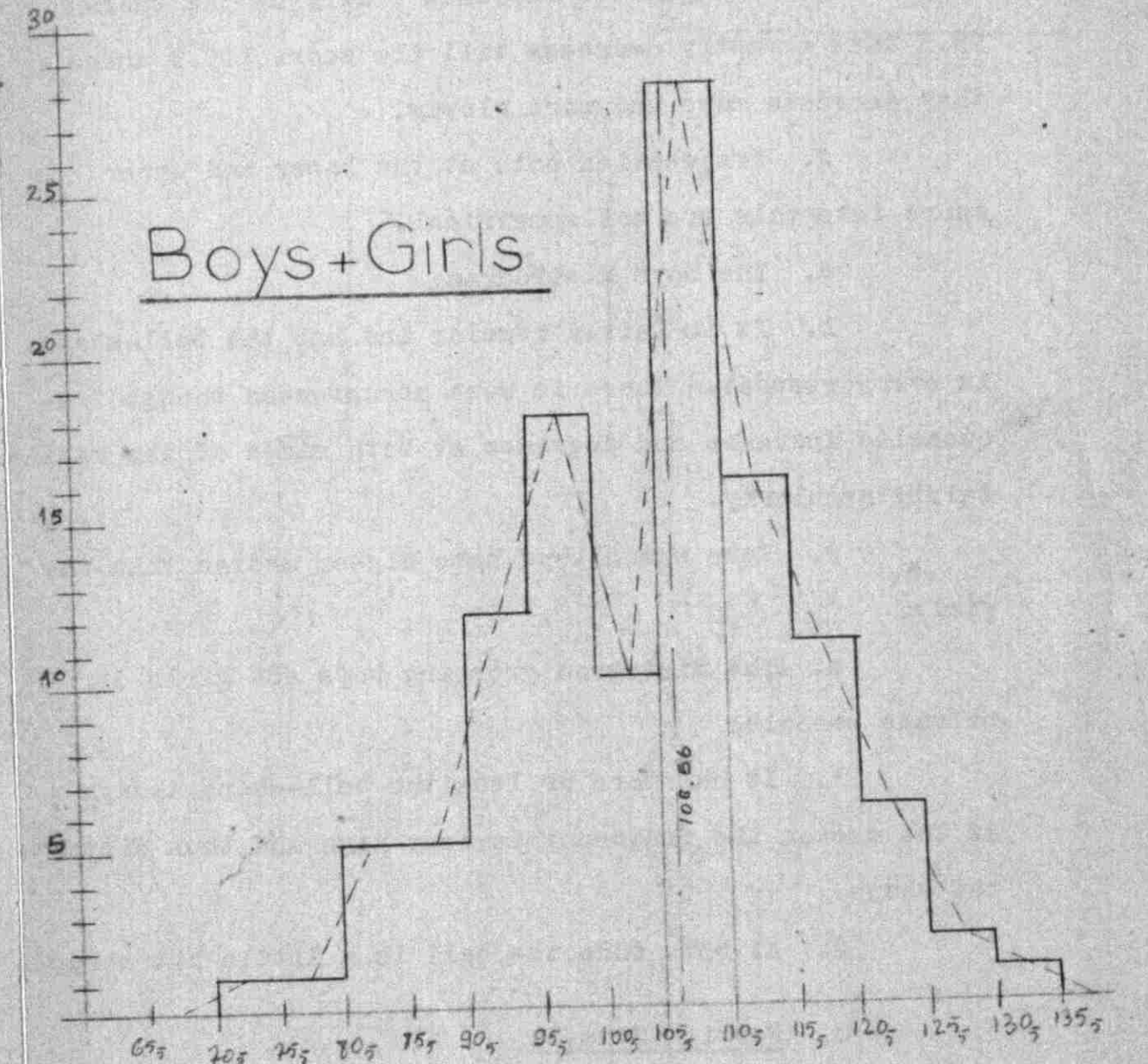
Graph N° IV



Median 106.23



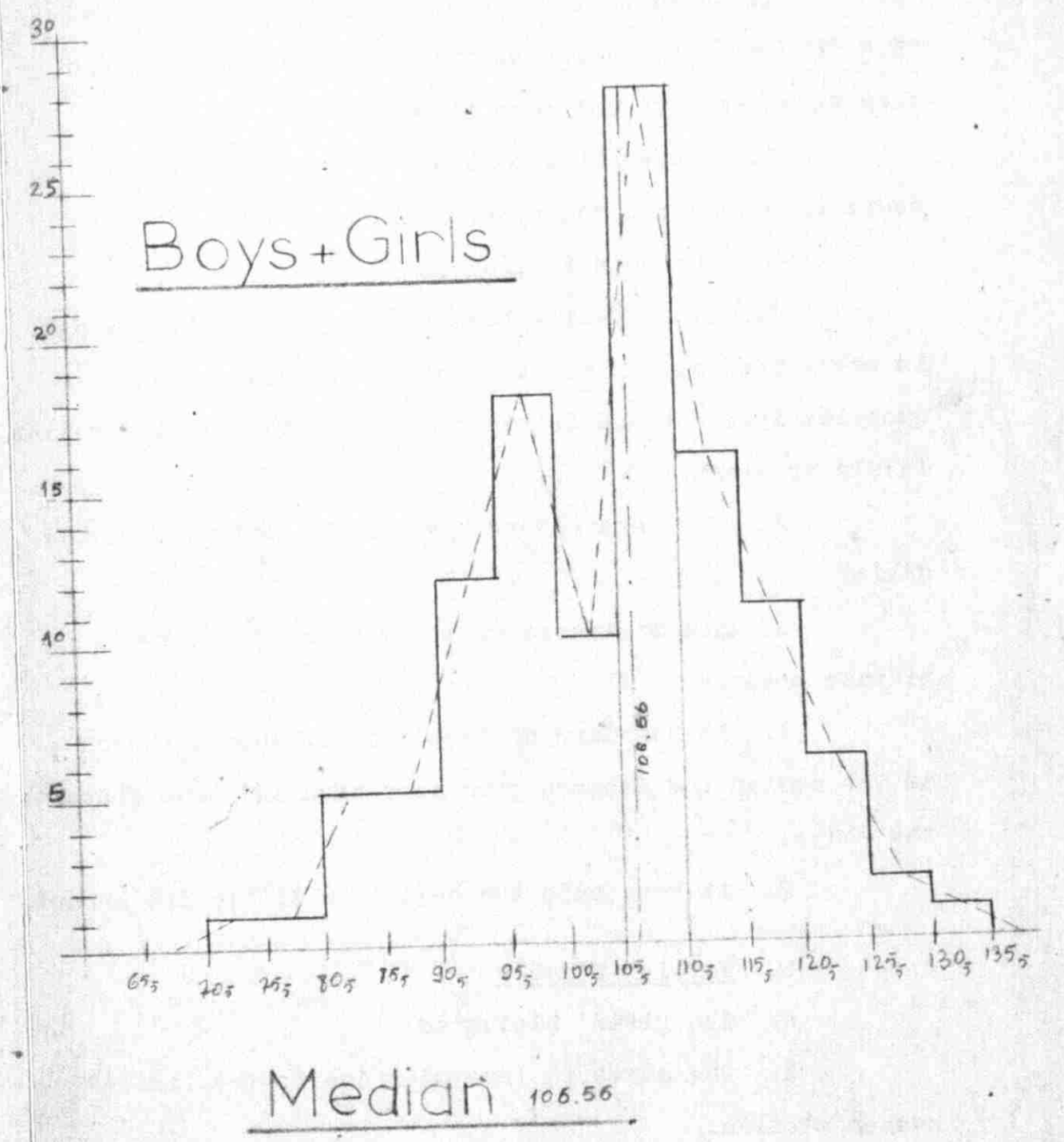
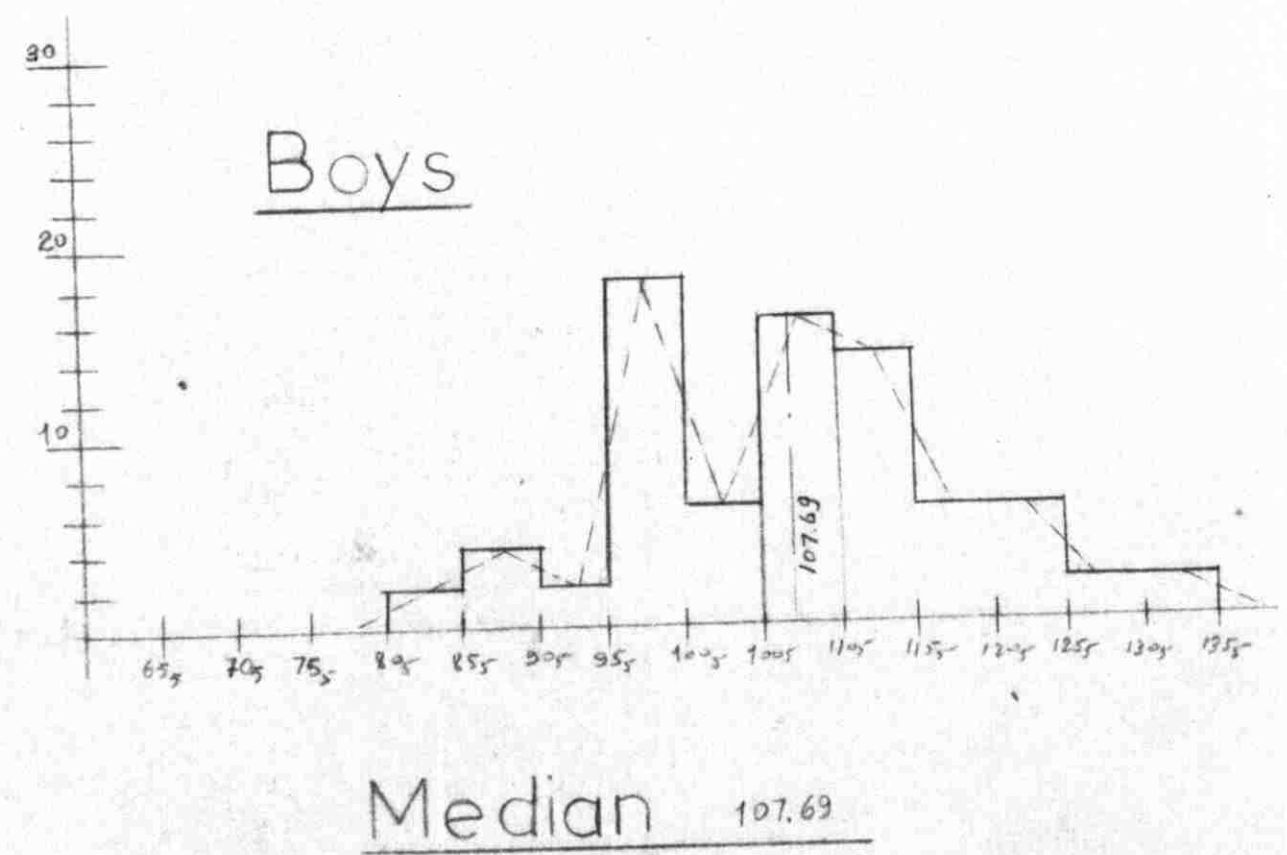
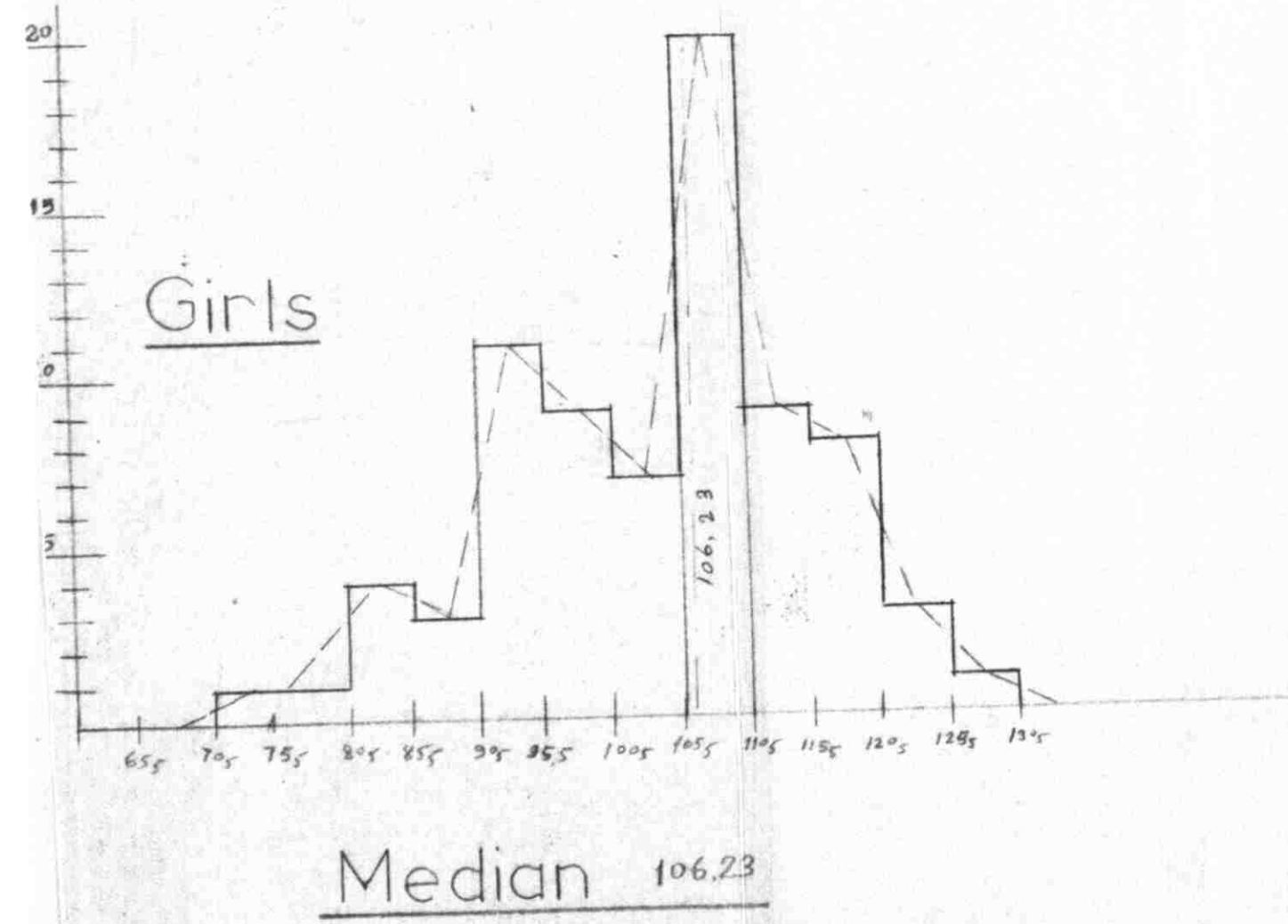
Median 107.69



Median 106.56

Foreign Schools

Graph N° IV



a. The histogram of girls presents the following features.

1. Frequencies increase slowly up the score 95.5 then abruptly decrease till the score 105.5 where they decrease more and more slowly.

2. Frequencies both at the lower and upper score intervals are not symmetrical.

b. The boys histogram:

1. It is fairly regular and has the bell-shape in every respect. There is some abruptness though frequencies increase and decrease at both sides of the median fairly regularly.

2. Here again boys have higher median than the girls.

c. The histogram grouping boys and girls of private schools:

1. It has more or less the bell-shape though at the median the frequency is very high and thus distorts the shape.

2. At both ends the bell is a little bit abrupt.

### C. Foreign Schools

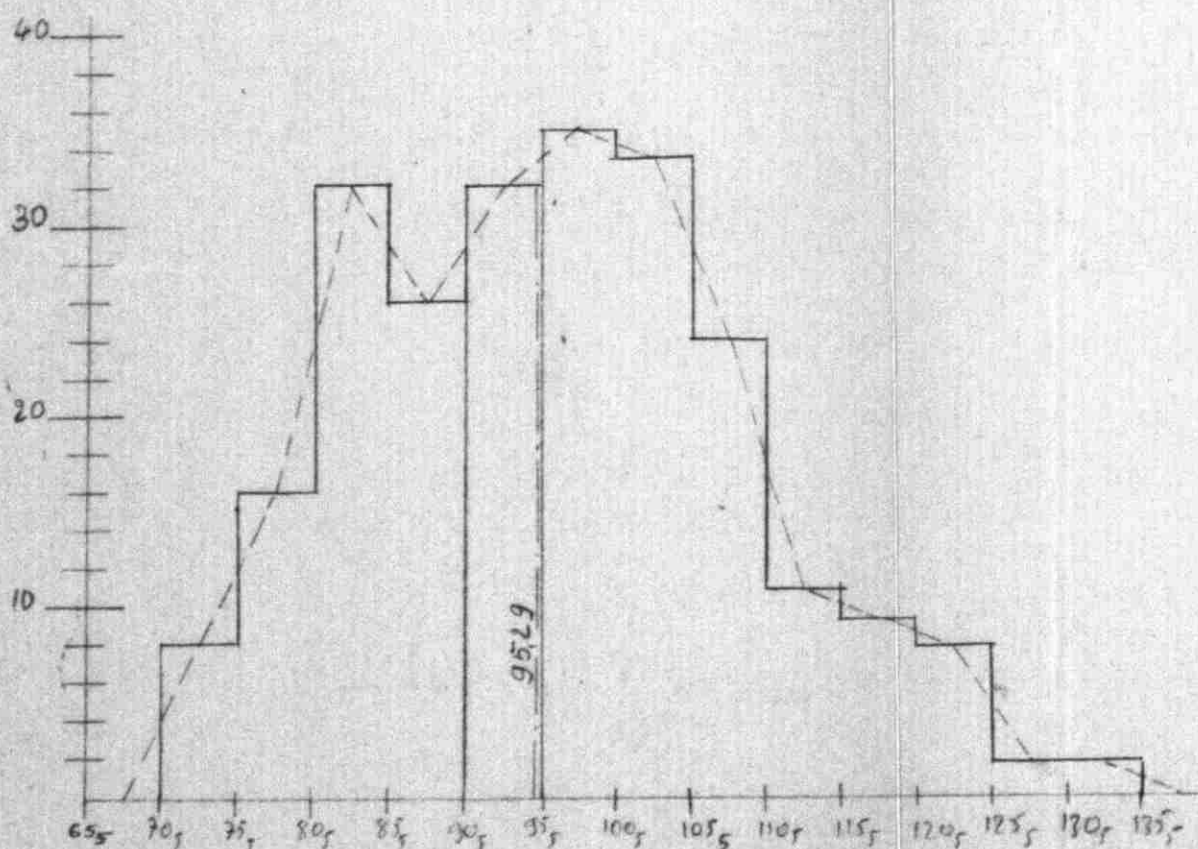
a. The girls' histogram:

1. The curve is irregular due to the limited number studied.

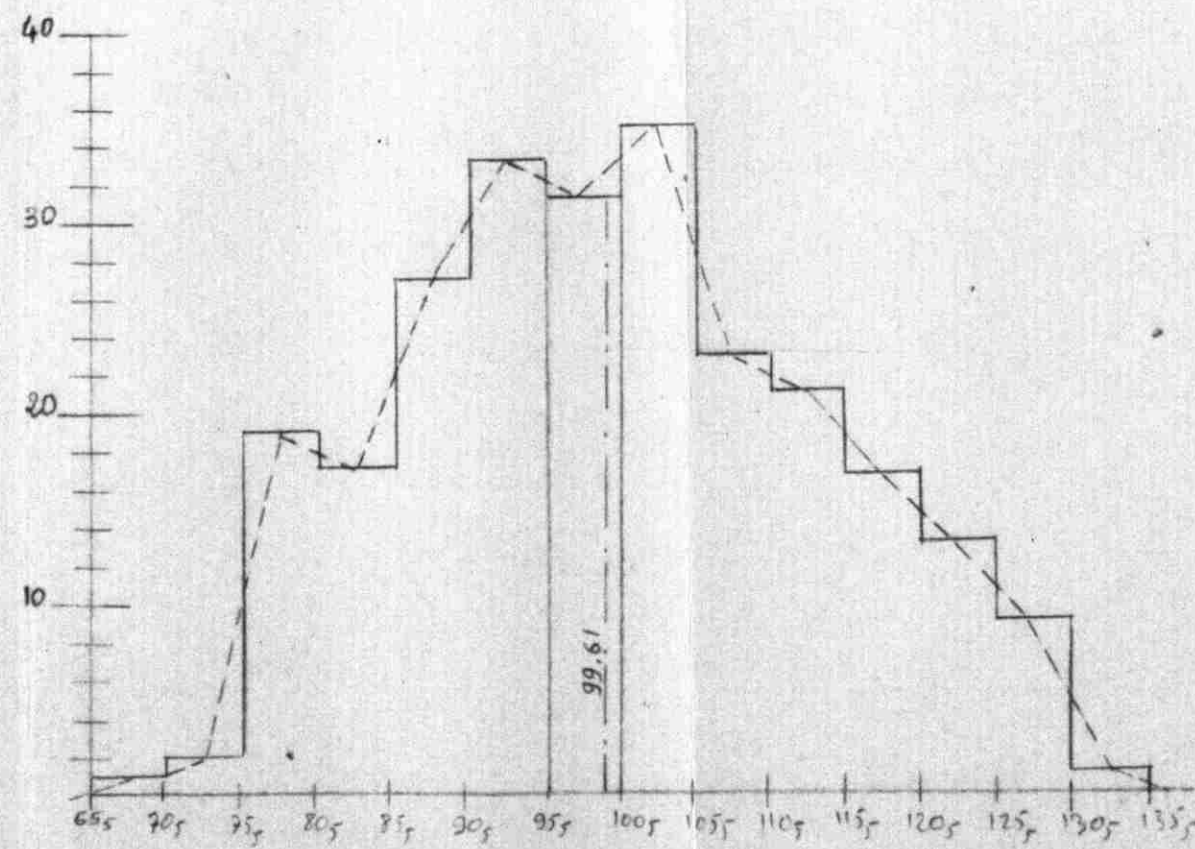
2. Frequencies begin to increase slowly at the score interval 80.5-85.5.

# Private + Public Schools

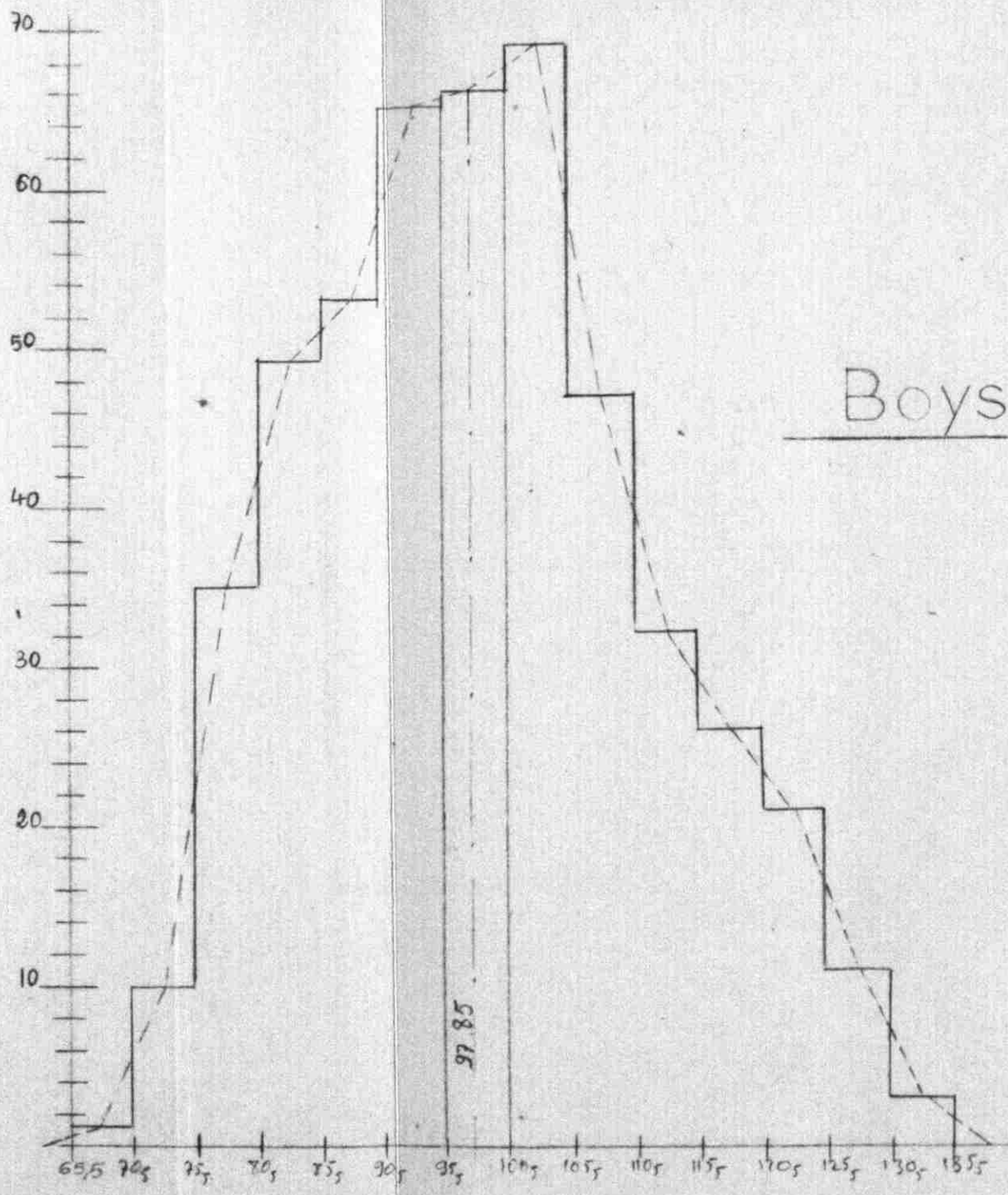
Girls



Boys

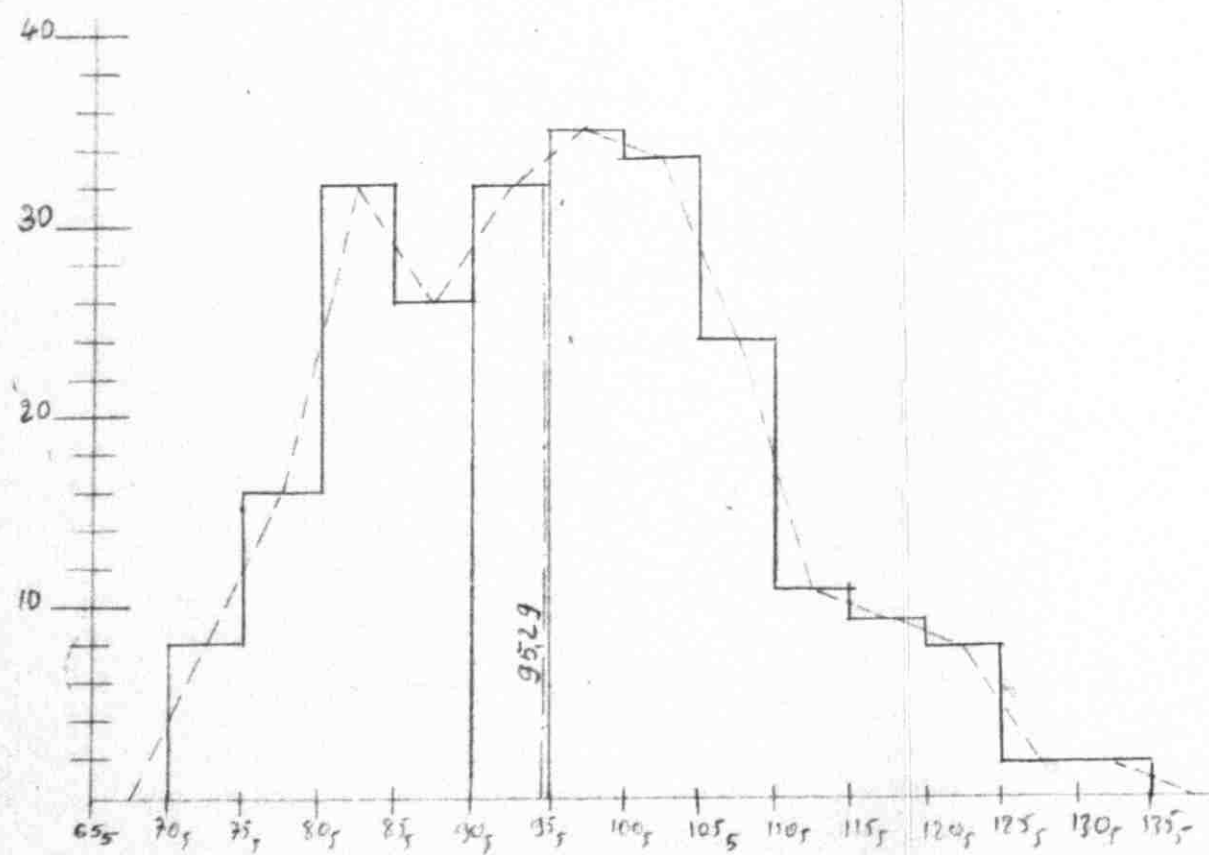


Boys + Girls

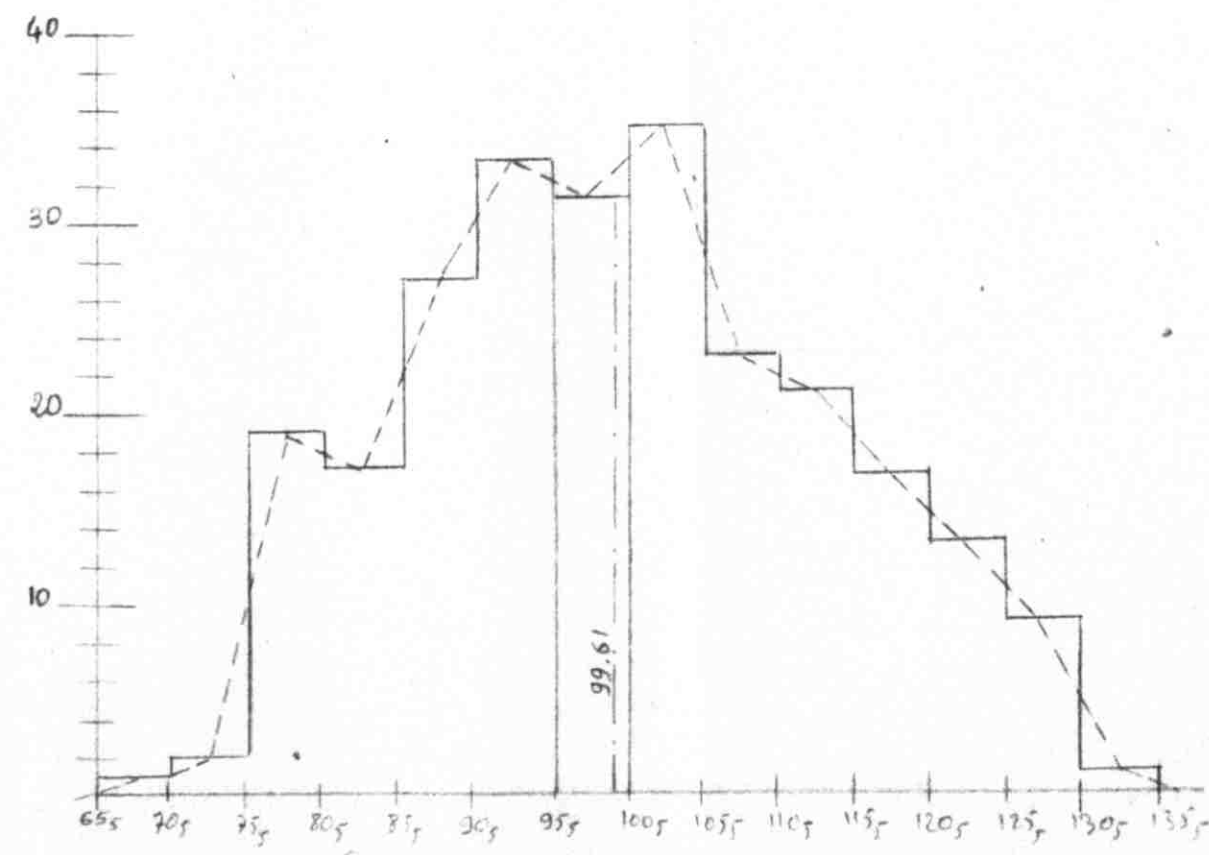


# Private + Public Schools

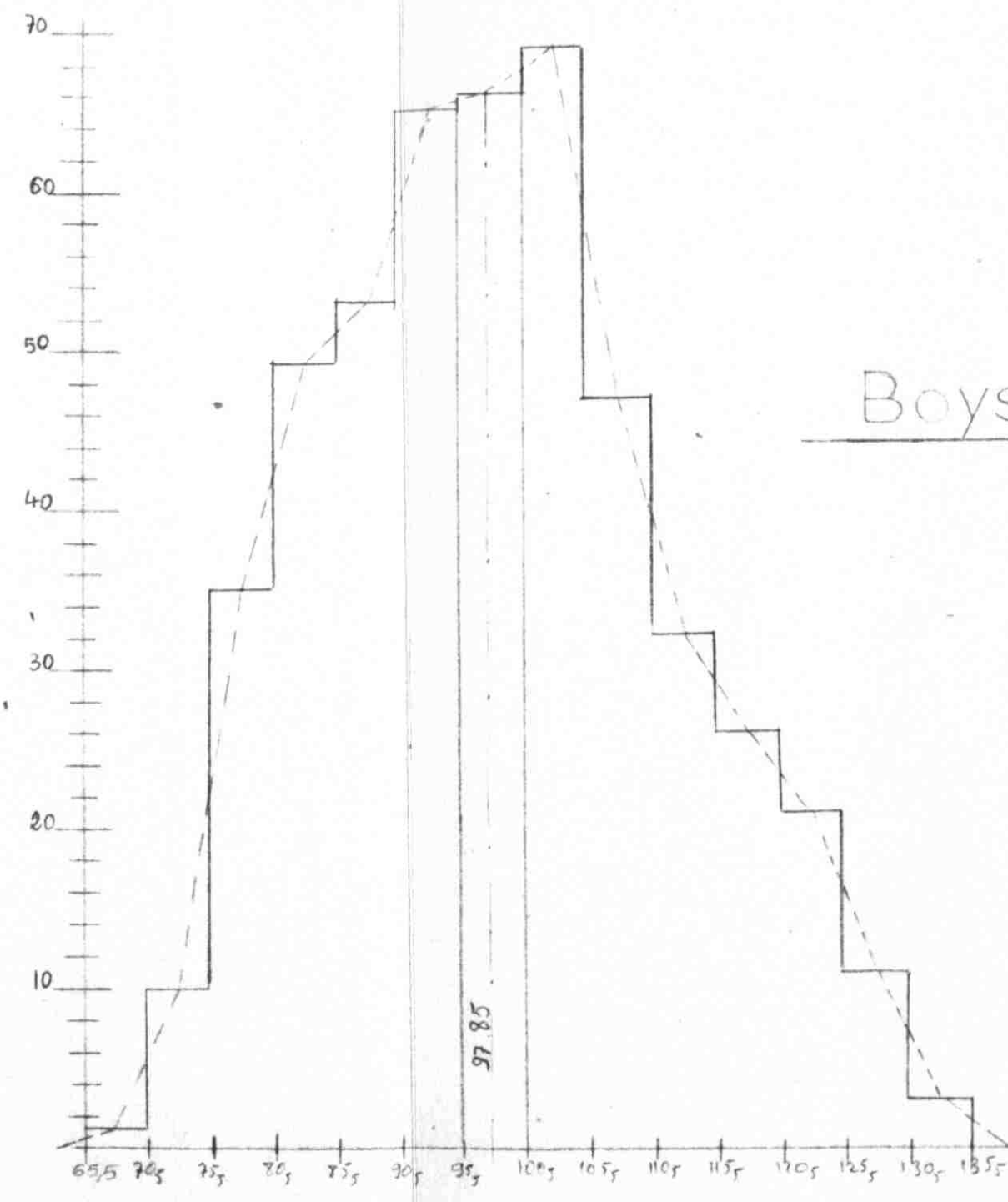
Girls



Boys

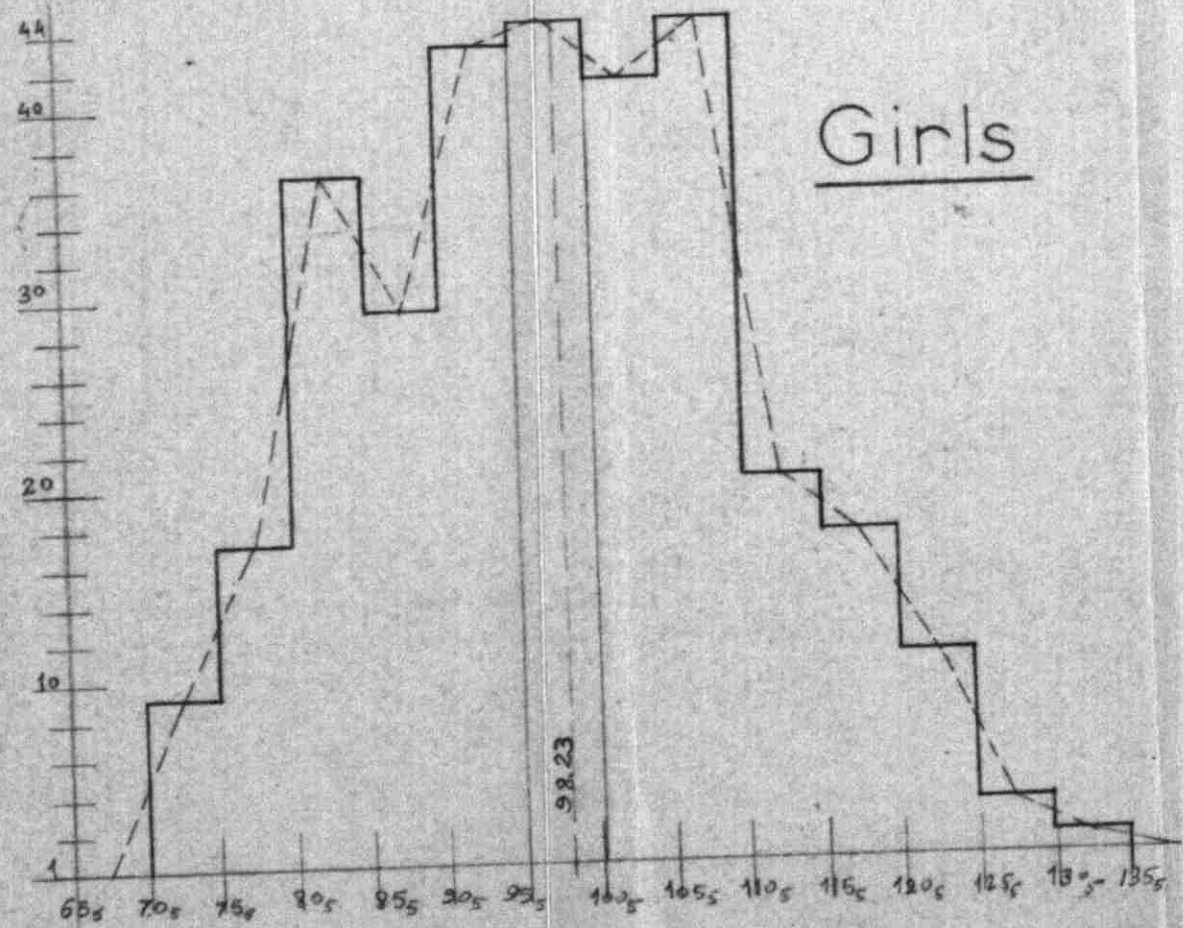


Boys + Girls

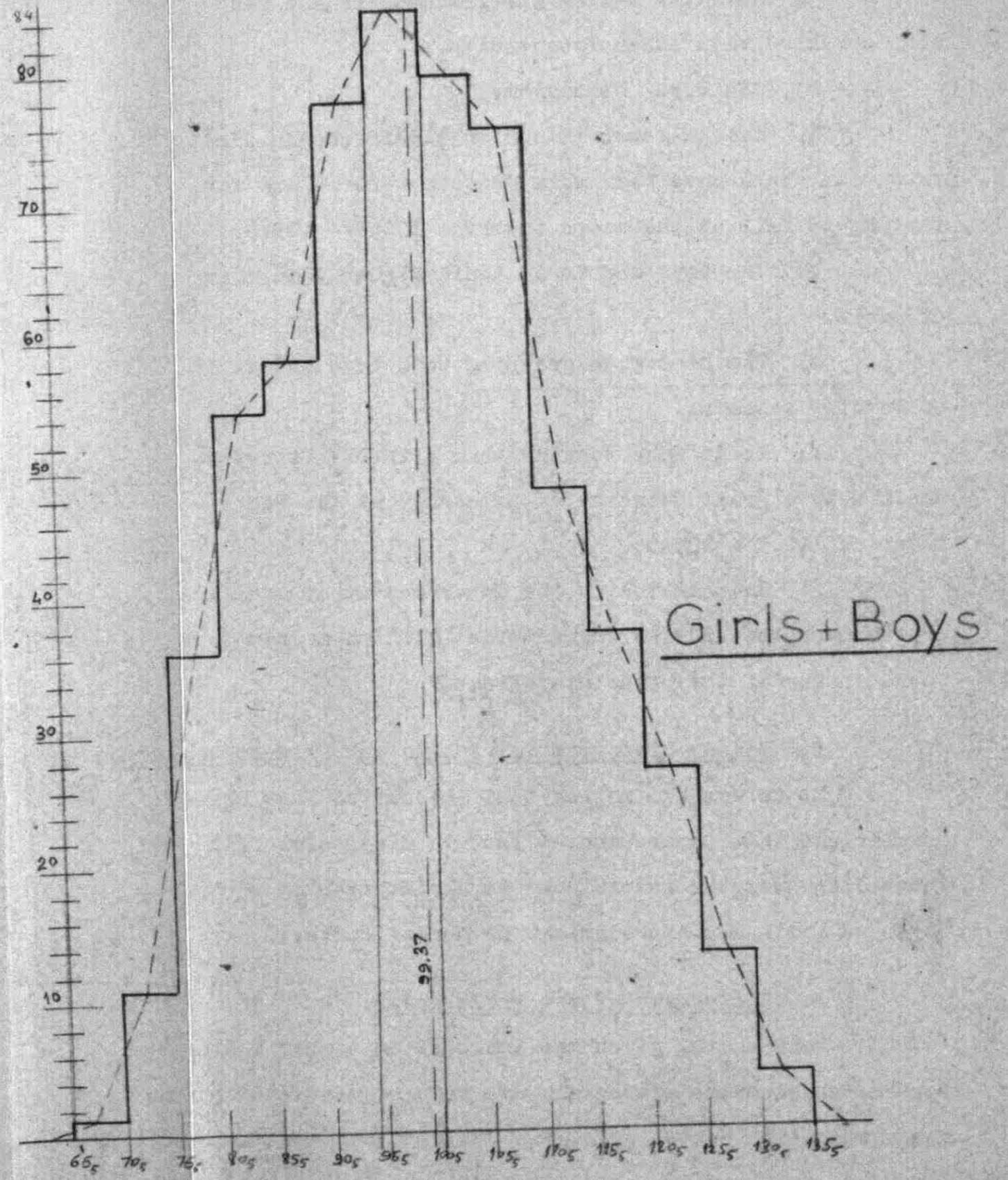
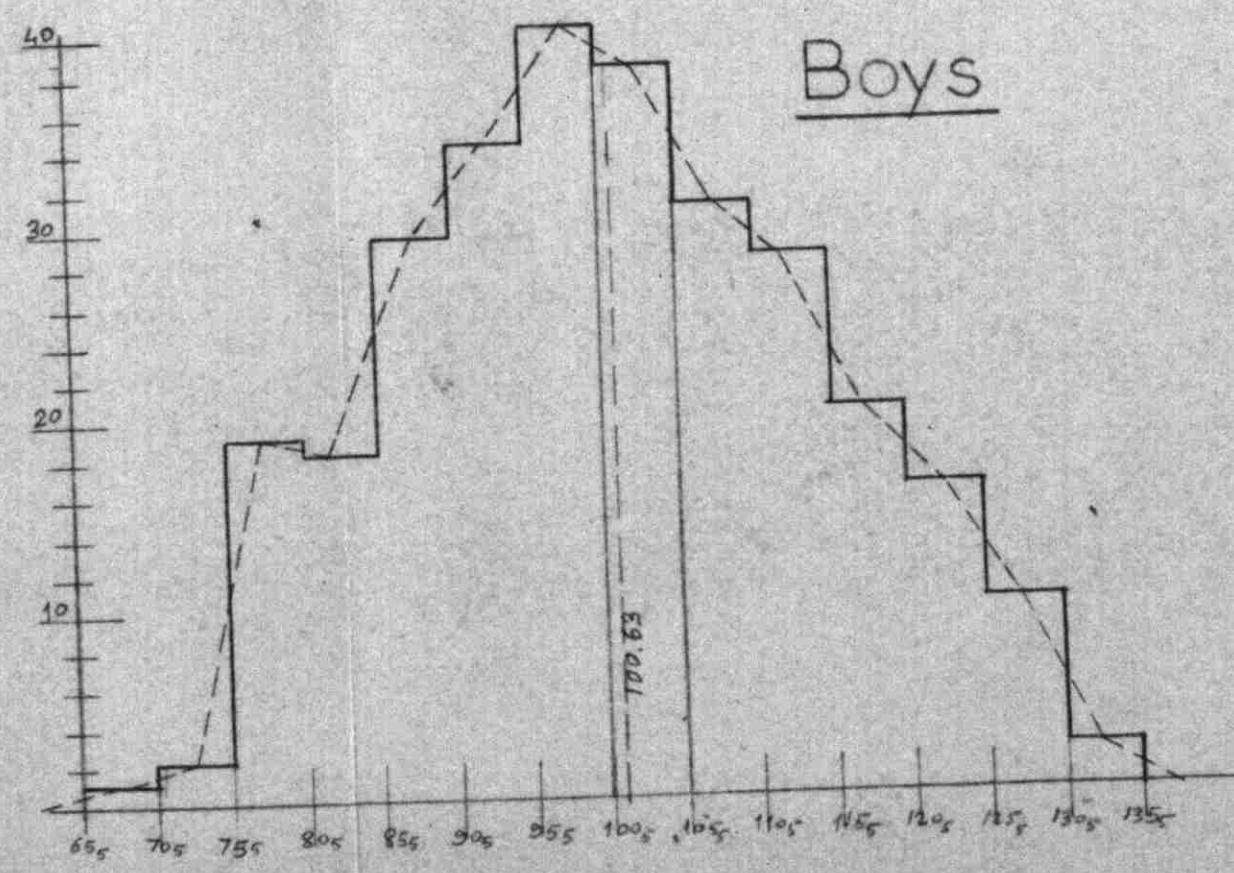




40  
30  
20  
10  
0

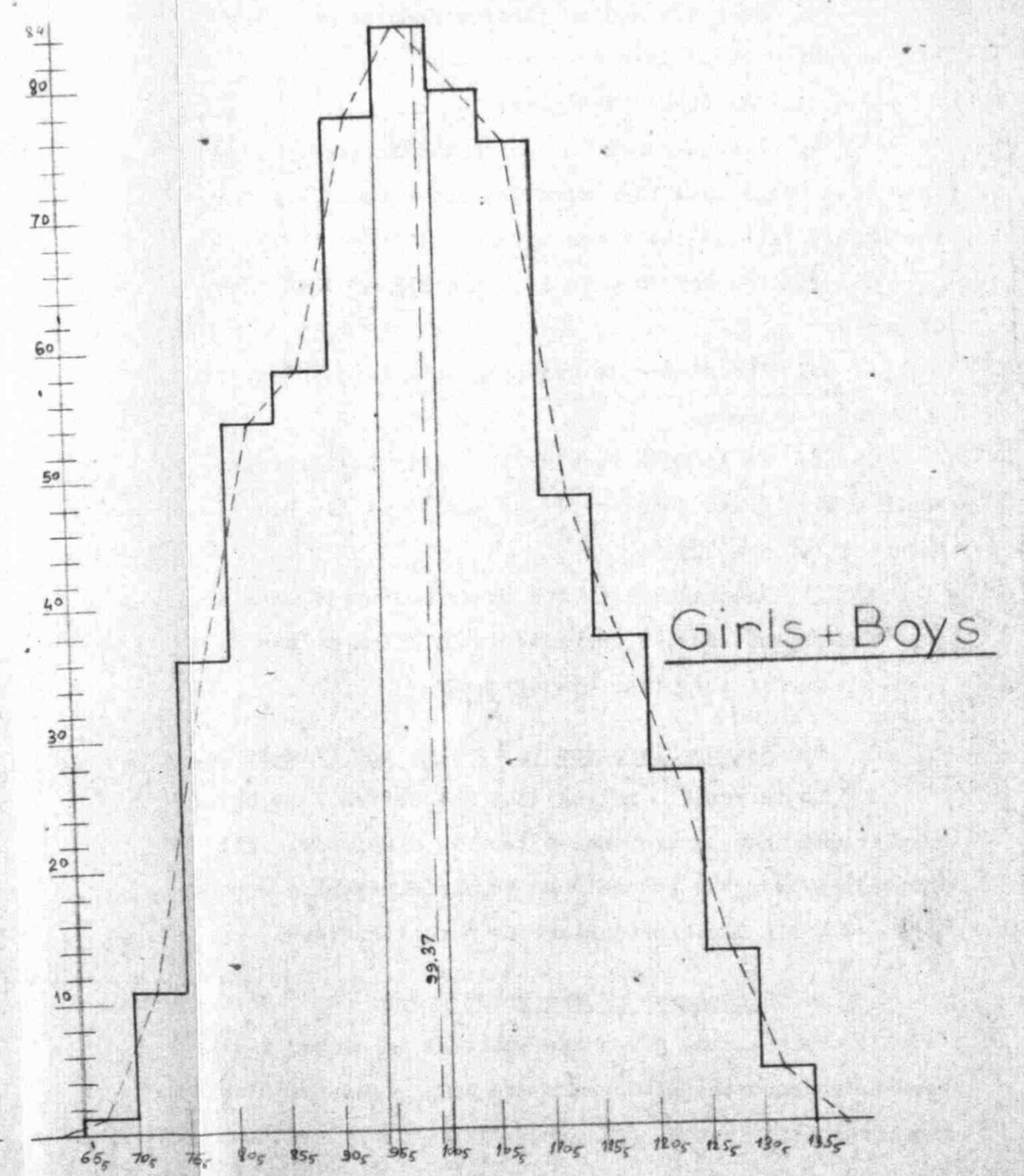
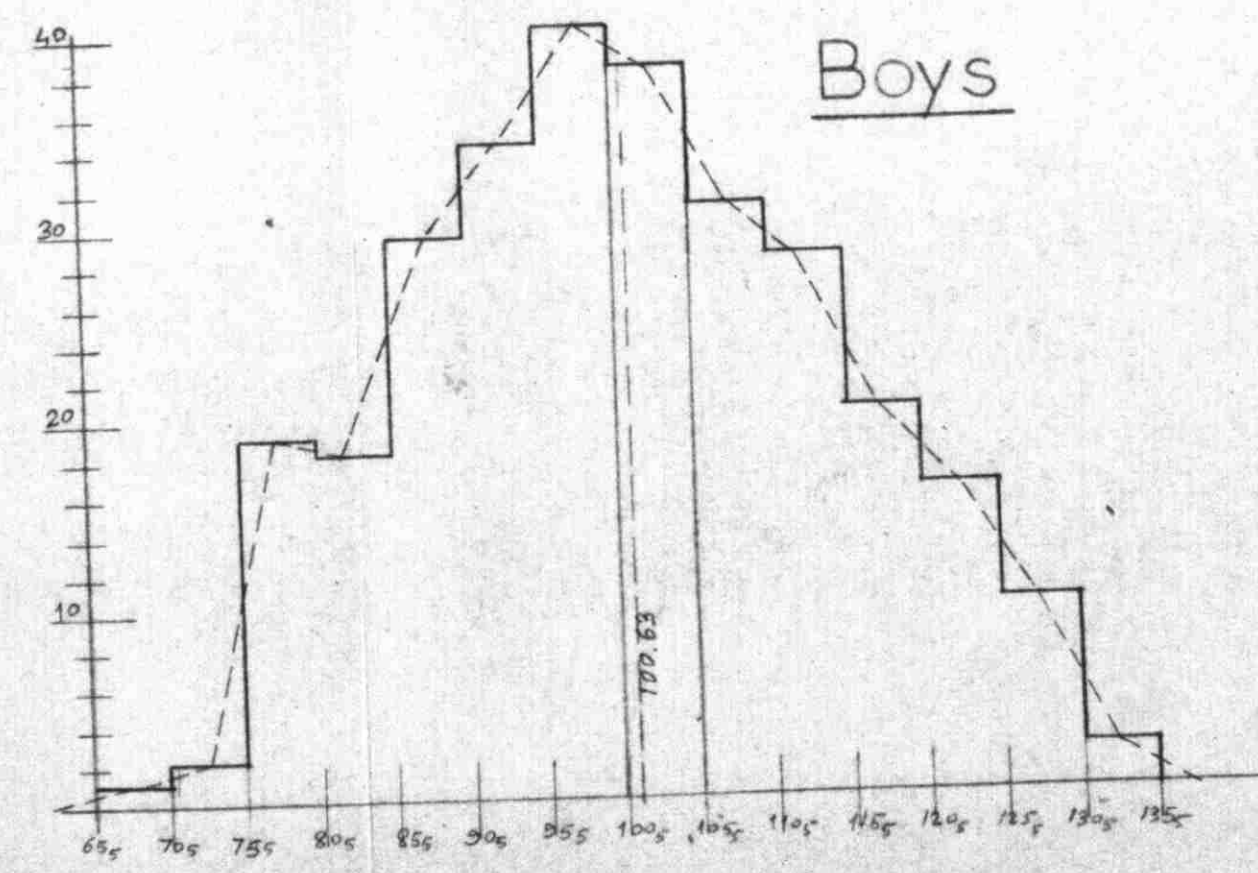
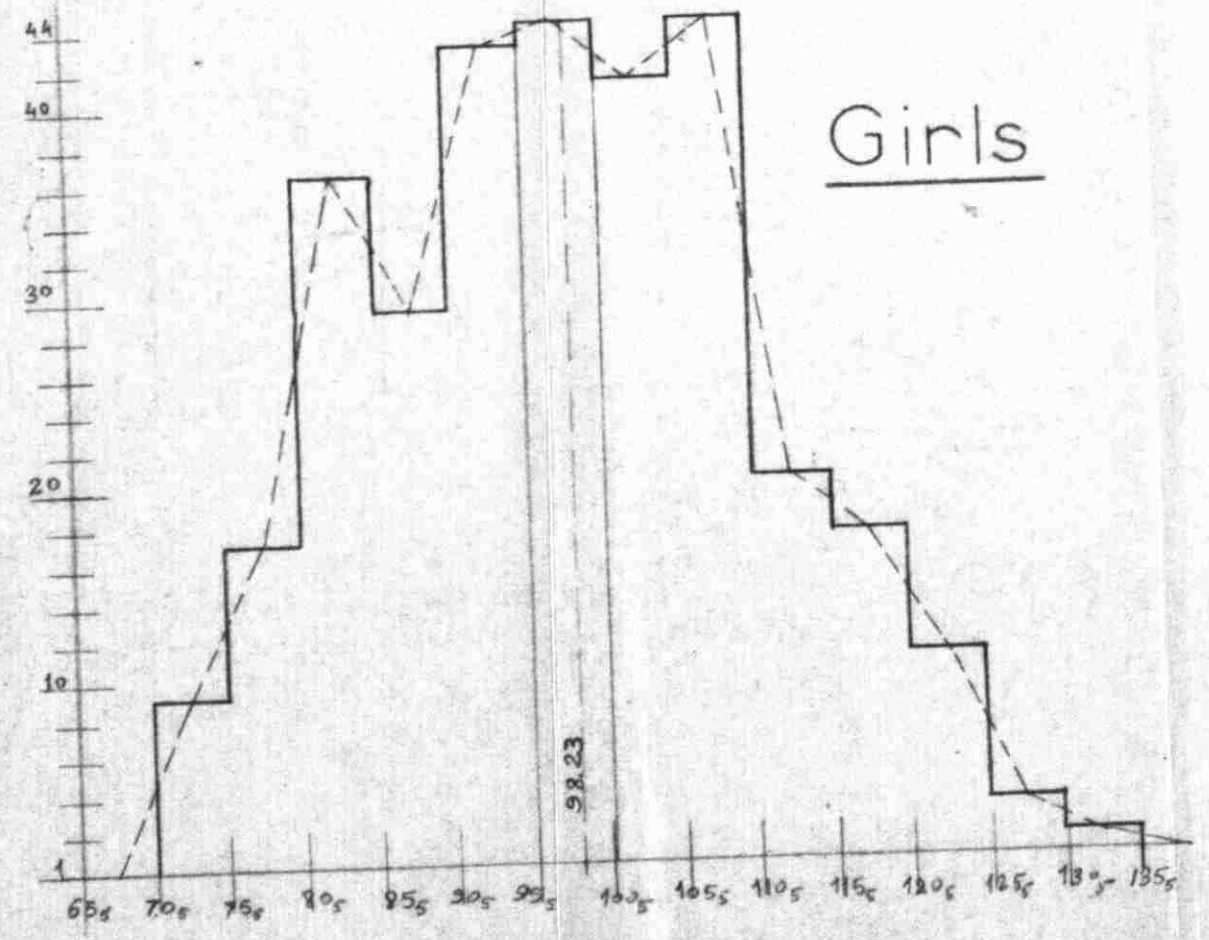


Foreign, Private + Public  
Schools



Foreign, Private + Public  
Schools

40  
30  
20  
10  
0



3. Near the median the frequencies are very high compared with other frequencies.

b. The boys' histogram:

1. Though fewer in number the frequency distribution would have been more uniform were it not for the abrupt fall at the score interval 100.5 - 105.5.

2. The boys median is again higher than that of girls.

c. The histogram grouping both boys and girls of Foreign schools:

1. It is more regular than either. It represents only a great decrease of frequency at the score interval 100.5 - 105.5.

2. Frequencies at the lower and upper ends are pretty much the same, a characteristic which is not to be found in any of the other histograms.

D. Common histogram for Public and Private Schools

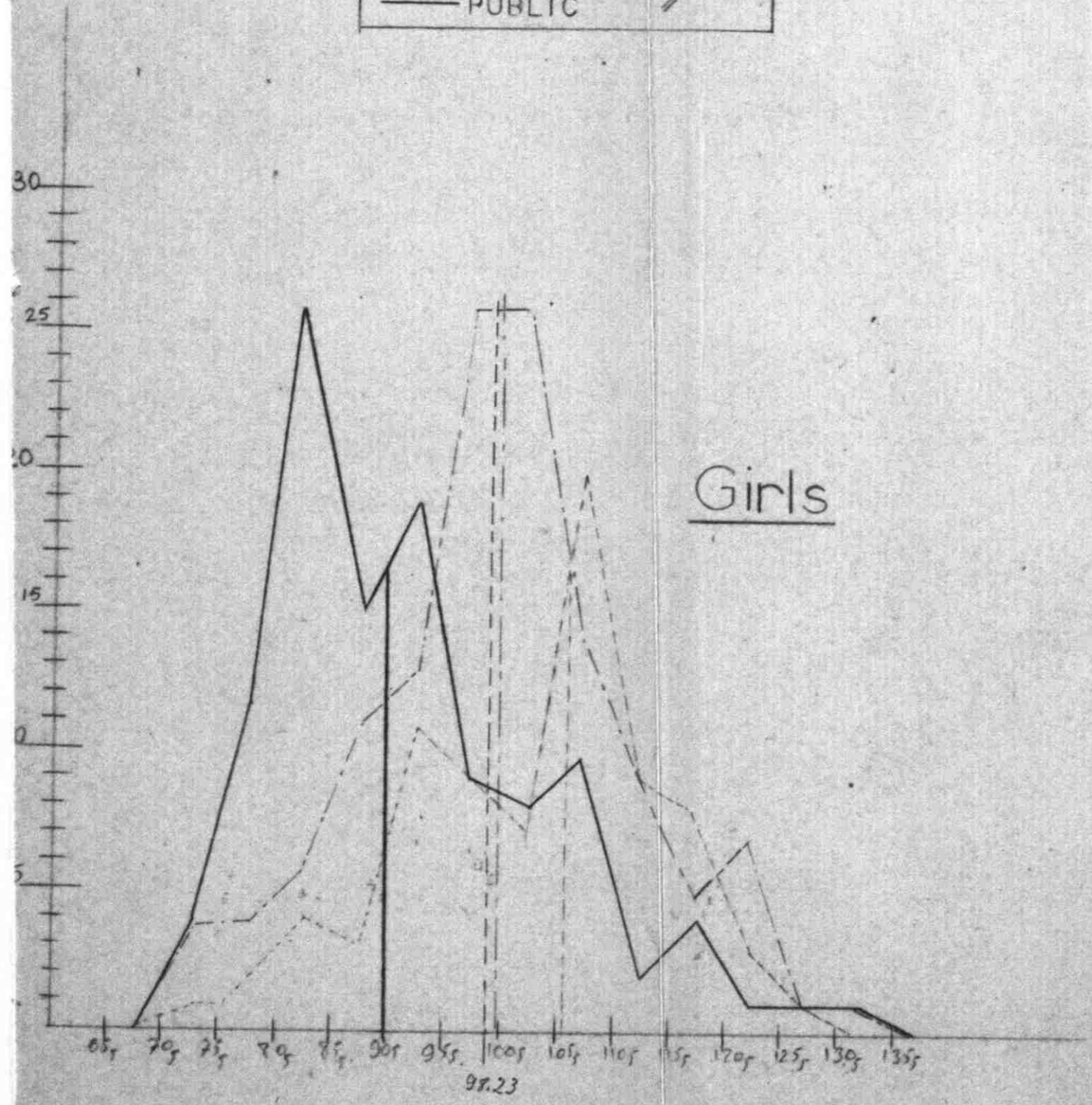
It is easy to notice that the curves here are more regular and that discrepancies tend to disappear. All three diagrams, the general one as those grouping separately boys and girls are approaching the normal curve.

E. Histograms of the whole group

Here again, given the increase in number of the tested subjects the histograms are more regular and approach the probability curve.

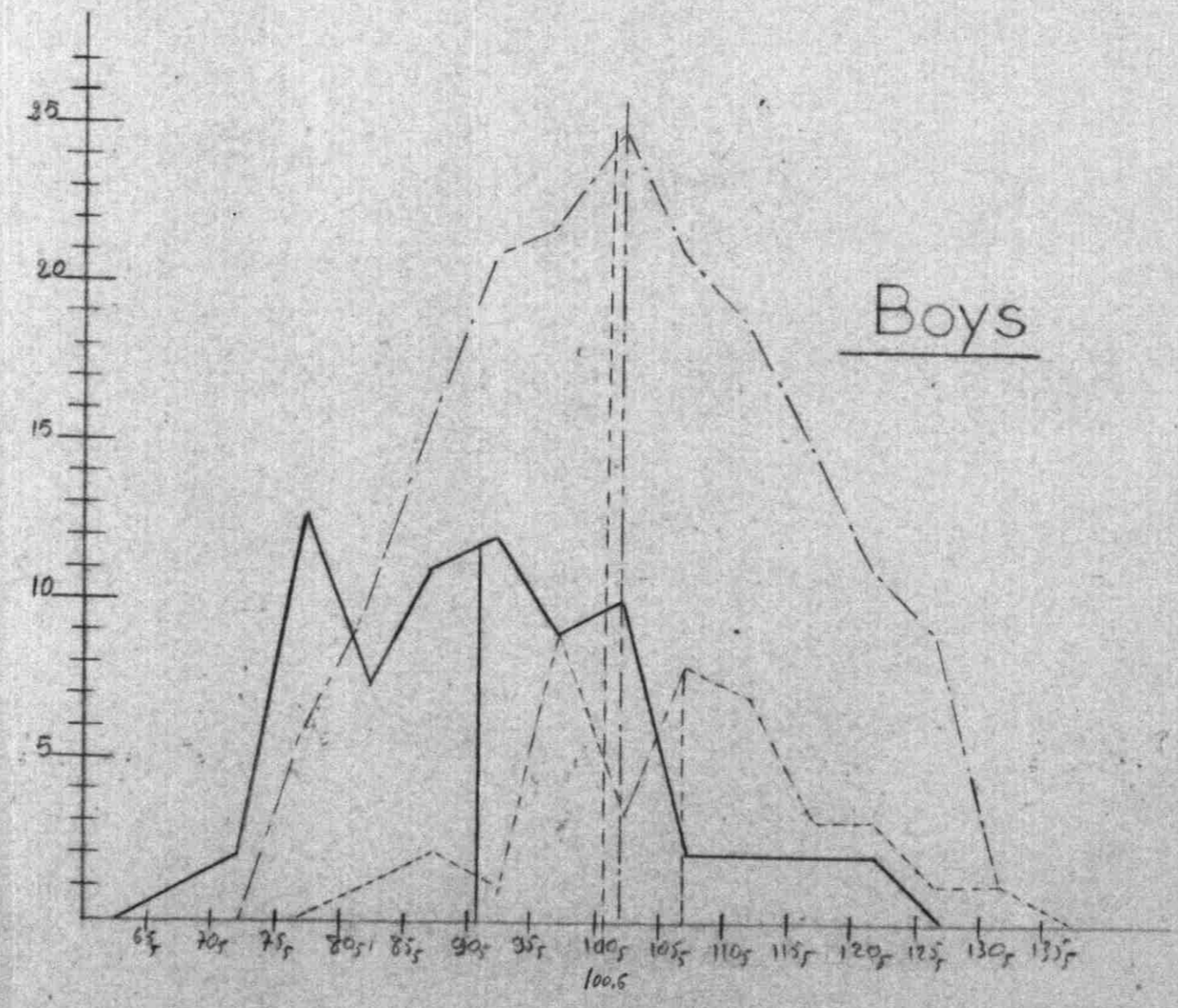
Graph VI

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



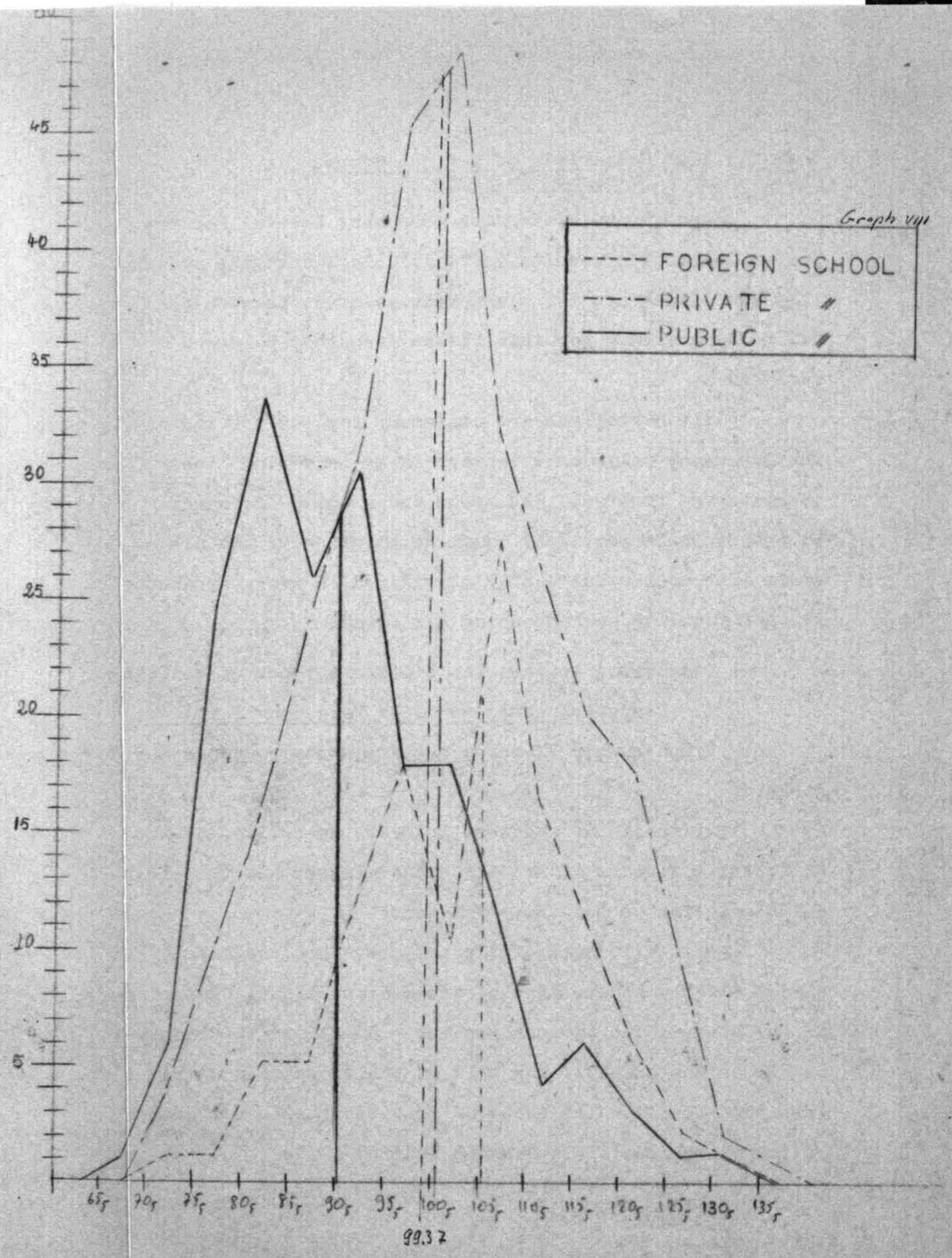
Graph VII

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



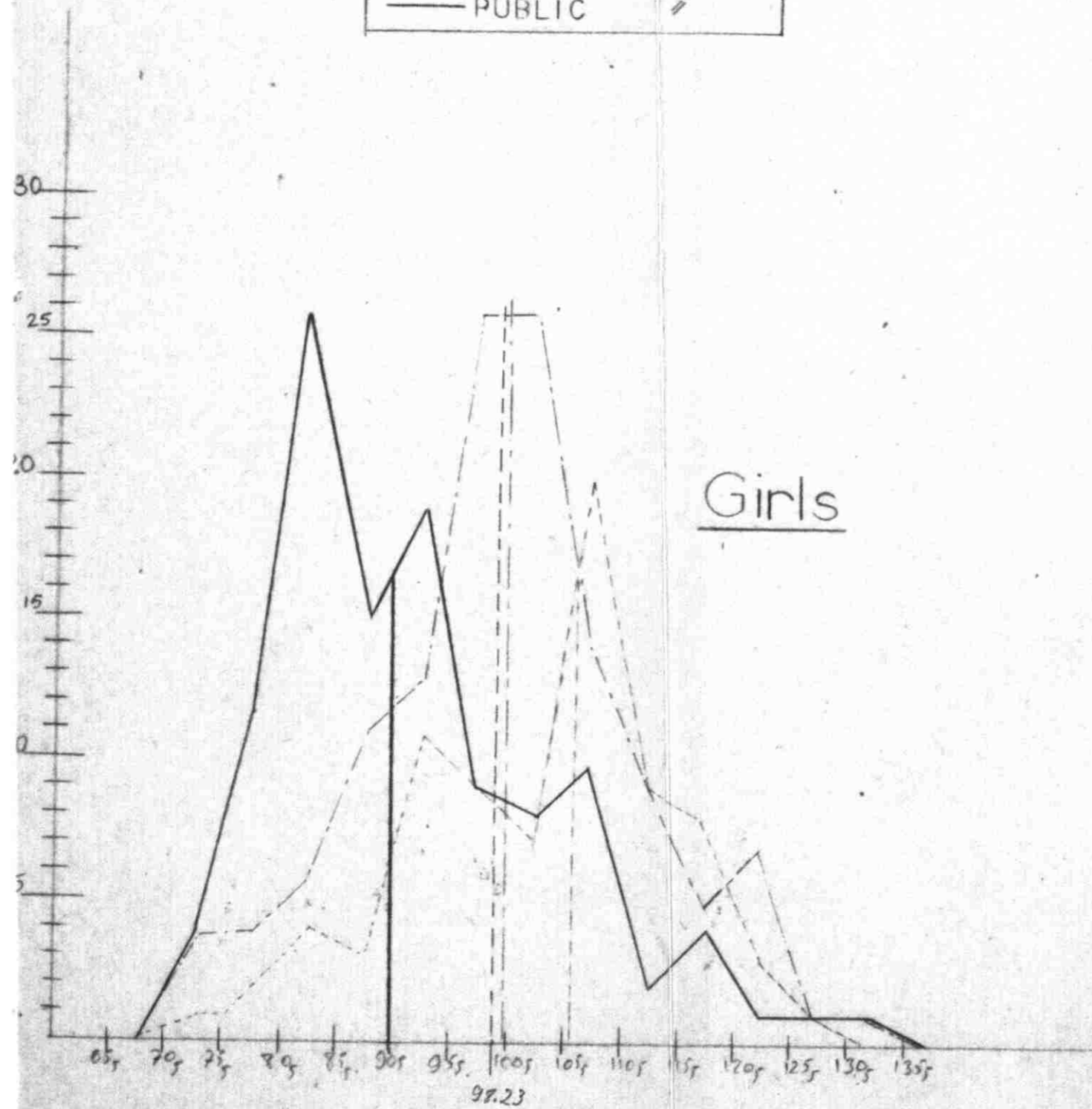
Graph VIII

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



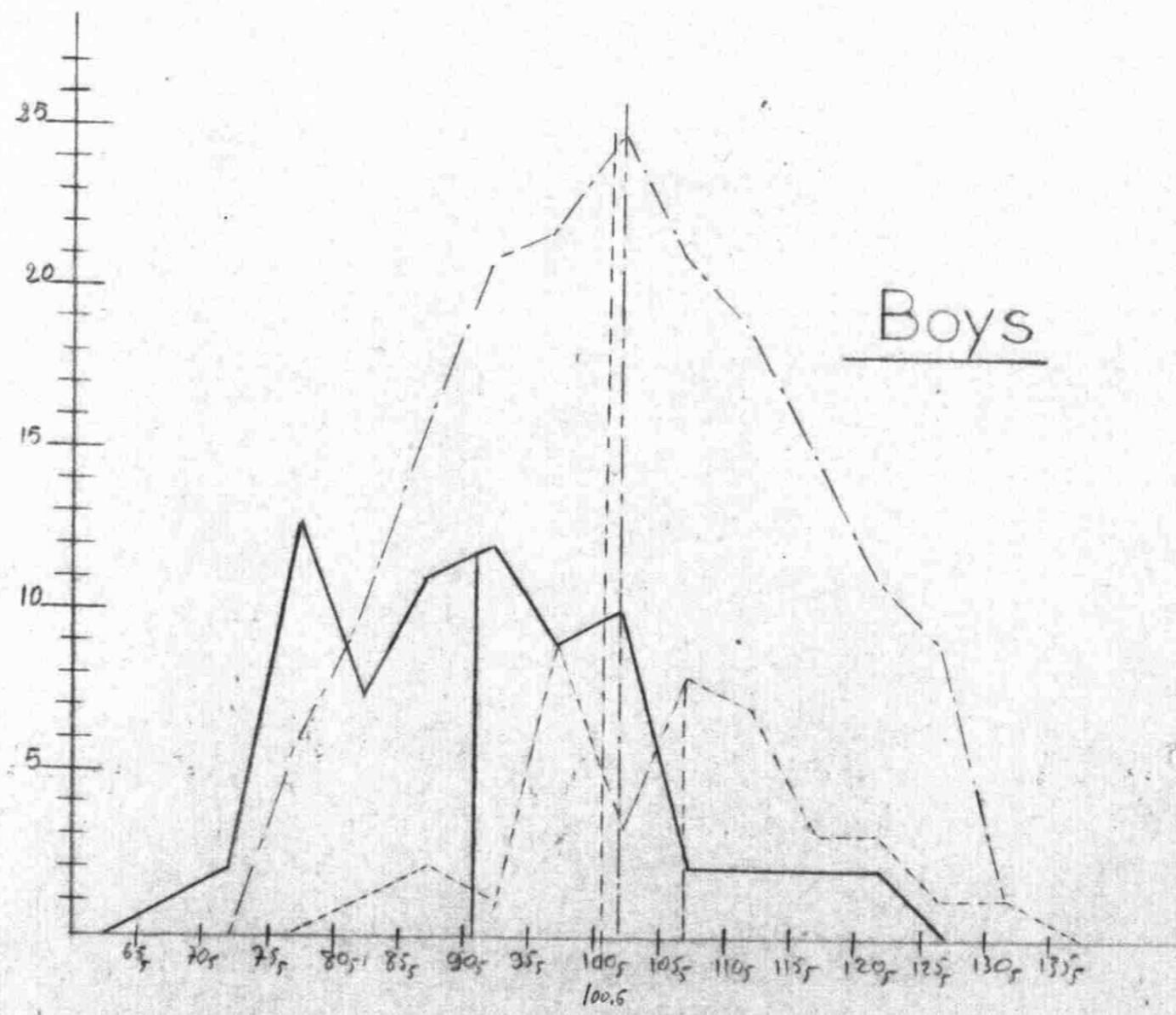
Graph VI

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



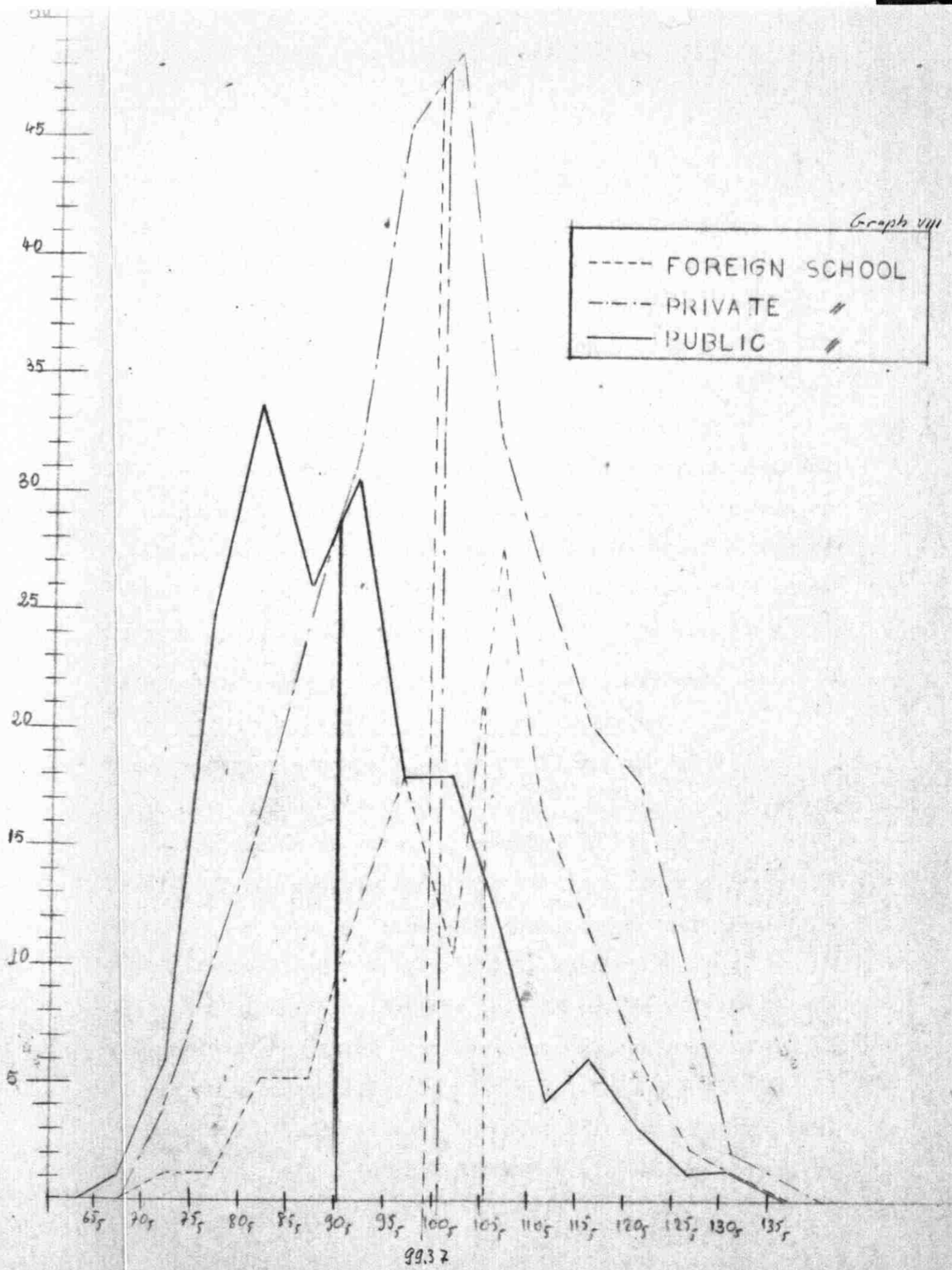
Graph VII

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



Graph VIII

|       |                |
|-------|----------------|
| ---   | FOREIGN SCHOOL |
| - - - | PRIVATE        |
| —     | PUBLIC         |



## II. Comparison of Various Groups Frequency Polygons

Though the histograms were very helpful for the discussion of the results and mainly to locate the median, they are inadequate for a comparative study between the different groups. For this reason frequency polygons were drawn.

The histograms are necessary for the tracing of the frequency polygons which are shown in dotted lines on histogram figures. The areas under these frequency polygons are respectively equal to those under the histogram. The median was easily transferred on every frequency polygon from its corresponding histogram.

Comparison between the different types of schools:

### A. Comparison between Girls Frequency Polygons:

Graph number VI shows the frequency polygons for girls.

It is of the greatest interest to notice the different positions of the different classes and the clear-cut separation of the three polygons:

1. While that of the private schools stands almost exactly at the middle, its median slightly superior to the general one (general median - 98.23 and is drawn with pencil on the graph), the bulk of public schools' girls lag very much behind, while those of private schools are grouped on the upper side of the common median.

2. On the other hand the median of Private schools lies much nearer (almost one class interval below) to that of foreign schools than that of the Public ones, which is two class intervals behind.

3. The girls of private schools are more evenly distributed around their median on one part and that of the general median of girls on the other.

B. Comparison between Boys Frequency Polygons

The same characteristics prevail here.

1. The Boys Private Schools polygons stands almost in the middle of the distribution, its median is almost the same as that of the general group. The general median for boys is drawn with pencil on the graph and it equals 100.17 while that of private schools boys equals 99.61.

2. Here again the bulk of boys from Public schools lag far behind and their greatest majority lies far below the general median for boys.

3. As to the polygon of boys from Foreign schools it stretches and lies mostly above the general median.

C. Comparison between the different types of Schools

The same characteristic prevails and are here more exaggerated because of the increase in number. The polygon

of Private schools is fairly regularly distributed around the median while the others are distorted and offer many irregularities. The majority of the children in Public schools lie behind the general median while that of the Foreign lies above.

### III. Cumulative Percentage Curve

These same results are shown on the cumulative percentage curves for the whole group as well as the group of Private and Public schools together.

Cumulative percentage curves are as important for the statistician as the chart of a certain patient for the physician.

It shows us how intelligence proceeds from the lowest to the highest degrees.

Once plotted the cumulative frequency percentage curve becomes a practical tool for the determination of any percentile. Thus the graphs No.IX and No.X are most interesting for comparative distributions of percentiles.

#### Interpretation of these Results

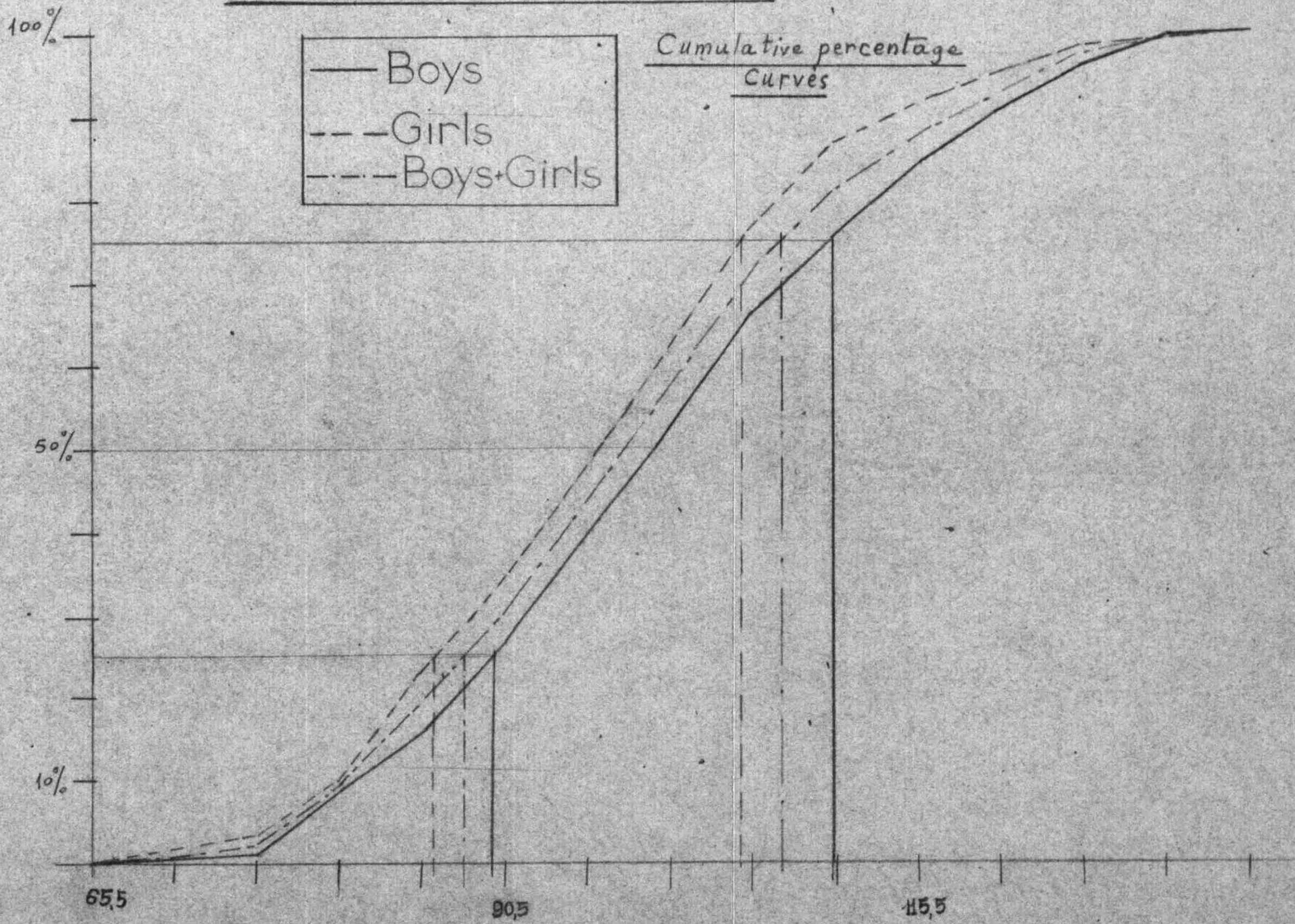
A. It is apparent from our comparative study that the group of private schools shows more homogeneity than any of the two other groups. How is this characteristic to be explained. Three main reasons may be mentioned:

##### 1. The number of tested subjects

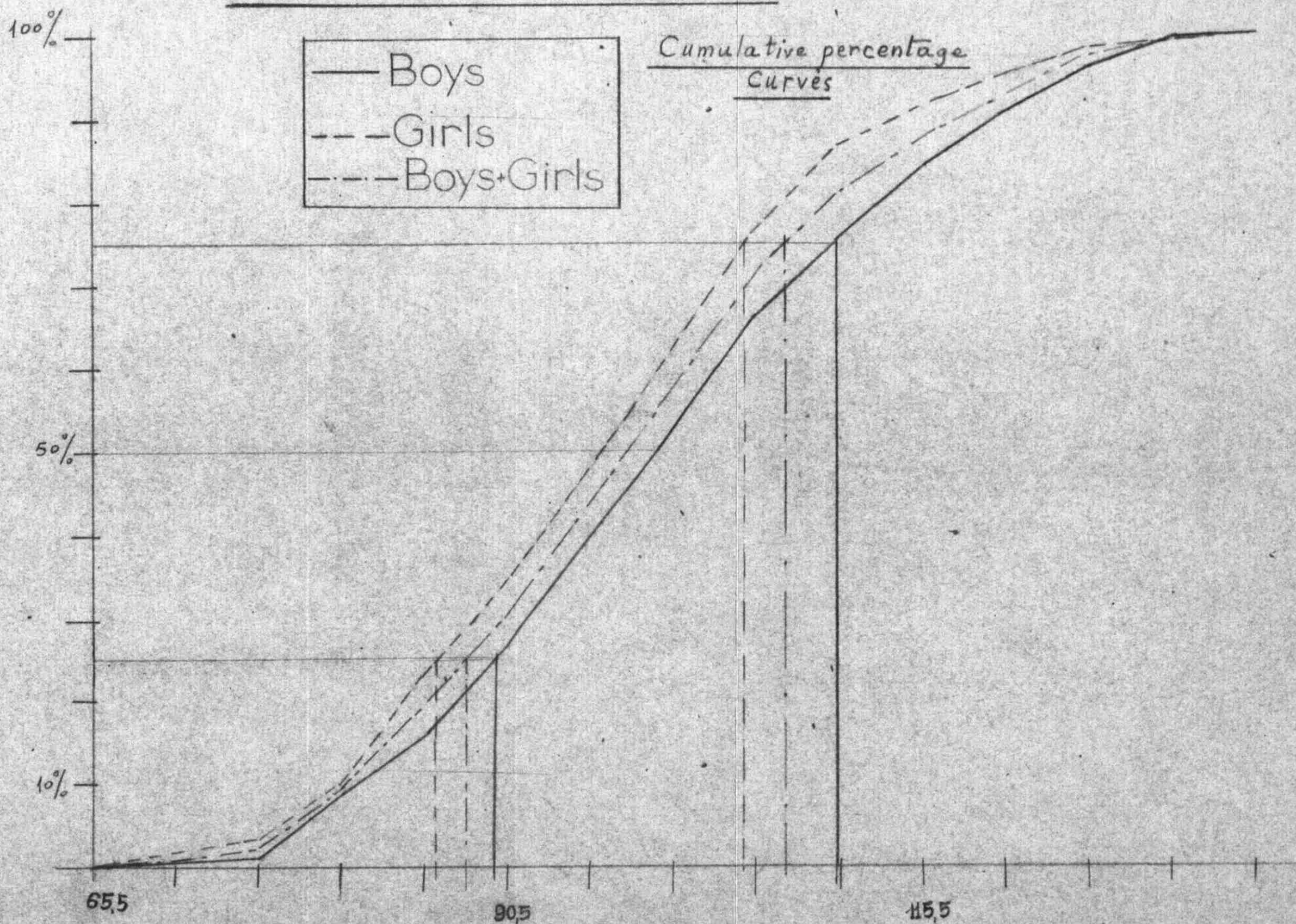
The number of tested subjects pertaining to private



# Private+Public Schools



# Private+Public Schools



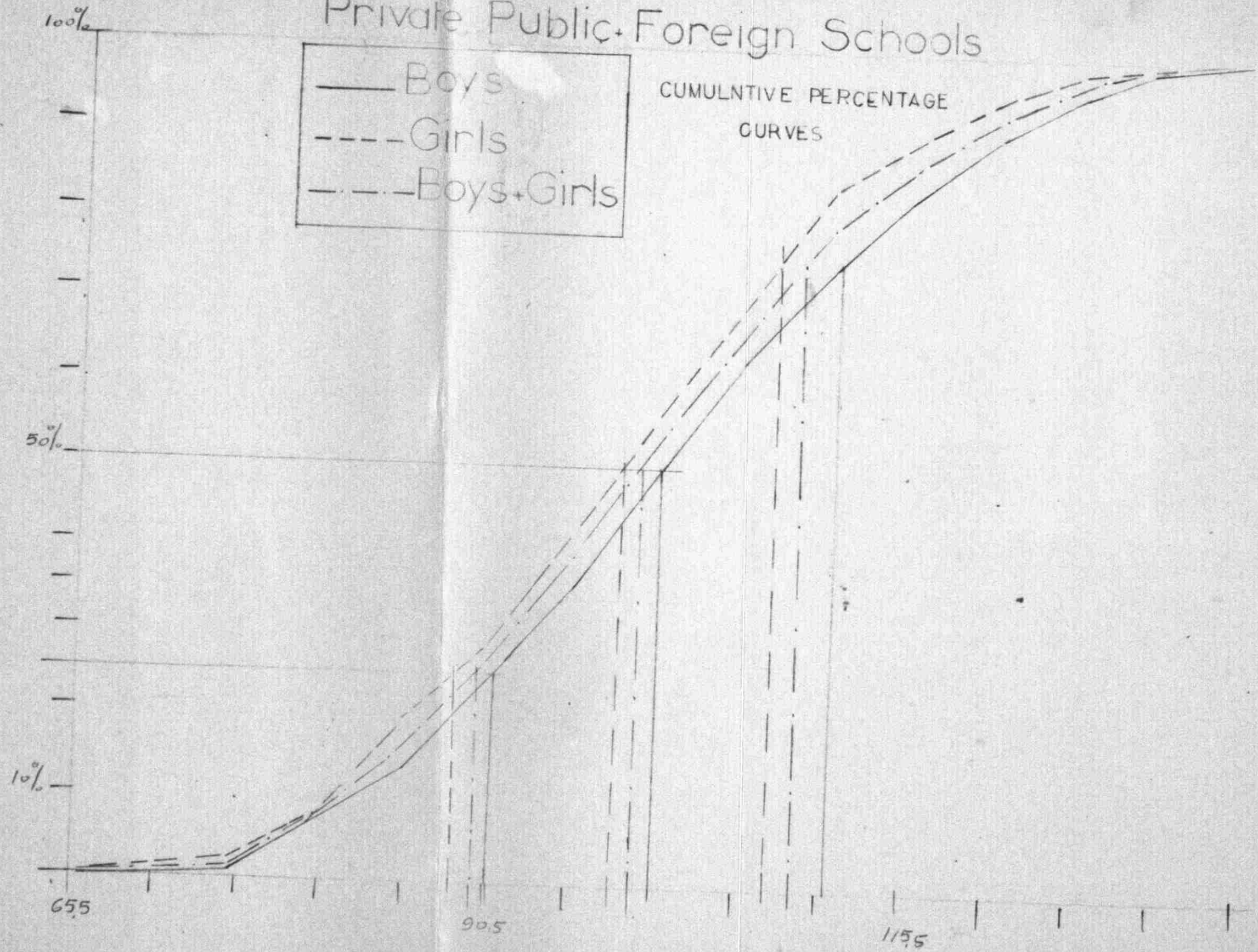
Private and Public

Boys and Girls

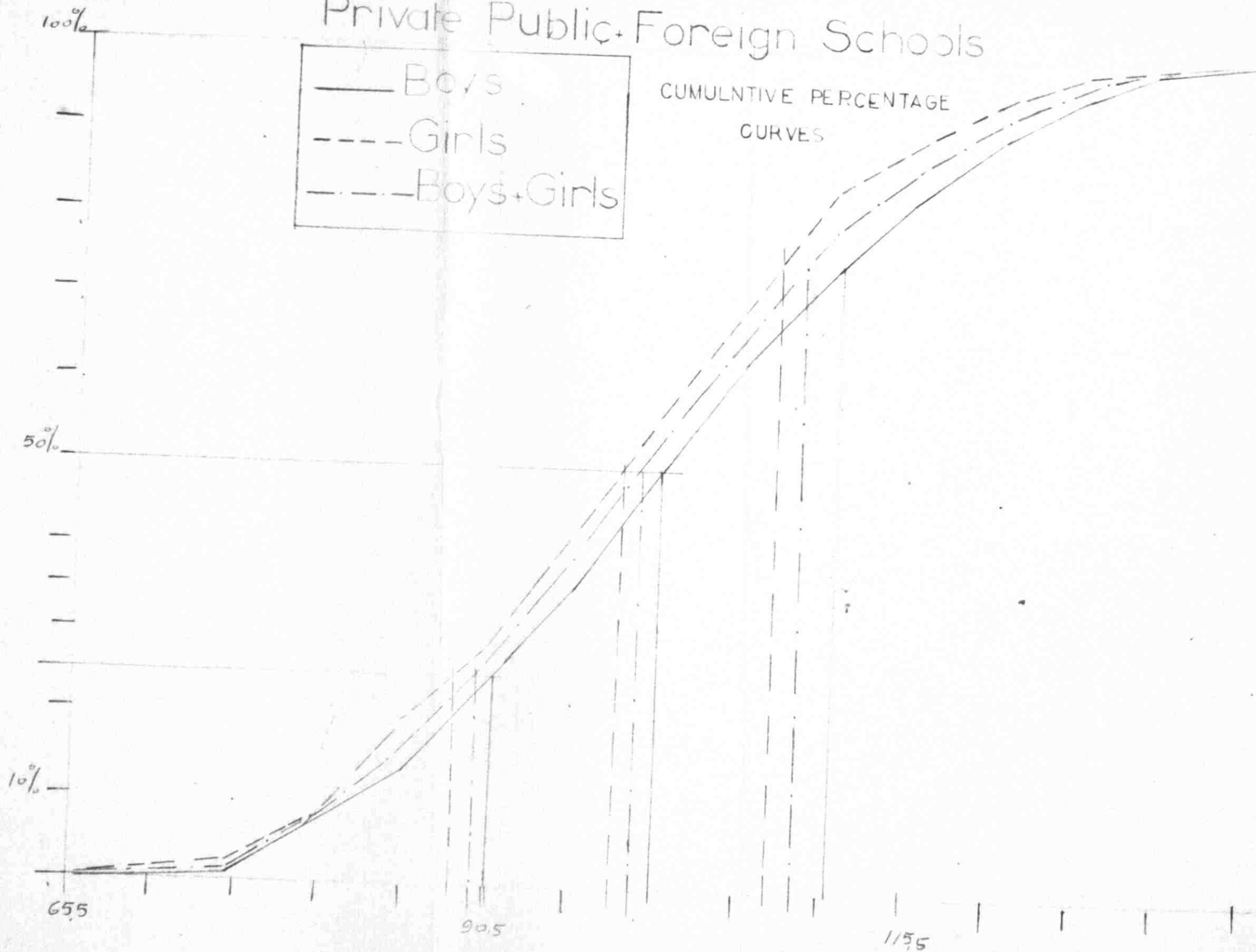
5th Percentiles

|                 |   |               |                  |   |        |
|-----------------|---|---------------|------------------|---|--------|
| P <sub>5</sub>  | - | 77.128        | P <sub>55</sub>  | - | 99.69  |
| P <sub>10</sub> | - | 80.79         | P <sub>60</sub>  | - | 101.50 |
| P <sub>15</sub> | - | 83.27         | P <sub>65</sub>  | - | 103.26 |
| P <sub>20</sub> | - | 85.745        | P <sub>70</sub>  | - | 105.03 |
| P <sub>25</sub> | - | 88.04         | P <sub>75</sub>  | - | 107.41 |
| P <sub>30</sub> | - | 90.35         | P <sub>80</sub>  | - | 110.01 |
| P <sub>35</sub> | - | 92.25         | P <sub>85</sub>  | - | 113.59 |
| P <sub>40</sub> | - | 94.13         | P <sub>90</sub>  | - | 117.84 |
| P <sub>45</sub> | - | 95.97         | P <sub>95</sub>  | - | 123.02 |
| P <sub>50</sub> | - | 97.848 Median | P <sub>100</sub> | - | 135.5  |

# Private Public Foreign Schools



# Private Public+Foreign Schools



Whole Group

Percentiles

|                 |   |              |                  |   |        |
|-----------------|---|--------------|------------------|---|--------|
| P <sub>5</sub>  | - | 78.1         | P <sub>55</sub>  | - | 101.2  |
| P <sub>10</sub> | - | 81.64        | P <sub>60</sub>  | - | 103.12 |
| P <sub>15</sub> | - | 84.44        | P <sub>65</sub>  | - | 105.03 |
| P <sub>20</sub> | - | 87.13        | P <sub>70</sub>  | - | 107.02 |
| P <sub>25</sub> | - | 89.58        | P <sub>75</sub>  | - | 109.03 |
| P <sub>30</sub> | - | 91.87        | P <sub>80</sub>  | - | 111.35 |
| P <sub>35</sub> | - | 93.83        | P <sub>85</sub>  | - | 114.5  |
| P <sub>40</sub> | - | 95.77        | P <sub>90</sub>  | - | 118.28 |
| P <sub>45</sub> | - | 97.57        | P <sub>95</sub>  | - | 123.05 |
| P <sub>50</sub> | - | 99.36 Median | P <sub>100</sub> | - | 135.5  |

Table XVII

| School   | Public | Private | Foreign |                     |
|--|--------|---------|---------|---------------------|
|  | 34     | 6       | -       | Lower Social class  |
| Laborer, servant, cook, porter                               | 23     | 22      | 2       |                     |
| Peddler, shopkeeper  | 5      | 5       | -       |                     |
| Butcher  | 18     | 9       | -       |                     |
| DRIVER? Watchman   | -      | 2       | -       |                     |
| Fuel merchant  | 16     | 9       | -       |                     |
| Policeman, Fireman soldier                                   | 28     | 24      | -       |                     |
| Skilled laborer, baker shoemaker, carpenter bricklayer, etc. | -      | 21      | 5       | Middle-class        |
| Farmer Landowner   | -      | 1       | -       |                     |
| WATCH-MAKER  | 14     | 28      | 6       |                     |
| Employee   | 18     | 22      | 1       |                     |
| State-Employee   | 7      | 5       | -       |                     |
| Hair-dresser, tailor   | 1      | 1       | 1       |                     |
| Longshoreman Contractor                                      | 7      | 53      | 27      |                     |
| Merchant   | -      | 5       | 4       |                     |
| Commissionary, exchanger                                     | 1      | 3       | -       |                     |
| Industrialist  | -      | 9       | -       |                     |
| Teacher  | -      | 1       | 5       | Higher Social class |
| Directors, High-officials                                    | 1      | 30      | 24      |                     |
| Engineer, lawyer, doctor, professor, writer                  | 1      | 6       | -       |                     |
| Dead   | 4      | 2       | -       |                     |
| Unemployed   | -      | 1       | -       |                     |
| Refugee  | 12     | 48      | 41      |                     |
| Unknown  |        |         |         |                     |

schools exceeds any of the two other groups taken separately, for this reason its curves approaches more or less the bell-shaped form.

## 2. The Socio-Economic factor

We have already mentioned the difficulty we have met in gathering data about the tested children for lack of school records and census reports. So exact information about the cultural and economical standard of the home from which the tested subjects came was impossible. The only available information in this field was the father's occupation.

Thus in order to have an estimate of the socio-economic status of our group, tested subjects were grouped according to their father's occupation.

The opposite table (See Table No.XVII) shows the uneven distribution of social classes in the three types of schools studied. The inferior class belonging to Public schools, the superior to the foreign, while the private have elements of both with a striking predominance of middle class population.

It is of interest to note the results of Terman's investigation on the role of environment in the development of intelligence and which we already mentioned in our historical summary.

Terman's data may be summarized as follows:



"The median I.Q. for children of the superior social class is about 7-points above, and that of the inferior class 7 points below the median I.Q. of the average social group."<sup>(1)</sup>

Let us now turn back to our tables and pick up the median of our three groups:

| <u>Public Schools</u> | <u>Private Schools</u> | <u>Foreign Schools</u> |
|-----------------------|------------------------|------------------------|
| Median                | Median                 | Median                 |
| 90.74                 | 101.72                 | 106.56                 |

If now we consider the population of private schools as representative of the middle class population, as it may be concluded from Table No. Xvii we may conclude that the result of our test agrees to a large extent with that of Terman.

This explains mostly why the bulk of subjects coming from Public schools fall under the general median, as it is eloquently shown in the frequency polygons, while the foreign school children is distinctly skewed towards superiority.

However the inferiority of the inferior class is more pronounced here than in Terman's study. The median of the middle class leans much more towards the superior than the inferior class. How shall we explain this characteristic? The following paragraph may throw some light on the subject.

---

(1) Terman, Op. Cit., p.72.

### 3. Methods of Teaching

Do not school atmosphere and school practice play a great role in intelligence development? We have already stressed the difference of response of children to our test in the different schools we visited. This response was the best in schools where modern instructional techniques were more or less used and where sensory powers and sensory observations were more relied upon than formal teaching, be these schools foreign or national.

For this reason a sub-group was selected from the whole body of the private schools which we termed group X and which was formed only of schools in which we have noticed a more modern attitude towards children and an effort to use modern instructional material. Scores were tabulated, the mean and the median of this group were computed, as results are shown in table No. XVI, *in the appendix*

A close examination of the results show a standard as high as that of Foreign schools. The median is slightly lower than that of foreign schools, but the mean is slightly superior.

May we not conclude from this that difference in school provision for instruction affects as much the mental development of a child as differences in home status?

B. Sex difference

Here our results show a little disagreement with those of Terman though they lead at the end to the same conclusion.

We have seen in our historical summary how Terman refuted the popular belief which attributes a higher average intelligence to boys and men than to girls and women. His investigation on sex difference had shown the opposite fact, mainly that girls showed a fairly constant superiority till the age of 13 years. However, he said, this superiority is so slight (amounting to 2 or 3 points in terms of I.Q.) that it would seem negligible.

Our study has yielded opposite results: In all groups tested the boys have shown a constant superiority over girls. But here too the difference is slight. (The median shows a difference which varies from 1 to 4 points I.Q.) and may be negligible while the means vary between 1 and 3.

So we can say that we are led to the same end though through two opposite ways.

However our results show agreement with the Terman-Merrill findings. The sample studied by them showed that below 6 years the means tend to run about 2 points higher for girls, from 6 to 13 years about 2 points higher for boys, and above 13 years 4 points higher for boys.

Since our group studied has six years of age we may conclude that our results are in perfect agreement with those

of Terman-Merill.

#### A pilot study of validity

The primary object of our study is to see if the norms established in America for 6 year-olds are valid for Beirut children too.

In order to judge the validity of these norms the adoption of a definite, constant criterion with which to compare our results is necessary.

#### Elements of this criterion

Many elements usually enter into the formation of this criterion such as: chronological age, teacher's estimate and school progress, school marks, comparison with the results of another test.

1. Chronological age: It is generally agreed that the general intelligence of the child grows till he reaches maturity, consequently "if the percentage of passes for a given test increased but little or not at all in going from younger to older children, this test should be considered as non-valid" says Terman. This criterion is useful when different ages are studied but is not useful in our present case.

II. Teacher's estimates and school progress:  
Usually a test is weighed against the teacher's estimate of the children as well as the children's school progress. It is supposed that, given the daily contact of children

and teacher this latter should have somewhat accurate estimate of the mental abilities of the children.

However, and though the teachers' opinion stays a valuable criterion, it was early discovered by Binet that teachers err very often for two main reasons:

1. Teachers usually mistake school performance for mental endowment.

2. They usually disregard the age factor: a superior child is sometimes underestimated because he is one or two years younger than the average child of his grade.

Binet mentions the case of a teacher whom he asked to name the brightest child of her class. After investigation Binet discovered that the one chosen by her was one year behind his normal grade.

A similar incident, occurred to us when we were discussing the scores of the children of one school with the principal: the child Z.B. 6 years 1 month, scored 127.5 IQ to the great astonishment of the principal. It was soon discovered that Z.B. is one year ahead of her normal school grade. So, if we recall the amount of retardation in public school mentioned in the first chapter, this child must be with children 2, 3 or even 4 years older than herself and her school work is necessarily compared to theirs.

Though the results of the test were very often discussed, verbally with teachers and principals, and

though we most often agreed, this criterion also has been discarded. We did so not only because of the reasons mentioned, but specially because our sample was taken from different schools of very different standards and whose teachers varied to a large extent in skill and professional training.

III. School marks: Again this criterion could not be wholly adopted for correlation can be done only when a tested group from the same room is large enough and has the same teacher. But unfortunately where these two conditions were realized the school was not always the most reliable one.

For this case we have chosen only two schools of the highest educational standing and which fortunately offered for testing a quite large group under the same teacher. The result was quite satisfactory in one of them as we shall see later.

IV. Comparison with the results of another standardized test: No locally standardized test is available for this purpose. In order to overcome this obstacle we are going to undertake the comparison of our results with the universally admitted criterion of a good test.

#### Validity of the test

##### 1. Correlation with school grades:

The two schools selected for this purpose are the

A.U.B. Elementary school and the French Protestant College.

a. A.U.B. Elementary School. The average school grades of 19 subjects all pertaining to the first grades were correlated with their corresponding mental age obtained by our test. The result was .61 which is a quite satisfactory result.

b. The French Protestant College. The grades of the final exam of 26 subjects all first graders and from the same class-room, were correlated with their mental ages. Here correlation was lower than in our first sample and amounted to .42.

Our test is not perhaps to be blamed for this difference nor the teacher. The higher correlation obtained in the A.U.B. elementary school may be attributed to the fact that the grades of their students are the average of the whole year and thus perhaps more accurate and reliable. Those of the French Protestant College are only of the final exam and thus chance may have played a greater part in them.

2. Agreement of our results with the guiding principles generally accepted as the criterion of every intelligence test

a. The Median: A correct mental scale, said Terman, must give a median intelligence quotient of unit or 100 for unselected children of each age.

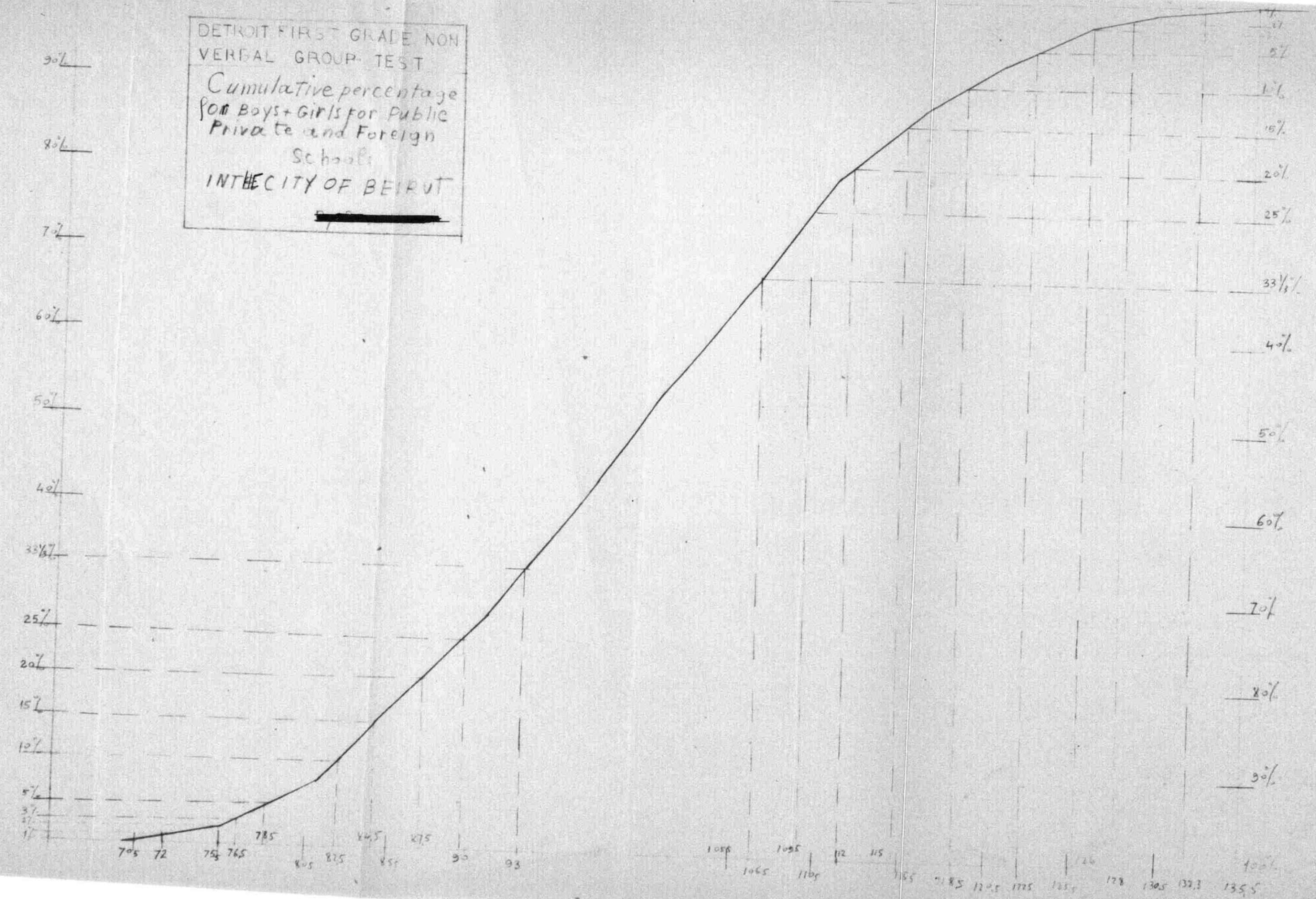
Our test, applied to Beirut children fulfills this condition. The general median of our whole group equals 99.37 which is fairly close to 100. And if we consider the population of private schools as the most representative of Beirut school population still our Median stays very close to 100. (Median of Private schools: 101.72)

b. Distribution of intelligence: The distribution of intelligence said Terman must be symmetrical at every age. It must not rise or fall abruptly because investigations have shown that no lines of demarcation exists between the different levels of intelligence: "Among unselected school children, at least for every child of any given degree of deficiency," said Terman, "there is another child as far above the average IQ as the former is below".<sup>(1)</sup>

Then Terman constructed a table which indicated how frequently an IQ of a definite size occurs and according to which he classified intelligence quotients as gradually diminishing from "Near genius or genius" to definite "feeble-mindedness". For the sake of clarity the table of the distribution of intelligence established by Terman is reproduced here, to which is opposed, step by step our own distribution. Agreement between the two scales is almost perfect, the slight differences may be neglected and attributed to chance error. The general cumulative percentage frequency curve is reproduced here to put into relief the regularity of our distribution. The points mentioned in our table are indicated on the graph.

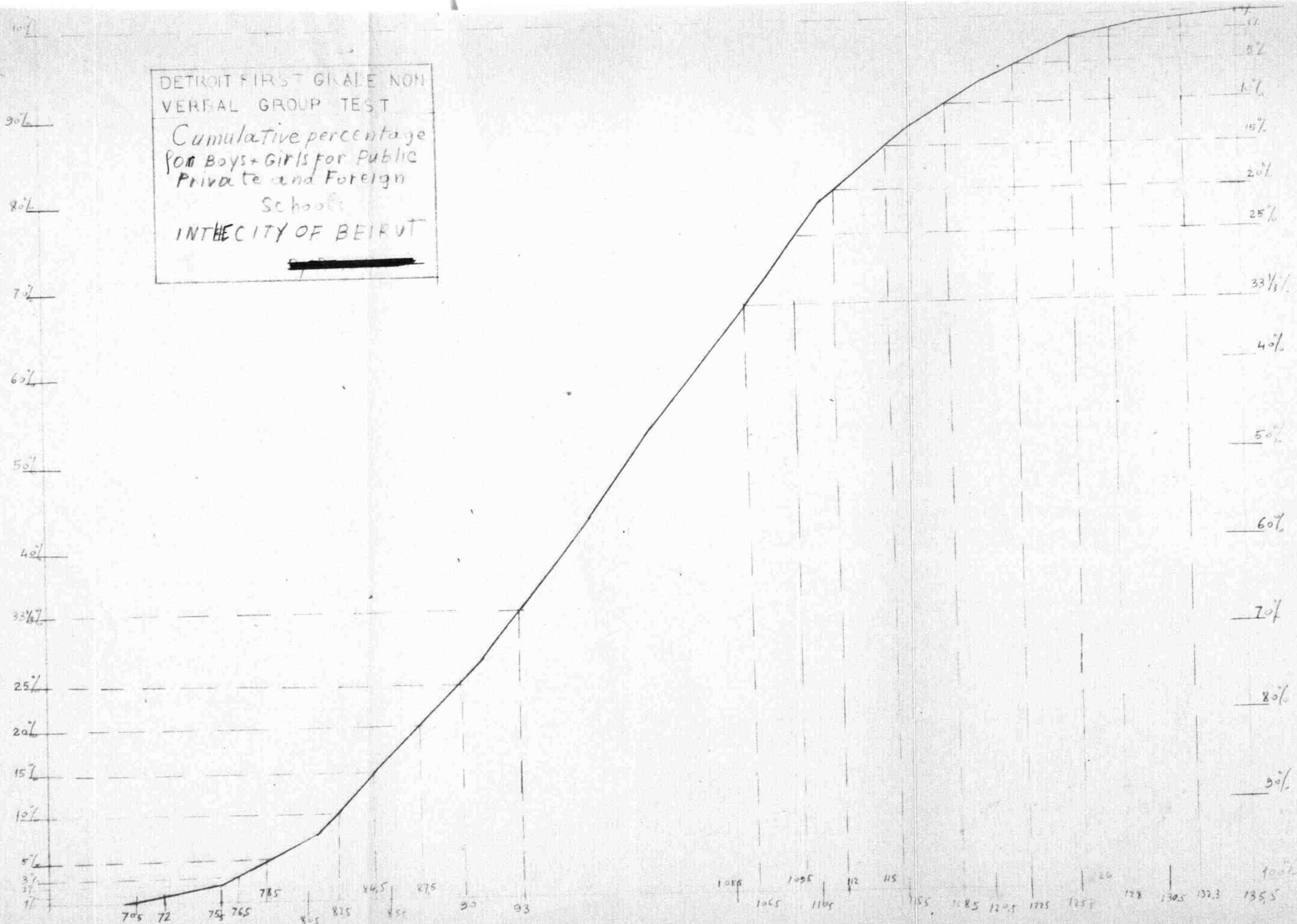


DETROIT FIRST GRADE NON  
 VERBAL GROUP TEST  
 Cumulative percentage  
 for Boys+Girls for Public  
 Private and Foreign  
 Schools  
 IN THE CITY OF BEIRUT



DETROIT FIRST GRADE NON  
VERBAL GROUP TEST

Cumulative percentage  
for Boys + Girls for Public  
Private and Foreign  
Schools  
IN THE CITY OF BEIRUT



DETROIT FIRST GRADE NON  
 VERBAL GROUP TEST  
 Cumulative percentage  
 for Boys + Girls for Public  
 Private and Foreign  
 Schools  
 IN THE CITY OF DETROIT

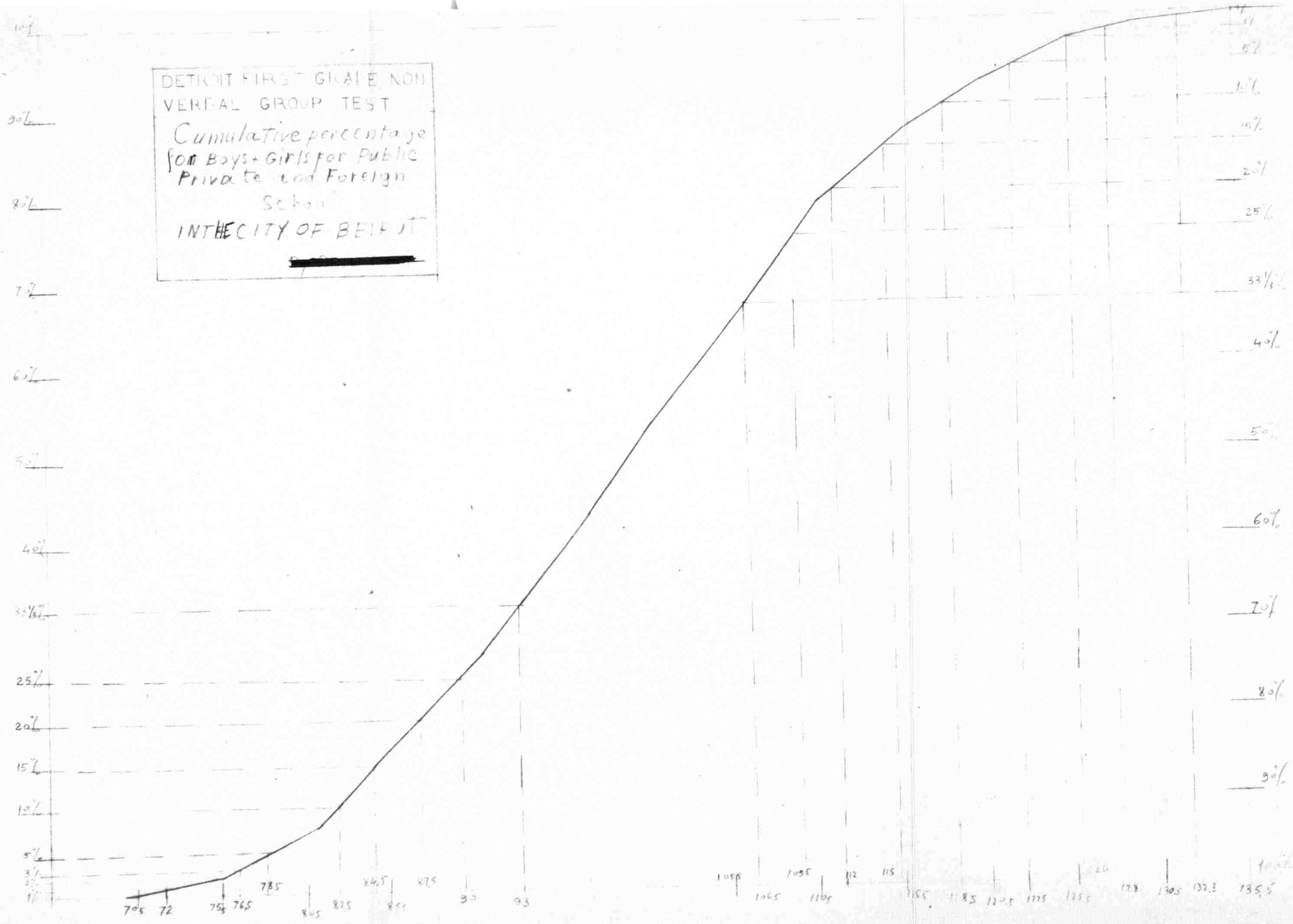


Table XVII

Frequency of Various Intelligence Quotients

|                     | <u>Terman</u> |      | <u>Detroit</u> |  |                      | <u>Terman</u> |       | <u>Detroit</u> |  |
|---------------------|---------------|------|----------------|--|----------------------|---------------|-------|----------------|--|
| The lowest 1% go to | 70            | 72   | or below       |  | The highest 1% reach | 130           | 132.3 | or above       |  |
| " " 2% " "          | 73            | 75.5 | "              |  | " " 2% "             | 128           | 128   | "              |  |
| " " 3% " "          | 76            | 76.5 | "              |  | " " 3% "             | 125           | 126   | "              |  |
| " " 5% " "          | 78            | 78.4 | "              |  | " " 5% "             | 122           | 122.5 | "              |  |
| " " 10% " "         | 85            | 82.5 | "              |  | " " 10% "            | 116           | 118.5 | "              |  |
| " " 15% " "         | 88            | 84.5 | "              |  | " " 15% "            | 113           | 115.  | "              |  |
| " " 20% " "         | 97            | 87.5 | "              |  | " " 20% "            | 110           | 112   | "              |  |
| " " 25.1/3 " "      | 92            | 90   | "              |  | " " 25% "            | 108           | 109.5 | "              |  |
| " " 33.1/3 " "      | 95            | 93   | "              |  | " " 33.1/3 "         | 106           | 106.5 | "              |  |

c. Standard deviation: Our standard deviations vary between 11.1 and 13.9 which is relatively good, Terman's was 15.

d. Sex differences: The test has shown no sex discrimination, as we have already mentioned, and may then be applied to all Beirut first graders male and female.

Proposed modification

Though the test has proved to be suitable for Beirut first-graders, however, some minor modifications are necessary.

The following table was constructed in order to throw more clarity on the modifications we are going to propose:

Table XVIII

| <u>Test No.</u> | <u>I</u> | <u>II</u>            | <u>III</u> | <u>IV</u> | <u>V</u> | <u>VI</u> | <u>VII</u> |
|-----------------|----------|----------------------|------------|-----------|----------|-----------|------------|
| I               | 96.8%    | 17.2% <sup>(1)</sup> | 38.1%      | 30.9%     | 4%       |           |            |
| II              | 92.7%    | 71.8%                | 66 %       | 46.7%     | 30.3%    |           |            |
| III             | 98.2%    | 88.2%                | 48.3%      | 64.7%     | 20.9%    |           |            |
| IV              | 96.7%    | 46.7%                | 20.9%      | 34.4%     | 33.3%    | 37.8%     | 43.8%      |
| V               | 96.2%    | 84.5%                | 70.6%      | 56.8%     |          |           |            |
| VI              | 96.8%    | 53.7%                | 50.4%      | 37.%      |          |           |            |
| VII             | 95.6%    | 84.5%                | 66.3%      | 41 %      | 23.3%    | 27.3%     |            |
| VIII            | 96.8%    | 70.8%                | 87 %       | 57.9%     | 21.5%    |           |            |
| IX              | 99.1%    | 93.2%                | 83.4%      | 83.6%     |          |           |            |
| X               | 95.4%    | 93.6%                | 65.2%      | 57.4%     | 33.6%    |           |            |

(1) This low percentage is difficult to explain. It may be attributed to the fact that the children were not aware of the number of objects which they should mark, and since in the 1st item they were required to mark one object only, here too they mark only one.

(2) The high percentage obtained here may suggest to some that this test is easy for our children and should be changed. Experience has shown that this high percentage is rather due to school training rather than to natural endowment. In modern schools where teaching is less formal and where number concept is not imposed on the children's mind the results were lower. And since this test is meant to measure native intelligence not school training it should be kept as it is.

This table represents the percentage of success of the whole group in every item. Since the items of every test have been, as we have already mentioned arranged in order of difficulty, the percentages decrease as we go up from the first to the last item. This decrease shows that the order conceived by the author is also suitable for Beirut children. However, this distribution shows some irregularity in some tests which calls either for the change of some items or the alteration of their order.

1. Items to be changed: The flag (test 3), the basket (item 3 test 4) and the Boy's costume (item 4 test 4) should be modified so as to have a more universal form: the flag is American. The form of the basket, common to American and European markets is unfamiliar to our children. The boy too is dressed in a manner which is not common to us.

2. Alteration of order:

a. Item 6 test 7 is considered by the author as the most difficult and so is placed last and scored 3 points. Our study has shown that item 4 is most difficult for our children as is shown in the table so their places should be interchanged.

b. Item 2 test 8 has proved to be more difficult than item 3. Here the children showed less accuracy or were not aware of what was essential to their drawing: The lines of their diagonals rarely fell in the corners of the square. As a matter of fact the observation of

children at work showed that this item needed greater manual dexterity and a <sup>better</sup> keenness of sight than the following item where the square was quickly and easily executed.

c. The difference of percentage of success between items 3 and 4 test 9 is so slight that it is negligible.

CONCLUSION

So, our investigation, though limited to the modest means of a single worker, has tended to support the hypothesis with which we started the study. It indicates that, though a test cannot, like a manufactured object, be indiscriminately applied everywhere, and though it is to a large extent determined by local social and cultural conditions, it is not necessarily limited to the narrow limits of local and national boundaries. A test which has proven to be valid in one country may also be valid in another if the environmental conditions are similar. But this does not acquit us from our duty in this field since a test must always be locally tried out before being applied.

We have been and still are depending, maybe without great harm, on Western means of civilization. We have absorbed and exploited with the same zeal and perhaps at the same time as most of the capitals of Europe and America, the latest mechanical inventions. But in testing we are half a century behind because a test cannot be transplanted unchanged. No country, no matter how advanced it may be, can boast itself to be the producer, and no other be contented of the easy lot of the consumer. Such a valuable tool, needs local investigation which needs to be constantly carried on. Though suggestions and help may come from every part of the world, our active, creative contribution is mostly needed. Nay, experiment on the spot is the foundation stone on which the edifice is to be erected.



Another most instructive, though negative lesson, is disclosed by our experiment: it has shown us that testing cannot like commerce or industry be erected on the shoulders of single individuals, unless governments or some educational institutions take it under their patronage, it will never flourish. Binet's scale of intelligence would not have yielded the results it did had not the France's Ministry of Education put at its disposal France's Public schools. Similarly, the testing movement would not have enjoyed rapid spectacular development in the United States had it not been for the interest universities showed in this field and the impetus given to it by the mass experiment which American Authorities have dared to attempt at one of the most critical moments of America's history.

Likewise, no positive, constructive work is to be expected in Lebanon and the other Arab countries before governments and educational institutions become aware of the help they can expect from psychological testing, i.e. before they start seeking for a scientific explanation of their many psychological, educational and social problems. Unless this revolution takes place in our mind, psychological testing will continue to lead the sporadic, intermittent, discontinuous life it actually leads. Its life will remain frail and uncertain and its results fruitless and sterile.

Table XVI

## General Comparative table

| Type of School   | Number of Subjects | $\bar{x}$ | Median | 6     |
|------------------|--------------------|-----------|--------|-------|
| Public Schools   | 185                | 92.3      | 90.74  | 12.35 |
| Boys             | 73                 | 92.18     | 91.54  | 12.15 |
| Girls            | 112                | 92.33     | 90.16  | 12.5  |
| Private Schools  | 303                | 102.17    | 101.72 | 12.85 |
| Boys             | 176                | 103.5     | 103.1  | 13.2  |
| Girls            | 127                | 100.36    | 100.41 | 12.1  |
| Foreign Schools  | 115                | 104.93    | 106.56 | 11.45 |
| Boys             | 39                 | 107.3     | 107.69 | 11.10 |
| Girls            | 77                 | 103.77    | 106.25 | 11.45 |
| Public & Private | 488                | 98.43     | 97.85  | 12.85 |
| Boys             | 249                | 100.17    | 99.61  | 12.75 |
| Girls            | 239                | 96.6      | 95.29  | 13.9  |
| Whole Group      | 604                | 99.67     | 99.37  | 13.4  |
| Boys             | 288                | 101.12    | 100.63 | 13.1  |
| Girls            | 316                | 98.35     | 98.23  | 13.65 |
| X Group (1)      | 158                | 105.21    | 104.46 | 13    |

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(1) A selected group representing the students of more or less 'modern' private schools.

Table XV

Whole Group

| Scores        | Frequencies | Cum<br>Frequencies | x   | x' | fx'   | f(x') <sup>2</sup> |
|---------------|-------------|--------------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | 1           | 1                  | 68  | -6 | -6    | 36                 |
| 70.5 - 75.4   | 11          | 12                 | 73  | -5 | -55   | 275                |
| 75.5 - 80.4   | 36          | 48                 | 78  | -4 | -144  | 576                |
| 80.5 - 85.4   | 54          | 102                | 83  | -3 | -162  | 486                |
| 85.5 - 90.4   | 58          | 160                | 88  | -2 | -116  | 232                |
| 90.5 - 95.4   | 77          | 237                | 93  | -1 | -77   | 77                 |
| 95.4 - 100.4  | 84          | 321                | 98  | 0  | 0     | 0                  |
| 100.5 - 105.4 | 79          | 400                | 103 | 1  | 79    | 79                 |
| 105.5 - 110.4 | 75          | 475                | 108 | 2  | 150   | 300                |
| 110.5 - 115.4 | 48          | 523                | 113 | 3  | 144   | 432                |
| 115.5 - 120.4 | 37          | 560                | 118 | 4  | 148   | 592                |
| 120.5 - 125.4 | 27          | 587                | 123 | 5  | 135   | 675                |
| 125.5 - 130.4 | 13          | 600                | 128 | 6  | 78    | 468                |
| 130.5 - 135.4 | 4           | 604                | 133 | 7  | 28    | 196                |
|               | <hr/>       |                    |     |    | <hr/> | <hr/>              |
|               | 604         |                    |     |    | +202  | 4424               |

$$\bar{x} = 98 + \frac{200 \times 5}{604} = 98 + 1.67 = 99.67$$

$$s^2 = 5 \left[ \frac{4424}{604} - \frac{202^2}{604} \right] = 5 [ 7.32 - 0.108 ] = 13.4$$

$$M = \frac{604}{2} = 302$$

$$302 - 237 = 65$$

$$95.5 + \frac{65 \times 5}{84} = 99.37$$

## Private &amp; Public &amp; Foreign

## Girls

| Scores        | Frequencies | x   | x' | fx'   | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | 0           | 68  | -6 | 0     | 0                  |
| 70.5 - 75.4   | 9           | 73  | -5 | -45   | 225                |
| 75.5 - 80.4   | 17          | 78  | -4 | -68   | 272                |
| 80.5 - 85.4   | 36          | 83  | -3 | -108  | 324                |
| 85.5 - 90.4   | 29          | 88  | -2 | -58   | 116                |
| 90.5 - 95.4   | 43          | 93  | -1 | -43   | 43                 |
| 95.5 - 100.4  | 44          | 98  | 0  | -322  | 0                  |
| 100.5 - 105.4 | 41          | 103 | 1  | 41    | 41                 |
| 105.5 - 110.4 | 44          | 108 | 2  | 88    | 176                |
| 110.5 - 115.4 | 20          | 113 | 3  | 60    | 180                |
| 115.5 - 120.4 | 17          | 118 | 4  | 68    | 272                |
| 120.5 - 125.4 | 11          | 123 | 5  | 55    | 275                |
| 125.5 - 130.4 | 3           | 128 | 6  | 18    | 108                |
| 130.5 - 135.4 | 2           | 133 | 7  | 14    | 98                 |
|               | <hr/>       |     |    | <hr/> | <hr/>              |
|               | 316         |     |    | +344  | 2130               |
|               |             |     |    | <hr/> |                    |
|               |             |     |    | +22   |                    |

$$\bar{x} = 98 + \frac{22 \times 5}{316} = 98 + 0.348 = 98.35$$

$$s^2 = 5 \frac{2.30}{316} - \frac{22^2}{316} = 5 \cdot 6.75 - 0.0047$$

$$= 5 \cdot 6.7353 = 5 \cdot 2.59 = 12.95$$

$$M = \frac{316}{2} = 158$$

$$158 - 134 = 24$$

$$95.5 + \frac{24 \times 5}{44} = 98.23$$

Table XIV <sup>a</sup>

General: Private + Public + Foreign

Boys

| Scores        | Frequencies | X   | x' | fx'   | fx') <sup>2</sup> |
|---------------|-------------|-----|----|-------|-------------------|
| 65.5 - 70.4   | 1           | 68  | -6 | -6    | 36                |
| 70.5 - 75.4   | 2           | 73  | -5 | -10   | 50                |
| 75.5 - 80.4   | 19          | 78  | -4 | -76   | 304               |
| 80.5 - 85.4   | 18          | 83  | -3 | -54   | 162               |
| 85.5 - 90.4   | 29          | 88  | -2 | -58   | 116               |
| 90.5 - 95.4   | 34          | 93  | -1 | -34   | 34                |
| 95.5 - 100.4  | 40          | 98  | 0  | -238  | 0                 |
| 100.5 - 105.4 | 38          | 103 | 1  | 38    | 38                |
| 105.5 - 110.4 | 31          | 108 | 2  | 62    | 124               |
| 110.5 - 115.4 | 28          | 113 | 3  | 84    | 252               |
| 115.5 - 120.4 | 20          | 118 | 4  | 80    | 320               |
| 120.5 - 125.4 | 16          | 123 | 5  | 80    | 400               |
| 125.5 - 130.4 | 10          | 128 | 6  | 60    | 360               |
| 130.5 - 135.4 | 2           | 133 | 7  | 14    | 98                |
|               | <hr/>       |     |    | <hr/> | <hr/>             |
|               | 288         |     |    | +418  | 2294              |
|               |             |     |    | <hr/> |                   |
|               |             |     |    | +180  |                   |
|               |             |     |    | <hr/> |                   |

$$\bar{x} = 98 + \frac{180 \times 5}{288} = 101.12$$

$$s^2 = 5 \frac{2294}{288} - \frac{180^2}{288} = 5 \cdot 7.96 - 0.3844$$

$$= 5 \cdot 7.576 = 5 + 2.75 = 13.75$$

$$M = \frac{288}{2} = 144$$

$$144 - 143 = 1$$

$$100.5 + \frac{1 \times 5}{38} = 100.63$$

Table XIII

Private & Public - Boys and Girls

| Scores        | Frequencies | Cum<br>Frequencies | x   | x' | fx'   | fx(x) <sup>2</sup> |
|---------------|-------------|--------------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | 1           | 1                  | 68  | -6 | -6    | 36                 |
| 70.5 - 75.4   | 10          | 11                 | 73  | -5 | -50   | 250                |
| 75.5 - 80.4   | 35          | 46                 | 78  | -4 | -140  | 560                |
| 80.5 - 85.4   | 49          | 95                 | 83  | -3 | -147  | 441                |
| 85.5 - 90.4   | 53          | 148                | 88  | -2 | -106  | 212                |
| 90.5 - 95.4   | 65          | 213                | 93  | -1 | -65   | 65                 |
| 95.5 - 100.4  | 66          | 279                | 98  | 0  | 0     | 0                  |
| 100.5 - 105.4 | 69          | 348                | 103 | +1 | 69    | 69                 |
| 105.5 - 110.4 | 47          | 395                | 108 | +2 | 94    | 188                |
| 110.5 - 115.4 | 32          | 427                | 113 | +3 | 96    | 288                |
| 115.5 - 120.4 | 26          | 453                | 118 | +4 | 104   | 416                |
| 120.5 - 125.4 | 21          | 474                | 123 | +5 | 115   | 189                |
| 125.5 - 130.4 | 11          | 485                | 128 | +6 | 66    | 396                |
| 130.5 - 135.4 | 3           | 488                | 133 | +7 | 21    | 147                |
|               |             |                    |     |    | <hr/> |                    |
|               |             |                    |     |    | -1    |                    |

$$\bar{x} = 98 - \frac{1 \times 5}{488} = 97.99$$

$$6 = 5 \frac{3257}{488} - \frac{101^2}{488} = 5 \quad 6.674 - 0.042 = 5 \quad 6.632$$

$$= 5 \times 2.57 = 12.85$$

$$M = \frac{488}{2} = 244$$

$$244 - 213 = 31$$

$$95.5 + \frac{31 \times 5}{66} = 97.85$$

## Private &amp; Public - Girls

| Scores        | Frequencies | x   | x' | fx'                       | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|---------------------------|--------------------|
| 65.5 - 70.4   | -           | 68  | -6 | 0                         | 0                  |
| 70.5 - 75.4   | 8           | 73  | -5 | -40                       | 200                |
| 75.5 - 80.4   | 16          | 78  | -4 | -64                       | 256                |
| 80.5 - 85.4   | 32          | 83  | -3 | -96                       | 288                |
| 85.5 - 90.4   | 26          | 88  | -2 | -52                       | 104                |
| 90.5 - 95.4   | 32          | 93  | -1 | -32                       | 32                 |
| 95.5 - 100.4  | 35          | 98  | 0  | -284                      | 0                  |
| 100.5 - 105.4 | 34          | 103 | 1  | 34                        | 34                 |
| 105.5 - 110.4 | 24          | 108 | 2  | 48                        | 96                 |
| 110.5 - 115.4 | 11          | 113 | 3  | 33                        | 99                 |
| 115.5 - 120.4 | 9           | 118 | 4  | 36                        | 144                |
| 120.5 - 125.4 | 8           | 123 | 5  | 40                        | 200                |
| 125.5 - 130.4 | 2           | 128 | 6  | 12                        | 72                 |
| 130.5 - 135.4 | 2           | 133 | 7  | 14                        | 98                 |
|               | <u>239</u>  |     |    | <u>+217</u><br><u>-67</u> | <u>1623</u>        |

$$\bar{x} = 98 - \frac{67 \times 5}{239} = 96.599$$

$$s^2 = 5 \frac{1623}{239} - \frac{67^2}{239} = 5 \cdot 6.79 - 0.0784 = 5 \cdot 6.7116 \\ = 5 + 2.59 = 12.95$$

$$M = \frac{239}{2} = 119.5$$

$$119.5 - 114 = 5.5$$

$$95.5 + \frac{5.5 \times 5}{35} = 95.29$$

Table XII

## Private &amp; Public - Boys

| Scores        | Frequencies | $x$ | $x'$ | $fx'$ | $f(x')^2$ |
|---------------|-------------|-----|------|-------|-----------|
| 65.5 - 70.4   | 1           | 68  | -6   | -6    | 36        |
| 70.5 - 75.4   | 2           | 73  | -5   | -10   | 50        |
| 75.5 - 80.4   | 19          | 78  | -4   | -76   | 304       |
| 80.5 - 85.4   | 17          | 83  | -3   | -51   | 153       |
| 85.5 - 90.4   | 27          | 88  | -2   | -54   | 108       |
| 90.5 - 95.4   | 33          | 93  | -1   | -33   | 33        |
| 95.5 - 100.4  | 31          | 98  | 0    | -230  | 0         |
| 100.5 - 105.4 | 35          | 103 | 1    | 35    | 35        |
| 105.5 - 110.4 | 23          | 108 | 2    | 46    | 92        |
| 110.5 - 115.4 | 21          | 113 | 3    | 63    | 189       |
| 115.5 - 120.4 | 17          | 118 | 4    | 68    | 272       |
| 120.5 - 125.4 | 13          | 123 | 5    | 65    | 325       |
| 125.5 - 130.4 | 9           | 128 | 6    | 54    | 324       |
| 130.5 - 135.4 | 1           | 133 | 7    | 7     | 49        |
|               | <hr/>       |     |      | <hr/> | <hr/>     |
|               | 249         |     |      | +338  | +1970     |
|               |             |     |      | +108  |           |

$$\bar{x} = 98 + \frac{108 \times 5}{249} = 100.168$$

$$6 = 5 \frac{1970}{249} = \frac{108^2}{249} = 5 \cdot 7.916 - 0.1875$$

$$= 5 \times 2.78 = 13.9$$

$$M = \frac{249}{2} = 124.5$$

$$124.5 - 99 = 25.5$$

$$95.5 + \frac{25.5 \times 5}{31} = 99.61$$



Table XI

Foreign - Boys and Girls

| Scores        | Frequencies | X   | x' | fx'   | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | -           | 68  | -6 | -     | -                  |
| 70.5 - 75.4   | 1           | 73  | -5 | -5    | 25                 |
| 75.5 - 80.4   | 1           | 78  | -4 | -4    | 16                 |
| 80.4 - 85.4   | 5           | 83  | -3 | -15   | 45                 |
| 85.5 - 90.4   | 5           | 88  | -2 | -10   | 20                 |
| 90.5 - 95.4   | 12          | 93  | -1 | -12   | 12                 |
| 95.5 - 100.4  | 18          | 98  | 0  | 0     | 0                  |
| 100.5 - 105.4 | 10          | 103 | 1  | 10    | 10                 |
| 105.5 - 110.4 | 28          | 108 | 2  | 56    | 112                |
| 110.5 - 115.4 | 16          | 113 | 3  | 48    | 144                |
| 115.5 - 120.4 | 11          | 118 | 4  | 44    | 176                |
| 120.5 - 125.4 | 6           | 123 | 5  | 30    | 150                |
| 125.5 - 130.4 | 2           | 128 | 6  | 12    | 72                 |
| 130.5 - 135.4 | 1           | 133 | 7  | 7     | 49                 |
|               | <hr/>       |     |    | <hr/> | <hr/>              |
|               | 116         |     |    | +161  | 831                |

$$\bar{x} = 98 + \frac{161}{116} = 104.939$$

$$6 = 5 \frac{831}{116} - \frac{161^2}{116} = 5 \cdot 7.163 - 1.904 = 5 \cdot 5.259$$

$$= 5 \times 2.29 = 11.45$$

$$M = \frac{116}{2} = 58$$

$$58 - 52 = 6$$

$$80 - 58 = 22$$

$$110.5 - \frac{22 \times 5}{28} = 106.56$$

## Foreign - Girls

| Scores        | Frequencies | x   | x' | fx'   | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | -           | 68  | -6 | -     | -                  |
| 70.5 - 75.4   | 1           | 73  | -5 | -5    | 25                 |
| 75.5 - 80.4   | 1           | 78  | -4 | -4    | 16                 |
| 80.5 - 85.4   | 4           | 83  | -3 | -12   | 36                 |
| 85.5 - 90.4   | 3           | 88  | -2 | -6    | 12                 |
| 90.5 - 95.4   | 11          | 93  | -1 | -11   | 11                 |
| 95.5 - 100.4  | 9           | 98  | -  | 9     | 0                  |
| 100.5 - 105.4 | 7           | 103 | +1 | 7     | 7                  |
| 105.5 - 110.4 | 20          | 108 | 2  | 40    | 80                 |
| 110.5 - 115.4 | 9           | 113 | 3  | 27    | 81                 |
| 115.5 - 120.4 | 8           | 111 | 4  | 32    | 128                |
| 120.5 - 125.4 | 3           | 123 | 5  | 15    | 75                 |
| 125.5 - 130.4 | 1           | 128 | 6  | 6     | 36                 |
| 130.5 - 135.4 | -           | 133 | 7  | -     | -                  |
|               | <hr/>       |     |    | <hr/> | <hr/>              |
|               | 77          |     |    | +89   | 507                |

$$\bar{x} = 98 + \frac{89 \times 5}{77} = 98 + 5.77 = 103.77$$

$$s^2 = 5 \frac{507}{77} - \frac{89^2}{77} = 5 \cdot 6.58 - 1.33 = 5 \cdot 5.25$$

$$M = \frac{77}{2} = 38.5$$

$$38.5 - 36 = 2.5$$

$$56 - 38.5 = 17.5$$

$$110.5 - \frac{17.5 \times 5}{20} = 106.23$$

Table X a

| Scores        | Frequencies | Foreign - Boys |    |     |                    |
|---------------|-------------|----------------|----|-----|--------------------|
|               |             | x              | x' | fx' | f(x') <sup>2</sup> |
| 65.5 - 70.4   | -           | 68             | -6 | -   | -                  |
| 70.5 - 75.4   | -           | 73             | -5 | -   | -                  |
| 75.5 - 80.4   | -           | 78             | -4 | -   | -                  |
| 80.5 - 85.4   | 1           | 83             | -3 | -3  | 9                  |
| 85.5 - 90.4   | 2           | 88             | -2 | -4  | 8                  |
| 90.5 - 95.4   | 1           | 93             | -1 | -1  | 2                  |
| 95.5 - 100.4  | 9           | 98             | 0  | 0   | 0                  |
| 100.5 - 105.4 | 3           | 103            | +1 | 3   | 3                  |
| 105.5 - 110.4 | 8           | 108            | 2  | 16  | 32                 |
| 110.5 - 115.4 | 7           | 113            | 3  | 21  | 63                 |
| 115.5 - 120.4 | 3           | 118            | 4  | 12  | 48                 |
| 120.5 - 125.4 | 3           | 123            | 5  | 15  | 75                 |
| 125.5 - 130.4 | 1           | 128            | 6  | 6   | 36                 |
| 130.5 - 135.4 | 1           | 133            | 7  | 7   | 49                 |
|               | 39          |                |    | +72 | 325                |

$$\bar{x} = 98 + \frac{72 \times 5}{39} = 107.3$$

$$s^2 = 5 \frac{325}{39} - \frac{72^2}{39^2} = 5 \cdot 8.33 - 3.40 = 5 \cdot 4.93 = 5 \times 2.22 = 11.1$$

$$M = \frac{39}{2} = 19.5$$

$$19.5 - 16 = 3.5$$

$$24 - 19.5 = 4.5$$

$$110.5 - \frac{4.5 \times 5}{8} = 107.69$$

Table IX

Private - Boys and Girls

| Scores        | Frequencies | x   | x' | fx'   | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-------|--------------------|
| 65.5 - 70.4   | -           | 68  | -6 | -     | -                  |
| 70.5 - 75.4   | 4           | 73  | -5 | -20   | 100                |
| 75.5 - 80.4   | 10          | 78  | -4 | -40   | 160                |
| 80.5 - 85.4   | 16          | 83  | -3 | -48   | 144                |
| 85.5 - 90.4   | 27          | 88  | -2 | -58   | 108                |
| 90.5 - 100.4  | 34          | 93  | -1 | -34   | 34                 |
| 95.5 - 100.4  | 48          | 98  | 0  | 0     | 0                  |
| 100.5 - 105.4 | 41          | 103 | 1  | 51    | 51                 |
| 105.5 - 110.4 | 35          | 108 | 2  | 70    | 140                |
| 110.5 - 115.4 | 28          | 113 | 3  | 84    | 252                |
| 115.5 - 120.4 | 20          | 118 | 4  | 80    | 320                |
| 120.5 - 125.4 | 18          | 123 | 5  | 90    | 450                |
| 125.5 - 130.4 | 10          | 128 | 6  | 60    | 360                |
| 130.5 - 135.4 | 2           | 133 | 7  | 14    | 98                 |
|               | <hr/>       |     |    | <hr/> | <hr/>              |
|               | 303         |     |    | 253   | 2217               |

$$\bar{x} = 98 + \frac{253 \times 5}{303} = 102.17$$

$$6 = 5 \frac{2217}{303} - \frac{253^2}{303} = 5 \cdot 7.316 - 0.695 = 5 \times 2.57 = 12.85$$

$$M = \frac{303}{2} = 151.5$$

$$151.5 - 113 = 38.5$$

$$105.5 - \frac{38.5 \times 5}{51} = 101.72$$

Table VIII b

## Private - Girls

| Scores        | Frequencies | x   | x' | fx'       | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-----------|--------------------|
| 65.5 - 70.4   | -           | 68  | -6 | -         | -                  |
| 70.5 - 75.4   | 4           | 73  | -5 | -20       | 100                |
| 75.5 - 80.4   | 4           | 78  | -4 | -16       | 64                 |
| 80.5 - 85.4   | 6           | 83  | -3 | -18       | 54                 |
| 85.5 - 90.4   | 11          | 88  | -2 | -22       | 44                 |
| 90.5 - 95.4   | 13          | 93  | -1 | -13       | 13                 |
| 95.5 - 100.4  | 26          | 98  | 0  | 0         | 0                  |
| 100.5 - 105.4 | 26          | 103 | 1  | 26        | 26                 |
| 105.5 - 110.4 | 14          | 108 | 2  | 28        | 56                 |
| 110.5 - 115.4 | 9           | 113 | 3  | 27        | 81                 |
| 115.5 - 120.4 | 5           | 118 | 4  | 20        | 80                 |
| 120.5 - 125.4 | 7           | 123 | 5  | 35        | 175                |
| 125.5 - 130.4 | 1           | 128 | 6  | 6         | 36                 |
| 130.5 - 135.4 | 1           | 133 | 7  | 7         | 49                 |
|               | <hr/> 127   |     |    | <hr/> +60 | <hr/> 778          |

$$\bar{x} = 98 + \frac{60 \times 5}{127} = 100.36$$

$$6 = 5 \frac{778}{127} - \frac{60^2}{127} = 5 \quad 6.12 - 0.23 = 12.1$$

$$M = \frac{127}{2} = 63.5$$

$$63.5 - 38 = 25.5$$

$$100.5 - \frac{0.5 \times 5}{26} = 100.41$$

Table VIII <sup>a</sup>

| Scores        | Frequencies | Private |      | Boys  |      | $f(x')^2$ |
|---------------|-------------|---------|------|-------|------|-----------|
|               |             | X       | $x'$ | $fx'$ |      |           |
| 65.5 - 70.4   | -           | 68      | -6   | -     | -    | -         |
| 70.5 - 75.4   | -           | 73      | -5   | -     | -    | -         |
| 75.5 - 80.4   | 6           | 78      | -4   | -24   | 96   |           |
| 80.5 - 85.4   | 10          | 83      | -3   | -30   | 90   |           |
| 85.5 - 90.4   | 16          | 88      | -2   | -32   | 64   |           |
| 90.5 - 95.4   | 21          | 93      | -1   | -21   | 21   |           |
| 95.5 - 100.4  | 22          | 98      | 0    | 0     | 0    |           |
| 100.5 - 105.4 | 25          | 103     | 1    | 25    | 25   |           |
| 105.5 - 110.4 | 21          | 108     | 2    | 42    | 84   |           |
| 110.5 - 115.4 | 19          | 113     | 3    | 57    | 511  |           |
| 115.5 - 120.4 | 15          | 118     | 4    | 60    | 240  |           |
| 120.5 - 125.4 | 11          | 123     | 5    | 55    | 275  |           |
| 125.5 - 130.4 | 9           | 128     | 6    | 54    | 324  |           |
| 130.5 - 135.4 | 1           | 133     | 7    | 7     | 49   |           |
|               | 176         |         |      | +193  | 1439 |           |

$$\bar{x} = 98 + \frac{193 \times 5}{176} = 103.5$$

$$s^2 = 5 \frac{1439}{176} - \frac{193^2}{176} = 5 \cdot 8.17 - 1.188 = 13.2$$

$$M = \frac{176}{2} = 88$$

$$101 - 88 = 13$$

$$100.5 + \frac{13 \times 5}{25} = 103.1$$

Table VII

Public - Boys and Girls

| Scores        | Frequencies | x   | X' | fx'  | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|------|--------------------|
| 65.5 - 70.4   | 1           | 68  | -6 | -6   | 36                 |
| 70.5 - 75.4   | 6           | 73  | -5 | -30  | 150                |
| 75.5 - 80.4   | 25          | 78  | -4 | -100 | 400                |
| 80.5 - 85.4   | 33          | 83  | -3 | -99  | 297                |
| 85.5 - 90.4   | 26          | 88  | -2 | -52  | 104                |
| 90.5 - 95.4   | 31          | 93  | -1 | -31  | 31                 |
| 95.5 - 100.4  | 18          | 98  | 0  | 0    | 0                  |
| 100.5 - 105.4 | 18          | 103 | 1  | 18   | 18                 |
| 105.5 - 110.4 | 12          | 108 | 2  | 24   | 48                 |
| 110.5 - 115.4 | 4           | 113 | 3  | 12   | 36                 |
| 115.5 - 120.4 | 6           | 118 | 4  | 24   | 96                 |
| 120.5 - 125.4 | 3           | 123 | 5  | 15   | 75                 |
| 125.5 - 130.4 | 1           | 128 | 6  | 6    | 36                 |
| 130.5 - 135.4 | 1           | 133 | 7  | 7    | 49                 |

$$\bar{x} = 98 - \frac{212 \times 5}{185} = 92.3$$

$$6 = 5 \frac{1376 - \frac{212^2}{175}}{175} = 5 \quad 7.438 - 1.313 = 12.35$$

$$M = \frac{185}{2} = 92.5$$

$$92.5 - 91. = 1.5$$

$$90.5 + \frac{1.5 \times 5}{91} = 90.74$$

Table VI <sup>b</sup>

| Public - Girls |           |     |    |       |                    |
|----------------|-----------|-----|----|-------|--------------------|
| Scores         | Frequency | x   | x' | fx'   | f(x') <sup>2</sup> |
| 65.5 - 70.4    | -         | 68  | -6 | 0     | 0                  |
| 70.5 - 75.4    | 4         | 73  | -5 | -20   | 100                |
| 75.5 - 80.4    | 12        | 78  | -4 | -48   | 192                |
| 80.5 - 85.4    | 26        | 83  | -3 | -78   | 234                |
| 85.5 - 90.4    | 15        | 88  | -2 | -30   | 60                 |
| 90.5 - 95.4    | 19        | 93  | -1 | -19   | 19                 |
| 95.5 - 100.4   | 9         | 98  | 0  | 0     | 0                  |
| 100.5 - 105.4  | 8         | 103 | 1  | 8     | 8                  |
| 105.5 - 110.4  | 10        | 108 | 2  | 20    | 40                 |
| 110.5 - 115.4  | 2         | 113 | 3  | 6     | 18                 |
| 115.5 - 120.4  | 4         | 118 | 4  | 16    | 64                 |
| 120.5 - 125.4  | 1         | 123 | 5  | 5     | 25                 |
| 125.5 - 130.4  | 1         | 128 | 6  | 6     | 36                 |
| 130.5 - 135.4  | 1         | 133 | 7  | 7     | 49                 |
|                | <hr/>     |     |    | <hr/> | <hr/>              |
|                | 112       |     |    | -127  | 845                |

$$\bar{x} = 98 - \frac{127 \times 5}{112} = 92.33$$

$$s^2 = 5 \frac{845}{112} - \frac{127^2}{112} = 5 \cdot 6.26 = 12.5$$

$$M = \frac{112}{2} = 56$$

$$56 - 42 = 14$$

$$85.5 + \frac{14 \times 5}{15} = 90.166$$



## Boys - Public

| Scores        | Frequencies | x   | x' | fx'       | f(x') <sup>2</sup> |
|---------------|-------------|-----|----|-----------|--------------------|
| 65.5 - 70.4   | 1           | 68  | -6 | -6        | 36                 |
| 70.5 - 75.4   | 2           | 73  | -5 | -10       | 50                 |
| 75.5 - 80.4   | 13          | 78  | -4 | -52       | 208                |
| 80.5 - 85.4   | 1           | 83  | -3 | -21       | 63                 |
| 85.5 - 90.4   | 18          | 88  | -2 | -22       | 44                 |
| 90.5 - 95.4   | 12          | 93  | -1 | -12       | 12                 |
| 95.5 - 100.4  | 9           | 98  | 0  | 0         | 0                  |
| 100.5 - 105.4 | 10          | 103 | 1  | 10        | 10                 |
| 105.5 - 110.4 | 2           | 108 | 2  | 4         | 8                  |
| 110.5 - 115.4 | 2           | 113 | 3  | 6         | 18                 |
| 115.5 - 120.4 | 2           | 118 | 4  | 8         | 32                 |
| 120.5 - 125.4 | 2           | 123 | 5  | 10        | 50                 |
| 125.5 - 130.4 | -           | 128 | 6  | -         | -                  |
| 130.5 - 135.4 | -           | 133 | 7  | -         | -                  |
|               | <hr/> 73    |     |    | <hr/> -85 | <hr/> 531          |

$$\bar{x} = 98 - \frac{85 \times 5}{73} = 92.18$$

$$s^2 = 5 \frac{531}{73} - \frac{85^2}{73} = 12.15$$

$$M = \frac{73}{2} = 36.5$$

$$36.5 - 34 = 2.5$$

$$90.5 + \frac{25 \times 5}{12} = 91.54$$

DETROIT FIRST-GRADE INTELLIGENCE TEST  
 By Anna M. Engel  
 Psychological Clinic Examiner, Detroit  
 Public Schools

EXAMINATION: FORM A

School \_\_\_\_\_ Date of test \_\_\_\_\_ Score \_\_\_\_\_

Last name \_\_\_\_\_ First name \_\_\_\_\_  
 Initial \_\_\_\_\_

Place of birth \_\_\_\_\_  
 Color \_\_\_\_\_

|               |     |      |     |   |
|---------------|-----|------|-----|---|
| Mo            | Day | Year | Sex |   |
|               |     |      | M   | F |
| Date of birth |     |      |     |   |

Terms in Kindergarten \_\_\_\_\_  
 Terms in Bl \_\_\_\_\_

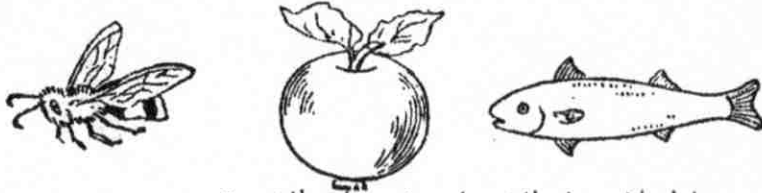
|                  |
|------------------|
| Country of birth |
| Child            |
| Father           |
| Mother           |
| Home language    |

TEST RECORD

| No. of Test | Name of Test  | Score |
|-------------|---------------|-------|
| 1           | Information   |       |
| 2           | Similarities  |       |
| 3           | Memory        |       |
| 4           | Absurdities   |       |
| 5           | Comparisons   |       |
| 6           | Relationships |       |
| 7           | Symmetries    |       |
| 8           | Designs       |       |
| 9           | Counting      |       |
| 10          | Directions    |       |
|             | Total         |       |

|              |
|--------------|
| Rating _____ |
| Group _____  |

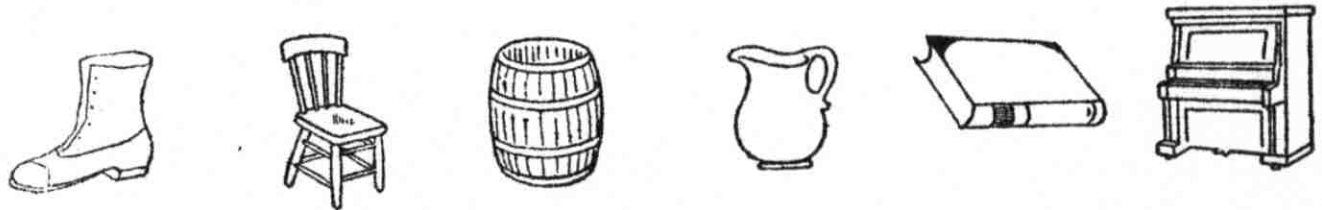
# Test 1



شايقين هالصور يلي باول صف - حطوا علامه على الشى يلي بفرخ على الشجرة  
( يجب ان توضع العلامة على الشى نفسه • اذا لزم الامر اذهب الى اللوح وارسم تفاحة وضع عليها العلامة )



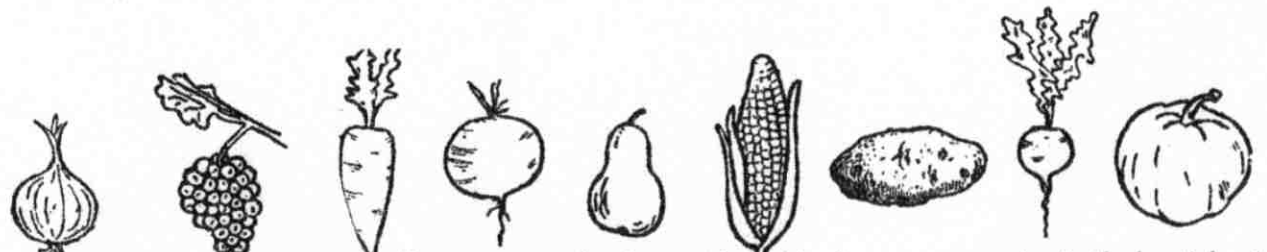
هلق اطلعوا بتاني صف • حطوا علامه على الشغلتين يلي منقصين



هلق اطلعوا بالصف اللي بعدوا • حطوا علامه على الثلاث اشيا منعملون من خشب



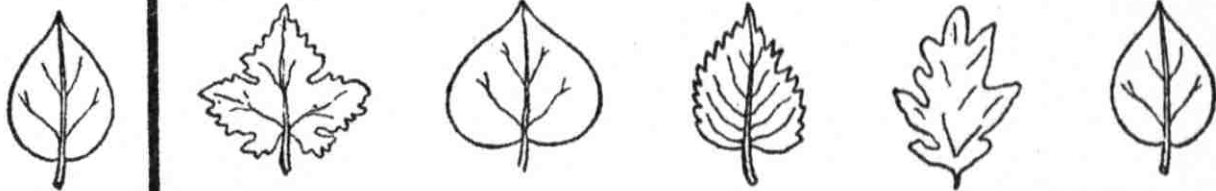
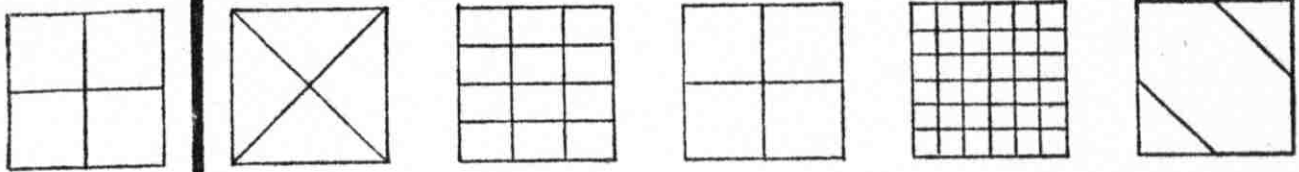
هلق اطلعوا بالصف يلي بعدو • حطوا علامه على اربع اشيا بتبيض بيض



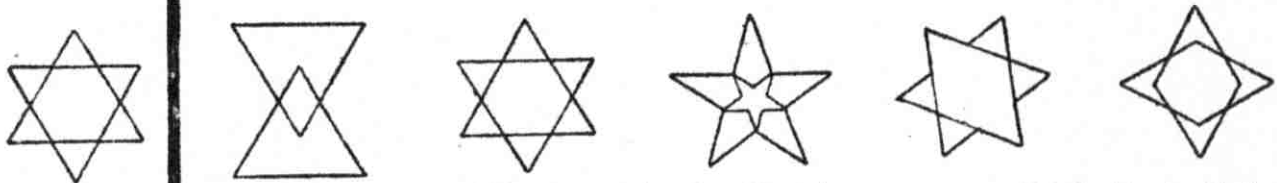
هلق اطلعوا بالصف يلي بعدو • حطوا علامه على خمس اشيا منقبعن من الارض  
عفاكم يا شاطرين • اقلبوا الوجه

## Test 2 هلق اطلعوا باول صف حطو علامه على اول شباك يلي وحده بالقرنه ورا الزيج الاسود التخين

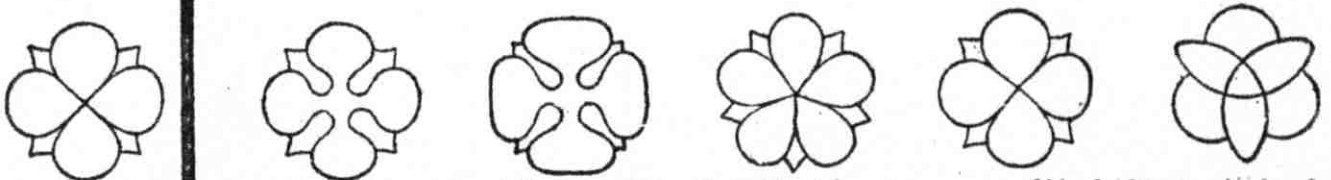
(اذا لزم الامر انظرو لهم كيف وصح الخطاء) هلق فنتشو على الشباك يلي متلو تمام وحتو عليه علامه



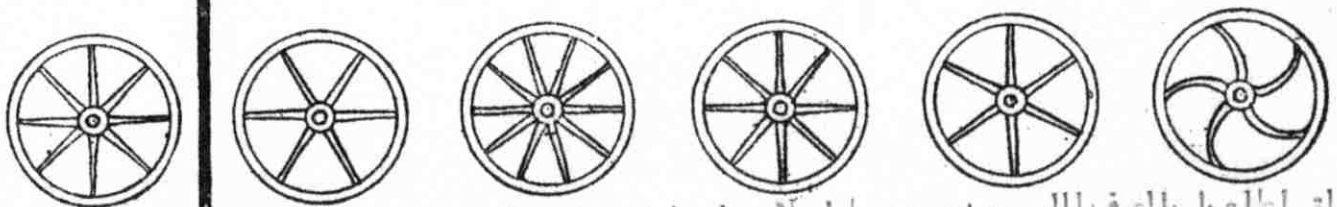
اطلعوا بالصف يلي بعدو • حطو علامه على اول ورقة اللي وحده بالقرنه ورا الزيج الاسود التخين  
(يحوز التصحيح هنا ايضا) هلق حطوا علامه على الورقة اللي متلها تمام •



هلق اطلعوا بالصف اللي بعدو • حطوا علامه على اول نجمة اللي وحدها بالقرنه ورا الزيج الاسود التخين  
(لا تجوز المساعدة من الان فصاعدا) هلق حطوا على النجمة اللي متلها تمام



هلق اطلعوا بالصف اللي بعدو • حطوا علامه على اول زهره اللي وحدها بالقرنه ورا الزيج الاسود التخين  
هلق حطوا علامه على الزهرة اللي متلها تمام •

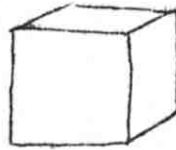


هلق اطلعوا بالصف اللي بعدو • حطوا علامه على اول دولاب اللي وحده في القرنه ورا الزيج الاسود التخين  
(3) هلق حطوا علامه على الدولاب اللي متلو تمام

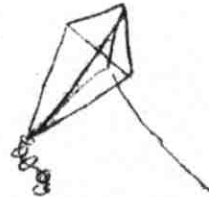
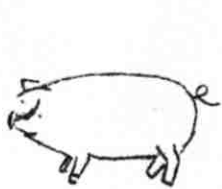
Test 3 هلق شايين هالصوريلي بهالوجه • بدنا نعلم هلى كم صوره من • پس لا تباشو غير تفلكم پلشو • هلق علوا قلامكم هيك واطلعوا باول صف • لا تنزلوا ايديكم غير تفلكم يلا • حظوا علامه على الحريبة • يلا



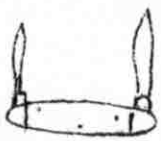
هلق علوا قلامكم هيك واطلعوا بتاني صف • لا تباشو غير ما فلكم يلا • هلق حظوا علامه على فلاحه والبسيه • يلا



هلق كمان علوا قلامكم هيك ولا تباشو غير ما فلكم يلا • هلق حظوا علامه على السطل والحلبه والنجمه • يلا



هلق كمان علوا قلامكم هيك ولا تباشو غير ما فلكم يلا • هلق حظوا علامه على القنينة والخنزير والارنب والكرسي • يلا



هلق كمان علوا قلامكم هيك ولا تباشو غير ما فلكم يلا • حظوا علامه على المكسه والحريبة والبقره والايدي والمجرون فلكم يا شاطرين • اتلبوا الوجه •

## Test 4

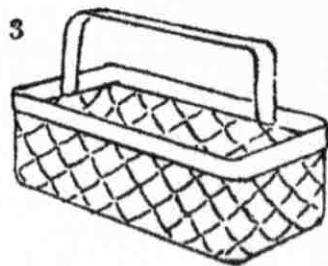
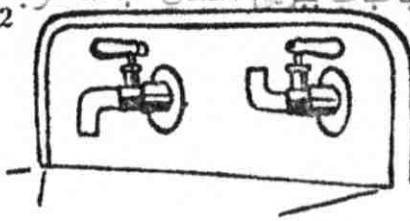
هلق شافين هالصور بكل صوره في شي غلط • هلق اطلعوا بالكلب شو عند و غلط • نعم عند و دنبي  
خطوا علامه على الدنوب الخلط حيا الله اى دنبي • هلق خطوا علامه على اللي الخلط بالمفسلة • بالسله يا

3 بالمبي بالباب بيبيج الشان بالمكتوب •

1



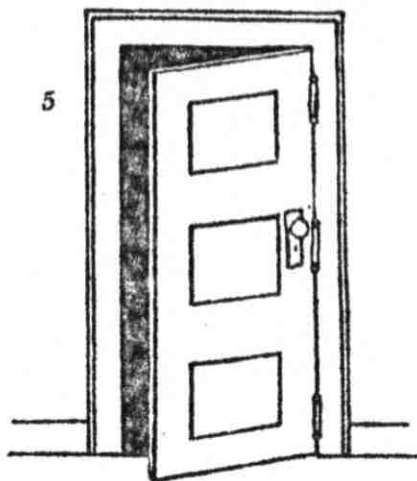
2



6



5



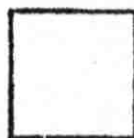
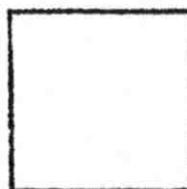
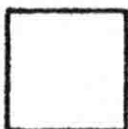
4



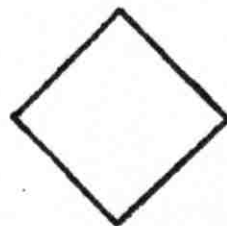
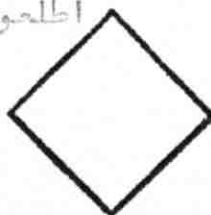
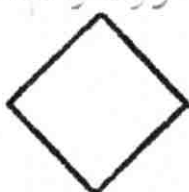
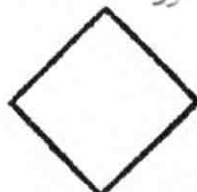
A. B. Sand,  
110 First St.,  
City.

## Test 5

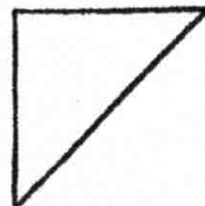
هلق شافين هالصور اللي باول السطر • نتوا اكبر علامه وخطو علامه •



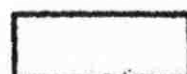
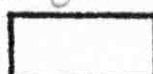
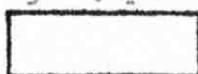
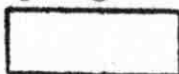
اطلعوا بتاني سطر وخطوا علامه على اكبر صوره



هلق اطلعوا بالتيف اللي بعدو • خطوا علامه على اكبر صوره



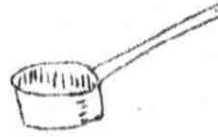
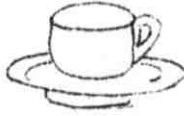
هلق اطلعوا بالصف اللي بعدو • خطوا علامه على اكبر صوره



عفاكم يا شاطرين • اقلبوا الوجه

Test 6

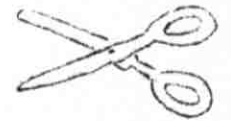
هلق شايغين هالصور يلي باول صف • حظوا علامه على الشي اللي بتلبسوا باجرم



هلق اطلعوا بالصف اللي بعدو • حظوا علامه على الشي يلي بنستعملوا مع السكين •



هلق اطلعوا بالصف اللي بعدو • حظوا علامه على الشي يلي بنستعملوا مع المكنسه •

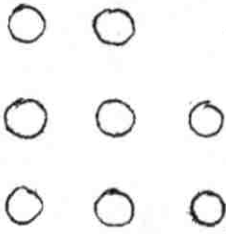


اطلعوا بالصف يلي بعدو • حظوا علامه على الشي يلي بنستعملوا مع الابره  
مفاكم يا شاطرين • اثلبو الوجه

هلق شايين هالطاهات • بكل محل في كومة طاهات • بس بكل طابه ضايحه • وبن محل  
الطابه يلي ضاغت من اول كومه هون ( اظهر لهم الكومة ) صوره الطابه الضايحه بمحلها

Test ( اظهر لهم كيف ) حتى تسير الكومه منظومه • هلق ثاني كومه • • • • • كلن الكومه يلي بعدا

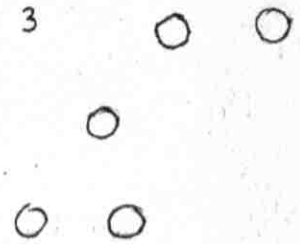
1



2

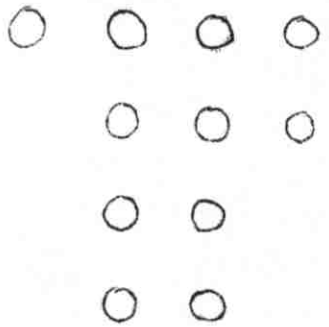


3

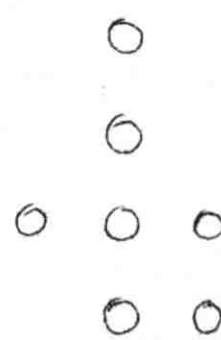


هلق اطلعوا بالكومات اللي تحت صوره الطابه الضايحه باول كومه • واللي بعدا • واللي بعدا •

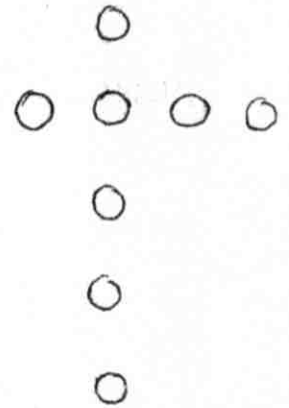
5



5



4

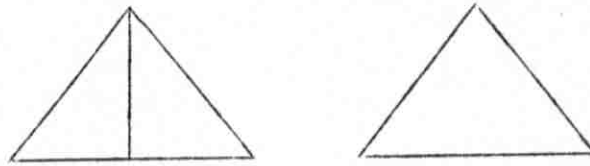


مفام يا شاطرين • اثلوا الوجه •

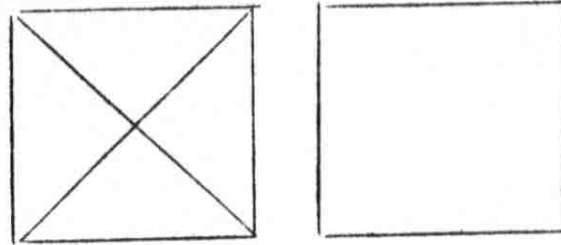


هلق شافين هالصورتين اللي باول صف • خطوا زيج بتاني صوره هيدي.

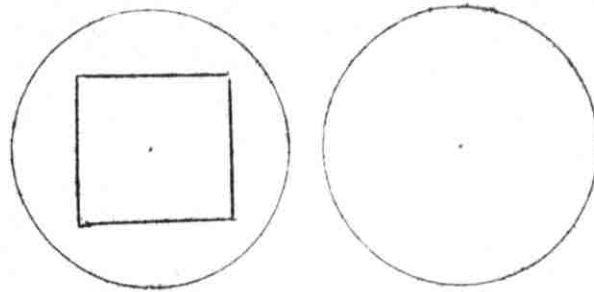
Test 8 حتى بصيروا صورتين مثل بعضهم ( صاعد اذا لزم الامر )



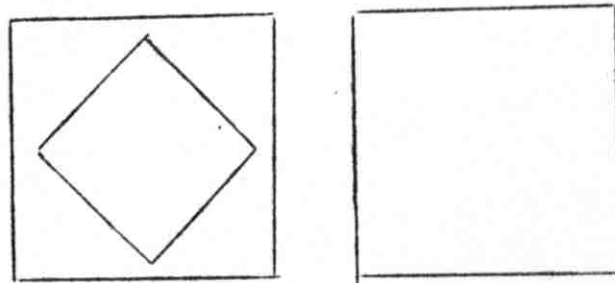
هلق اظالعوا بالصورتين اللي بتاني صفكاه • خطوا الزيجين جه الصورة حتى بصيروا صورتين مثل بعض.



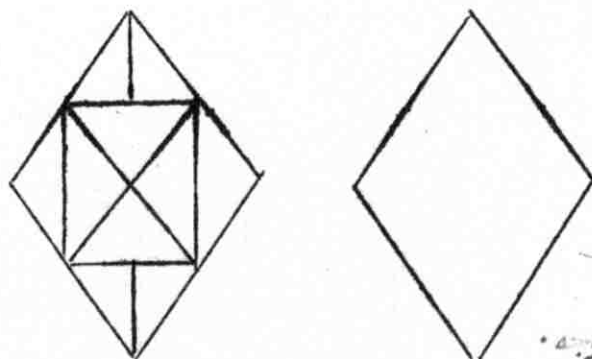
هلق اظالعوا بالصورة الثانيه • ضرروا متجوس بهنطالعلا به • حتى بصيروا الطايتين مثل بعض



هلق ضرروا اقلبه بقلب الخاطيه هيدي حتى بصيروا العلبتين مثل بعض.



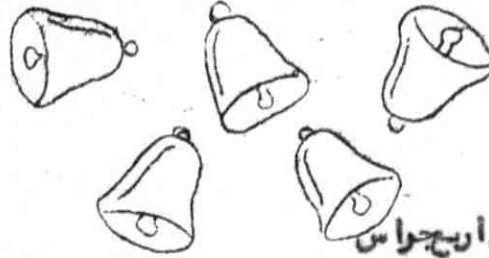
اظالعوا هالصورتين المنقلبتين بعض.



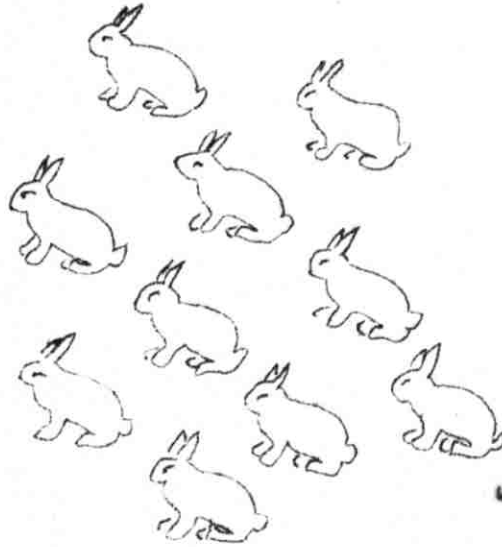
عقام يا شاطرين • اقلبوا الوجه.

هلق شايين هالكراسي • حظوا علامه على كرستين

Test 9



هلق شايين هالجزاس • حظوا علامه على ارب جزاس



هلق شايين هالارانب • حظوا علامه على  
ثمان ارانب •

شايين هالهجوم • حظوا علامه على ثلاث عشر نجمه •



مفام يا شاطرين • اتلبوا الوجه



هلق ارفع القلام هيك • شايغين البشقة والغره • عملوا زيچ من تم البشقة لدنوب الفاره • يلا



هلق ارفعوا القلام هيك • عملوا زيچ من الطابه للسله وخو يبرق من فوق النجمه • يلا



هلق ارفعوا للقلام هيك • عملوا زيچ مع الحصان للفنجان وخلو يبرق من تحت الشمسة والورقة • يلا



هلق ارفعوا القلام هيك • عملوا زيچ من الكرسي للكلب وخلو يبرق من تحت الشاكوش ومن فوق السمكورا من البنت يلا •



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