

Mental Testing and Applied Psychology

By Amy Quarton

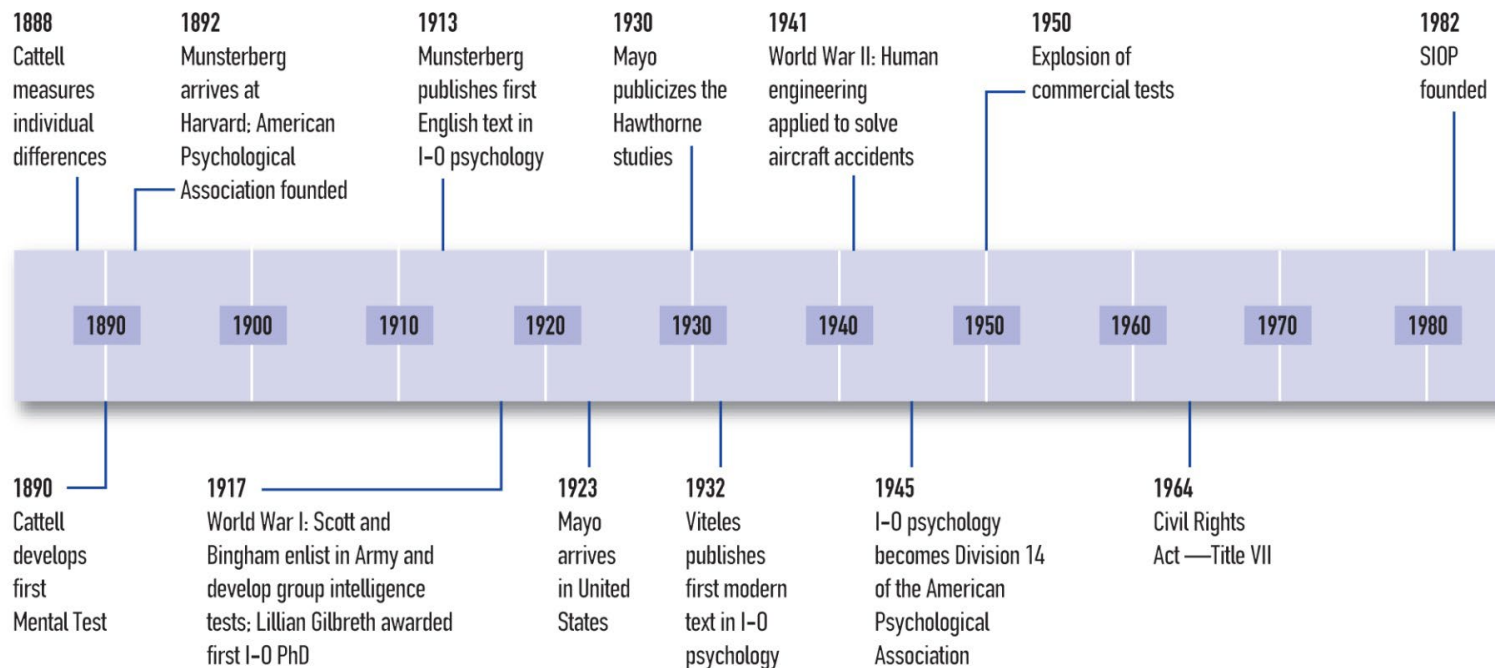
Discussion Questions

- How did applied psychology develop? Why were psychologists interested in application?
- How did mental testing develop? How did Galton, Cattell, Binet, Goddard, Terman, and Hollingworth contribute?
- How did Münsterberg, Yerkes, Bingham, and Gilbreth contribute to the development of applied psychology?
- How did the Hawthorne studies contribute to the development of applied psychology?

**How did applied
psychology develop? Why
were psychologists
interested in application?**

How did applied psychology develop?

- Applied psychology emerged in the 1890s with the beginning of mental testing.



How did applied psychology develop?

- Alfred Binet
- Walter Bingham
- James M. Cattell
- Francis Galton
- Lillian Gilbreth
- Henry Goddard
- Leta Stetter Hollingworth
- Elton Mayo
- Walter Miles
- Hugo Münsterberg
- Fritz Roethlisberger
- Walter D. Scott
- E. W. Scripture
- Lewis Terman
- Robert Yerkes

Why were psychologists interested in application?

- Reason 1 – American Pragmatism
 - Recent technological changes led Americans to expect products and services to be useful to everyday life.
- Reason 2 – Institutional Reform
 - Americans were also interested in reforming institutions (like education and government).
- Reason 3 – Institutional Pressures
 - To justify the cost of psychology labs, administrators insisted the research benefit society.

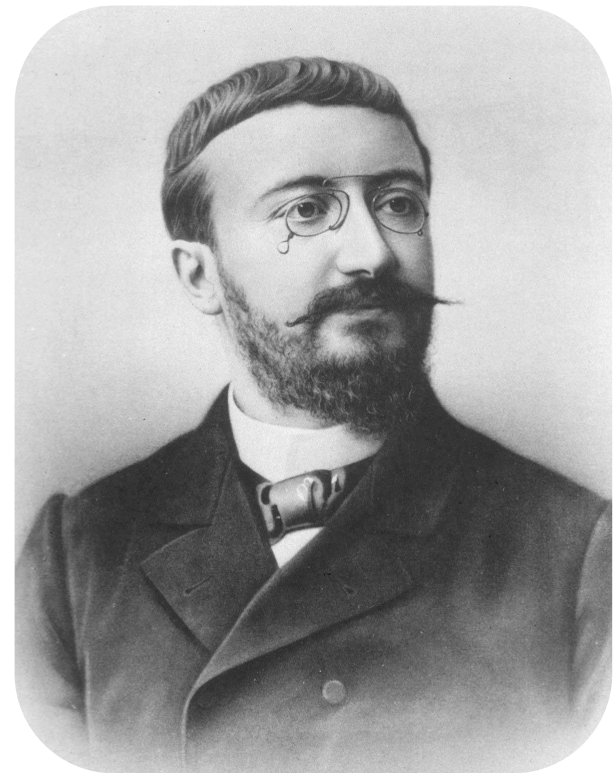
How did mental testing develop? How did Galton, Cattell, Binet, Goddard, Terman, and Hollingworth contribute?

How did Galton and Cattell contribute to mental testing?

- In the 1880s, Francis Galton was the 1st to measure individual differences in humans.
 - Along with Cattell, Goddard, Terman, and Yerkes, he said mental abilities are inherited and measurable.
- In 1890, James M. Cattell coined the term mental test.
 - Although his tests could not be validated, he was a pioneer in mental testing.
 - He also founded The Psychological Corporation in 1921.

How did Binet contribute to mental testing?

- In 1905, Alfred Binet (1857-1911) and Théodore Simon (1872-1961) created the 1st intelligence test in Paris, France: the Binet-Simon scale.
 - The goal was to identify students with low ability.
 - It was revised in 1908 and 1911.



How did Binet contribute to mental testing?

Three Years

- 1 Where is your nose, eyes, mouth?
- 2 Repetition of sentences
- 3 Repetition of numbers
- 4 Describing pictures
- 5 Name of family

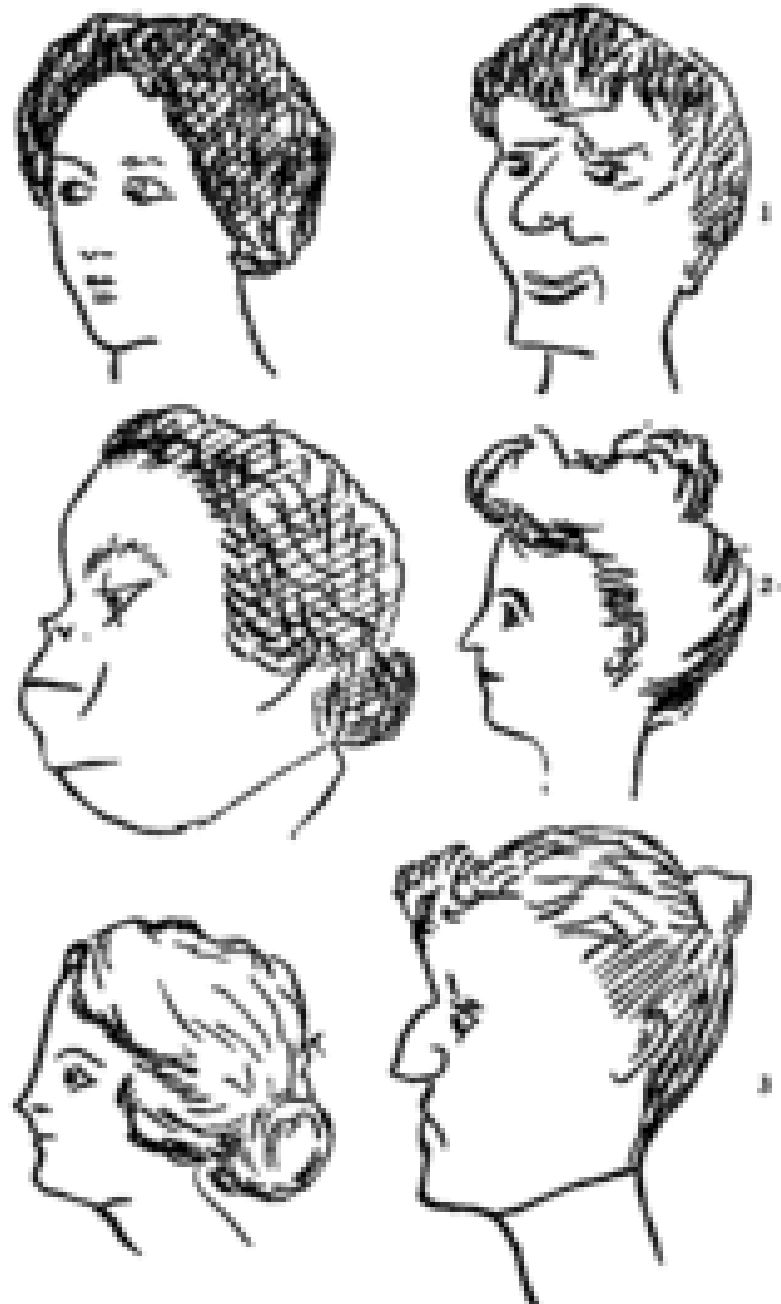
Thirteen Years

- 54 Drawing from design cut in paper
- 55 Describing figure made from reversed triangle
- 56 Differences between abstract terms.

Example items from the original Binet-Simon scale

***"Which of
these two
faces is the
prettier?"***

Example item from the 1908 version of
the Binet-Simon scale



How did Binet contribute to mental testing?

- First, he administered Galton's tests to his daughters but failed to find expected differences.
- Then, he tested two groups of students and chose the tests that resulted in expected differences.

Classification	Q.1.	% théorique
Débile (Defective)	65 et au-dessous	2.2
Cas limite (Borderline)	66-79	6.7
Normal médiocre (Dull normal)	80-90	16.1
Moyen (Average)	81-110	50.0
Normal supérieur (Bright normal)	111-119	16.1
Supérieur (Superior)	120-127	6.7
Très supérieur (Very superior)	128 et au-dessus	2.2

How did Binet contribute to mental testing?

- Binet's believed:
 - Intelligence is made up of multiple dimensions.
 - Within limits, intelligence can improve with training.
 - His test should only be used to identify “weak students”.
 - Intelligence cannot be inferred from a single test.



How did Goddard contribute to mental testing?

- **Henry Goddard** (1866-1957) brought the Binet-Simon scale from France to the USA.



- In **1899**, he earned a PhD from Clark University and studied with Hall.
- From **1906** to **1918**, he worked at the 1st known research laboratory of intellectual disability at the Vineland Training School.

How did Goddard contribute to mental testing?

- In the 1910s, he administered the Binet-Simon scale, and he found individual differences that confirmed the teachers' observations.
- He adapted the classification scheme, defining a child's score as mental age (instead of mental level).

Mental Age	Classification
1-2 years	Idiots
3-7 years	Imbeciles
8-12 years	Morons

How did Goddard contribute to mental testing?

- In **1892**, Ellis Island was built in New York to screen millions of immigrants.
 - The poorest immigrants had to pass physical and mental tests, including a version of the Binet-Simon scale.
- In the **1910s**, he and his team tested thousands of immigrants.
 - Hundreds of those who failed were deported.
 - Physicians and other workers began to doubt the usefulness of the test.

How did Goddard contribute to mental testing?

- In 1912, he published a case study.
 - By comparing the maternal and paternal families of Deborah Kallikak, one of his patients, he identified what he thought were differences due to genes.
 - E.g., 82 infants died on “bad side” vs. 15 infants on “good side”
 - However, he ignored environmental causes!
- To correct mental defectiveness, he advocated for institutionalization.

How did Terman contribute to mental testing?

- **Lewis Terman** (1877-1956) created one of the best-known intelligence tests, the Stanford-Binet.
- In **1906**, he earned a PhD from Clark University and studied with Hall.
- In **1910**, he was hired at Stanford University and eventually chaired its psychology department.



How did Terman contribute to mental testing?

- In **1916**, he translated, revised, and standardized the Binet-Simon scale to create the Stanford-Binet.
 - To standardize it, he tested about 2,300 children and adults and used their scores to develop test norms.
 - He coined the term **intelligence quotient** (IQ), a single number that represents the relationship between one's mental age and chronological age.

$$\text{IQ} = \frac{\text{mental age}}{\text{chronological age}} \times 100$$

How did Terman contribute to mental testing?

- His longitudinal study of gifted children is the longest-running psychology study of all time.
 - In 1921, about 1,470 students in California took the Stanford-Binet, and some of them were retested after 10, 25, and 35 years.
 - In 1925, the results challenged common stereotypes about gifted children.
 - They were smarter, more successful and productive, well adjusted, and physically healthier than their peers.

How did Hollingworth contribute to mental testing?

- **Leta Stetter Hollingworth** (1886-1939) was the 1st to study gifted children.



- In **1916**, she earned a PhD from Columbia University with Thorndike.
- In **1918**, she taught the 1st gifted education course.
- In **1926**, she published the 1st gifted education textbook.

How did Hollingworth contribute to mental testing?

- She recommended:
 - Gifted children should be placed in classes with other gifted children in the same age group.
 - The curriculum should include the traditional curriculum plus an array of enrichment courses/activities designed to challenge these students.

How did Hollingworth contribute to mental testing?

- She also studied gender stereotypes and advocated for women's right to vote.
 - She compared 23 women's mental abilities during all phases of the menstrual cycle to men's mental abilities.
 - She failed to find gender differences in her research.
 - Her results challenged commonly held stereotypes that women are (1) less mentally capable and (2) incapacitated during menstruation.

**How did Münsterberg,
Yerkes, Bingham, and
Gilbreth contribute to the
development of applied
psychology?**

How did Münsterberg contribute to applied psychology?

- **Hugo Münsterberg** (1863-1916) was a German psychologist and pioneer in employee selection and development.
- In **1885**, he earned a PhD from the University of Leipzig and studied with Wundt.



How did Münsterberg contribute to applied psychology?

- In 1892, William James invited him to chair the psychology lab at Harvard University.
 - He quickly learned to speak English and became a favorite among the students.
 - He influenced Mary Calkins.
- In 1898, he was elected president of the APA.

How did Münsterberg contribute to applied psychology?

- In **1913**, he wrote about applied psychology in his book, *Psychology and Industrial Efficiency*.
 - He selected employees using simulations and tests of specific job-related qualities.
 - He studied the effects of monotony and fatigue on productivity.



CONTENTS

INTRODUCTION

I. APPLIED PSYCHOLOGY	3
II. THE DEMANDS OF PRACTICAL LIFE	11
III. MEANS AND ENDS	17

I. THE BEST POSSIBLE MAN

IV. VOCATION AND FITNESS	27
V. SCIENTIFIC VOCATIONAL GUIDANCE	37
VI. SCIENTIFIC MANAGEMENT	49
VII. THE METHODS OF EXPERIMENTAL PSYCHOLOGY	57
VIII. EXPERIMENTS IN THE INTEREST OF ELECTRIC RAILWAY SERVICE	63
IX. EXPERIMENTS IN THE INTEREST OF SHIP SERVICE	83
X. EXPERIMENTS IN THE INTEREST OF TELEPHONE SERVICE	97
XI. CONTRIBUTIONS FROM MEN OF AFFAIRS	116
XII. INDIVIDUALS AND GROUPS	129

II. THE BEST POSSIBLE WORK

XIII. LEARNING AND TRAINING	141
XIV. THE ADJUSTMENT OF TECHNICAL TO PSYCHICAL CONDITIONS	158

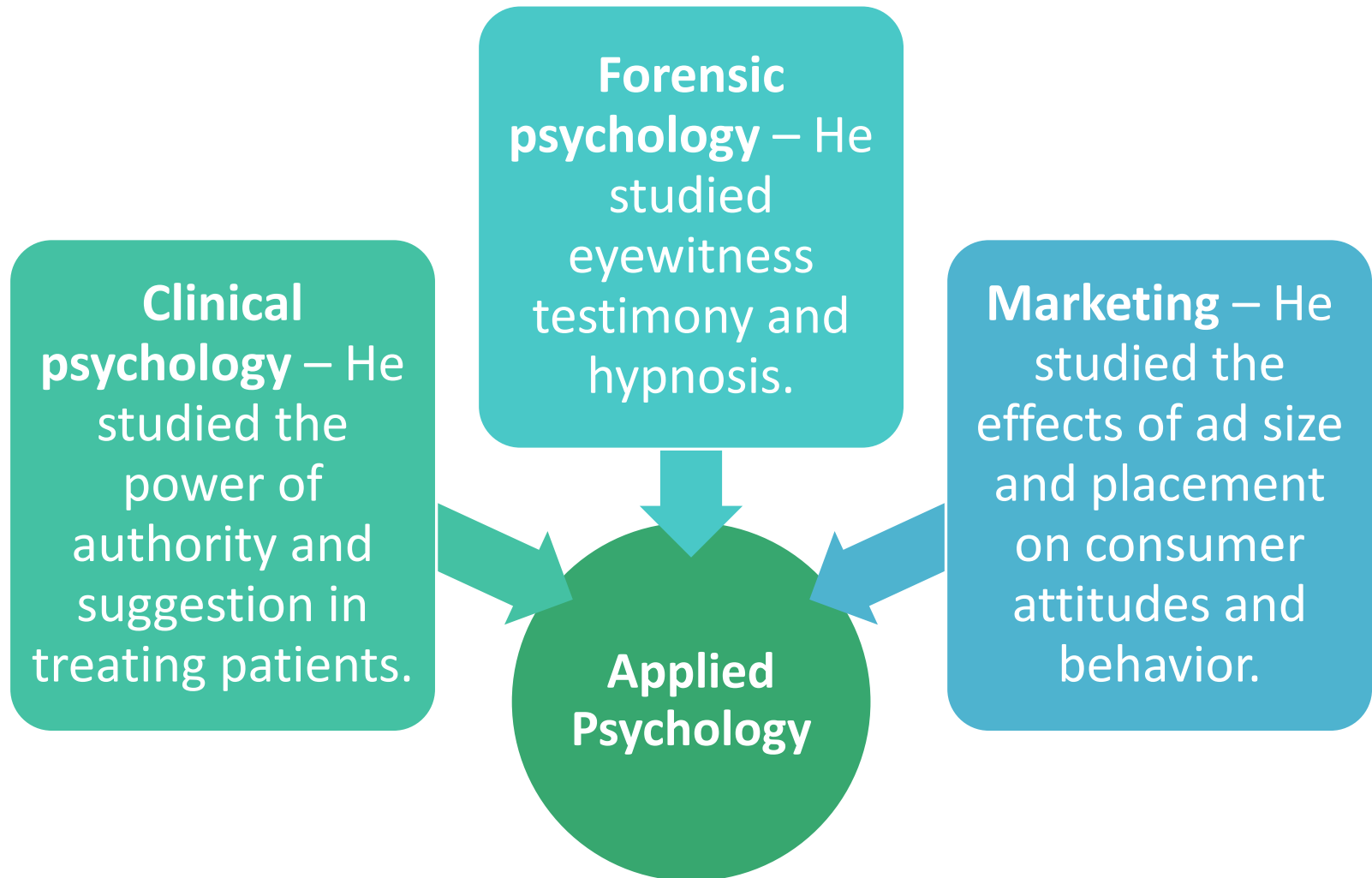
CONTENTS

XV. THE ECONOMY OF MOVEMENT	180
XVI. EXPERIMENTS ON THE PROBLEM OF MONOTONY	190
XVII. ATTENTION AND FATIGUE	206
XVIII. PHYSICAL AND SOCIAL INFLUENCES ON THE WORKING POWER	221

III. THE BEST POSSIBLE EFFECT

XIX. THE SATISFACTION OF ECONOMIC DEMANDS	243
XX. EXPERIMENTS ON THE EFFECTS OF ADVERTISEMENTS	255
XXI. THE EFFECT OF DISPLAY	272
XXII. EXPERIMENTS WITH REFERENCE TO ILLEGAL IMITATION	282
XXIII. BUYING AND SELLING	294
XXIV. THE FUTURE DEVELOPMENT OF ECONOMIC PSYCHOLOGY	303
NOTES	311
INDEX	317

How did Münsterberg contribute to applied psychology?



How did Yerkes contribute to applied psychology?



- **Robert Yerkes** (1876-1956) was a pioneer in intelligence testing and comparative psychology.
- He was also a strong supporter of eugenics.
- In **1902**, he earned a PhD from Harvard University.
- In **1917**, he served as the 26th APA president.

How did Yerkes contribute to applied psychology?

- During World War I, he chaired the Committee on the Psychological Examination of Recruits.
 - He helped develop the [Army Alpha](#) and [Army Beta](#) tests that assessed soldiers' qualities to place them in jobs.
 - By the end of [1918](#), the team had tested more than 1.7 million soldiers (but the results were never used).
 - The Alpha and Beta tests initiated the development of other tests for schools, clinics, and businesses.

A dealer bought some mules for \$1,200. He sold them for \$1,500, making \$50 on each mule.

How many mules were there?

A machine gun is more deadly than a rifle because it

- A. was invented more recently.
- B. fires more rapidly.
- C. can be used with less training.

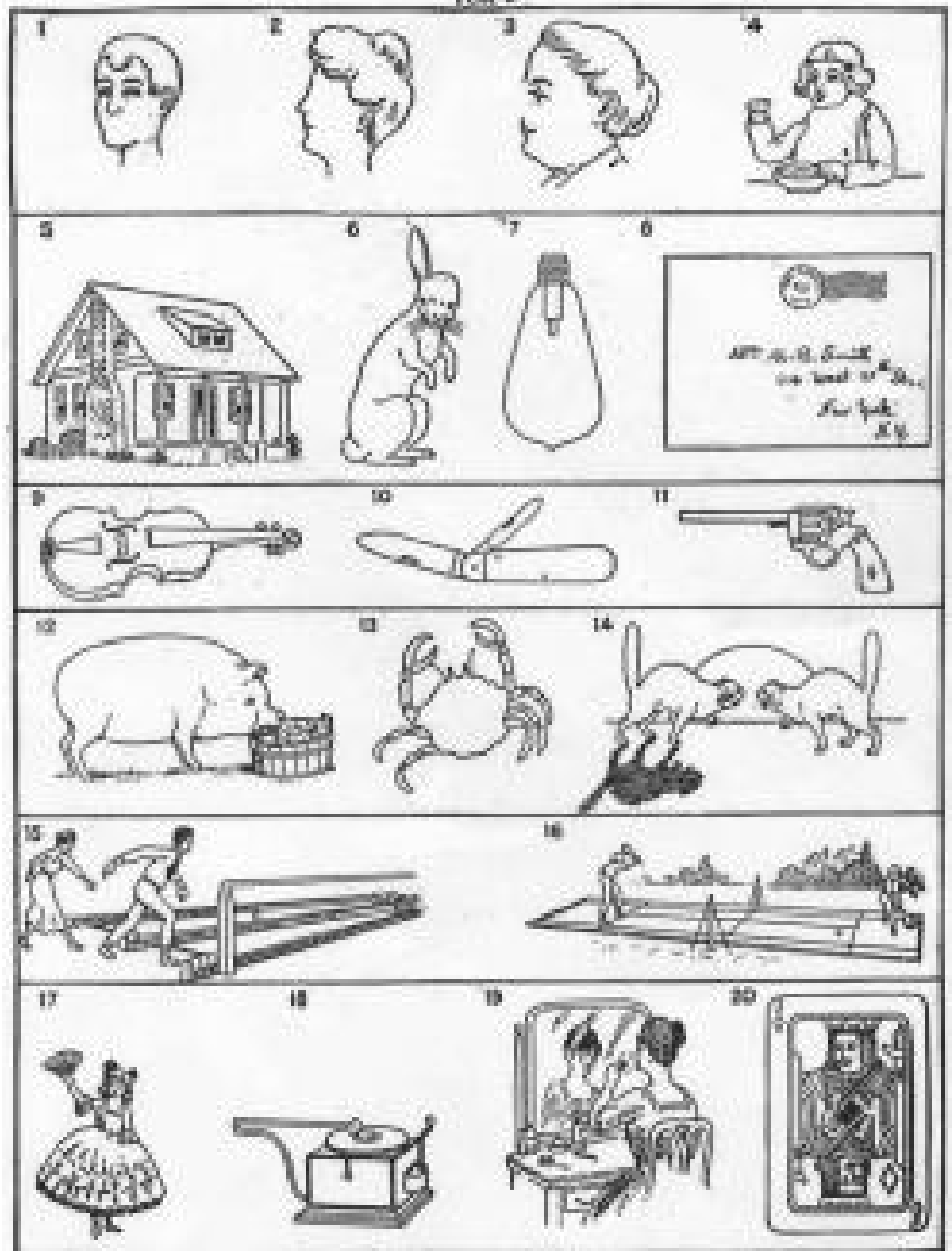
Determine the next two numbers in the following sequence:

18 14 17 13 16 12

Example items from the Army Alpha test

**“What is
missing from
each picture?”**

Example item from the Army
Beta test



How did Bingham contribute to applied psychology?

- **Walter V. Bingham** (1880-1952) was a pioneer in intelligence testing and a prolific writer (200+ books and articles).
- In **1908**, he earned two PhDs from the University of Chicago with Angell.



How did Bingham contribute to applied psychology?

- In **1915**, he led the Division of Applied Psychology at the Carnegie Institute of Technology.
 - His team developed and validated employment tests, created training manuals, and made recommendations.
 - He established the Bureau of Salesmanship Research and hired **Walter Dill Scott** to lead it.
 - He established the Research Bureau for Retail Training.



How did Bingham contribute to applied psychology?

- During World War I, he worked with **Terman**, **Yerkes**, **Thorndike**, and **Scott** to develop the Army Alpha and Beta tests.
- During World War II, he developed and administered a more advanced test to millions of soldiers.
 - The results were used to place recruits in jobs best suited to their talents.

How did Gilbreth contribute to applied psychology?



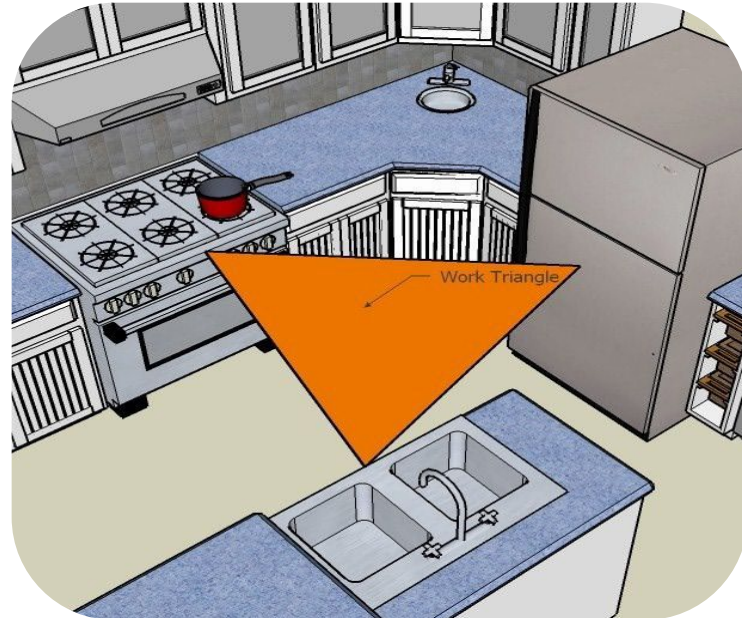
- **Lillian Gilbreth** (1878-1972) is known as the “mother of scientific management” and the “1st lady of management.”
- In **1915**, she earned the 1st PhD in industrial psychology from Brown University.

How did Gilbreth contribute to applied psychology?



How did Gilbreth contribute to applied psychology?

- The Gilbreths sought to increase efficiency and productivity using their time and motion studies.
 1. Breaking down every action into its parts.
 2. Timing each movement.
 3. Developing more efficient movements.



How did Gilbreth contribute to applied psychology?



Fig. 23. — Common type of Trestle Horse Staging. Bricklayers cannot be expected to lay as many brick per day when working in this position as when standing up between a wall and a stock platform, each 2 ft. high.



Fig. 11. — Standard practice of providing bricklayers with materials—raised mortar boxes and high piles of packs when the wall is waist high.

How did Gilbreth contribute to applied psychology?

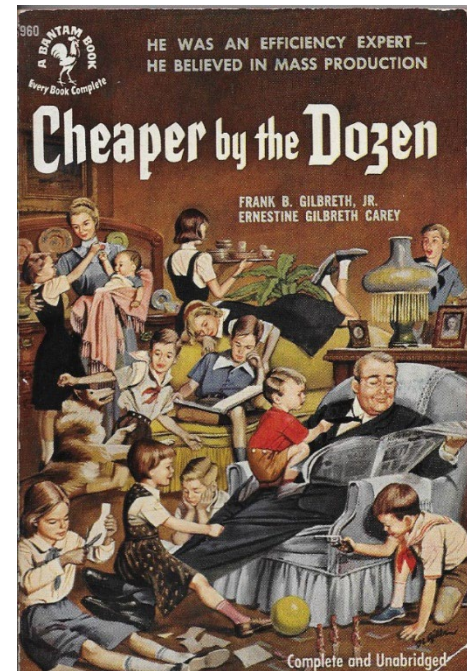
- In the 1910s, she began to promote the application of psychology to business.
 - The Psychology of Management (1914)
 - Applied Motion Study (1917)
 - Fatigue Study (1919)
 - Process Charts (1921)

How did Gilbreth contribute to applied psychology?

- She was a pioneer in **ergonomics**, the study of how systems and products can be made to be more efficient for human use.



How did Gilbreth contribute to applied psychology?



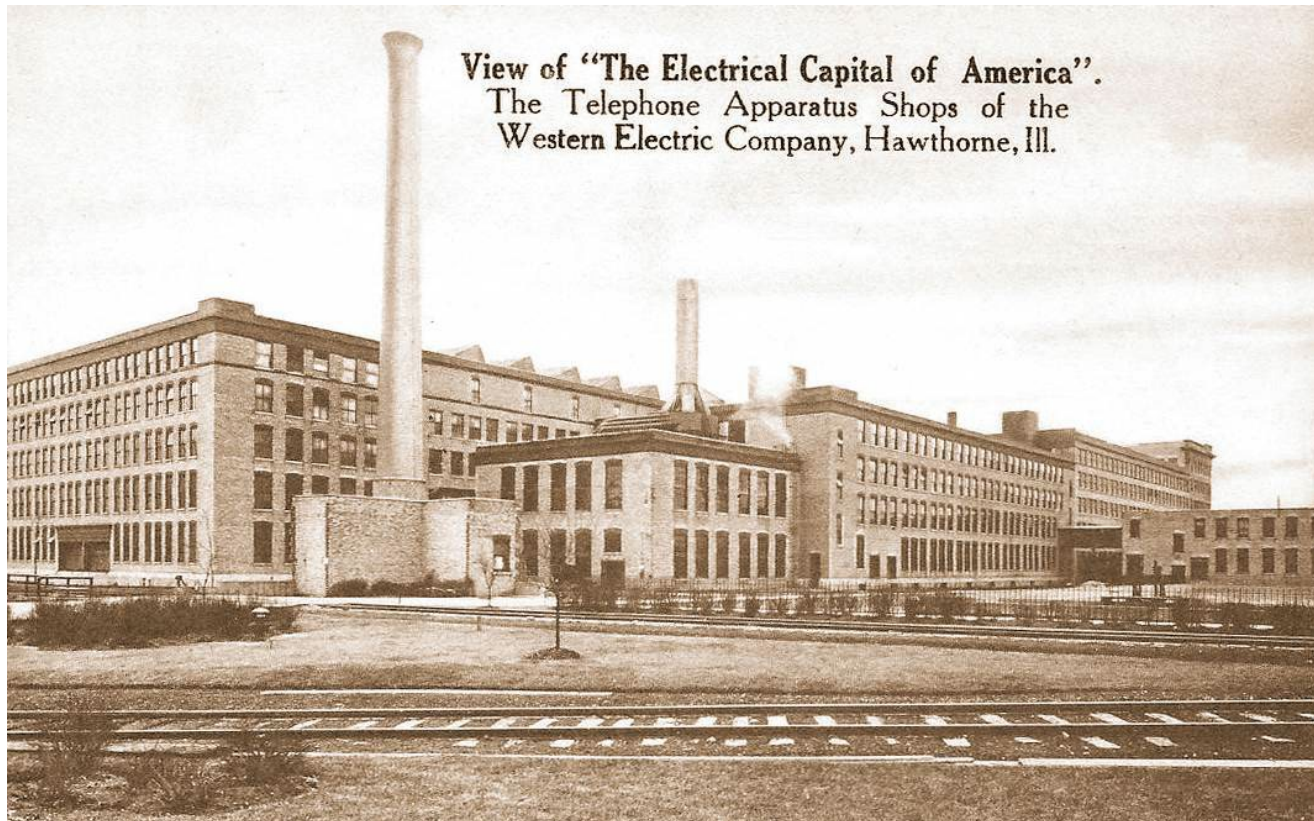
How did the Hawthorne studies contribute to the development of applied psychology?

How did the Hawthorne studies contribute to applied psychology?

- From 1924 to 1932, **Elton Mayo** (1880-1949) and **Fritz Roethlisberger** (1889-1974) conducted the Hawthorne studies at a Western Electric plant.



How did the Hawthorne studies contribute to applied psychology?



How did the Hawthorne studies contribute to applied psychology?

- These studies are known as the birth of organizational psychology.
- **Mayo** and **Roethlisberger** began by examining the impact of illumination on workers' productivity.
 - They changed the lighting.
 - They also looked at different pay schedules and various lengths of employee breaks.

How did the Hawthorne studies contribute to applied psychology?

- To their surprise, job attitudes (not illumination) were responsible for increased productivity.
 - By participating in the studies, the treatment group felt cared for and mentally stimulated (the **experimenter effect**).
 - By being separated and given special attention, they developed cohesion (the **social effect**).

