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# GEORGE MALCOLM STRATTON

1865—1957

A Biographical Memoir by EDWARD C. TOLMAN

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Biographical Memoir

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George M. Stratton

# GEORGE MALCOLM STRATTON

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BY EDWARD C. TOLMAN1

PEORGE MALCOLM STRATTON made three main contributions to psychology. He carried out the first and wholly novel experiment of wearing continuously, over several days, lenses which inverted the visual image up and down and left and right. This experiment has instigated a long series of further experiments by other investigators which continue to this day.

Secondly, Stratton was one of the original group of American students who went to study with Wilhelm Wundt ("the father of experimental psychology") and came back to form at the University of California in Berkeley one of the initial experimental laboratories for psychology in this country.

Finally, he was one of the early pioneers in social psychology. His interests in this area soon focused on the problems of international relations and peace. Most of the lectures and publications of his later years were devoted to this theme.

George Stratton's father, James Thompson Stratton, of colonial English ancestry, was a civil engineer who came to California in 1850, in his early twenties, to join the gold rush. He came by ship and across the Isthmus of Panama. He had only indifferent success, and returned to his home in Ossining, in New York state, within a couple of years. Here he met and married Cornelia Smith, of Dutch and English descent. He brought her back to California and they

<sup>&</sup>lt;sup>1</sup> Many thanks are due to Professors Olga L. Bridgman and Clarence W. Brown for assistance in the working up of this biography.

settled in Oakland. As a civil engineer he became Surveyor General for the state and had much to do with surveying the old Spanish Grants and determining definite boundaries where only vague descriptions had existed before.

George Malcolm Stratton was born in Oakland in 1865 and was the youngest of four children who survived beyond infancy. There was an older sister and two older brothers. One of the brothers became a lawyer and State Senator. He was also a Collector of the Port of San Francisco. The other brother became a practicing physician in Oakland.

George Stratton obtained his primary and secondary education in the Oakland public schools and graduated from the University of California in 1888. He then taught English and Latin in the Buenaventura High School, becoming its principal in his second year. Here he met Alice Elenore Miller (born in San Francisco) whom he later married. In 1800 he obtained an M.A. from Yale University. In 1801 he returned to the University of California as a Fellow in Philosophy. As an undergraduate he had come under the influence of the philosopher, Professor George Holmes Howison, whom he greatly admired and whose biography he published in 1934 in collaboration with John Buckham. Through the good offices of Professor Howison, Stratton obtained a fellowship from the University of California for two years of study with Wundt in Leipzig and obtained both another M.A. and his Ph.D. there in 1896. He then returned to the University of California as Instructor in Pyschology. In 1896 and 1807 he published the three papers reporting his experiments with the lenses for which he is probably best known.

In 1899 he established the psychological laboratory at the University of California, and in 1904 he went to Johns Hopkins University as Professor of Psychology and Director of the Psychological Laboratory which had been founded by G. Stanley Hall in 1883. In 1908 he returned to the University of California, where the rest of his academic life was spent as Professor of Psychology.

He was president of the American Psychological Association in

1908, a member of the National Research Council from 1921 to 1924, and chairman of its Division of Anthropology and Psychology 1925–1926. He was elected to the National Academy of Sciences in 1928. He was also an honorary member of the National Institute of Psychology and a corresponding member of the American Institute of Czechoslovakia. He lectured, after he retired, in a number of universities in the United States, Europe, and the Orient.

Stratton was widely read in all the humanities. He was a person of delightful manners, though somewhat reserved in personal contacts. He had few hobbies other than helping to design his beautiful house in the Berkeley hills with its spacious rooms and redwood panelling and in the building of brick walls and paths in the garden. It is reported that he was especially proud of his brickwork. His son reports that this laying of brick was his main hobby.

He and his family spent many summers camping in the Sierras. But even there he spent every morning writing under a distant tree (far from distraction).

There were three children, Elenore Stratton Fliess, James Malcolm Stratton (a Berkeley physician), and Florence Stratton Reinke, all of whom have survived him. Mrs. Stratton died in 1955.

In his early years at Berkeley, Stratton stimulated a number of later well-known psychologists to go on to graduate study; and to every student who obtained an A in his introductory course his custom was to write a personal letter of congratulation and encouragement.

Although he personally was not particularly sympathetic to the more objective trends in psychology which developed in this country as an outgrowth of behaviorism, he was always anxious that his younger colleagues should have every opportunity to follow their own interests and biases.

Though his studies on binocular vision and depth perception have probably had the greatest impact on the thinking and research of other psychologists, he himself undoubtedly considered of greater importance his studies in the fields of emotions, social values, and international conduct. He staunchly believed that the understanding of impulses, instincts, and motives in man merited the same careful scientific analysis as did sensation and perception, intellect and ability, learning and memory.

His book Experimental Psychology and Its Bearing upon Culture (1903) was his first systematic excursion into the realm of social behavior, and included a thorough description of experimental findings in such areas as mental measurement, unconscious ideas, illusions, memory, imitation, and suggestion, as well as investigations of the influence of colors and the fine arts on behavior. For each topic he emphasized the significance of the findings for the everyday cultural life of the individual.

During World War I, he served in the psychological division of army aviation, attaining the rank of Major, and became more deeply interested in international relations and the causes of war, later writing many articles and two books dealing with the problems of war and peace. It was his strong conviction that the time had come for the scientific psychologist to contribute his energy and talents to man's efforts to avert war. Other books written during the last years of his life were directed toward the same end, and although written for the general reader, they presented current psychological knowledge of the creative and destructive aspects of human nature. It was his firm belief that it was quite possible for nations to develop the attitudes toward one another which the most civilized individuals and communities have achieved.

Although during the years immediately following his studies in Leipzig he performed many experiments in the fields of perception, memory, and emotion, he never abandoned entirely the philosophical and broadly religious ideas stimulated by Professor Howison while he was still an undergraduate student in philosophy, applying to them the concepts developed from his experimental investigations. He disagreed strongly with those scientists who regard man as "merely an animal, or merely a mechanism, or merely an inert particle driven hither and yon by the wind," and added that "hosts of

men become confident that a highest reality . . . is the source and meaning of the universe verified by our senses." This theme he enlarged in his last published book, *Man, Creator or Destroyer*, which appeared in 1952 when he was eighty-seven years old.

At the time of his death Professor Stratton was completing a book with the tentative title *The Divisive and Unifying Forces of the Community of Nations*. Before the book was in final form, he died at his home in Berkeley on October 8, 1957, at the age of ninety-two.

His was a familiar figure on the campus during the twenty-two years after he became Professor Emeritus. He was in his office every weekday morning until a few weeks before his death, and even though his vision was seriously impaired, he worked steadily on the material for the book which he had hoped to complete. He was always generous of his time to others and helped many persons in their educational and vocational problems. He was respected and liked by all of his colleagues, many of whom had joined the staff of the department long after his retirement from active university duties.

Among psychologists, Dr. Stratton's reputation probably rests primarily on his early experimental work, particularly the research in sensation and perception. His article *Vision without Inversion of the Retinal Image*, although published sixty years ago, still appears in volumes of readings and is familiar to most of the younger psychologists. His experiments were varied and numerous and were planned and executed with painstaking thoroughness; nevertheless, for him the most important aspects of psychology lay beyond the possibility of exact and objective investigation. Probably for this reason, many of his later writings have been of little interest to modern psychologists, who do not sympathize with his feeling of an urgent need to make the world more intelligible by going beyond those boundaries "where science stops, declaring it can as yet go no farther."

## KEY TO ABBREVIATIONS

Amer. Asso. Int. Conciliation = American Association of International Conciliation

Amer. J. Psychol. = American Journal of Psychology

Amer. J. Theology = American Journal of Theology

Amer. Psychol. Asso. Proceedings = American Psychological Association Proceedings

Atl. Mo. = Atlantic Monthly

Clark Univ. Press = Clark University Press

Com. on Int. Relations=Commission on International Relations

Cyclo. Ed.=Cyclopedia of Education

Daily Sci. News Bull. = Daily Science News Bulletin

Educ. Rev. = Educational Revue

Int. Conciliation = International Conciliation

Int. Cong. of Psychol.=International Congress of Psychologists

Int. J. Ethics = International Journal of Ethics

Int. J. Surgery=International Journal of Surgery

Japanese J. Psychol. = Japanese Journal of Psychology

J. Abn. Soc. Psychol.=Journal of Abnormal and Social Psychology

J. Exper. Psychol.=Journal of Experimental Psychology

J. Higher Educ.=Journal of Higher Education

J. Religion = Journal of Religion

Mind, n.s. = Mind, New Series

News Bull. Int. Ed. = News Bulletin of International Education

Philos. Rev. = Philosophical Revue

Philos. Stud. = Philosophische Studien

Pop. Sci. Mo. = Popular Science Monthly

Psychol. Bull. = Psychological Bulletin

Psychol. Rev.=Psychological Revue

Quart. J. Sci., Relig. & Philos.=Quarterly Journal of Science, Religion & Philosophy

Sci. Amer. = Scientific American

Sci. Mo. = Scientific Monthly

Sci. Newsletter = Science Newsletter

Sci. Service = Science Service

U.C. Chron.=University of California Chronicle

U. C. Publ. in Philosophy = University of California Publications in Philosophy Zeitsch. für Psychol. und Physiol. der Sinnes. = Zeitschrift für Psychologie und Physiologie der Sinnesorgane

### BIBLIOGRAPHY

# 1895

The Sensations Are Not the Emotions. Psychol. Rev., 2:173-174.

# 1896

Some Preliminary Experiments on Vision without Inversion on the Retinal Image. Psychol. Rev., 3:611-617.

Ueber die Wahrnehmung von Druckänderungen bei verschiedenen Geschwindigkeiten. Philos. Stud., 12:525–526.

The New Psychological Laboratory at Leipzig. Science, n.s., 4:867–868. The Relation between Psychology and Logic. Psychol. Rev., 3:313–320.

# 1897

Child-Study and Psychology. Educ. Rev., 14:132–139.
Upright Vision and the Retinal Image. Psychol. Rev., 4:182–187.
Vision without Inversion of the Retinal Image. Psychol. Rev., 4:341–360; 463–481.

# 1898

Review of Scripture's: "The New Psychology." Science, n.s., 7:213-214. A Mirror Pseudoscope and the Limit of Visible Depth. Sci. Amer., 5:633-638.

# 1899

The Psychological Evidence for Theism. The New World, 8:326-343. Review of Baldwin's "The Story of the Mind." Science, n.s., 10:148-150. Gamble's, "The Applicability of Weber's Law to Smell." Psychol. Rev., 6:557-559.

Lloyd Morgan's "Psychology for Teachers." Psychol. Rev., 6:559–561. The Spatial Harmony of Touch and Sight. Mind, n.s., 8:492–505.

#### 1900

Review of Münsterberg's "Psychology and Life." Science, n.s., 11:463-464.

The Spatial Harmony of Touch and Sight. Mind, n.s., 8:1-14.

A New Determination of the Minimum Visible and Its Bearings on Binocular Depth. Psychol. Rev., 7:429-434.

A New Determination of the Minimum Visible and Its Bearings on Lo-

calization and Binocular Depth. Delivered before 4th Int. Cong. of Psychol. Paris, 1900; Psychol. Rev., 7:411-417.

With F. H. Verhoeff. The Space Threshold by the Pseudoscopic Method. Psychol. Rev., 7:610-612.

# 1901

A Psychological Test of Virtue. Int. J. Ethics, 11:200-213.

Reddingius' "Eine Anpassung." Psychol. Rev., 8:99-101.

Münsterberg's "Grundzüge der Psychologie, Erster Band." Philos. Rev., 10:417

In Answer to Professor Münsterberg's Criticism of My Review. Philos. Rev., 10:687.

Der Linear-perspektivische Faktor in der Erscheinung des Himmelsgewölbes, Zeitschrift für Psychol. und Physiol. der Sinnes., 28:42-45.

# 1902

Studies from the Psychological Laboratory of the University of California, V-VI. Psychol. Rev., 9:447-459; 549-569.

Eye Movements and the Aesthetics of Visual Form, Contribution to the 'Festschrift' in honor of the 70th Birthday of Prof. Wilhelm Wundt, Leipzig, Engelmann. Philos. Stud., 20 (Festsch):336–359.

Von Zehender's "Die Form des Himmelsgewölbes und das Grösser-Erscheinen der Gestirne am Horizont." Psychol. Rev., 9:88-91.

Ogden's "A Method of Mapping Retinal Circulation by Projection." Psychol. Rev., 9:527.

Berger's "Ueber stereoskopische Lupen und Brillen." Psychol. Rev., 9:528-530.

Jastrow's "Fact and Fable in Psychology." Science, n.s., 16:23-26.

The Method of Serial Groups. Psychol. Rev., 9:444-447.

Visible Motion and the Space Threshold. Psychol. Rev., 9:433-443.

#### 1903

Experimental Psychology and Its Bearing upon Culture. New York and London, Macmillan, Reprinted: 1908, 1914.

#### 1904

Some Scientific Apologies for Evil. U.C. Publ. in Philosophy, 1:56-71. Royce's "Outlines of Psychology." Psychol. Bull., 1:73-78.

Review of "Zur Verständigung über die Geometrisch." Zeitsch. für Psychol. und Physiol. der Sinnes., 38:241–258.

## 1906

Review of Wallin's "Optical Illusions of Reversible Perspective: A Volume of Historical and Experimental Researches." Psychol. Bull., 3:104–105.

The Difference between the Mental and Physical. Psychol. Bull., 3:1-9. Symmetry, Linear Illusions and the Movements of the Eye. Psychol. Rev., 13:81-96.

The Character of Conscience. Psychol. Bull., 3:117–124.

Review of "Primitive Traits in Religious Revivals: A Study in Mental and Social Evolution," Frederick Morgan Davenport. Psychol. Bull., 3: 239-241.

#### 1907

Railway Disasters at Night. Century Magazine, 74:118–123.

Modified Causation for Psychology. Psychol. Bull., 4:129-133.

Eye Movements and Visual Direction. Psychol. Bull., 4:155-158.

Emotion: Its Place and Training. The Johns Hopkins' Nurses Alum. Mag., 6:158–167.

Railway Signals. Science n.s., 26:255-256.

Railway Accidents and the Color Sense. Pop. Sci. Mo., 72:244-252.

Some Experiments on the Perception of the Movement, Color and Direction of Lights, with Special Reference to Railway Signaling. Psychol. Rev.—Monog. Suppl., 10:84–105.

#### 1909

Toward the Correction of Some Rival Methods in Psychology (Pres. Address to APA). Psychol. Rev., 16:67-84.

The Illusory Undulation and Shimmer of Straight Lines. Psychol. Rev.—Monog. Suppl., 10:63-84.

The Color Sense and Block Signals by Direction, Reprinted in Symposium. "What Are the Causes Leading to Railway Accidents and What Remedies Can be Suggested?" Int. J. Surgery, 52–60.

#### 1910

The Localization of Diasclerotic Light. Psychol. Rev., 17:294-300.

Psychology of the Religious Life. New York, Macmillan; London, Allen. 376 p.

The Psychology of Change: How Is the Perception of Movement Related to That of Succession? Psychol. Rev., 18:262-293.

Some Lower and Higher Stages of Mental Development. Outline of Lectures in Gen. Sci., U.C. Syllabus Series No. 23:54-61.

Visual Space. Psychol. Bull., 8:223-231.

#### 1912

Visual Space. Psychol. Bull., 9:249-254.

Review: McDougall: "Body and Mind—A History and Defense of Animism." Philos. Rev., 21:585-592.

The Double Standard in Regard to Fighting. Int. Conciliation, No. 59: 3-14.

### 1913

Lawyer and Physician, a Contrast. Atl. Monthly, 111:46-52. Talent. Cyclo. Ed., New York (ed. by Paul Monroe), 5:497. Voluntarism. Cyclo. Ed., New York (ed. by Paul Monroe), 5:743. Visual Space. Psychol. Bull., 10:253-258.

#### 1914

Visual Space. Psychol. Bull., 11:233-238.

The Control of the Fighting Instinct. Amer. Asso. Int. Conciliation, 73: 3-14.

Who Is Responsible? Atl. Mo., 113:70-73.

#### 1915

Crooked Thinking in Regard to War (Letter). The Nation, 100:2597:384. California and the Japanese. The Japanese Amer. News, 25–28. The Two Issues Regarding War (Letter). The Nation, 100: No. 2607. Creative Imagination in Boys and Girls. Psychol. Bull., 12:324–325.

# 1916

For an East and West Conference. The New York Times, Jan. 4. Girls, Boys and Story-Telling. Atl. Mo., February. The Docility of the Fighter. Int. J. Ethics, 26:368–376. Woman's Mastery of the Story. Century Magazine, May:668–676. Feminism and Psychology. Century Magazine, 118:367–374.

Theophrastus and the Greek Physiological Psychology before Aristotle. London, Allen and Unwin; New York, Macmillan. 227 p. The Mnemonic Feat of the "Shass Pollak." Psychol. Rev., 24:244–247.

# 1918

Coe's "Psychology of Religion." Amer. J. Theology, 22:307–311.

Army Mental Tests, Methods, Typical Results and Practical Applications.

Washington, D.C., 1–23.

# 1919

Psycho-physical Tests of Aviators. Sci. Mo., 8:421–426. Retroactive Hyperamnesia and Other Emotional Effects on Memory. Psy-

Retroactive Hyperamnesia and Other Emotional Effects on Memory. Psy chol. Rev., 26:474–486.

#### 1920

With McComas, H. C., Coover, J. E., and Bagby, E. Psychological Tests for Selecting Aviators. J. Exper. Psychol., 3:405-423.

#### 1921

The Control of Another Person by Obscure Signs. Psychol. Rev., 28:301-314.

A Study of Race Differences Needed. First Pan-Pac. Educ. Conf., Program and Proceedings, p. 64.

The Mind as Misrepresented to Teachers. Atl. Mo., 127:366-374.

### 1922

Developing Mental Power. Boston, Houghton-Mifflin. Translated into Japanese with intro. essay by Professor Yo Sugisaki, 1941. 76 p. The American Mind in the Orient. Atl. Mo., 129:501-505. Universities and the New International Order. U.C. Chron., 24:361-366. Blood, the Color Red, and the Anger of Cattle. Amer. Psychol. Asso. Proceedings, 31:26.

#### 1923

Anger: Its Religious and Moral Significance. New York, Macmillan. 277 p.

The Color Red and the Anger of Cattle. Psychol. Rev., 30:321-325. Cattle and Excitement from Blood. Psychol. Rev., 30: 380-387. Where Has Psychology Left Religion? J. Religion, 3:51-63.

Danger Keys Up Our Behavior. Daily Sci. News Bull., 238F:1-3.

An Experience during Danger and the Wider Functions of Emotion. In: *Problems of Personality Studies*, presented to Dr. Morton Prince. New York: Harcourt, Brace & Co.:47-62.

Psychological Reactions during Danger. Sci. Mo., 21:633-637.

With Brown, M. S. The Spatial Threshold of Touch in Blind and in Seeing Children. J. Exper. Psychol., 8:434-442.

# 1926

Human Nature and War. Sci. Mo., 23:71-74.

Emotion and the Incidence of Disease. J. Abn. Soc. Psychol., 21:19-23.

### 1927

International Education. Japanese J. of Psychol., 2:197.

Anger and Fear: Their Probable Relation to Each Other, to Intellectual Work and to Primogeniture. Amer. J. Psychol., 39:125-140.

# 1928

Excitement as an Undifferentiated Emotion. Feelings and Emotions. *The Wittenberg Symposium*. Worcester, Mass.: Clark Univ. Press:215-221. The Function of Emotion as Shown Particularly in Excitement. Psychol.

Rev., 35:351-366.

Excitement Plays Useful Emergency Role. Daily Sci. News Bull., Nov. 10.

#### 1929

The Social Psychology of International Conduct. New York: D. Appleton & Co. 387 p.

Re-education for International Affairs. The Pacific Area, Report of the Northwest Session of the Institute of International Relations. Univ. of Wash. Press, 19:152–160. Cosmopolitan Student, Berkeley, California, 19:1-4.

Emotion and the Incidence of Disease: The Influence of the Number of Diseases, and of the Age at Which They Occur. Psychol. Rev., 36:242-253.

A Black Beast in Our Education. Sci. Mo., 29:546–550.

### 1930

We Can Obtain Navy Parity or Reduction but Not Both. (Letter.) The New York Times, March 23.

Brain Localization, by Albertus Magnus and Some Earlier Writers. Amer. J. Psychol., 43:128–131.

Emotional Differences Connected with Certain Signs of Race. Science, n.s., 73:537–538.

### 1932

Attitude Created by National Power. World Unity, 10:180–185. Public Opinion in Time of National Crisis. Quart. J. Sci., Relig. & Philos., 3:49–56.

## 1933

Marching as to War (Letter). The New York Times, Nov. 28. Psychologist in the East. Proceedings, Inst. World Affairs, 10:148–152.

#### 1934

With J. W. Buckham. George Holmes Howison, Philosopher and Teacher: A Selection from His Writing with a Biographical Sketch. Berkeley: Univ. of Calif. Press. 418 p.

The Relation of Emotion to Sex, Primogeniture and Disease. Amer. J. Psychol., 46:590–595.

Jungle Children. Psychol. Bull., 31:596-597.

Emotional Reactions Connected with Differences in Cephalic Index, Shade of Hair, and Color of Eyes in Caucasians. Amer. J. Psychol., 46: 409-419.

#### 1935

With F. M. Henry. Some Reactions of Mongolians and Caucasians in an Emotional Situation. Science, n.s., 81:425.

### 1936

International Delusions. New York: Houghton, Mifflin; London: Allen and Unwin. 232 p.

Masaryk's Latest Benefaction. News Bull. Int. Ed., 11:87-93.

Error in Psychology. In: Story of Human Error (Ed. by J. Jastrow) D. Appleton Century Co., Chap. 10:322-344.

Die Oxford-Gruppen-Bewegung. Zeitschrift für Religionspsychologie, 9: No. 2: 84-93.

Economic Action versus War. The New York Times, 22:7.

Is World Peace an Attainable Ideal? Problems of War and Peace in the Society of the Nations. Com. on Int. Relations: 129–155.

Pacific Solution of International Problems: An Orientation Course in College\* World Fed'n. of Ed. Assn's. Proceedings of the 7th Biennial Conference, Tokyo, 3:41-51.

What Might Colleges Do? Assoc. of Colleges and Universities of the Pacific Southwest:22–28.

## 1938

\* Same article also in: J. Higher Educ., 9:117-123.

With F. M. Henry. Mongolians and Caucasians: Their Physiological Reactions to Emotional Stimulus. Psychol. Bull., 35:695.

Is World Peace an Attainable Ideal? Int. Conciliation, 339:156-173.

# 1939

Trading with an Aggressor. Manchester Guardian Weekly, 40:438. Review: Jung, C. G. "Psychology and Religion." Amer. J. Psychol., 52: 310-313.

#### 1940

International Peace Cannot Be Established by Winning Wars. Conflict Can be Eliminated only in Community of Nations Interested in Common Welfare of All. Mimeo. leaflet, copyrighted by Sci. Service.

Attachment to a Cause through Understanding of Emotion. Conference on Education and the National Emergency. Univ. of Calif. Press:107-110.

Conflict Can be Eliminated in Community of Nations. Sci. News Letter, 38:No. 4:54.

#### 1941

Violence within the Nation. Psychol. Bull., 38:732.

### 1942

Cooperation and Violence: Their Psychological Source and Interlacing. Psychol. Bull., 39:445.

## 1943

Emotion in Chinese, Japanese and Whites; Racial and National Differ-

ences and Likenesses in Physiological Reactions to an Emotional Stimulus. Amer. J. Psychol., 56:161-180.

Wundt and Leipzig in the Association's Early Days. Psychol. Rev., 50: 68-70.

### 1944

Violence between Nations; Deeper Sources; The Way of Liberation. Psychol. Rev., 51:85-101.

Violence within the Nation; Treatment, Particularly in the United States. Psychol. Rev., 51:147-161.

# 1952

Man, Creator or Destroyer. London: Allen and Unwin. 170 p.