The University of Georgia

Shepherd I. Franz (1874-1933) and Karl S. Lashley (1890-1958): An Example of Unfair Historical Recognition?

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Invited presentation at the Center for the History of Psychology, University of Akron, OH, October 11, 2011. This was occasioned by my donation of Lashley's microsurgical instruments in a Fatima cigarette tin (his brand), his personal collection of Franz's early reprints, and one of his standard rat brain diagrams that Lashley hand-labeled to identify reference points such as the genu of the corpus callosum and the nucleus ruber (red nucleus).

Shepherd Ivory Franz

CONTEXT

***...[Franz's] pioneering investigations in experimental and clinical neuropsychology have been largely ignored. (*p. 141)**

Colotla, V. A., & Bach-y-Rita, P. (2002). Shepherd Ivory Franz: His contributions to neuropsychology and rehabilitation. *Cognitive, Affective, and & Behavioral Neuroscience*, *2*, 141-148.

A SELECTED HISTORY OF CORTICAL FUNCTIONING: I

Localization versus Anti-localization

Localization Emerges and Prevails (circa 1780-1824)

- **Franz Joseph Gall (1758-1828) based his localization theory on attributing mental faculties to different parts of the brain by correlating bumps and recesses on the skull presumed to reflect to well-developed or under-developed faculties.**
- **Gall referred to this science as craniology, organology, or physiognomy.**
- **Thomas Forster coined the terem "phrenology" (1815).**
- **Gall's junior colleague, J. G. Spurzheim 1776-1832) adopted the term *phrenology* and popularized it. Gall disliked the term.**

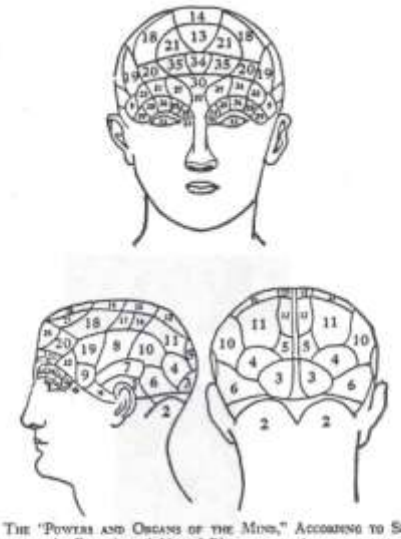


FIG. 1. THE 'POWERS AND ORGANS OF THE MIND," ACCORDING TO SPURZHEIM, *Phrenology, or the Doctrine of Mental Phenomena*, 1834.

AFFECTIVE FACULTIES		INTELLECTUAL FACULTIES	
PROPENSITIES	SENTIMENTS	PERCEPTIVE	REFLECTIVE
) Desire to live	10 Cautiousness	22 Individuality	34 Comparison
* Alimentiveness	11 Approbativeness	23 Configuration	35 Causality
1 Destructiveness	12 Self-Esteem	24 Size	
2 Amativeness	13 Benevolence	25 Weight and Resistance	
3 Philoprogenitiveness	14 Reverence	26 Coloring	
4 Adhesiveness	15 Firmness	27 Locality	
5 Inhabitiveness	16 Conscientiousness	28 Order	
6 Combativeness	17 Hope	29 Calculation	
7 Secretiveness	18 Marvelousness	30 Eventuality	
8 Acquisitiveness	19 Ideality	31 Time	
9 Constructiveness	20 Mirthfulness	32 Tune	
	21 Imitation	33 Language	

Gall's **method was, in principle, correlational.**

The main problems scientifically were:

(a) poor control in subject selection.

(b) subjectivity in observations.

(c) interpretation loosely applied.

An enduring legacy of phrenology was the attention it focused on the localization of brain functions.

Anti-localization via Pierre Flourens (1794-1867) Circa 1830-1860

Two important books:

***Recherches experimentales sur les proprieties et les functions du systeme nerveus dons les animaux vertebres* (1824)**

***Examen de la phrenology* (1842)**

Flourens advocated two principles:

1. ***Action propre,* whereby, each brain region has its proper functions.**
2. ***Action commune,* whereby, each region functions in common with the others. HOWEVER. . . "*Unity is the grand principle that reigns; it is everywhere, it dominates everything*."**

3. Localization Re-emerges and Prevails (circa 1861-1910)

1. Discovery of the Brain Center for Human Speech

- **Anthropological Society of Paris, February - April, 1861.**
- **Ernest Auburtin (localization) vs. Pierre Gratiolet (anti-localization).**
- **Pierre Paul Broca received a disproportionate share of the credit.**

Broca Quotation

During the last session [April 18, 1861 of the Société d'Anthropologie in Paris] I showed you the brain of a man...[Leborgne] in which a lesion of the frontal convolutions had abolished the faculty of speech. I felt obliged to present to the society this rare and curious fact which by strange coincidence has fallen into my hands at the same time that Mm. Gratiolet and Auburtin were discussing the site of the faculty of speech. But, while I inclined towards M. Auburtin's opinion, *I did not intend to take part in the debate. I am expressing myself neither for or against specific localizations*.' [Paul Broca, May 2, 1861; emphasis added]

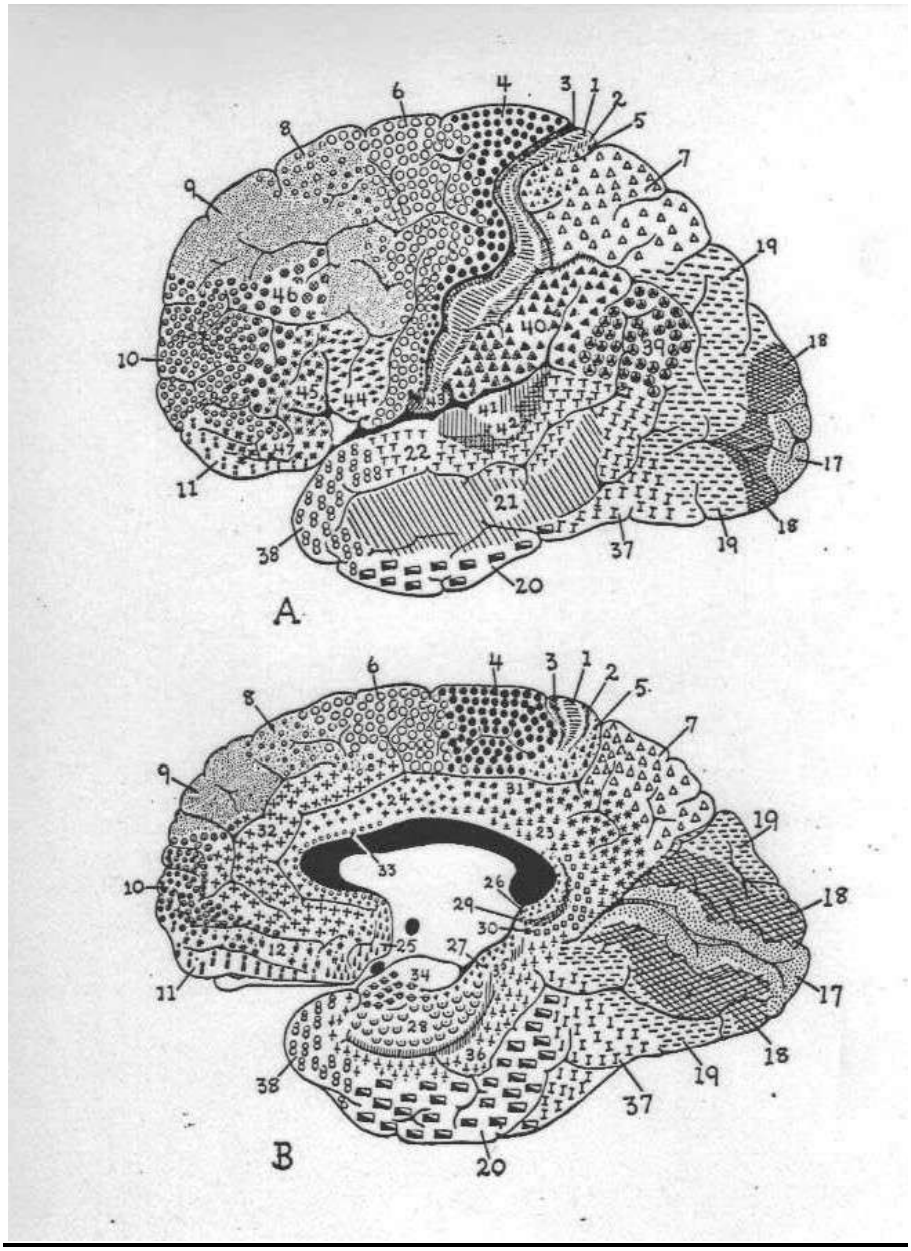
Please see:

Thomas, R. K. (2007) Recurring errors among recent history of psychology textbooks. *American Journal of Psychology*, *120*, 477-495.

2. Other Important Contributions to Localization

- **Fritsch and Hitzig (1870) used electrical stimulation to locate the motor area in a dog's brain.**
- **David Ferrier's *The function of the brain* (1876) was an important general textbook that summarized all that was then known about locations of sensory and motor areas of the cerebral cortex.**
- **Korbinian Brodmann used microscopic sectioning and neural staining (mostly the Nissl stain) to map cytoarchitecturely distinguishable areas of the cerebral cortex**

Brodmann's Cytoarchitectural Map (1909)



With no evidence that he provided, Brodmann asserted that for each distinct anatomical area there is a distinct function.

Documentation associated with Gall to Brodmann and beyond, including Franz and Lashley, may be seen in:

Krech, D. (1963). Cortical localization of function. In L. Postman (Ed.) P*sychology in the making*, pp. 31-72. New York: Alfred A, Knopf.

Anti-localization re-emerges with Franz (1902) and was continued by Lashley until his death in 1958.

Shepherd Ivory Franz (1874-1933)

Early Career: 1899-1907 (Franz had two major historical firsts).

Franz's Ph.D. with James McKeen Cattell, Columbia U., 1899.

1899-1901, Franz taught physiology at Harvard Medical School and learned from Henry Bowditch, "father" of American physiology.

1901-1904, Franz taught physiology at the Dartmouth Medical School.

1902, Franz, was the first to combine a behavioral experiment with a physiological method (ablation).

Franz, S. I. (1902). On the functions of the cerebrum: The frontal lobes in relation to the production and retention of simple sensory habits. *American Journal of Physiology, 8*, 1-22.

1904, Franz developed the first psychological laboratory in a hospital (McLean Hospital associated with Harvard Medical School).

Mid-Career: 1907-1924 (More historical firsts)

1907, Franz is hired to be the Psychologist at the Government Hospital for the Insane (a.k.a., St. Elizabeth's Hospital which is the only name used today).

1907, Franz began the first routine psychological examinations of patients in a mental hospital.

1908, Franz's chapter for W. A. White's *Outlines of Psychiatry* (1908) was the forerunner of Franz's . . .

1912, *Handbook of Mental Examination Methods.* Arguably, this was the first book of its kind in the North America if not world-wide in clinical neuropychology. [Earlier Franz had contributed to Whipple's *Manual of Mental and Physical Tests,* 1910, the first of its kind in North America.]

Franz's Presidential address, "New Phrenology," for the Southern Society for Philosophy and Psychology (December 1911) was published as lead article in *Science, March 1912.* This had a significant role in reviving anti-localization of brain function for "higher order functions" such as learning and memory.

1922, Franz developed a Neuro-psychiatry Course at St. Elizabeth's to teach military and other government physicians facing the challenges of treating

brain injuries resulting from WWI. The course involved a "who's who" in behavioral neuroscience (e.g. Cannon, Herrick, Thorndike, Watson et al.)

1923, Franz's *Nervous and Mental Re-Education* may have been the first book in clinical neuropsychology focused on rehabilitation of brain injured humans.

End of Career: 1924-1933

1924-1933, Franz was Professor of Psychology and Department Head at UCLA.
AND
Chief, Psychological and Educational Clinic at the Children's Hospital, Hollywood

Franz chaired the committee that planned UCLA's Graduate School.

1933, Franz published two books, *Persons One and Three, Persons,* a study in multiple personality. A reviewer described it as a no-nonsense account meaning that it avoided the "psychobabble" usually associated with such accounts.
AND
***Psychology* with Kate Gordon, a Professor and departmental colleague at UCLA.**

1933, Died in 1933 of amyotrophic lateral sclerosis.

1940, Franz Hall, housing the Psychology Department at UCLA, was dedicated.

Franz's Books (except *Persons One and Three*)

Karl Spencer Lashley (1890-1958)

PhD (1914) with H. S. Jennings, a zoologist, at John Hopkins University

1915-1917 Lashley did postdoctoral research and collaborative teaching with John B. Watson at John Hopkins.

1915-1917, while still affiliated with Johns Hopkins, Lashley became a junior collaborator with Shepherd I. Franz, then at St. Elizabeth's Hospital in Washington, DC. Franz taught Lashley how to do surgery on animals, rats in Lashley's case.

AMONG LASHLEY'S MOST IMPORTANT PUBLICATIONS

***Brain Mechanisms and Intelligence* (1929). Described by Krech (1963; see bottom page 5) as having set higher standards for brain-behavioral research by:**

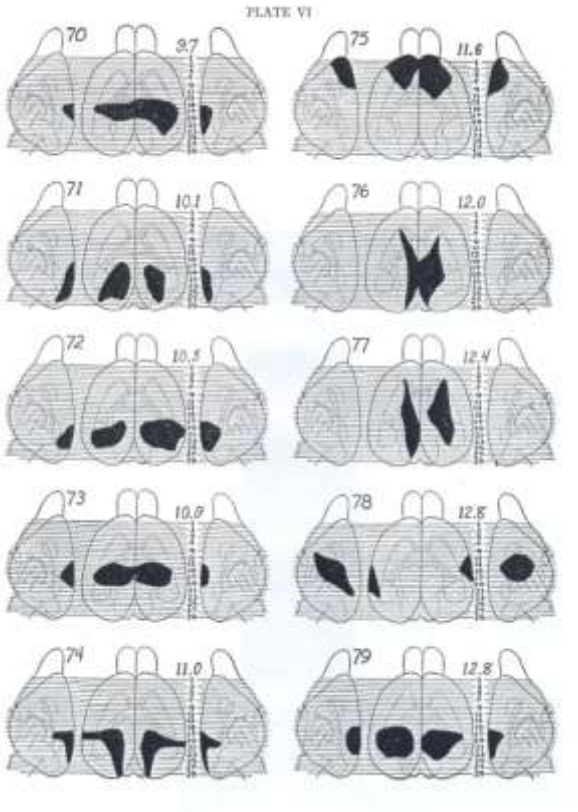
- **Using multiple behavioral tasks so that the determined effects of brain damage would not be task-dependent.**
- **Using statistical analysis, especially correlation and statistical confirmation of observed differences (e.g., between lesioned and control groups).**

However, Lashley did not have available to him nonparametric statistics which were later used to question the validity of the principle of equipotentiality.

Thomas, R. K. (1970). Mass function and equipotentiality: A reanalysis of Lashley's retention data. *Psychological Reports, 22*, 899-902. [Download a copy:

https://faculty.franklin.uga.edu/rkthomas/sites/faculty.franklin.uga.edu.rkthomas/files/ReanalysisLashley1970.pdf

- **Quantifying and mapping cortical lesions.**



Lashley's *Brain and intelligence* (1929) included diagrams (e.g., above) of all the rats' lesions. Diagrams show lesions as they appeared in left and right lateral views and dorsal view of rat cerebral cortex. The larger number is each rat's ID and the small numbers show percentages of damage to total cerebral cortex.

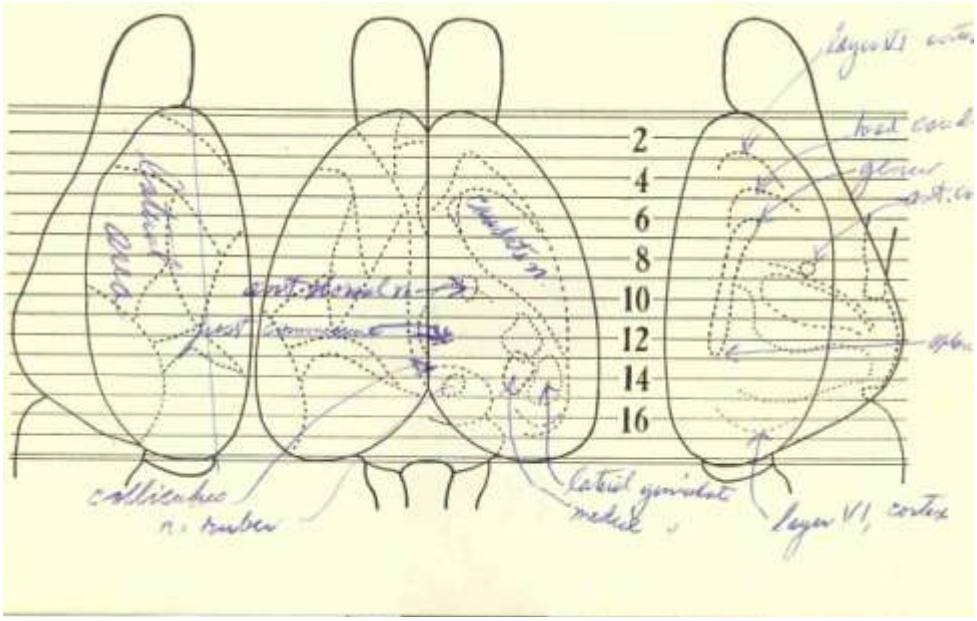


Diagram above was hand-labeled by Lashley to identify reference points as aids to mapping (e.g., *n. ruber* or *red nucle*us bottom left and *genu* of corpus callosum near upper right), as mapping was based on microscopic, coronal sections.

Brain Mechanisms and Intelligence **(1929; Lashley's only book) also advanced Lashley's famous principles of (a) *equipotentiality*, whereby any area of the cerebral cortex might function equally well in learning and retention for any other area and (b) *mass function*, whereby a minimum amount of cortical damage was deemed necessary to disrupt learning/memory; Lashley's data indicated 10-15%, but Thomas (see above) showed the number was likely less than 10%**

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Two Additional Important Articles By Lashley

1. **In search of the engram (1950) where Lashley concluded that locating the site of memory formation might be impossible.**

Lashley, K. S. (1950). In search of the engram. *Symposia of the Society for Experimental Biology, 4*, 454-482.

2. **The problem of serial order in behavior (1951) was cited by Leahey (1992) as being at the "metaphorical conception" of the so-called "cognitive revolution" in psychology due to how it challenged S-R psychology.**

Lashley, K. S. (1951). The problem of serial order in behavior. In L. A. Jeffries (Ed.) *Cerebral Mechanisms in Behavior* (pp. 112-136). New York Wiley.

Leahey, T. H. (1992). The mythical revolutions of American psychology, *American Psychologist, 47*, 308-318.

As his title indicates, Leahey argued that a cognitive revolution had not occurred in American psychology; that is, Leahey argued that what was now being referred to as a "cognitive revolution" was part of psychology from the beginning. Nevertheless, for the "cognitive revolution believers" he did discuss the role that Lashley's chapter may have had; see page 314.

Lashley's standard method of lesioning the cerebral cortex in rats was cauterization.. However, he also had microsurgical instruments housed in a Fatima cigarette tin, his brand. See next two photos.

Historical Recognition of Franz vs. Lashley: Part 1

Three examples from early historians of psychology.

1. **"Franz's work represents the beginning of a swing of the pendulum back to Flourens....Franz's work along these lines has since been taken up by K. S. Lashley.... " (Boring, 1929, p. 560)**

Boring, E. G. (1929). *A history of experimental psychology*. New York: Appleton-Century

2. **"As early as 1907 there are suggestions in the work of Franz that cortical localization is not rigid and absolute; and in the later work of Franz and Lashley [1917] there were suggestions of . . . [equipotentiality]." (Murphy, 1949, p. 376).**

Murphy, G. (1949). *Historical introduction to modern psychology: Revised edition*. New York: Harcourt, Brace & Co.

3. **"Two men who have devoted almost a lifetime to the probing of brain localization are S. I. Franz and K. S. Lashley. Franz was the more radical of the two in contesting the accepted doctrine of . . . [localization]." (Roback, 1952, p. 389-390.**

Roback, A. A. (1952). *History of American psychology*. New York: Library Publishers

<u>Survey of 19 of the most recent editions of History of Psychology textbooks published from 1991-2009 that happened to be on my bookshelf in 2011 when this presentation was assembled; see list at end of main text.</u>

- **All 19 included Lashley, and most did for two or more pages.**
- **Only 9 of 19 included Franz, mostly in relatively minor ways.**
- **Best coverage of Franz's clinical work was in Watson and Evans (1991).**
- **Best coverage of Franz's role in anti-localization was in Fancher (1996) and Thorne & Henley (2006)**
- **Viney and King (2003) also recognized Franz's leadership in promoting anti-localization.**

Historical Recognition of Franz vs. Lashley: Part 2

Bolles (1993), after noting that Lashley was so well respected that he was one of the youngest ever to be elected president of APA (age 39, 1929), wrote the following erroneous and logic-defying sentence.

***"Franz, the physiological clinician, also gained from his collaboration with Lashley and was elected president of APA back in 1920.* (Bolles, 1993, p. 384.)**

Roger Smith (1997) wrote:

***"He [Lashley] was taught the necessary surgery by S. I. Franz (1874-1933), a physiologist and psychologist who studied the question whether there are localized brain areas that correlate with learned habits. Lashley found his research impossibly complex and perhaps theoretically confused, and he therefore turned to the study of cerebral functions.* (Smith, 1997, pp. 818-819)**

Having never read anything that comported with that second sentence, I emailed Smith (July 25, 2011). Regarding the second sentence, Smith replied (July 28, 2011) that upon re-reading it he liked it no more than I did. He also

said that what he knew of Lashley was "second-hand, notably from Nadine Weidman's book."

DIGRESSION

Nadine Weidman wrote a book that in my opinion made preposterous claims regarding how Lashley's racism influenced his research. There is no doubt that Lashley was racist; however, as one who knows Lashley's research well, it seems inconceivable to me that his racism could have influenced his research. Weidman was ably refuted by Darryl Bruce and Donald Dewsbury.

Weidman, N.M. (1999). *Constructing scientific psychology: Karl Lashley's Mind-Brain Debates*. New York: Cambridge University Press.

Bruce, D. (2000). [Review of the book: *Constructing scientific psychology: Karl Lashley's Mind-Brain Debates*]. *Isis, 94*, 824-825.

Dewsbury, D. A. (2002). Constructing representations of Karl Spencer Lashley. *Journal of the History of the Behavioral Sciences. 38*, 225-245.

Weidman, N. (2002). The depoliticization of Karl Spencer Lashley: A response to Dewsbury. *Journal of the History of the Behavioral Sciences. 38*, 227-253.

Dewsbury, D. A. (2002). The role of evidence in interpretations of the scientific work of Karl Lashley. *Journal of the History of the Behavioral Sciences. 38*, 255-257.

Historical Recognition of Franz vs. Lashley: Part 3

<u>Why has Franz been so under-recognized in contemporary history textbooks?</u>

1. Lashley gave Franz no theoretical credit in *Brain Mechanisms and Intelligence* (1929). He did not cite Franz's "New Phrenology" article (1912) or other pre-1929 articles in which Franz questioned strict localization and fostered views akin to mass function and equipotentiality. Possibly, this was because by 1929, Franz had long moved over to clinical neuropsychology and had stopped doing animal research. Nevertheless, Franz and Lashley co-authored two publications based on their research between 1915-1917, and it is inconceivable that Lashley was not influenced by Franz's theoretical views.

2. Academic appointments for Franz were secondary until the end of Franz's career, and Franz had only one PhD student, Grace Kent, who did not follow in his tradition. Kent received her PhD from George Washington University where Franz held a joint appointment as Professor.

One may only hope that Franz will begin to receive his well deserved recognition in both theoretical brain research and clinical neuropsychology.

For More About Franz

Colotla, V. A., & Bach-y-Rita, P. (2002). Shepherd Ivory Franz: His contributions to neuropsychology and rehabilitation. *Cognitive, Affective, and & Behavioral Neuroscience*, *2*, 141-148.

Devonis, D. C. (2012). Shepherd Ivory Franz. In R. W. Rieber (Ed.) *Encyclopedia for the History of Psychological Theories*. *Volume 1.* New York, NY: Springer Verlag'

Thomas, R. K. (1999). Shepherd Ivory Franz (1874-1933). In J. A. Garraty (Editor-in-Chief), *American National Biography*. New York: Oxford University Press.

Thomas, R. K. (2000). Shepherd I. Franz (1874-1933). In A. E. Kazdin (Editor-in-Chief), *Encyclopedia of Psychology*, Washington: American Psychological Association.

Thomas, R. K. (Accepted for publication) Shepherd Ivory Franz (1874-1933). In J. L. Pate (Ed.). *Southern Society for Philosophy and Psychology Presidents and Presidential Addresses.* Amsterdam: Rodopi Press. (This chapter may be downloaded.)
https://faculty.franklin.uga.edu/rkthomas/sites/faculty.franklin.uga.edu.rkthomas/files/Franz.pdf

Thomas, R. K. (2016). Priority Disputes in the History of Psychology with Special Attention to the Franz-Kalischer Dispute About Who First Combined Animal Training with Brain Extirpation to Investigate Brain Functions. *The Psychological Record., 66,* 191-199.
(A PDF is available upon request:: rthomas@uga.edu)

For More About Lashley

Bruce, D. (1986). Lashley's shift from bacteriology to neuropsychology, 1910-1917, and the influence of Jennings, Watson, and Franz. *Journal of the History of the Behavioral Sciences, 22*, 27-44.

Bruce, D. (1991). Integrations of Lashley. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology Vol. 1* (pp. 307-323). Hillsdale, NJ: Erlbaum.

Bruce, D. (1994). Lashley and the problem of serial order. *American Psychologist, 49*, 93-103.

Bruce, D. (2000). Karl Spencer Lashley. In A. E. Kazdin (Ed.) *Encyclopedia of Psychology Vol.4* (pp. 371-373). New York> American Psychological Association and Oxford University Press.

Bruce, D. (2001). Fifty years since Lashley's In Search of the Engram: Refutations and Conjectures. J*ournal of the History of the Neurosciences, 10*, 308-318.

Dewsbury, D. A. (2006). *Monkey farm: A History of the Yerkes Laboratories of Primate Biology in Orange Park, Florida, 1930-1965*. Lewisburg, PA: Bucknell University Press.

Recent History of Psychology Textbooks Examined in 2011,

Benjafield, J. G. (2005). *A history of psychology (*2nd ed.). Canada: Oxford University Press.

Benjamin, L. T. Jr. (2007). *A history of modern psychology*. Malden, MA: Blackwell Publishing.

Benjamin, L. T., Jr. (2009). A brief history of modern psychology with annotated readings in the history of modern psychology. New York, NY: John Wiley & Sons.

Bolles, R. C. (1993). *The story of psychology: A thematic history*. Pacific Grove, CA: Brooks/Cole.

Brennan, J. F. (2003). *History and systems of psychology* (6th ed.) Englewood Cliffs, NJ: Prentice Hall.

Fancher, R. E. (1996). *Pioneers of psychology* (3rd ed.). New York: W. W. Norton.

Goodwin, C. J. (2008). *A history of modern psychology* (3rd ed.) New York: John Wiley & Sons.

Hergenhahn, B. R. (2009). *An introduction to the history of psychology* (6th ed.). Pacific Grove, CA: Thomson/Wadsworth.

Hothersall, D. (2004). *History of psychology* (4th ed.). New York: McGraw-Hill.

Hunt, M. (1993). *The story of psychology*. New York: Doubleday.

Leahey, T. H. (2001). *A history of modern psychology* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

Leahey, T. H. (2004). *A history of psychology: Main currents in psychological thought* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

O'Boyle, C. G. (2006). *History of psychology: A cultural perspective*. Mahwah, NJ: Lawrence Erlbaum Associates.

Schultz, D. P., &Schultz, S. E. (2004). *A history of modern psychology* (8th ed.). Belmont, CA: Thomson/Wadsworth.

Smith, R. (1997). The Norton history of the human sciences. London: W. W. Norton.

Thorne, B. M., & Henley, T. B. (2005). *Connections in the history and systems of Psychology* (3rd ed.). Boston: Houghton Mifflin.

Viney, W., & King, D. B. (2003). *A history of psychology: Ideas and context* (3rd ed). Boston: Allyn and Bacon.

Watson, R. I., & Evans, R. B. (1991). *The great psychologists: A history of psychological thought* (5th ed.). New York: Harper Collins.

Wertheimer, M. (2000). *A brief history of psychology (4th ed.)*. Belmont, CA: Thomson/Wa