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A COMPARISON OF WILHELM WUNDT'S "PRINCIPLES" WITH MODERN TEXTBOOKS IN PHYSIOLOGICAL PSYCHOLOGY

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INTRODUCTION

The recent celebration of psychology's centennial has resulted in increased interest in *Wilhelm WUNDT* (1832-1920) and his work (BRINGMANN & TWENEY, 1980). In particular, his pioneering work in the field of physiological psychology and his classic textbook, *Principles of Physiological Psychology* (*Grundzüge der physiologischen Psychologie*, 1873, 1874, 1874), have attracted considerable attention. Some historians have even suggested that the centennial should more appropriately date from 1873 or 1874, the years in which the *Principles of Physiological Psychology* was first published, rather than from the establishment of Wundt's laboratory in 1879 (BRINGMANN & UNGERER, 1980). Although surprisingly little is known about Wundt's classic textbook, an inspection of its content reveals that Wundt's interest in the newly emerging field of experimental psychology began between 1860 and 1865 (2).

A Russian translation of the first edition was printed in 1880 and a French translation in 1886, however no English translation of this edition exists.

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Titchener's partial translation of Wundt's "Principles" is based on the first part of the fifth edition (WUNDT, 1902). In addition, the original German editions of the book are scarce, fragile and not readily available for examination to most psychologists.

Although much has been written about WUNDT, few articles about his *magnum opus* exist. One notable exception is a 1932 article by FELDMAN in which an attempt was made to summarize the content of the first edition. Unfortunately, the first section of Wundt's text was excluded and the remaining chapters were summarized only in the most cursory manner. A second article about Wundt's *Principles of Physiological Psychology* appeared in 1979 (BRINGMANN, 1979). The historical context in which the "Principles" was written and the reception of the book in Germany and the United States were discussed, but little information concerning its content was included.

It was the aim of the present study to provide information about the content of the first edition of Wundt's *Principles of Physiological Psychology* and to compare this classical work with contemporary textbooks in the same field in the hope of assessing some of the changes which have occurred in physiological psychology during the past century.

MATERIALS

The first edition of Wilhelm Wundt's *Principles of Physiological Psychology* was originally published in two parts in 1873 and 1874 (BRINGMANN, 1979). A one-volume edition of the entire book which appeared in 1874 was used for the present study. Ten recent texts which were first published between 1975 and 1981 were selected from a collection of works in physiological psychology. All chosen texts included the words "physiological psychology" in either titles or their subtitles.

PROCEDURE

The first stage in the research involved preparation of an English translation of the *Table of Contents of* Wundt's textbook. Next, a list of fifty non-overlapping physiological topics which are covered by most textbooks was derived from the tables of contents of Wundt's work and the ten recent publications. The *Thesaurus of Psychological Index Terms* (American Psychological Association, 1982) was used as an additional source of important topics. A worksheet was then prepared which allowed recording of descriptive information for the individual texts. Finally, each text was carefully examined in a page by page search and the number of pages devoted to each of the fifty topics was recorded on a separate worksheet for that text. Since topics often changed in the middle of a page, the amount of space was assessed to the nearest half page. The actual number of

pages devoted to each topic was converted to per cent of text pages to allow a comparison between texts. In addition, the references and illustrations in each text were counted and recorded. Other distinctive or unique features of the texts were also noted. The results were then organized to be displayed in four tables to permit comparison between the contents of classical and modern texts in physiological psychology.

RESULTS

The first edition of Wilhelm Wundt's *Principles of Physiological Psychology*, published in one volume in 1874 by Wilhelm Engelmann in Leipzig, Germany, was 871 pages in length, 863 pages containing textual material, and there were 155 illustrations prepared from woodcuts. Figure I is a reproduction of the title page of that volume (FIGURE I).

The text is divided into six subdivisions: Introduction (20 pages, 2.32 per cent of text), First Section -Physiological Characteristics of the Nervous System (252 pages, 29.20 per cent of text), Second Section -On Sensations (191 pages, 22.13 per cent of text), Third Section -On the Nature of Images (243 pages, 28.16 per cent of text), Fourth Section -Consciousness and its Influence on Ideas (113 pages, 13.09 per cent of text), and Fifth Section -On Movement (44 pages, 5.10 per cent of text). Following is a complete translation of the Table of Contents of Wundt's text. The numbers in brackets which follow each subtopic refer to the specific pages in Wundt's "Principles" on which these topics are first mentioned.

TABLE OF CONTENTS

(782). Relative estimation of time (784). Law of reproductive time ideas (786). Association of reproduced ideas (786). Principle of relationship and of associative adaptation (788). Causes of reproduction (790). Physiological basis of association laws (792). Psychological meaning of laws of association (793). Influence of attention on association (794). Law of contrast (795). Herbart's mechanics of ideation (796). Beneke's psychological theories (799).

CHAPTER TWENTY. Emotions (800).

General forms of emotions (800). Affect (801). Bodily feedback of affect (802). Psychological causes of affect (804). Drives (807). Basic forms of desire and resistance (807). Innate drives or instincts (808). Theory of instincts (810). Participation of intelligence in instincts (813). Intellectual and moral drives (813). Relationship of drives to feelings and affects (814). The temperaments (816). Criticism of theories (818).

FIFTH SECTION. ON MOVEMENT (820).

CHAPTER TWENTY-ONE. Reflexive and voluntary movement (820).

Origin of external movement from emotions (820). Conscious and unconscious movements (821). The simple reflexive movements (823). Adaptation phenomena in spinal reflexes (825). Complex brain reflexes (827). Voluntary movement (830). Freedom of will (830). Two-fold determination of will (834). Historical-critical comments (836).

CHAPTER TWENTY-TWO. Expressive movements (838).

Expression of emotion (838). Three principles of expression (839). Principle of direct change in innervation (840). Principle of the association of analogous sensations (843). Principle of relationship of movement to sensory ideas (845). Combined effect of the three laws of expression (846). Externalization (expression) of ideas (847). Language of gestures (847). Demonstrated and representational gestures (848). Spoken language (849). Speech sound as sound gestures (850). Direct and indirect onomatopoeia (851). Demonstrative and predicative roots (852). Interjection (852). Speech and apperception (853). Theories of mimicry and speech (855).

CHAPTER TWENTY-THREE. Final considerations (858).

Principle of universal reciprocal effect (858). Dualistic systems (859). Monistic viewpoints (859). Materialism (859). Idealism (860). Realism (860). Ideal realism (860). Monadological systems (860). Unity of soul (862). The consciousness and self-understanding (862). Soul and world (863).

A summary of this detailed translation is presented in TABLE I including only main chapter headings. The length of each chapter in pages is included as well as the per cent of total text pages which that chapter comprises (TABLE I).

TABLE II contains descriptive data for each textbook examined, including the author, date of publication, length, and number of illustrations and references.

The recent texts, on the average, were found to be slightly more than half as long as Wundt's text (57.6 per cent). While the number of illustrations varied considerably (from 75 to 195), the mean number of illustrations, 141.1, was not much different from the 155 illustrations found in Wundt's text.

TABLE I: WILHELM WUNDT'S *PRINCIPLES OF PHYSIOLOGICAL PSYCHOLOGY*

TABLE OF CONTENTS	LENGTH IN PAGES	PER CENT
PREFACE	4	0.46
INTRODUCTION		
1.- The tasks of physiological psychology	7	0.81
2.- Basic psychological concepts	13	1.51
FIRST SECTION. PHYSIOLOGICAL CHARACTERISTICS OF THE NERVOUS SYSTEM		
1.- The general relations of the nervous system to the total organism	6	0.70
2.- Structural elements of the nervous system	16	1.85
3.- Morphological development of the central nervous system	60	6.95
4.- Course of nervous pathways	70	8.11
5.- Physiological function of the central nervous system	62	7.19
6.- General physiological mechanics of the nervous system	38	4.40
SECOND SECTION. ON SENSATIONS		
7.- General characteristics of sensations	9	1.04
8.- Intensity of sensations	33	3.82
9.- Qualities of sensations	111	12.86
10.- Sense-Feelings	38	4.41
THIRD SECTION. ON THE NATURE OF IMAGES		
11.- The concept and nature of images	6	0.70
12.- Images derived from touch and movement	26	3.01
13.- Images derived from hearing	26	3.01
14.- Visual images	121	14.02
15.- Images of fantasy	22	2.56
16.- Complex images, general images, and different forms of perception	26	3.01
17.- Aesthetic feelings	16	1.85
FOURTH SECTION. CONSCIOUSNESS AND ITS INFLUENCE ON IDEAS		
18.- Consciousness and attention	19	2.20
19.- Duration and association of images	74	8.58
20.- Emotions	20	2.31
FIFTH SECTION. ON MOVEMENT		
21.- Reflexive and voluntary movement	18	2.08
22.- Expressive movements	20	2.32
23.- Final considerations	6	0.70
INDEX	7	0.81

TABLE II: A DESCRIPTION OF RECENT TEXTBOOKS IN PHYSIOLOGICAL PSYCHOLOGY

AUTHOR	DATE OF PUBLICATION	TOTAL PAGES	PAGES OF TEXT	ILLUSTRATIONS	REFERENCES	INDEX
1.- BEATTY	1975.0	357.0	307.0	99.0	295.0	yes
2.- BROWN	1976.0	413.0	310.0	75.0	780.0	yes
3.- BROWN & WALLACE	1980.0	634.0	527.0	182.0	647.0	yes
4.- BRUCE	1977.0	416.0	363.0	179.0	273.0	no
5.- LEVITT	1981.0	594.0	483.0	195.0	1323.0	yes
6.- McFARLAND	1981.0	437.0	359.0	127.0	861.0	yes
7.- PLOTNIK & MOLLENAUER	1978.0	416.0	224.0	102.0	351.0	yes
8.- SCHNEIDER & TARSHIS	1975.0	529.0	422.0	88.0	577.0	yes
9.- THOMPSON	1975.0	669.0	587.0	194.0	720.0	yes
10.- WATSON	1981.0	552.0	460.0	170.0	450.0	yes
MEAN	1977.9	501.7	404.2	141.1	627.7	

Summary data concerning the content of the textbooks examined are found in TABLE III. Data are given concerning the extent of coverage of each of twenty-three major topics for each of the texts examined.

Comparing the content of Wundt's text with that of recent texts, it was found that the list of topics which comprise 100 per cent of recent texts make up only 57 per cent of Wundt's text. The content of recent texts corresponds roughly to the first three and the sixth sections of Wundt's texr.

The topics which were found to be unique to Wundt's text or to the contemporary texts are listed in TABLE IV.

Topics which were found to be unique to Wundt's text are largely topics that would be covered in textbooks in the areas of perception, cognition, or experimental psychology today. For the most part, topics unique to the contemporary texts are subjects about which little or nothing was known at the time that Wundt wrote his text.

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TABLE III: A TOPICAL COMPARISON OF WUNDT'S TEXT WITH RECENT TEXTS*

TOPICS	WUNDT	1	2	3	4	5	6	7	8	9	10	MEAN
INTRODUCTION	2	2	0	2	2	0	1	0	1	0	0	1
HISTORY	2	0	9	0	3	0	0	0	3	0	3	2
METHODS	1	0	0	0	0	0	2	0	4	0	1	1
NEUROANATOMY	10	3	8	4	11	6	5	5	6	8	8	6
DEVELOPMENT	5	0	4	8	12	7	5	21	4	9	9	8
NEURON	6	8	7	7	8	8	11	8	7	7	4	8
SENSATION	2	15	5	3	13	6	1	1	4	7	5	6
VISION	7	11	2	6	5	4	11	4	9	3	7	6
AUDITION	3	7	1	6	4	3	4	2	5	2	5	4
CHEMICAL SENSES	0	0	1	6	4	2	2	3	3	0	2	2
SOMESTHESIS	0	5	3	7	4	4	3	2	5	2	8	4
MOTOR SYSTEMS	8	7	8	5	4	8	6	0	5	3	5	5
ANS	0	1	2	1	5	2	1	5	3	0	0	2
MOTIVATION	0	3	5	6	2	9	10	7	8	8	8	7
SEX & HORMONES	0	0	1	8	0	11	8	4	3	3	1	4
EMOTION	2	2	8	5	1	4	7	6	6	7	3	5
SLEEP	1	13	1	8	4	7	8	5	3	9	4	6
REINFORCEMENT	0	1	0	2	1	5	0	0	2	2	0	1
LEARNING & MEMORY	0	9	9	9	5	10	10	6	9	15	7	9
CORTEX	1	12	9	8	6	2	4	5	4	12	6	7
BRAIN DISORDERS	0	0	4	2	1	3	3	6	4	0	10	3
CONSCIOUSNESS	2	0	5	0	2	0	0	1	1	0	3	1
ALTERED STATES	3	0	8	0	4	0	0	8	0	3	2	3
TOTAL	57	100	100	100	100	100	100	100	100	100	100	100

*Numbers in heading refer to recent textbooks as listed in Table II. Numbers in body of table are per cent of text pages. Computed mean is based on recent texts only, excluding Wundt.

TABLE IV: CONTENT DIFFERENCES BETWEEN WUNDT'S TEXT AND RECENT TEXTX*

UNIQUE TO WUNDT	UNIQUE TO RECENT TEXTS
PSYCHOPHYSICS (4)	CHEMICAL SENSES (2)
SENSORY FEELINGS (4)	SOMESTHETIC, PROPIOCEPTIVE AND VESTIBULAR SYSTEMS (4)
SENSORY THEORIES (4)	AUTONOMIC NERVOUS SYSTEM (2)
AESTHETIC FEELINGS (2)	MOTIVATION (HUNGER & THIRST) (7)
IMAGES (GENERAL) (1)	SEXUAL BEHAVIOR & HORMONES (4)
SPATIAL IMAGES (3)	REINFORCEMENT (1)
AUDITORY IMAGES (3)	LEARNING AND MEMORY (9)
VISUAL IMAGES (13)	BRAIN DISORDERS & BEHAVIOR (3)
COMPLEX AND ABSTRACT IMAGES (3)	
RELATION & ASSOCIATION OF IDEAS (8)	

*Numbers in parentheses are per cent of text pages.

DISCUSSION

Although more than one hundred years have elapsed since Wilhelm WUNDT published the first edition of his classic book, *Principles of Physiological Psychology*, the text is not as out-dated as might be expected. Although advances in knowledge have occurred, the overall scope of the discipline has not changed considerably and there is much overlap between the basic content and organization of Wundt's text and modern texts. Specifically, if one were to outline the first, second, and fifth sections of Wundt's text, that outline would be consistent with the content of most modern texts. In addition, with only relatively minor changes and additions, one could use that outline to teach a modern course in physiological psychology. WUNDT would certainly be able to recognize a modern textbook or course of physiological psychology for what it is.

Differences do exist, however, between Wundt's text and modern texts. It seems that the field of physiological psychology for WUNDT was much more broadly defined than it is today. Two major areas which were part of physiological psychology in Wundt's day, perception and cognition, have become separate fields today. In addition, Wundt's text included much information that would normally be found in textbooks of experimental psychology today. In general, almost half of Wundt's *Principles of Physiological Psychology* covers a very broad range of experimental psychology topics that would today be covered in textbooks in areas other than physiological psychology such as the areas of cognition, perception, emotion, and philosophy.

In contrast, physiological psychology today is much more narrowly defined as a highly specialized field which depends heavily on advanced technological developments. While much of the basic neuroanatomy had already been described in the 1800's and the basic functions of the neuron and of the various parts of the brain were known, the detailed interconnections of brain nuclei, neurochemical and neurohormonal interactions, and detailed functional theories concerning the neuron and the brain were not known and are only now, because of many technological advances, beginning to be specified.

It would seem appropriate that future work should include an accurate translation into English of Wundt's entire text to make it readily available for further examination and study. In addition, it would be of interest to compare the later editions of Wundt's text with the first edition, as well as to compare Wundt's text with earlier work in related fields in order to trace the origins and development of this important branch of psychology.

RESUMEN

Como resultado de la reciente celebración del centenario de la fundación de la psicología, mucho interés se ha engendrado en Wilhelm WUNDT y sus obras. Esta investigación se diseñó para dar información comprensiva acerca del texto clásico de WUNDT, *Principios de la psicología fisiológica,* publicado en 1874.

El texto *Principios de la psicología fisiológica* de Wilhelm WUNDT se examinó y comparó con otros textos modernos publicados en el área de la psicología fisiológica. Después de completar una cuidadosa traducción del índice del texto de WUNDT, se completó un análisis del contenido de cada texto, página por página. Semejantemente se examinaron diez textos modernos de psicología fisiológica publicados en los Estados Unidos entre 1975 y 1981. Una comparación del contenido del texto de WUNDT con la de los textos recién publicados indicó lo siguiente:

1) Hay mucha semejanza entre el texto de WUNDT y los textos modernos. El contenido de los textos recién publicados corresponde aproximadamente al cincuenta y siete (57) por ciento del texto de WUNDT.

2) Los textos modernos incluyen secciones acerca del desarrollo en esta área que han ocurrido desde que se publicó el texto de WUNDT.

3) El texto de WUNDT es casi dos veces más largo que los textos recién publicados e incluye temas generalmente discutidos en textos, de hoy sobre la psicología de la percepción, psicología del conocimiento, y psicología experimental.

En conclusión, basado en un análisis del contenido de los textos en esta área, durante la época de WUNDT la psicología fisiológica era un área muy extensiva que abarcaba las disciplinas de psicología del conocimiento, psicología de la percepción y psicología experimental además de lo que hoy se conoce como la psicología fisiológica. Por otro lado, hoy la psicología fisiológica es una disciplina estrecha pero muy especializada.

SUMMARY

As a result of the recent celebration of psychology's centennial, much interest in Wilhelm WUNDT and his work has been generated. The present study was designed to provide comprehensive information about Wundt's classic textbook, *Principles of Physiological Psychology* (1873, 1874, 1874).

The content of Wilhelm Wundt's *Principles of Physiological Psychology* was examined and compared to ten selected modern texts in the same field. A comparison of the content of Wundt's text with that of the recent texts yielded the following results:

(1) A great deal of similarity exists between Wundt's text and modern texts, the content of recent texts corresponding to approximately 57 per cent of Wundt's text.

(2) Recent texts include sections on developments in the field which have occurred since Wundt's text was published as well as updated information and theories in many areas.

(3) Wundt's text is about twice as long as most recent texts and includes topics generally covered in modern textbooks of perception, cognition and experimental psychology.

(4) The scope of physiological psychology has not changed considerably and it would be possible to teach a course today using the outline of Wundt's text with only relatively minor changes and additions.

NOTES

(1) This work was supported in part by University of South Alabama Research Grant 3-61170, May 1980 to December 1982.

(2) A Facsimile reprint of the first edition of Wundt's *Principles of Physiological Psychology* is to be published by the *VEB Verlag der Wissenschaften* in East Germany and the *Springer Publishing Company* in West Germany.

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