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Personnel
and
Labor Relations

Personnel
and
Labor Relations

by

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It is, in part, as a reflection of this growing group consciousness, with a further conviction that much of that feeling will long persist, that major emphasis in this presentation falls upon group problems. Collective bargaining with independent unions is taken for granted as a relatively permanent feature of many employer-employee relationships, and it is assumed that, even where formal union organizations are not involved, management will quite generally accede to labor's expressed preference for group rather than individual consideration.

Analysis of group problems is facilitated by various statistical tools, many of which are widely encountered in the literature of personnel administration. Several of the most useful of such tools are described throughout the various chapters that follow, and illustrative problems, reduced in extent so that they may be regularly assigned, are included for those who care to use such material.

Within the chapters, sections devoted to such statistical analysis have been clearly labeled, and they may be omitted without injury to the descriptive sections to which they are related. Many instructors may wish to ignore them and the problems entirely, especially if the entire breadth of the field is studied in a single quarter or semester. On the other hand, some of these devices may properly be regarded as almost essential to intelligent administration of present-day industrial relations. They represent a means, and almost the only means, by which management can maintain a constant check on the efficacy of many managerial policies affecting personnel. They make it possible for management to identify its course and discover where it appears to be going in industrial relations. Viewed from another angle, they parallel the measures of financial progress regularly made available by the auditing division or the analysis of production schedules provided by production departments. Only a beginning has been made in the regular application of these analytical tools to the problems of industrial relations, but they have so thoroughly demonstrated their use-

fulness that slight question can be raised as to their wider use in the future.

Each of the chapters is accompanied by a list of selected collateral readings, and footnotes throughout suggest specific studies and investigations for further consideration. The author, in his own classes, has followed the practice of asking each class member to present a brief written summary or abstract of one such reference for each chapter, and that practice is suggested in the exercises accompanying each chapter.

A word of caution is appropriate, especially for those adult representatives of management who may be so concerned with problems of industrial relations as to attempt to follow suggestions stated or implied in this presentation. It must be clearly understood that successful managerial direction of industrial relations is not an achievement to be gained in a day, after management has experienced a sudden conversion to sound personnel policies. On the contrary, it is a development that necessitates painstaking consideration over a period of years. Depending primarily, as it does, upon general recognition of the soundness of managerial policies by workmen who are largely uninformed as to management's problems, successful administration of industrial relations requires an extensive period of honest, effective interpretation as well as the actual adoption of appropriate personnel practices. Management must first of all conceive and adopt a sound labor policy; then it must convince employees of the soundness of that policy.

The first step necessitates an open mind and a critical evaluation of every phase of industrial relations, an appraisal in terms of values clearly enunciated in a statement of fundamental principles. Then, as the process of appraisal continues, employees must be encouraged to accept the facts of management's sincerity and of the fairness with which every phase of personnel policy is established and maintained, or, if found wanting, is discontinued.

Development and maintenance of fundamentally sound

industrial relations is thus a long-time, permanent program, rather than a sudden achievement. Essentially, it depends upon continuous analysis and appraisal, adjustment and re-adjustment of personnel policies, coupled with constant, effective interpretation of these policies to the entire working force.

Numerous debts to colleagues, students, assistants, and others might be acknowledged here, but they are, as far as possible, indicated where reference is made to the contribution involved.

DALE YODER

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APPENDICES

APPENDIX A

INDUSTRIES FOR WHICH CURRENT REPORTS OF EMPLOYMENT ARE AVAILABLE

The following list includes the eighty-nine manufacturing industries and the sixteen nonmanufacturing industries for which monthly samples of employment are secured by the Bureau of Labor Statistics. Employment changes in these industries are summarized in the *Monthly Labor Review* and in mimeographed releases available from the Bureau.

MANUFACTURING INDUSTRIES

Durable-goods groups

Iron and steel and their products	Transportation equipment (cont.)
Blast furnaces and rolling mills	Cars, electric and steam rail- road
Bolts, nuts, washers, and rivets	Locomotives
Cast-iron pipe	Shipbuilding
Cutlery and edge tools	Railroad repair shops
Forgings, iron and steel	Electric railroad
Hardware	Steam railroad
Plumbers' supplies	Nonferrous metals and their pro- ducts
Steam and hot-water heating ap- paratus and steam fittings	Aluminum manufactures
Stoves	Brass, bronze, and copper pro- ducts
Structural and ornamental metal work	Clocks and watches
Tin cans and other tinware	Jewelry
Tools	Lighting equipment
Wirework	Silverware and plated ware
Machinery	Smelting and refining—copper, etc.
Agricultural implements	Stamped and enameled ware
Cash registers, adding machines, etc.	Lumber and allied products
Electrical machinery and sup- plies	Furniture
Engines, turbines, and tractors	Lumber
Foundry and machine-shop pro- ducts	Millwork
Machine tools	Sawmills
Radios and phonographs	Stone, clay, and glass products
Textile machinery and parts	Brick, tile, and terra cotta
Typewriters and parts	Cement
Transportation equipment	Glass
Aircraft	Marble, granite, slate, and other products
Automobiles	Pottery

Nondurable-goods groups

Textiles and their products	Chemicals and allied products
Fabrics	(cont.)
Carpets and rugs	Leather
Cotton goods	Food and kindred products
Cotton small wares	Baking
Dyeing and finishing textiles	Beverages
Hats; fur, felt	Butter
Knit goods	Canning and preserving
Silk and rayon goods	Confectionery
Woolen and worsted goods	Flour
Wearing apparel	Ice cream
Clothing, men's	Slaughtering and meat
Clothing, women's	packing
Corsets and allied garments	Sugar, beet
Men's furnishings	Sugar refining, cane
Millinery	Tobacco manufactures
Shirts and collars	Chewing and smoking to-
Paper and printing	bacco and snuff
Boxes, paper	Cigars and Cigarettes
Paper and pulp	Explosives
Printing and publishing	Fertilizers
Book and job	Paints and varnishes
Newspapers and periodicals	Rayon and allied products
Chemicals and allied products, and	Soap
petroleum refining	Petroleum refining
Other than petroleum refining	Rubber products
Chemicals	Rubber boots and shoes
Cottonseed oil, cake, and meal	Rubber goods, other than boots,
Druggists' preparations	shoes, tires, and inner
Leather and its manufactures	tubes
Boots and shoes	Rubber tires and inner tubes

NONMANUFACTURING INDUSTRIES

Coal mining	Public utilities (cont.)
Anthracite	Telephone and telegraph
Bituminous	Trade
Metalliferous mining	Wholesale
Quarrying and nonmetallic mining	Retail
Crude petroleum producing	Hotels (year-round)
Public utilities	Laundries
Electric light and power and	Dyeing and cleaning
manufactured gas	Brokerage
Electric-railroad and motor-bus	Insurance
operation and maintenance	Building construction

APPENDIX B

ESTIMATES OF EMPLOYMENT

TOTAL NONAGRICULTURAL EMPLOYMENT IN THE UNITED STATES, BY MONTHS, 1929 TO 1937

Employment on federal emergency construction has been included in these estimates only when such construction is carried out in a manner essentially similar to private work or regular government work. Thus, employment on P.W.A. projects has been included, as has employment on projects under the supervision of the Bureau of Public Roads. Other federal emergency projects have been excluded.

(In thousands of persons)

Month	1929	1930	1931	1932	1933	1934	1935	1936	1937
Average.....	36,158	33,927	30,851	27,623	27,663	30,167	31,346	32,975	.....
January.....	34,898	34,641	31,426	28,579	26,241	28,688	30,154	31,416	33,340
February.....	35,045	34,351	31,059	28,389	26,180	29,173	30,465	31,428	33,655
March.....	35,377	34,293	31,201	28,206	25,897	29,760	30,761	31,840	34,138
April.....	35,879	34,540	31,499	27,993	26,269	30,184	31,146	32,401	.....
May.....	36,276	34,664	31,530	27,689	26,672	30,608	31,219	32,761	.....
June.....	36,569	34,494	31,419	27,389	27,345	30,706	31,288	33,092	.....
July.....	36,684	34,081	31,052	27,015	27,827	30,462	31,288	33,297	.....
August.....	37,019	33,788	30,807	27,023	28,598	30,478	31,570	33,477	.....
September.....	37,068	33,714	30,699	27,366	29,218	30,304	31,866	33,797	.....
October.....	37,044	33,457	30,375	27,582	29,469	30,611	32,193	34,069	.....
November.....	36,421	32,828	29,734	27,287	29,214	30,450	32,053	33,953	.....
December.....	35,634	32,274	29,410	26,953	29,024	30,578	32,146	34,171	.....

Source: "Nonagricultural Employment in the United States, March, 1937," *Monthly Labor Review*, June, 1937, Vol. 44, No. 6, p. 1421.

APPENDIX C

COVERAGE OF UNEMPLOYMENT COMPENSATION, AVERAGE FOR 1930

State	Number (In thousands)	Per Cent of Total Gainful Workers
United States.....	22,279	45.6
Alabama.....	312	30.4
Arizona.....	73	44.2
Arkansas.....	164	24.6
California.....	1,267	50.7
Colorado.....	172	42.7
Connecticut.....	372	54.9
Delaware.....	47	47.9
District of Columbia.....	112	46.0
Florida.....	271	45.2
Georgia.....	382	32.9
Idaho.....	56	34.5
Illinois.....	1,645	51.7
Indiana.....	580	46.4
Iowa.....	337	36.9
Kansas.....	270	38.9
Kentucky.....	320	35.3
Louisiana.....	301	36.9
Maine.....	149	48.3
Maryland.....	341	50.7
Massachusetts.....	1,019	56.2
Michigan.....	978	50.7
Minnesota.....	400	40.3
Mississippi.....	170	20.1
Missouri.....	630	43.2
Montana.....	79	36.5
Nebraska.....	179	35.3
Nevada.....	20	46.6
New Hampshire.....	99	51.4
New Jersey.....	959	56.0
New Mexico.....	49	34.3
New York.....	3,084	55.8
North Carolina.....	371	32.5
North Dakota.....	62	25.8
Ohio.....	1,337	51.1
Oklahoma.....	304	36.7
Oregon.....	190	46.4
Pennsylvania.....	2,013	54.1
Rhode Island.....	167	56.2
South Carolina.....	197	28.6
South Dakota.....	68	27.5
Tennessee.....	340	35.5
Texas.....	795	36.0
Utah.....	75	44.1
Vermont.....	60	42.5
Virginia.....	352	40.0
Washington.....	325	48.9
West Virginia.....	263	46.1
Wisconsin.....	487	43.1
Wyoming.....	36	38.9

APPENDIX D

NATIONAL LABOR RELATIONS ACT

THE National Labor Relations Act, or the Wagner Act as it is sometimes called, was approved by the President, July 5, 1935. The full text of the law follows:

SECTION 1. Findings and policy.—The denial by employers of the right of employees to organize and the refusal by employers to accept the procedure of collective bargaining lead to strikes and other forms of industrial strife or unrest, which have the intent or the necessary effect of burdening or obstructing commerce by (a) impairing the efficiency, safety, or operation of the instrumentalities of commerce; (b) occurring in the current of commerce; (c) materially affecting, restraining, or controlling the flow of raw materials or manufactured or processed goods from or into the channels of commerce, or the prices of such materials or goods in commerce; or (d) causing diminution of employment and wages in such volume as substantially to impair or disrupt the market for goods flowing from or into the channels of commerce.

The inequality of bargaining power between employees who do not possess full freedom of association or actual liberty of contract, and employers who are organized in the corporate or other forms of ownership association substantially burdens and affects the flow of commerce, and tends to aggravate recurrent business depressions, by depressing wage rates and the purchasing power of wage earners in industry and by preventing the stabilisation of competitive wage rates and working conditions within and between industries.

Experience has proved that protection by law of the right of employees to organize and bargain collectively safeguards commerce from injury, impairment, or interruption, and promotes the flow of commerce by removing certain recognized sources of industrial strife and unrest, by encouraging practices fundamental to the friendly adjustment of industrial disputes arising out of differences as to wages, hours, or other working conditions, and by restoring equality of bargaining power between employers and employees.

It is hereby declared to be the policy of the United States to eliminate the causes of certain substantial obstructions to the free flow of commerce and to mitigate and eliminate these obstructions when they have occurred by encouraging the practice and procedure of collective bargaining and by protecting the exercise by workers of full freedom of association, self-organization, and designation of representatives of their

own choosing, for the purpose of negotiating the terms and conditions of their employment or other mutual aid of protection.

Sec. 2. Definitions.—When used in this act—

(1) The term “person” includes one or more individuals, partnerships, associations, corporations, legal representatives, trustees, trustees in bankruptcy, or receivers.

(2) The term “employer” includes any person acting in the interest of an employer, directly or indirectly, but shall not include the United States, or any State or political subdivision thereof, or any person subject to the Railway Labor Act, as amended from time to time, or any labor organization (other than when acting as an employer), or anyone acting in the capacity of officer or agent of such labor organization.

(3) The term “employee” shall include any employee, and shall not be limited to the employees of a particular employer, unless the act explicitly states otherwise, and shall include any individual whose work has ceased as a consequence of, or in connection with, any current labor dispute or because of any unfair labor practice, and who has not obtained any other regular and substantially equivalent employment, but shall not include any individual employed as an agricultural laborer, or in the domestic service of any family or person at his home, or any individual employed by his parent or spouse.

(4) The term “representatives” includes any individual or labor organization.

(5) The term “labor organization” means any organization of any kind, or any agency or employee representation committee or plan, in which employees participate and which exists for the purpose, in whole or in part, of dealing with employers concerning grievances, labor disputes, wages, rates of pay, hours of employment, or conditions of work.

(6) The term “commerce” means trade, traffic, commerce, transportation, or communication among the several States, or between the District of Columbia or any Territory of the United States and any State or other Territory, or between any foreign country and any State, Territory, or the District of Columbia, or within the District of Columbia or any Territory, or between points in the same State but through any other State or any Territory or the District of Columbia or any foreign country.

(7) The term “affecting commerce” means in commerce, or burdening or obstructing commerce or the free flow of commerce, or having led or tending to lead to a labor dispute burdening or obstructing commerce or the free flow of commerce.

(8) The term “unfair labor practice” means any unfair labor practice listed in section 8.

(9) The term “labor dispute” includes any controversy concerning terms, tenure, or conditions of employment, or concerning the association or representation of persons in negotiating, fixing, maintaining, changing, or seeking to arrange terms or conditions of employment, regardless of whether the disputants stand in the proximate relation of employer and employee.

(10) The term "National Labor Relations Board" means the National Labor Relations Board created by section 3 of this act.

(11) The term "old Board" means the National Labor Relations Board established by Executive Order No. 6763 of the President on June 29, 1934, pursuant to Public Resolution No. 44, approved June 19, 1934 (48 Stat. 1183), and reestablished and continued by Executive Order No. 7074 of the President of June 15, 1935, pursuant to title I of the National Industrial Recovery Act (48 Stat. 195) as amended and continued by Senate Joint Resolution 113 approved June 14, 1935.

Sec. 3. *Creation of National Labor Relations Board.*—(a) There is hereby created a board, to be known as the "National Labor Relations Board" (hereinafter referred to as the "Board"), which shall be composed of three members, who shall be appointed by the President, by and with the advice and consent of the Senate. One of the original members shall be appointed for a term of 1 year, one for a term of 3 years, and one for a term of 5 years, but their successors shall be appointed for terms of 5 years each, except that any individual chosen to fill a vacancy shall be appointed only for the unexpired term of the member whom he shall succeed. The President shall designate one member to serve as chairman of the Board. Any member of the Board may be removed by the President, upon notice and hearing, for neglect of duty or malfeasance in office, but for no other cause.

(b) A vacancy in the Board shall not impair the right of the remaining members to exercise all the powers of the Board, and two members of the Board shall, at all times, constitute a quorum. The board shall have an official seal which shall be judicially noticed.

(c) The Board shall at the close of each fiscal year make a report in writing to Congress and to the President stating in detail the cases it has heard, the decisions it has rendered, the names, salaries, and duties of all employees and officers in the employ or under the supervision of the Board, and an account of all moneys it has disbursed.

Sec. 4. *Personnel of Board.*—(a) Each member of the Board shall receive a salary of \$10,000 a year, shall be eligible for reappointment, and shall not engage in any other business, vocation, or employment. The Board shall appoint, without regard for the provisions of the civil-service laws but subject to the Classification Act of 1923, as amended, an executive secretary, and such attorneys, examiners, and regional directors, and shall appoint such other employees with regard to existing laws applicable to the employment and compensation of officers and employees of the United States, as it may from time to time find necessary for the proper performance of its duties and as may be from time to time appropriated for by Congress. The Board may establish or utilize such regional, local, or other agencies, and utilize such voluntary and uncompensated services, as may from time to time be needed. Attorneys appointed under this section may, at the direction of the Board, appear for and represent the Board in any case in court. Nothing in this act shall be construed to authorize the Board to appoint individuals for the purpose of conciliation or mediation (or for statistical work),

where such service may be obtained from the Department of Labor.

(b) Upon the appointment of the three original members of the Board and the designation of its chairman, the old Board shall cease to exist. All employees of the old Board shall be transferred to and become employees of the Board with salaries under the Classification Act of 1923, as amended, without acquiring by such transfer a permanent or civil-service status. All records, papers, and property of the old Board shall become records, papers, and property of the Board, and all unexpended funds and appropriations for the use and maintenance of the old Board shall become funds and appropriations available to be expended by the Board in the exercise of the powers, authority, and duties conferred on it by this act.

(c) All of the expenses of the Board, including all necessary traveling and subsistence expenses outside the District of Columbia incurred by the members or employees of the Board under its orders, shall be allowed and paid on the presentation of itemized vouchers therefor approved by the Board or by any individual it designates for that purpose.

Sec. 5. *Location of Board.*—The principal office of the Board shall be in the District of Columbia, but it may meet and exercise any or all of its powers at any other place. The Board may, by one or more of its members or by such agents or agencies as it may designate, prosecute any inquiry necessary to its functions in any part of the United States. A member who participates in such an inquiry shall not be disqualified from subsequently participating in a decision of the Board in the same case.

Sec. 6. *Powers of Board.*—(a) The Board shall have authority from time to time to make, amend, and rescind such rules and regulations as may be necessary to carry out the provisions of this act. Such rules and regulations shall be effective upon publication in the manner which the Board shall prescribe.

Sec. 7. *Rights of employees.*—Employees shall have the right to self-organization, to form, join, or assist labor organizations, to bargain collectively through representatives of their own choosing, and to engage in concerted activities, for the purpose of collective bargaining or other mutual aid or protection.

Sec. 8. *Unfair labor practices.*—It shall be an unfair labor practice for an employer—

(1) To interfere with, restrain, or coerce employees in the exercise of the rights guaranteed in section 7.

(2) To dominate or interfere with the formation or administration of any labor organization or contribute financial or other support to it: *Provided*, That subject to rules and regulations made and published by the Board pursuant to section 6 (a), an employer shall not be prohibited from permitting employees to confer with him during working hours without loss of time or pay.

(3) By discrimination in regard to hire or tenure of employment or any term or condition of employment to encourage or discourage membership in any labor organization: *Provided*, That nothing in this act,

or in the National Industrial Recovery Act (U. S. C., Supp. VII, title 15, secs. 701-712), as amended from time to time, or in any code or agreement approved, or prescribed thereunder, or in any other statute of the United States, shall preclude an employer from making an agreement with a labor organization (not established, maintained, or assisted by any action defined in this act as an unfair labor practice) to require as a condition of employment membership therein, if such labor organization is the representative of the employees as provided in section 9 (a), in the appropriate collective-bargaining unit covered by such agreement when made.

(4) To discharge or otherwise discriminate against an employee because he has filed charges or given testimony under this act.

(5) To refuse to bargain collectively with the representatives of his employees, subject to the provisions of section 9 (a).

Sec. 9. *Representatives and elections.*—(a) Representatives designated or selected for the purposes of collective bargaining by the majority of the employees in a unit appropriate for such purposes, shall be the exclusive representatives of all the employees in such unit for the purposes of collective bargaining in respect to rates of pay, wages, hours of employment, or other conditions of employment: *Provided*, That any individual employee or a group of employees shall have the right at any time to present grievances to their employer.

(b) The Board shall decide in each case whether, in order to insure to employees the full benefit of their right to self-organization and to collective bargaining, and otherwise to effectuate the policies of this act, the unit appropriate for the purposes of collective bargaining shall be the employer unit, craft unit, plant unit, or subdivision thereof.

(c) Whenever a question affecting commerce arises concerning the representation of employees, the Board may investigate such controversy and certify to the parties, in writing, the name or names of the representatives that have been designated or selected. In any such investigation, the Board shall provide for an appropriate hearing upon due notice, either in conjunction with a proceeding under section 10 or otherwise, and may take a secret ballot of employees, or utilize any other suitable method to ascertain such representatives.

(d) Whenever an order of the Board made pursuant to section 10 (c) is based in whole or in part upon facts certified following an investigation pursuant to subsection (c) of this section, and there is a petition for the enforcement or review of such order, such certification and the record of such investigation shall be included in the transcript of the entire record required to be filed under subsections 10 (e) or 10 (f), and thereupon the decree of the court enforcing, modifying, or setting aside in whole or in part the order of the Board shall be made and entered upon the pleadings, testimony, and proceedings set forth in such transcript.

Sec. 10. *Prevention of unfair labor practices.*—(a) The Board is empowered, as hereinafter provided, to prevent any person from engaging in any unfair labor practice (listed in section 8) affecting commerce.

This power shall be exclusive, and shall not be affected by any other means of adjustment or prevention that has been or may be established by agreement, code, law, or otherwise.

(b) Whenever it is charged that any person has engaged in or is engaging in any such unfair labor practice, the Board, or any agent or agency designated by the Board for such purposes, shall have power to issue and cause to be served upon such person a complaint stating the charges in that respect, and containing a notice of hearing before the Board or member thereof, or before a designated agent or agency, at a place therein fixed, not less than 5 days after the serving of said complaint. Any such complaint may be amended by the member, agent or agency conducting the hearing, or the Board in its discretion at any time prior to the issuance of an order based thereon. The person so complained of shall have the right to file an answer to the original or amended complaint and to appear in person or otherwise and give testimony at the place and time fixed in the complaint. In the discretion of the member, agent or agency conducting the hearing, or the Board, any other person may be allowed to intervene in the said proceeding and to present testimony. In any such proceeding the rules of evidence prevailing in courts of law or equity shall not be controlling.

(c) The testimony taken by such member, agent or agency, or the Board shall be reduced to writing and filed with the Board. Thereafter, in its discretion, the Board upon notice may take further testimony or hear argument. If upon all the testimony taken, the Board shall be of the opinion that any person named in the complaint has engaged in or is engaging in any such unfair labor practice, then the Board shall state its findings of fact and shall issue and cause to be served on such person an order requiring such person to cease and desist from such unfair labor practice, and to take such affirmative action, including reinstatement of employees with or without back pay, as will effectuate the policies of this act. Such order may further require such person to make reports from time to time showing the extent to which it has complied with the order. If upon all the testimony taken, the Board shall be of the opinion that no person named in the complaint has engaged in or is engaging in any such unfair labor practice, then the Board shall state its findings of fact and shall issue an order dismissing the said complaint.

(d) Until a transcript of the record in a case shall have been filed in a court, as hereinafter provided, the Board may at any time, upon reasonable notice and in such manner as it shall deem proper, modify or set aside, in whole or in part, any finding or order made or issued by it.

(e) The Board shall have power to petition any circuit court of appeals of the United States (including the Court of Appeals of the District of Columbia), or if all the circuit courts of appeals to which application may be made are in vacation, any district court of the United States (including the Supreme Court of the District of Columbia), within any circuit or district, respectively, wherein the unfair labor practice in question occurred or wherein such person resides or transacts business, for the enforcement of such order and for appropriate temporary

relief or restraining order, and shall certify and file in the court a transcript of the entire record in the proceeding, including the pleadings and testimony upon which such order was entered and the findings and order of the Board. Upon such filing, the court shall cause notice thereof to be served upon such person, and thereupon shall have jurisdiction of the proceeding and of the question determined therein, and shall have power to grant such temporary relief or restraining order as it deems just and proper, and to make and enter upon the pleadings, testimony, and proceedings set forth in such transcript a decree enforcing, modifying, and enforcing as so modified, or setting aside in whole or in part the order of the Board. No objection that has not been urged before the Board, its member, agent, or agency, shall be considered by the court, unless the failure or neglect to urge such objection shall be excused because of extraordinary circumstances. The findings of the Board as to the facts, if supported by evidence, shall be conclusive. If either party shall apply to the court for leave to adduce additional evidence and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the hearing before the Board, its member, agent, or agency, the court may order such additional evidence to be taken before the Board, its member, agent, or agency, and to be made a part of the transcript. The Board may modify its findings as to the facts, or make new findings, by reason of additional evidence so taken and filed, and it shall file such modified or new findings, which, if supported by evidence, shall be conclusive, and shall file its recommendations, if any, for the modification or setting aside of its original order. The jurisdiction of the court shall be exclusive and its judgment and decree shall be final, except that the same shall be subject to review by the appropriate circuit court of appeals if application was made to the district court as hereinabove provided, and by the Supreme Court of the United States upon writ of certiorari or certification as provided in sections 239 and 240 of the Judicial Code, as amended (U.S.C., title 28, secs. 346 and 347).

(f) Any person aggrieved by a final order of the Board granting or denying in whole or in part the relief sought may obtain a review of such order in any circuit court of appeals of the United States in the circuit wherein the unfair labor practice in question was alleged to have been engaged in or wherein such person resides or transacts business, or in the Court of Appeals of the District of Columbia, by filing in such court a written petition praying that the order of the Board be modified or set aside. A copy of such petition shall be forthwith served upon the Board, and thereupon the aggrieved party shall file in the court a transcript of the entire record in the proceeding, certified by the Board, including the pleading and testimony upon which the order complained of was entered and the findings and order of the Board. Upon such filing, the court shall proceed in the same manner as in the case of an application by the Board under subsection (e), and shall have the same exclusive jurisdiction to grant to the Board such temporary relief or restraining

order as it deems just and proper, and in like manner to make and enter a decree enforcing, modifying, and enforcing as so modified, or setting aside in whole or in part the order of the Board; and the findings of the Board as to the facts, if supported by evidence, shall in like manner be conclusive.

(g) The commencement of proceedings under subsection (e) or (f) of this section shall not, unless specifically ordered by the court, operate as a stay of the Board's order.

(h) When granting appropriate temporary relief or a restraining order, or making and entering a decree enforcing, modifying, and enforcing as so modified, or setting aside in whole or in part an order of the Board, as provided in this section, the jurisdiction of courts sitting in equity shall not be limited by the act entitled "An act to amend the Judicial Code and to define and limit the jurisdiction of courts sitting in equity, and for other purposes", approved March 23, 1932 (U. S. C., Supp. VII, title 29, secs. 101-115).

(i) Petitions filed under this act shall be heard expeditiously and, if possible, within 10 days after they have been docketed.

Sec. 11. *Investigatory powers.*—For the purpose of all hearings and investigations, which, in the opinion of the Board, are necessary and proper for the exercise of the powers vested in it by section 9 and section 10—

(1) The Board, or its duly authorized agents or agencies, shall at all reasonable times have access to, for the purpose of examination, and the right to copy any evidence of any person being investigated or proceeded against that relates to any matter under investigation or in question. Any member of the Board shall have power to issue subpoenas requiring the attendance and testimony of witnesses and the production of any evidence that relates to any matter under investigation or in question, before the Board, its member, agent, or agency conducting the hearing or investigation. Any member of the Board, or any agent or agency designated by the Board for such purposes, may administer oaths and affirmations, examine witnesses, and receive evidence. Such attendance of witnesses and the production of such evidence may be required from any place in the United States or any Territory or possession thereof, at any designated place of hearing.

(2) In case of contumacy or refusal to obey a subpoena issued to any person, any District Court of the United States or the United States courts of any Territory or possession, or the Supreme Court of the District of Columbia, within the jurisdiction of which the inquiry is carried on or within the jurisdiction of which said person guilty of contumacy or refusal to obey is found or resides or transacts business, upon application by the Board shall have jurisdiction to issue to such person an order requiring such person to appear before the Board, its member, agent, or agency, there to produce evidence if so ordered, or there to give testimony touching the matter under investigation or in question; and any failure to obey such order of the court may be punished by said court as a contempt thereof.

(3) No person shall be excused from attending and testifying or from producing books, records, correspondence, documents, or other evidence in obedience to the subpoena of the Board, on the ground that the testimony or evidence required of him may tend to incriminate him or subject him to a penalty or forfeiture; but no individual shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter, or thing concerning which he is compelled, after having claimed his privilege against self-incrimination, to testify or produce evidence, except that such individual so testifying shall not be exempt from prosecution and punishment for perjury committed in so testifying.

(4) Complaints, orders, and other process and papers of the Board, its member, agent, or agency, may be served either personally or by registered mail or by telegraph or by leaving a copy thereof at the principal office or place of business of the person required to be served. The verified return by the individual so serving the same setting forth the manner of such service shall be proof of the same, and the return post-office receipt or telegraph receipt therefor when registered and mailed or telegraphed as aforesaid shall be proof of service of the same. Witnesses summoned before the Board, its member, agent, or agency, shall be paid the same fees and mileage that are paid witnesses in the courts of the United States, and witnesses whose depositions are taken and the persons taking the same shall severally be entitled to the same fees as are paid for like services in the courts of the United States.

(5) All process of any court to which application may be made under this act may be served in the judicial district wherein the defendant or other person required to be served resides or may be found.

(6) The several departments and agencies of the Government, when directed by the President, shall furnish the Board, upon its request, all records, papers, and information in their possession relating to any matter before the Board.

Sec. 12. *Violations.*—Any person who shall willfully resist, prevent, impede, or interfere with any member of the Board or any of its agents or agencies in the performance of duties pursuant to this act shall be punished by a fine of not more than \$5,000 or by imprisonment for not more than 1 year, or both.

Sec. 13. *Right to strike preserved.*—Nothing in this act shall be construed so as to interfere with or impede or diminish in any way the right to strike.

Sec. 14. *Conflicting laws.*—Wherever the application of the provisions of section 7 (a) of the National Industrial Recovery Act (U. S. C., Supp. VII, title 15, sec. 707 (a)), as amended from time to time, or of section 77 B, paragraphs (l) and (m) of the act approved June 7, 1934, entitled "An act to amend an act entitled 'An act to establish a uniform system of bankruptcy throughout the United States' approved July 1, 1898, and acts amendatory thereof and supplementary thereto" (48 Stat. 922, pars. (l) and (m)), as amended from time to time, or of Public Resolution No. 44, approved June 19, 1934 (48 Stat. 1183), conflicts with the application of the provisions of this act, this act shall prevail: *Pro-*

vided, That in any situation where the provisions of this act cannot be validly enforced, the provisions of such other acts shall remain in full force and effect.

SEC. 15. *Constitutionality*.—If any provision of this act, or the application of such provision to any person or circumstance, shall be held invalid, the remainder of this act, or the application of such provision to persons or circumstances other than those as to which it is held invalid, shall not be affected thereby.

SEC. 16. *Title of act*.—This act may be cited as the "National Labor Relations Act."

APPENDIX E

VALUES OF x AND A FOR BI-SERIAL ETA

(The table represents the cumulative area, A , of the right half of the normal curve of distribution of unit area. Values of x are measured in standard deviation units.)

x	A	x	A	x	A
0.00	0.00000	0.50	0.19146	1.00	0.34134
0.01	0.00399	0.51	0.19497	1.01	0.34375
0.02	0.00798	0.52	0.19847	1.02	0.34614
0.03	0.01197	0.53	0.20194	1.03	0.34850
0.04	0.01595	0.54	0.20540	1.04	0.35083
0.05	0.01994	0.55	0.20884	1.05	0.35314
0.06	0.02392	0.56	0.21228	1.06	0.35543
0.07	0.02790	0.57	0.21566	1.07	0.35769
0.08	0.03188	0.58	0.21904	1.08	0.35993
0.09	0.03586	0.59	0.22240	1.09	0.36214
0.10	0.03983	0.60	0.22575	1.10	0.36433
0.11	0.04380	0.61	0.22907	1.11	0.36650
0.12	0.04776	0.62	0.23237	1.12	0.36864
0.13	0.05172	0.63	0.23565	1.13	0.37076
0.14	0.05567	0.64	0.23891	1.14	0.37286
0.15	0.05962	0.65	0.24215	1.15	0.37493
0.16	0.06356	0.66	0.24537	1.16	0.37698
0.17	0.06749	0.67	0.24857	1.17	0.37900
0.18	0.07142	0.68	0.25175	1.18	0.38100
0.19	0.07535	0.69	0.25490	1.19	0.38298
0.20	0.07928	0.70	0.25804	1.20	0.38493
0.21	0.08317	0.71	0.26115	1.21	0.38686
0.22	0.08706	0.72	0.26424	1.22	0.38877
0.23	0.09095	0.73	0.26730	1.23	0.39065
0.24	0.09483	0.74	0.27035	1.24	0.39251
0.25	0.09871	0.75	0.27337	1.25	0.39435
0.26	0.10257	0.76	0.27637	1.26	0.39617
0.27	0.10642	0.77	0.27935	1.27	0.39796
0.28	0.11026	0.78	0.28230	1.28	0.39973
0.29	0.11409	0.79	0.28524	1.29	0.40147
0.30	0.11791	0.80	0.28814	1.30	0.40320
0.31	0.12172	0.81	0.29103	1.31	0.40490
0.32	0.12552	0.82	0.29389	1.32	0.40658
0.33	0.12930	0.83	0.29673	1.33	0.40824
0.34	0.13307	0.84	0.29955	1.34	0.40988
0.35	0.13683	0.85	0.30234	1.35	0.41149
0.36	0.14058	0.86	0.30511	1.36	0.41309
0.37	0.14431	0.87	0.30785	1.37	0.41466
0.38	0.14803	0.88	0.31057	1.38	0.41621
0.39	0.15173	0.89	0.31327	1.39	0.41774
0.40	0.15542	0.90	0.31594	1.40	0.41924
0.41	0.15910	0.91	0.31859	1.41	0.42073
0.42	0.16276	0.92	0.32121	1.42	0.42220
0.43	0.16640	0.93	0.32381	1.43	0.42364
0.44	0.17003	0.94	0.32639	1.44	0.42507
0.45	0.17364	0.95	0.32894	1.45	0.42647
0.46	0.17724	0.96	0.33147	1.46	0.42786
0.47	0.18082	0.97	0.33398	1.47	0.42922
0.48	0.18439	0.98	0.33646	1.48	0.43056
0.49	0.18793	0.99	0.33891	1.49	0.43189

x	A	x	A	x	A
1.50	0.43319	2.00	0.47725	2.50	0.49379
1.51	0.43448	2.01	0.47778	2.51	0.49396
1.52	0.43574	2.02	0.47831	2.52	0.49413
1.53	0.43699	2.03	0.47882	2.53	0.49430
1.54	0.43822	2.04	0.47932	2.54	0.49446
1.55	0.43943	2.05	0.47982	2.55	0.49461
1.56	0.44062	2.06	0.48030	2.56	0.49477
1.57	0.44179	2.07	0.48077	2.57	0.49492
1.58	0.44295	2.08	0.48124	2.58	0.49506
1.59	0.44408	2.09	0.48169	2.59	0.49520
1.60	0.44520	2.10	0.48214	2.60	0.49534
1.61	0.44630	2.11	0.48257	2.61	0.49547
1.62	0.44738	2.12	0.48300	2.62	0.49560
1.63	0.44845	2.13	0.48341	2.63	0.49573
1.64	0.44950	2.14	0.48382	2.64	0.49585
1.65	0.45053	2.15	0.48422	2.65	0.49598
1.66	0.45154	2.16	0.48461	2.66	0.49609
1.67	0.45254	2.17	0.48500	2.67	0.49621
1.68	0.45352	2.18	0.48537	2.68	0.49632
1.69	0.45449	2.19	0.48574	2.69	0.49643
1.70	0.45543	2.20	0.48610	2.70	0.49653
1.71	0.45637	2.21	0.48645	2.71	0.49664
1.72	0.45728	2.22	0.48679	2.72	0.49674
1.73	0.45818	2.23	0.48713	2.73	0.49683
1.74	0.45907	2.24	0.48745	2.74	0.49693
1.75	0.45994	2.25	0.48778	2.75	0.49702
1.76	0.46080	2.26	0.48809	2.76	0.49711
1.77	0.46164	2.27	0.48840	2.77	0.49720
1.78	0.46246	2.28	0.48870	2.78	0.49728
1.79	0.46327	2.29	0.48899	2.79	0.49736
1.80	0.46407	2.30	0.48928	2.80	0.49744
1.81	0.46485	2.31	0.48956	2.81	0.49752
1.82	0.46562	2.32	0.48983	2.82	0.49760
1.83	0.46638	2.33	0.49010	2.83	0.49767
1.84	0.46712	2.34	0.49036	2.84	0.49774
1.85	0.46784	2.35	0.49061	2.85	0.49781
1.86	0.46856	2.36	0.49086	2.86	0.49788
1.87	0.46926	2.37	0.49111	2.87	0.49795
1.88	0.46995	2.38	0.49134	2.88	0.49801
1.89	0.47062	2.39	0.49158	2.89	0.49807
1.90	0.47128	2.40	0.49180	2.90	0.49813
1.91	0.47193	2.41	0.49202	2.91	0.49819
1.92	0.47257	2.42	0.49224	2.92	0.49825
1.93	0.47320	2.43	0.49245	2.93	0.49831
1.94	0.47381	2.44	0.49266	2.94	0.49836
1.95	0.47441	2.45	0.49286	2.95	0.49841
1.96	0.47500	2.46	0.49305	2.96	0.49846
1.97	0.47558	2.47	0.49324	2.97	0.49851
1.98	0.47615	2.48	0.49343	2.98	0.49856
1.99	0.47670	2.49	0.49361	2.99	0.49861

Appendix E

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<i>x</i>	<i>A</i>	<i>x</i>	<i>A</i>	<i>x</i>	<i>A</i>
3.00	0.49865	3.40	0.49966	3.80	0.49993
3.01	0.49869	3.41	0.49968	3.81	0.49993
3.02	0.49874	3.42	0.49969	3.82	0.49993
3.03	0.49878	3.43	0.49970	3.83	0.49994
3.04	0.49882	3.44	0.49971	3.84	0.49994
3.05	0.49886	3.45	0.49972	3.85	0.49994
3.06	0.49889	3.46	0.49973	3.86	0.49994
3.07	0.49893	3.47	0.49974	3.87	0.49995
3.08	0.49897	3.48	0.49975	3.88	0.49995
3.09	0.49900	3.49	0.49976	3.90	0.49995
3.10	0.49903	3.50	0.49977	3.91	0.49995
3.11	0.49906	3.51	0.49978	3.92	0.49996
3.12	0.49910	3.52	0.49978	3.94	0.49996
3.13	0.49913	3.53	0.49979	3.95	0.49996
3.14	0.49916	3.54	0.49980	3.97	0.49996
3.15	0.49918	3.55	0.49981	3.98	0.49997
3.16	0.49921	3.56	0.49981	4.00	0.49997
3.17	0.49924	3.57	0.49982	4.02	0.49997
3.18	0.49926	3.58	0.49983	4.04	0.49997
3.19	0.49929	3.59	0.49983	4.07	0.49998
3.20	0.49931	3.60	0.49984		
3.21	0.49934	3.61	0.49985		
3.22	0.49936	3.62	0.49985		
3.23	0.49938	3.63	0.49986		
3.24	0.49940	3.64	0.49986		
3.25	0.49942	3.65	0.49987		
3.26	0.49944	3.66	0.49987		
3.27	0.49946	3.67	0.49988		
3.28	0.49948	3.68	0.49988		
3.29	0.49950	3.69	0.49989		
3.30	0.49952	3.70	0.49989		
3.31	0.49953	3.71	0.49990		
3.32	0.49955	3.72	0.49990		
3.33	0.49957	3.73	0.49990		
3.34	0.49958	3.74	0.49991		
3.35	0.49960	3.75	0.49991		
3.36	0.49961	3.76	0.49992		
3.37	0.49962	3.77	0.49992		
3.38	0.49964	3.78	0.49992		
3.39	0.49965	3.79	0.49992		

APPENDIX F

VALUES OF z FOR BI-SERIAL CORRELATION ¹

q	z	q	z	q	z
.500	.3989	.450	.3958	.400	.3863
.499	.3989	.449	.3957	.399	.3861
.498	.3989	.448	.3955	.398	.3858
.497	.3989	.447	.3954	.397	.3856
.496	.3989	.446	.3953	.396	.3853
.495	.3989	.445	.3951	.395	.3850
.494	.3989	.444	.3950	.394	.3848
.493	.3989	.443	.3949	.393	.3845
.492	.3989	.442	.3947	.392	.3842
.491	.3988	.441	.3946	.391	.3840
.490	.3988	.440	.3944	.390	.3837
.489	.3988	.439	.3943	.389	.3834
.488	.3988	.438	.3941	.388	.3831
.487	.3987	.437	.3940	.387	.3828
.486	.3987	.436	.3938	.386	.3825
.485	.3987	.435	.3936	.385	.3823
.484	.3986	.434	.3935	.384	.3820
.483	.3986	.433	.3933	.383	.3817
.482	.3985	.432	.3931	.382	.3814
.481	.3985	.431	.3930	.381	.3811
.480	.3984	.430	.3928	.380	.3808
.479	.3984	.429	.3926	.379	.3804
.478	.3983	.428	.3924	.378	.3801
.477	.3983	.427	.3922	.377	.3798
.476	.3982	.426	.3921	.376	.3795
.475	.3982	.425	.3919	.375	.3792
.474	.3981	.424	.3917	.374	.3789
.473	.3980	.423	.3915	.373	.3786
.472	.3980	.422	.3913	.372	.3782
.471	.3979	.421	.3911	.371	.3779
.470	.3978	.420	.3909	.370	.3776
.469	.3977	.419	.3907	.369	.3772
.468	.3977	.418	.3905	.368	.3769
.467	.3976	.417	.3903	.367	.3766
.466	.3975	.416	.3901	.366	.3762
.465	.3974	.415	.3899	.365	.3759
.464	.3973	.414	.3896	.364	.3755
.463	.3972	.413	.3894	.363	.3752
.462	.3971	.412	.3892	.362	.3748
.461	.3970	.411	.3890	.361	.3745
.460	.3969	.410	.3887	.360	.3741
.459	.3968	.409	.3885	.359	.3738
.458	.3967	.408	.3883	.358	.3734
.457	.3966	.407	.3881	.357	.3730
.456	.3965	.406	.3878	.356	.3727
.455	.3964	.405	.3876	.355	.3723
.454	.3963	.404	.3873	.354	.3719
.453	.3962	.403	.3871	.353	.3719
.452	.3961	.402	.3868	.352	.3712
.451	.3959	.401	.3866	.351	.3708

¹ Adopted by permission from Enlow, Elmer R., *Statistics in Education and Psychology*, p. 165. New York: Prentice-Hall, Inc., 1937.

Appendix F

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<i>q</i>	<i>z</i>	<i>q</i>	<i>z</i>	<i>q</i>	<i>z</i>
.350	.3704	.300	.3477	.250	.3178
.349	.3700	.299	.3472	.249	.3171
.348	.3696	.298	.3466	.248	.3164
.347	.3692	.297	.3461	.247	.3157
.346	.3688	.296	.3456	.246	.3151
.345	.3684	.295	.3450	.245	.3144
.344	.3680	.294	.3445	.244	.3137
.343	.3676	.293	.3440	.243	.3130
.342	.3672	.292	.3434	.242	.3123
.341	.3668	.291	.3429	.241	.3116
.340	.3664	.290	.3423	.240	.3109
.339	.3660	.289	.3417	.239	.3102
.338	.3656	.288	.3412	.238	.3095
.337	.3652	.287	.3406	.237	.3087
.336	.3647	.286	.3401	.236	.3080
.335	.3643	.285	.3395	.235	.3073
.334	.3639	.284	.3389	.234	.3066
.333	.3635	.283	.3384	.233	.3059
.332	.3630	.282	.3378	.232	.3051
.331	.3626	.281	.3372	.231	.3044
.330	.3621	.280	.3366	.230	.3036
.329	.3617	.279	.3360	.229	.3029
.328	.3613	.278	.3355	.228	.3022
.327	.3608	.277	.3349	.227	.3014
.326	.3604	.276	.3343	.226	.3007
.325	.3599	.275	.3337	.225	.2999
.324	.3595	.274	.3331	.224	.2992
.323	.3590	.273	.3325	.223	.2984
.322	.3585	.272	.3319	.222	.2976
.321	.3581	.271	.3313	.221	.2969
.320	.3576	.270	.3306	.220	.2961
.319	.3571	.269	.3300	.219	.2953
.318	.3567	.268	.3294	.218	.2945
.317	.3562	.267	.3288	.217	.2938
.316	.3557	.266	.3282	.216	.2930
.315	.3552	.265	.3275	.215	.2922
.314	.3548	.264	.3269	.214	.2914
.313	.3543	.263	.3263	.213	.2906
.312	.3538	.262	.3256	.212	.2898
.311	.3533	.261	.3250	.211	.2890
.310	.3528	.260	.3244	.210	.2882
.309	.3523	.259	.3237	.209	.2874
.308	.3518	.258	.3231	.208	.2866
.307	.3513	.257	.3224	.207	.2858
.306	.3508	.256	.3218	.206	.2849
.305	.3503	.255	.3211	.205	.2841
.304	.3498	.254	.3204	.204	.2833
.303	.3493	.253	.3198	.203	.2825
.302	.3487	.252	.3191	.202	.2816
.301	.3482	.251	.3184	.201	.2808

q	z	q	z	q	z
.200	.2800	.150	.2332	.100	.1755
.199	.2791	.149	.2321	.099	.1742
.198	.2783	.148	.2311	.098	.1729
.197	.2774	.147	.2300	.097	.1716
.196	.2766	.146	.2290	.096	.1703
.195	.2757	.145	.2279	.095	.1690
.194	.2748	.144	.2269	.094	.1677
.193	.2740	.143	.2258	.093	.1664
.192	.2731	.142	.2247	.092	.1651
.191	.2722	.141	.2237	.091	.1637
.190	.2714	.140	.2226	.090	.1624
.189	.2705	.139	.2215	.089	.1610
.188	.2696	.138	.2204	.088	.1597
.187	.2687	.137	.2193	.087	.1583
.186	.2678	.136	.2182	.086	.1570
.185	.2669	.135	.2171	.085	.1556
.184	.2660	.134	.2160	.084	.1542
.183	.2651	.133	.2149	.083	.1529
.182	.2642	.132	.2138	.082	.1515
.181	.2633	.131	.2127	.081	.1501
.180	.2624	.130	.2115	.080	.1487
.179	.2615	.129	.2104	.079	.1473
.178	.2606	.128	.2093	.078	.1458
.177	.2596	.127	.2081	.077	.1444
.176	.2587	.126	.2070	.076	.1430
.175	.2578	.125	.2059	.075	.1416
.174	.2568	.124	.2047	.074	.1401
.173	.2559	.123	.2035	.073	.1387
.172	.2550	.122	.2024	.072	.1372
.171	.2540	.121	.2012	.071	.1357
.170	.2531	.120	.2000	.070	.1343
.169	.2521	.119	.1989	.069	.1328
.168	.2511	.118	.1977	.068	.1313
.167	.2502	.117	.1965	.067	.1298
.166	.2492	.116	.1953	.066	.1283
.165	.2482	.115	.1941	.065	.1268
.164	.2473	.114	.1929	.064	.1253
.163	.2463	.113	.1917	.063	.1238
.162	.2453	.112	.1905	.062	.1222
.161	.2443	.111	.1893	.061	.1207
.160	.2433	.110	.1880	.060	.1191
.159	.2423	.109	.1868	.059	.1176
.158	.2413	.108	.1856	.058	.1160
.157	.2403	.107	.1843	.057	.1144
.156	.2393	.106	.1831	.056	.1128
.155	.2383	.105	.1818	.055	.1112
.154	.2373	.104	.1806	.054	.1096
.153	.2362	.103	.1793	.053	.1080
.152	.2352	.102	.1781	.052	.1064
.151	.2342	.101	.1768	.051	.1048

Appendix F

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<i>q</i>	<i>s</i>	<i>q</i>	<i>s</i>	<i>q</i>	<i>s</i>
.050	.1031	.030	.0680	.010	.0267
.049	.1015	.029	.0662	.009	.0243
.048	.0998	.028	.0643	.008	.0219
.047	.0982	.027	.0623	.007	.0195
.046	.0965	.026	.0604	.006	.0170
.045	.0948	.025	.0584	.005	.0145
.044	.0931	.024	.0565	.004	.0118
.043	.0914	.023	.0545	.003	.0091
.042	.0897	.022	.0525	.002	.0063
.041	.0879	.021	.0505	.001	.0034
.040	.0862	.020	.0484		
.039	.0844	.019	.0464		
.038	.0826	.018	.0443		
.037	.0809	.017	.0422		
.036	.0791	.016	.0400		
.035	.0773	.015	.0379		
.034	.0755	.014	.0357		
.033	.0736	.013	.0335		
.032	.0718	.012	.0312		
.031	.0699	.011	.0290		

APPENDIX G

THE LEAST SIGNIFICANT (5%) VALUES OF CORRELATION MEASURES ¹

This chart is adapted to the evaluation of both simple and more complicated measures of correlation. To that end, curves are designated according to the number of constants in the regression equation. For simple linear correlation, therefore, the curve $m = 2$ is used, and the same curve may be employed in evaluating bi-serial r and bi-serial η .

The procedure in the use of the chart is as follows: (1) Locate the given number of items, N , on the base line. (2) Note the point at which the ordinate of that number intersects the selected curve. (3) Read the appropriate value on the horizontal scale directly at the left of the point of intersection. For instance, for a simple linear coefficient derived from analysis of 75 cases, the indicated value is approximately 0.23. This value is the least significant for the given conditions; that is, a value as great or greater would appear only once in twenty times by pure chance.

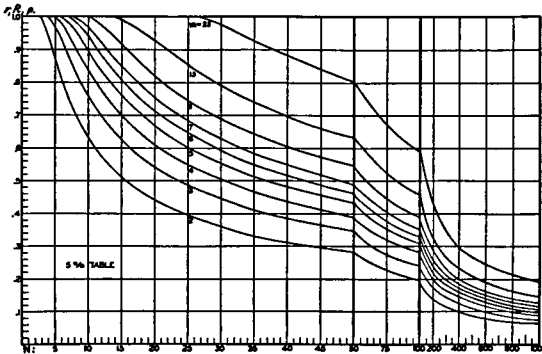


Fig. 37.—Least Significant Measures of Correlation.

¹Reproduced by permission from Davies, G. R., and Yoder, Dale, *Business Statistics*, p. 497. New York: John Wiley & Sons, Inc., 1937.

APPENDIX H

THE LEAST HIGHLY SIGNIFICANT (1%) VALUES OF CORRELATION MEASURES¹

This chart, like Figure 37, is adapted to the evaluation of both simple and more complicated measures of correlation. It is for that reason that a number of curves are included. Each is designated in terms of the number of constants in the regression equation. For simple correlation and for bi-serial r and bi-serial η , the curve, $m = 2$, is used.

The steps in evaluating a given measure are the same as those for Figure 37. The resultant value is that which may be regarded as the least highly significant; that is, a value as great or greater would appear only once in one hundred times by pure chance.

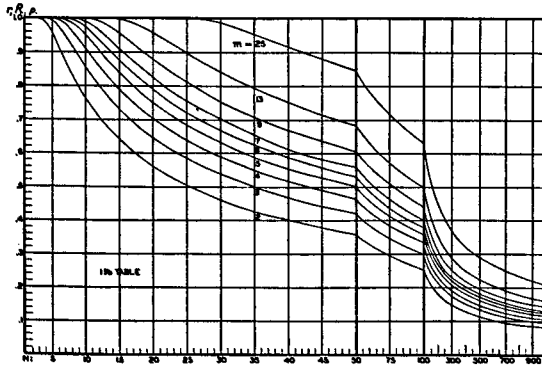


Fig. 38.—Least Highly Significant Measures of Correlation.

¹ Reproduced by permission from Davies, G. R., and Yoder, Dale, *Business Statistics*, p. 498. New York: John Wiley & Sons, Inc., 1937.

APPENDIX I

EVALUATION OF CHI-SQUARE¹

The measure of chi-square is used to determine to what extent a given distribution conforms to the characteristics of a normal or chance distribution having similar characteristics. The chart indicates the degree of probability that a given distribution is merely the result of chance. That probability is expressed in the form of a percentage, and the discovered probability represents, therefore, the number of times in one hundred that the given distribution might be expected to appear by pure chance. If the probability is 5 per cent or less, it may be considered significant; if it is 1 per cent or less, it is conventionally regarded as highly significant.

To use the chart: (1) Locate the given value of chi-square on the base line. (2) Select the appropriate curve, which is that whose number corresponds to the number of classes per row less

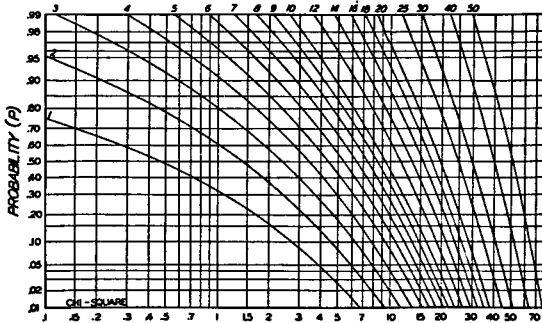


Fig. 39.—Evaluation of Chi-Square.

¹ Reproduced by permission from Davies, G. R., and Yoder, Dale, *Business Statistics*, p. 502. New York: John Wiley & Sons, Inc., 1937.

one multiplied by the number of classes per column less one. Thus, for the ordinary fourfold table, the curve is $(2 - 1) \times (2 - 1) = 1$. For a three by two table, the curve is $(3 - 1) \times (2 - 1) = 2$. (3) Note the point of intersection of the selected curve with the ordinate rising from the given value on the base line. (4) Read the probability on the horizontal scale at the left of the point of intersection. To illustrate, assume a chi-square value of 1.5 from a fourfold table. The curve is that numbered 1. The indicated probability is approximately .22, which means that a value of chi-square as great or greater might appear, under these conditions, 22 times in one hundred by pure chance.

APPENDIX J

CONVERSION SCALE FOR INTELLIGENCE QUOTIENTS ¹

This chart may be most effectively utilized if a ruler is held in a horizontal position across the five scales. It thus indicates equivalent intelligence quotients as measured by each of the tests.

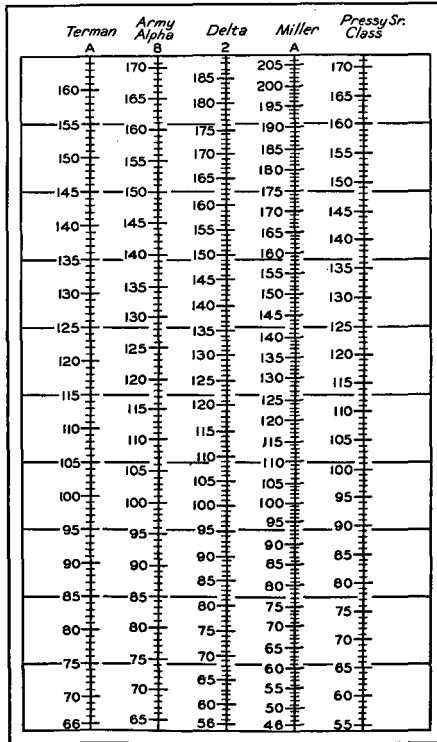


Fig. 40.—Conversion Scale for Intelligence Quotients.

¹ Adapted from Finch, F. A., "Equating Intelligence Quotients from Group Tests," *Journal of Educational Research*, December, 1935, Vol. 28, pp. 589-592.

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