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Occupational status in 2000
Over a century of census-based measurement

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Abstract. The Nam–Powers–Boyd Occupational Status Scale for the year 2000 is introduced here. It is the sixth in a decennial series of such scales that were initiated at the Census Bureau a half century earlier. The bureau's examination of occupational status actually goes back to the end of the 19th century and its thread continues today. The historical background of the 2000 scale, the methodology for constructing the scores, some comparisons with other occupational scales, the 2000 scores themselves, and applications of the 2000 scores are presented.

Keywords: Measurement, Occupations, Socioeconomic

Introduction

The occupational status scores presented in this article carry forward a tradition of interest in occupations and their social significance going back to the founding of the American nation. In the sections that follow, we will cover these aspects of census-based occupational measurement: (1) historical background; (2) methodology for constructing the occupational status scores; (3) conceptual and empirical comparisons with other occupational scales; (4) the 2000 scores themselves; and (5) applications of the 2000 scores.

Historical background

Although the first census of the United States in 1790 was a bare-bones inquiry, covering items of sex, age, color, and slave status, there had been an attempt to also include an item on occupational pursuit. James Madison, who championed the collection of occupational information, made reference to the need for "the description of the several classes in

which the community is divided.'' He remarked that ''If the plan was pursued in taking every future census, it would give them an opportunity of marking the progress of the society, and distinguishing the growth of every interest'' (Gales 1834: 1108). Madison's proposal failed to gain sufficient support, but two Pennsylvania communities opted for adding the occupation item to their schedules (Rossiter 1909: 142). Moreover, with the later support of Thomas Jefferson and others (Padover 1943), the groundwork was laid for the inclusion of the occupation item in the census of 1820.

From three broad categories of occupations in 1820, the number increased over time to at least several hundred. More importantly, the Census of 1850 shifted from family to individual enumeration, making it possible to link occupations with persons other than the family head, and the census of 1870 introduced the concept of ''gainful work'' in occupations which related occupations to their monetary rewards. In 1940, the addition of an employment-unemployment framework sharpened the contribution of occupational activities to the labor force structure (Nam & Powers 1983: 26–28).

This evolution of occupational information in the censuses extended the kind of data that was available, but no attempt was made to convert occupations into the ''classes of society'' Madison had earlier envisaged until just before the 20th century began. In 1897, William C. Hunt, a Department of Labor staff member and later to be Census Bureau official, initiated a systematic analysis of occupational data for socioeconomic interpretation. In a Bulletin of the Department of Labor, Hunt (1897) reviewed the tabulations of workers at gainful occupations in the censuses of 1870, 1880, and 1890, and described the trends by age and sex, and for states over that period of time. He grouped the specific occupations into four great groups, designated as A, B, C, and D. Each of the groupings had subcategories (4 in group A, 2 in group B, 12 in group C, and 9 in group D), based on Hunt's understanding of ''the character of employment.'' Analysis of changes from 1870 to 1890 in the distribution of these categories led Hunt to conclude ''that the great body of workers has, as a whole, progressed and has perceptibly risen in the social scale of life.''

After Hunt's work, it became increasingly apparent that occupations could be examined both as components of a labor force structure and as indicators of a country's social stratification (Scoville 1972). Alba Edwards, in charge of occupational statistics for the 1910 Census, was familiar with Hunt's work and decided to carry it one step further. He built up a new classificatory scheme, which he published in an article on

"Social-Economic Groups of the United States" in the *Journal of the American Statistical Association* (Edwards 1917). The 1910 census data on roughly 428 occupations were grouped into nine categories bearing the titles of proprietors, officials, and managers; clerks and kindred workers; skilled workers; semi-skilled workers; laborers; servants; public officials; semi-official public employees; and professional persons. (These categories were forerunners of what was in later years to be called major occupational groups.) The assignment of each occupation to a broad category was done on the basis of Edwards' familiarity with the occupation. Measures of educational attainment and income had not yet been introduced into the census, so no empirical basis for the assignments was available. Using this classification scheme, Edwards analyzed the distributions for 1870 to 1910, thus extending and refining what Hunt had started. Over the next couple of decades, Edwards continued to revise his classification and in 1933 published another article in the *Journal of the American Statistical Association* (Edwards 1933). During the long stretch of Edwards' work on the social-economic grouping of occupations, his publications on the topic were restricted to professional journals. None of it was issued in government publications. But the Census Bureau finally assented to a monograph on historical statistics on occupation, including social-economic groupings (Edwards 1938).

Subsequently, a major publication of the 1940 census incorporated this material, using the newly developed labor force concept, with its components of employment and unemployment (Edwards 1943). Since education and income data were collected in the 1940 census, Edwards presented the average education and income for each occupational group to demonstrate that it supported the "descending order of the social-economic status of the workers comprising them and that they do constitute a scale" (Edwards 1943: 80). He added this prophetic statement: "With increased accuracy in the original census data, and with more nearly exact classification of these data by occupation, education, and income, it will be possible to refine the context of the respective groups and thus to make them a more nearly exact and satisfactory scale for the measurement of census and other occupation data" (Edwards 1943: 182).

In the late 1950s, as preliminary work for the 1960 census was being carried out, several of the Census Bureau's Population Division staff discussed the possibility of creating a new socioeconomic scale of occupations that was an upgraded version of what Edwards had done previously (Nam & Powers 1983: 42, 43). After consideration of a

number of alternative methodologies, Census Working Paper No. 15 was issued and titled Methodology and Scores of Socioeconomic Status (US Bureau of the Census 1963). The principal author was Charles B. Nam, but several colleagues, especially Howard G. Brunsman, Paul C. Glick, and Edward G. Stockwell made important contributions. The scores were used as an integral part of the 1960 census tabulations, including a separate subject report on socioeconomic status. Mary G. Powers, who joined the Bureau staff subsequently, collaborated with Nam on further developments of the scale.

In the preparation of the scale for 1980 and 1990, E. Walter Terrie was affiliated with Nam and Powers in constructing the scores. Monica Boyd provided major input to the 2000 version of the scale, thus extending the list of major contributors to the century-old tradition of census-based occupational socioeconomic measurement.

Methodology for constructing the scores

The occupational socioeconomic scores developed at the Census Bureau in the late 1950s were designed to reflect the average education and income of incumbents of each detailed occupation. It was determined that no data external to the census would be used and that education and income were valid indicators of what is meant by socioeconomic status. In this sense, the derived score would represent a level of living for persons in the occupation. Because the score is an average for the occupation, it was recognized that the score did not apply to the particular person to whom the score was assigned but rather to the typical person in that occupation.

The procedures for calculating the scores were as follows. (1) Array the detailed list of census detailed occupations in the experienced civilian labor force according to the median educational level of the incumbents. (2) Array the same occupations separately according to the median income level of the incumbents. (3) Using the number of persons engaged in each occupation, determine the cumulative interval of persons in each occupation for each of the two arrays, beginning with the lowest-ranked occupation. (4) Average the midpoints of the two cumulative intervals of occupants and divide by the total number of persons in all occupations. (The end result can be arrived at by using shortcut calculations.)

For example, if there were 50 million persons in the experienced civilian labor force, of whom 1 million were in occupation X, and the

median educational level was higher for occupations containing 14 million persons, the cumulative interval of persons for occupation X in the education array would be 14,500,001–15,000,000. If a similar calculation for the income array resulted in a cumulative interval of 17,000,001–18,000,000, then 14,500,000 (the midpoint on the education interval) plus 17,500,000 (the midpoint on the income interval) would average to 15,000,000, when divided by 50,000,000, the total experienced civilian labor force, would result in a score for occupation X of 32. The occupation scores can take values from 0 to 100.

Particular features of this methodology (referred to again in the section "Conceptual and empirical comparisons with other occupational scales") include (1) the essential constancy of the method over time regardless of changes in occupational classification; and (2) the straightforward interpretation of the score as the approximate percentage of persons in the experienced civilian labor force who are in occupations having combined levels of education and income lower than the given occupation.

This methodology was used for 1950 (US Bureau of the Census 1963), for 1960 (Nam & Powers 1968), for 1970 (Nam et al. 1975), for 1980 (Nam & Terrie 1988), for 1990 (Terrie & Nam 1994), and for 2000 (as indicated herein).

Some conceptual and empirical comparisons with other occupational scales

There is a substantial literature that deals with occupational measurement (Nam & Powers 1983: Chapter 1). Many of the earliest studies focused on how individuals rated the social standing of particular occupations, generally known as prestige ratings of occupations. Almost all of these considered only limited sets of occupations and obtained the ratings from particular categories of individuals, such as college students. Among these are the studies of Counts (1925), Anderson (1927, 1928), Wilkinson (1929), Lehman and Witty (1931), Hartman (1934), Smith (1935), Neitz (1935), Coutu (1936), Osgood and Stegner (1941), Deeg and Patterson (1947), Clark (1948), and Cattell (1942).

Warner et al. (1949) and Hollingshead (1949) collected assessments of occupations through community studies. Both of these also used alternative methods to gauge social status. Warner constructed an Index of Status Characteristics based on a weighted combination of measures of occupation, house type, and dwelling area. Hollingshead devised

indexes combining judged class position, residence, occupation, and education. In each case, the judgment of the researcher was paramount in establishing the scales.

Subsequently, prestige-based ratings of occupations were introduced by the National Opinion Research Center (NORC) in 1947 (North & Hatt 1949) and repeated in occasional later years. Siegel (1971) combined several of these prestige-based surveys to derive a scale that covered as many as 203 occupations.

The best known of all occupational scales is that of Duncan (1961), whose so-called Socioeconomic Index of All Occupations attempted to apply census indicators of education and income for the full range of occupations to the NORC data. Using multiple regression statistical procedures, Duncan predicted the percentage of occupations that would have favorable prestige ratings on the NORC survey based on the census socioeconomic indicators. In later years, the Duncan index was replicated with allowance for changes in census occupational classification and other time-ordered variations in the data (Hauser & Warren 1997; Nakao & Treas 1994; Stevens & Cho 1985; Stevens & Featherman 1981).

At about the same time as Nam and colleagues were developing the US Census occupational scale, similar work was being done in Canada by Blishen (1958). Still later, Bogue (1962, 1969) constructed a socioeconomic scale of occupations, and Blau and Duncan (1967) rank-ordered major occupational groupings according to education and income.

In addition to the methodological differences in the construction of these several scales, an important distinction is the extent to which they measure a prestige vs. socioeconomic dimension of occupations. Nam (2000) has attempted to show the conceptual bases of the major occupational scales, as well as the empirical differences in the relative distribution of resulting scores and the statistical association of each with independent variables of socio-demographic interest.

If prestige is what we intend to measure, and operational measures of it relate to judgments made by persons concerning the "social standing" of other persons or the positions they hold, as is the case with the vast majority of occupational scales found in the research literature, then the resulting indicators must be interpreted as relating to status attributes such as prestige, respect, honor, and reputation. If, on the other hand, the intention is to measure social class or socioeconomic level, and operational measures of it are reported objective characteristics such as education and income, then the resulting data should be interpreted as indicating the level of living of those being studied. From this perspective, of the three most often used occupational scales (Miller &

Salkind 2002), Siegel's scale is a "pure prestige" scale, Duncan's scale is a "socioeconomically predicted prestige" scale, and the Nam-Powers-Boyd scale is a "pure socioeconomic" scale. Which scale a researcher chooses should be based on the type of measure that best fits the intended analysis.

The 2000 Nam–Powers–Boyd Occupational Status Scores (OSS)

In calculating the occupational status scores for 2000, we applied the previously described methods to the 1 percent sample, available from Integrated Public Use Microdata Series (IPUMS) housed at the Minnesota Population Center, University of Minnesota. The resulting Nam–Powers–Boyd scores are displayed in Appendix A. The highest score of 100 is found for dentists and for physicians and surgeons (census occupational codes of 301 and 306) and the lowest is assigned to counter attendants in cafeterias, food concessions and coffee shops and to dishwasher (census occupational codes of 406 and 414).

The population for these scores consists of the civilian experienced labour force, age 16 and older. It excludes those who are unemployed, never worked or did not work during the last 5 years. As well, 0.6% of those reporting occupations are excluded because they are working for the armed forces, including those in military occupations (codes 980–983). This omission is consistent with data collection practices in censuses from 1960 to 1980. During these years, the universe for occupations excluded persons currently in the armed forces (see <www.ipums.org/usa/pwork/occa.html>). We continue to exclude military employment and military occupations in order to reduce the sensitivity of rankings of civilian occupations to upswings and downturns in the size of the military as a result of governmental actions.

Although our method of calculating occupational status scores remains the same over time, we used earnings instead of total income in producing the scores for 2000. The earlier practice of combining information on education and total income originated in an era where researchers had to rely on data released in hard copy format and where highly detailed, publicly available census data sets were non-existent. Although it breaks with earlier procedures, we believe our selection of earnings is more consistent with the development of a scale based on the socioeconomic properties of occupations.

Two restrictions arise from the reliance on census data to generate the new 2000 scores. First, occupational status scores rest on information for

one job. The census asks respondents to report only one occupation, either the job at which the person worked the greatest number of hours during the reference week prior to the census, or, if unemployed or out of the labor force, their most recent job within the previous 5 years. Information for other jobs held simultaneously is not collected. According to estimates from the Current Population Survey for 2000, 5.6% of the employed population was classified as multiple jobholders (see US Census Bureau 2000: 4–6; 2002: 377). (However, earnings data apply to all jobs held.)

Second, the 2000 Nam–Powers–Boyd occupational status scores use the maximum amount of occupational detail available from the 2000 census and they map completely to the occupational codes found in the 1% sample. However, in the 5% data for 2000, the Census Bureau suppressed about 7% of the occupational codes (because of disclosure concerns where state data were available), and combined these suppressed occupational categories with other occupational categories (see <www.ipums.org/usa/volii/00occup.html>). This aggregation affected 4.2% of the reference population used to generate the 2001 Nam–Powers–Boyd scores. Appendix B indicates the percentage distributions for the specific occupations found in the 1% sample that were collapsed in the 5% sample. In all cases, one detailed occupational title dominates. Two possible options exist for users of the 5% sample: (1) to apply the score reported in this paper for the dominant occupational title to the aggregated occupational code found in the 5% census sample or (2) to produce a ''new'' score for the aggregated code by applying the proportion of the reference population in each detailed code in the 1% sample (see Appendix A) to the relevant Nam–Power–Boyd score, and then summing. In the first case, the score assigned to the aggregated occupation of mathematicians, statisticians and miscellaneous mathematical science occupations found in the 5% sample would be the score for the occupational code of ''statisticians'' (90 for the 1% sample) which contains 76% of the population in the larger aggregation (Appendix B). In the second case, a composite score of 91 would be calculated from Appendixes A and B by summing (0.103*98) + (0.764*90) + (0.133*91).

Applications of the 2000 OSS

Occupational measures are used extensively throughout the social and biological sciences as independent, contextual or dependent variables. In recent research, occupational status scores are used as control vari-

ables or as independent variables in studies of injury and in studies of health outcomes (Hearth-Holmes et al. 1997; Hummer et al. 1998; Koessel et al. 1996; Steenland et al. 2003; Volinn et al. 1991), and as antecedent variables in studies of social behavior, ranging from risk of homelessness (Herman et al. 1997) to determinants of African–American marriage and family structures (Cready et al. 1997). Occupational status scores also are used as dependent variables (Powers & Seltzer 1998; Powers et al. 1998) and as measures of inequality between groups (Baunach 2002; Seibert et al. 1997).

Occupational status scores (and other prestige and occupational scales) are incorporated into particular research designs because they strongly differentiate among social groups. When we attach the scores to the occupations of the experienced civilian labor force in the 1% census sample, we find a clear gradient in status among groups in American society, defined by sex, age, residential location, race, Hispanic origins, nativity and English speaking ability (Appendix C). On average, scores are the highest for men, for those in the established career years of 45–64, and for persons living in Statistical Metropolitan Areas (SMAs), particularly in Washington, DC, in contrast to the mean scores for women, those under age 45 or over age 64 and persons not living in SMAs. Percentage distributions tell a similar story, with lower means associated with the greater concentration of that group having scores between 0 and 19.

Variations in occupational status by race are quite pronounced in 2000. The highest mean status is found for Asian Indian-Hindus, followed by the Chinese, Korean, and the white populations. The American Indian, black, and Vietnamese populations have substantially lower mean occupational status scores. Within the Hispanic origin population, variation also exists, with higher average scores characterizing Cubans and the lowest average scores existing for Mexican Hispanics. Some of these racial and Hispanic differences, of course, are associated with nativity and recent arrival as well as with correlates such as English language skills. Recent arrivals have lower occupational status scores on average than those arriving before 1990 and the native born. Similarly, not speaking English is associated with a very low average occupational status score. Nearly half (45%) of this group are in occupations where scores range from 0 to 19. Conversely, the highest occupational status scores characterize persons who speak only English or speak English very well.

None of the patterns found in Appendix A are surprising for students of immigration or for researchers in stratification. The data confirm that the scores do discriminate between social groups. This, of course, has been the objective of virtually all classifications and scaling of occupations in American censuses for nearly 200 years.

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Appendix A

Nam–Powers–Boyd occupational scores for 2000, census occupational codes and titles. The first column shows the Nam–Powers–Boyd occupational score. The second set of digits show the census occupational code in 2000. Calculations based on data from the 1% sample of the 2000 census

Management occupations		
93	1	Chief executives
86	2	General and operations managers
76	3	Legislators
86	4	Advertising and promotions managers
90	5	Marketing and sales managers
89	6	Public relations managers
82	10	Administrative services managers
93	11	Computer and information systems managers
86	12	Financial managers
82	13	Human resources managers
84	14	Industrial production managers
86	15	Purchasing managers
70	16	Transportation, storage, and distribution managers
49	20	Farm, ranch, and other agricultural managers
31	21	Farmers and ranchers
77	22	Construction managers
92	23	Education administrators
96	30	Engineering managers
52	31	Food service managers
75	32	Funeral directors
63	33	Gaming managers
63	34	Lodging managers
85	35	Medical and health services managers
97	36	Natural sciences managers
76	40	Postmasters and mail superintendents
67	41	Property, real estate, and community association managers
78	42	Social and community service managers
86	43	Managers, all other
Business operations specialists		
70	50	Agents and business managers of artists, performers, and athletes
57	51	Purchasing agents and buyers, farm products
62	52	Wholesale and retail buyers, except farm products
74	53	Purchasing agents, except wholesale, retail, and farm products
73	54	Claims adjusters, appraisers, examiners, and investigators

Appendix A. *(Continued)*

80	56	Compliance officers, except agriculture, construction, health and safety, & transportation
76	60	Cost estimators
77	62	Human resources, training, and labor relations specialists
83	70	Logisticians
92	71	Management analysts
72	72	Meeting and convention planners
69	73	Other business operations specialists
Financial specialists		
85	80	Accountants and auditors
81	81	Appraisers and assessors of real estate
89	82	Budget analysts
75	83	Credit analysts
94	84	Financial analysts
92	85	Personal financial advisors
82	86	Insurance underwriters
91	90	Financial examiners
76	91	Loan counselors and officers
73	93	Tax examiners, collectors, and revenue agents
44	94	Tax preparers
73	95	Financial specialists, all other
Computer and mathematical occupations		
89	100	Computer scientists and systems analysts
90	101	Computer programmers
94	102	Computer software engineers
76	104	Computer support specialists
89	106	Database administrators
83	110	Network and computer systems administrators
84	111	Network systems and data communications analysts
96	120	Actuaries
98	121	Mathematicians
90	122	Operations research analysts
90	123	Statisticians
91	124	Miscellaneous mathematical science occupations
Architecture and engineering occupations		
92	130	Architects, except naval
84	131	Surveyors, cartographers, and photogrammetrists

Appendix A. *(Continued)*

95	132	Aerospace engineers
91	133	Agricultural engineers
91	134	Biomedical engineers
95	135	Chemical engineers
94	136	Civil engineers
92	140	Computer hardware engineers
94	141	Electrical and electronics engineers
95	142	Environmental engineers
90	143	Industrial engineers, including health and safety
92	144	Marine engineers and naval architects
92	145	Materials engineers
93	146	Mechanical engineers
91	150	Mining and geological engineers, including mining safety engineers
96	151	Nuclear engineers
95	152	Petroleum engineers
94	153	Engineers, all other
69	154	Drafters
72	155	Engineering technicians, except drafters
56	156	Surveying and mapping technicians
Life, physical, and social science occupations		
83	160	Agricultural and food scientists
88	161	Biological scientists
88	164	Conservation scientists and foresters
93	165	Medical scientists
99	170	Astronomers and physicists
94	171	Atmospheric and space scientists
91	172	Chemists and materials scientists
93	174	Environmental scientists and geoscientists
91	176	Physical scientists, all other
98	180	Economists
87	181	Market and survey researchers
93	182	Psychologists
92	183	Sociologists
96	184	Urban and regional planners
82	186	Miscellaneous social scientists and related workers
59	190	Agricultural and food science technicians
67	191	Biological technicians
71	192	Chemical technicians

Appendix A. *(Continued)*

75	193	Geological and petroleum technicians
79	194	Nuclear technicians
53	196	Other life, physical, and social science technicians
Community and social services occupations		
75	200	Counselors
77	201	Social workers
68	202	Miscellaneous community and social service specialists
75	204	Clergy
63	205	Directors, religious activities and education
50	206	Religious workers, all other
Legal occupations		
99	210	Lawyers
98	211	Judges, magistrates, and other judicial workers
71	214	Paralegals and legal assistants
64	215	Miscellaneous legal support workers
Education, training, and library occupations		
86	220	Postsecondary teachers
45	230	Preschool and kindergarten teachers
83	231	Elementary and middle school teachers
86	232	Secondary school teachers
80	233	Special education teachers
45	234	Other teachers and instructors
77	240	Archivists, curators, and museum technicians
82	243	Librarians
22	244	Library technicians
32	254	Teacher assistants
88	255	Other education, training, and library workers
Arts, design, entertainment, sports, and media occupations		
56	260	Artists and related workers
67	263	Designers
55	270	Actors
86	271	Producers and directors
41	272	Athletes, coaches, umpires, and related workers
32	274	Dancers and choreographers
51	275	Musicians, singers, and related workers
37	276	Entertainers and performers, sports and related workers, all other
55	280	Announcers

Appendix A. *(Continued)*

78	281	News analysts, reporters and correspondents
79	282	Public relations specialists
79	283	Editors
89	284	Technical writers
76	285	Writers and authors
57	286	Miscellaneous media and communication workers
66	290	Broadcast and sound engineering technicians and radio operators
55	291	Photographers
73	292	Television, video, and motion picture camera operators and editors
66	296	Media and communication equipment workers, all other
Healthcare practitioners and technical occupations		
97	300	Chiropractors
100	301	Dentists
70	303	Dietitians and nutritionists
99	304	Optometrists
97	305	Pharmacists
100	306	Physicians and surgeons
78	311	Physician assistants
99	312	Podiatrists
83	313	Registered nurses
91	314	Audiologists
88	315	Occupational therapists
90	316	Physical therapists
84	320	Radiation therapists
74	321	Recreational therapists
77	322	Respiratory therapists
87	323	Speech-language pathologists
74	324	Therapists, all other
98	325	Veterinarians
71	326	Health diagnosing and treating practitioners, all other
73	330	Clinical laboratory technologists and technicians
74	331	Dental hygienists
72	332	Diagnostic related technologists and technicians
65	340	Emergency medical technicians and paramedics
49	341	Health diagnosing and treating practitioner support technicians
57	350	Licensed practical and licensed vocational nurses
45	351	Medical records and health information technicians
57	352	Opticians, dispensing

Appendix A. *(Continued)*

60	353	Miscellaneous health technologists and technicians
79	354	Other healthcare practitioners and technical occupations
Healthcare support occupations		
28	360	Nursing, psychiatric, and home health aides
62	361	Occupational therapist assistants and aides
56	362	Physical therapist assistants and aides
48	363	Massage therapists
45	364	Dental assistants
42	365	Medical assistants and other healthcare support occupations
Protective service occupations		
72	370	First-line supervisors/managers of correctional officers
85	371	First-line supervisors/managers of police and detectives
83	372	First-line supervisors/managers of fire fighting and prevention workers
67	373	Supervisors, protective service workers, all other
77	374	Fire fighters
77	375	Fire inspectors
60	380	Bailiffs, correctional officers, and jailers
87	382	Detectives and criminal investigators
83	383	Fish and game wardens
44	384	Parking enforcement workers
79	385	Police and sheriff's patrol officers
48	386	Transit and railroad police
44	390	Animal control workers
72	391	Private detectives and investigators
36	392	Security guards and gaming surveillance officers
11	394	Crossing guards
11	395	Lifeguards and other protective service workers
Food preparation and serving occupations		
39	400	Chefs and head cooks
33	401	First-line supervisors/managers of food preparation and serving workers
8	402	Cooks
3	403	Food preparation workers
30	404	Bartenders
4	405	Combined food preparation and serving workers, including fast food
1	406	Counter attendants, cafeteria, food concession, and coffee shop
20	411	Waiters and waitresses

Appendix A. *(Continued)*

16	412	Food servers, nonrestaurant
1	413	Dining room and cafeteria attendants and bartender helpers
1	414	Dishwashers
4	415	Hosts and hostesses, restaurant, lounge, and coffee shop
5	416	Food preparation and serving related workers, all other
Building and grounds cleaning and maintenance occupations		
37	420	First-line supervisors/managers of housekeeping and janitorial workers
52	421	First-line supervisors/managers of landscaping, lawn service, and groundskeeping workers
17	422	Janitors and building cleaners
7	423	Maids and housekeeping cleaners
44	424	Pest control workers
11	425	Grounds maintenance workers
Personal care and service occupations		
62	430	First-line supervisors/managers of gaming workers
54	432	First-line supervisors/managers of personal service workers
37	434	Animal trainers
25	435	Nonfarm animal caretakers
45	440	Gaming services workers
27	441	Motion picture projectionists
11	442	Ushers, lobby attendants, and ticket takers
15	443	Miscellaneous entertainment attendants and related workers
32	446	Funeral service workers
31	450	Barbers
31	451	Hairdressers, hairstylists, and cosmetologists
24	452	Miscellaneous personal appearance workers
36	453	Baggage porters, bellhops, and concierges
32	454	Tour and travel guides
62	455	Transportation attendants
21	460	Child care workers
19	461	Personal and home care aides
37	462	Recreation and fitness workers
36	464	Residential advisors
24	465	Personal care and service workers, all other
Sales occupations		
60	470	First-line supervisors/managers of retail sales workers
76	471	First-line supervisors/managers of non-retail sales workers

Appendix A. *(Continued)*

11	472	Cashiers
17	474	Counter and rental clerks
42	475	Parts salespersons
32	476	Retail salespersons
73	480	Advertising sales agents
74	481	Insurance sales agents
87	482	Securities, commodities, and financial services sales agents
56	483	Travel agents
74	484	Sales representatives, services, all other
79	485	Sales representatives, wholesale and manufacturing
21	490	Models, demonstrators, and product promoters
70	492	Real estate brokers and sales agents
90	493	Sales engineers
20	494	Telemarketers
21	495	Door-to-door sales workers, news and street vendors, and related workers
61	496	Sales and related workers, all other
Office and administrative support occupations		
66	500	First-line supervisors/managers of office and administrative support workers
34	501	Switchboard operators, including answering service
39	502	Telephone operators
55	503	Communications equipment operators, all other
49	510	Bill and account collectors
47	511	Billing and posting clerks and machine operators
48	512	Bookkeeping, accounting, and auditing clerks
37	513	Gaming cage workers
55	514	Payroll and timekeeping clerks
63	515	Procurement clerks
36	516	Tellers
66	520	Brokerage clerks
59	521	Correspondence clerks
53	522	Court, municipal, and license clerks
54	523	Credit authorizers, checkers, and clerks
48	524	Customer service representatives
68	525	Eligibility interviewers, government programs
29	526	File clerks
33	530	Hotel, motel, and resort desk clerks

Appendix A. *(Continued)*

38	531	Interviewers, except eligibility and loan
38	532	Library assistants, clerical
59	533	Loan interviewers and clerks
58	534	New accounts clerks
36	535	Order clerks
59	536	Human resources assistants, except payroll and timekeeping
34	540	Receptionists and information clerks
53	541	Reservation and transportation ticket agents and travel clerks
49	542	Information and record clerks, all other
55	550	Cargo and freight agents
37	551	Couriers and messengers
51	552	Dispatchers
46	553	Meter readers, utilities
69	554	Postal service clerks
69	555	Postal service mail carriers
67	556	Postal service mail sorters, processors, and processing machine operators
66	560	Production, planning, and expediting clerks
33	561	Shipping, receiving, and traffic clerks
24	562	Stock clerks and order fillers
36	563	Weighers, measurers, checkers, and samplers, record keeping
54	570	Secretaries and administrative assistants
58	580	Computer operators
41	581	Data entry keyers
45	582	Word processors and typists
67	583	Desktop publishers
56	584	Insurance claims and policy processing clerks
32	585	Mail clerks and mail machine operators, except postal service
40	586	Office clerks, general
36	590	Office machine operators, except computer
51	591	Proofreaders and copy markers
60	592	Statistical assistants
60	593	Office and administrative support workers, all other
Farming, fishing, and forestry occupations		
33	600	First-line supervisors/managers of farming, fishing, and forestry workers
64	601	Agricultural inspectors
28	602	Animal breeders
4	604	Graders and sorters, agricultural products
6	605	Miscellaneous agricultural workers

Appendix A. *(Continued)*

21	610	Fishing and hunting workers
20	611	Hunters and trappers
18	612	Forest and conservation workers
21	613	Logging workers
Construction trades		
60	620	First-line supervisors/managers of construction trades and extraction workers
51	621	Boilermakers
29	622	Brickmasons, blockmasons, and stonemasons
35	623	Carpenters
29	624	Carpet, floor, and tile installers and finishers
24	625	Cement masons, concrete finishers, and terrazzo workers
21	626	Construction laborers
30	630	Paving, surfacing, and tamping equipment operators
63	631	Pile driver operators
40	632	Construction equipment workers, except paving, surfacing, and tamping equipment
24	633	Drywall installers, ceiling tile installers, and tapers
58	635	Electricians
41	636	Glaziers
30	640	Insulation workers
23	642	Painters, construction and maintenance
41	643	Paperhangers
47	644	Pipelayers, plumbers, pipefitters, and steamfitters
27	646	Plasterers and stucco masons
32	650	Reinforcing iron and rebar workers
18	651	Roofers
50	652	Sheet metal workers
47	653	Structural iron and steel workers
12	660	Helpers, construction trades
71	666	Construction and building inspectors
66	670	Elevator installers and repairers
20	671	Fence erectors
40	672	Hazardous materials removal workers
38	673	Highway maintenance workers
49	674	Rail-track laying and maintenance equipment operators
33	675	Septic tank servicers and sewer pipe cleaners
33	676	Miscellaneous construction and related workers

Appendix A. *(Continued)*

Extraction workers		
40	680	Derrick, rotary drill, and service unit operators, oil, gas, and mining
41	682	Earth drillers, except oil and gas
53	683	Explosives workers, ordnance handling experts, and blasters
52	684	Mining machine operators
47	691	Roof bolters, mining
14	692	Roustabouts, oil and gas
20	693	Helpers - extraction workers
35	694	Other extraction workers
Installation, maintenance, and repair workers		
68	700	First-line supervisors/managers of mechanics, installers, and repairers
66	701	Computer, automated teller, and office machine repairers
70	702	Radio and telecommunications equipment installers and repairers
72	703	Avionics technicians
53	704	Electric motor, power tool, and related repairers
54	705	Electrical and electronics installers and repairers, transportation equipmen
68	710	Electrical and electronics repairers, industrial and utility
63	711	Electronic equipment installers and repairers, motor vehicles
48	712	Electronic home entertainment equipment installers and repairers
52	713	Security and fire alarm systems installers
72	714	Aircraft mechanics and service technicians
33	715	Automotive body and related repairers
43	716	Automotive glass installers and repairers
37	720	Automotive service technicians and mechanics
48	721	Bus and truck mechanics and diesel engine specialists
51	722	Heavy vehicle and mobile equipment service technicians and mechanics
32	724	Small engine mechanics
20	726	Miscellaneous vehicle and mobile equipment mechanics, installers, and repair
55	730	Control and valve installers and repairers
51	731	Heating, air conditioning, and refrigeration mechanics and installers
45	732	Home appliance repairers
56	733	Industrial and refractory machinery mechanics
47	734	Maintenance and repair workers, general
50	735	Maintenance workers, machinery
63	736	Millwrights

Appendix A. *(Continued)*

64	741	Electrical power-line installers and repairers
57	742	Telecommunications line installers and repairers
67	743	Precision instrument and equipment repairers
39	751	Coin, vending, and amusement machine servicers and repairers
62	752	Commercial divers
46	754	Locksmiths and safe repairers
22	755	Manufactured building and mobile home installers
46	756	Riggers
69	760	Signal and track switch repairers
11	761	Helpers–installation, maintenance, and repair workers
43	762	Other installation, maintenance, and repair workers
Production occupations		
60	770	First-line supervisors/managers of production and operating workers
45	771	Aircraft structure, surfaces, rigging, and systems assemblers
28	772	Electrical, electronics, and electromechanical assemblers
50	773	Engine and other machine assemblers
50	774	Structural metal fabricators and fitters
29	775	Miscellaneous assemblers and fabricators
22	780	Bakers
22	781	Butchers and other meat, poultry, and fish processing workers
37	783	Food and tobacco roasting, baking, and drying machine operators and tenders
25	784	Food batchmakers
11	785	Food cooking machine operators and tenders
54	790	Computer control programmers and operators
46	792	Extruding and drawing machine setters, operators, and tenders, metal and plastic
44	793	Forging machine setters, operators, and tenders, metal and plastic
36	794	Rolling machine setters, operators, and tenders, metal and plastic
33	795	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic
37	796	Drilling and boring machine tool setters, operators, and tenders, metal and plastic
30	800	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic
41	801	Lathe and turning machine tool setters, operators, and tenders, metal and plastic

Appendix A. *(Continued)*

43	802	Milling and planing machine setters, operators, and tenders, metal and plastic
52	803	Machinists
43	804	Metal furnace and kiln operators and tenders
68	806	Model makers and patternmakers, metal and plastic
38	810	Molders and molding machine setters, operators, and tenders, metal and plastic
42	812	Multiple machine tool setters, operators, and tenders, metal and plastic
64	813	Tool and die makers
39	814	Welding, soldering, and brazing workers
48	815	Heat treating equipment setters, operators, and tenders, metal and plastic
47	816	Lay-out workers, metal and plastic
38	820	Plating and coating machine setters, operators, and tenders, metal and plastic
45	821	Tool grinders, filers, and sharpeners
34	822	Metalworkers and plastic workers, all other
30	823	Bookbinders and bindery workers
43	824	Job printers
46	825	Prepress technicians and workers
45	826	Printing machine operators
13	830	Laundry and dry-cleaning workers
9	831	Pressers, textile, garment, and related materials
11	832	Sewing machine operators
19	833	Shoe and leather workers and repairers
20	834	Shoe machine operators and tenders
20	835	Tailors, dressmakers, and sewers
26	836	Textile bleaching and dyeing machine operators and tenders
16	840	Textile cutting machine setters, operators, and tenders
24	841	Textile knitting and weaving machine setters, operators, and tenders
19	842	Textile winding, twisting, and drawing out machine setters, operators, and tenders
44	843	Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers
76	844	Fabric and apparel patternmakers
23	845	Upholsterers
18	846	Miscellaneous textile, apparel, and furnishings workers, except upholsterers

Appendix A. *(Continued)*

37	850	Cabinetmakers and bench carpenters
32	851	Furniture finishers
53	852	Model makers and patternmakers, wood
21	853	Sawing machine setters, operators, and tenders, wood
21	854	Woodworking machine setters, operators, and tenders, except sawing
32	855	Woodworkers, all other
73	860	Power plant operators, distributors, and dispatchers
63	861	Stationary engineers and boiler operators
61	862	Water and liquid waste treatment plant and system operators
65	863	Miscellaneous plant and system operators
57	864	Chemical processing machine setters, operators, and tenders
35	865	Crushing, grinding, polishing, mixing, and blending workers
21	871	Cutting workers
35	872	Extruding, forming, pressing, and compacting machine setters, operators, and tenders
41	873	Furnace, kiln, oven, drier, and kettle operators and tenders
45	874	Inspectors, testers, sorters, samplers, and weighers
34	875	Jewelers and precious stone and metal workers
47	876	Medical, dental, and ophthalmic laboratory technicians
18	880	Packaging and filling machine operators and tenders
30	881	Painting workers
33	883	Photographic process workers and processing machine operators
55	884	Semiconductor processors
23	885	Cementing and gluing machine operators and tenders
20	886	Cleaning, washing, and metal pickling equipment operators and tenders
23	890	Cooling and freezing equipment operators
35	891	Etchers and engravers
38	892	Molders, shapers, and casters, except metal and plastic
40	893	Paper goods machine setters, operators, and tenders
56	894	Tire builders
17	895	Helpers–production workers
30	896	Production workers, all other
Transportation and material moving occupations		
60	900	Supervisors, transportation and material moving workers
92	903	Aircraft pilots and flight engineers
84	904	Air traffic controllers and airfield operations specialists
39	911	Ambulance drivers and attendants,except emergency medical technicians

Appendix A. *(Continued)*

31	912	Bus drivers
41	913	Driver/sales workers and truck drivers
31	914	Taxi drivers and chauffeurs
18	915	Motor vehicle operators, all others
70	920	Locomotive engineers and operators
61	923	Railroad brake, signal, and switch operators
68	924	Railroad conductors and yardmasters
59	926	Subway, streetcar, and other rail transportation workers
40	930	Sailors and marine oilers
66	931	Ship and boat captains and operators
65	933	Ship engineers
58	934	Bridge and lock tenders
20	935	Parking lot attendants
11	936	Service station attendants
67	941	Transportation inspectors
53	942	Other transportation workers
30	950	Conveyer operators and tenders
51	951	Crane and tower operators
37	952	Dredge, excavating, and loading machine operators
41	956	Hoist and winch operators
31	960	Industrial truck and tractor operators
8	961	Cleaners of vehicles and equipment
20	962	Laborers and freight, stock, and material movers, hand
22	963	Machine feeders and offbearers
12	964	Packers and packagers, hand
50	965	Pumping station operators
22	972	Refuse and recyclable material collectors
14	973	Shuttle car operators
28	974	Tank car, truck, and ship loaders
33	975	Material moving workers, all other?

Appendix B
Occupational Distributions of the Nam–Powers–Boyd reference population[a] for Census Occupational Codes in the 1% Sample, but Collapsed in the 5% Sample[b]

121	Mathematicians	10.3
123	Statisticians	76.4
124	Miscellaneous mathematical science occupations	13.3
Total		100.0
133	Agricultural engineers	0.8
134	Biomedical engineers	2.6
153	Engineers, all others	96.6
Total		100.0
150	Mining and geological engineers, includ. Safety Mining Eng.	35.1
152	Petroleum engineers	64.9
Total		100.0
183	Sociologists	6.1
186	Miscellaneous social scientists and related workers	93.9
Total		100.0
194	Nuclear technicians	2.0
196	Other life, physical, and social science technicians	98.0
Total		100.0
290	Broadcast and sound engineering technicians	99.7
296	Media and communication equipment workers	0.3
Total		100.0
383	Fish and game wardens	32.9
384	Parking enforcement workers	67.1
Total		100.0
385	Police and sheriffs patrol officers	99.8
386	Transit and railroad police	0.2
Total		100.0
413	Dining room and cafeteria attendants and bartenders	98.1
416	Food preparation and serving related workers	1.9
Total		100.0

Appendix B. *(Continued)*

521	Correspondence clerks	4.6
535	Order clerks	95.4
Total		100.0
602	Animal breeders	0.5
605	Miscellaneous agricultural workers	99.5
Total		100.0
610	Fishing and hunting workers	97.6
611	Hunters and trappers	2.4
Total		100.0
631	Pile driver operators	0.6
632	Const equip, exc paving, surfacing and tamping equip.	99.4
Total		100.0
650	Reinforcing iron and rebar workers	6.0
653	Structural iron and steel workers	94.0
Total		100.0
680	Derrick, rotary drill, and service unit	87.3
692	Roustabouts, oil and gas	12.7
Total		100.0
691	Roof bolters, mining	10.8
693	Helpers - extraction workers	12.1
694	Other extraction workers	77.0
Total		100.0
705	Electrical &electronics installers & repairers, transportation equip.	20.6
710	Electrical and electronics repairers, industrial & utility	9.4
Total		100.0
752	Commercial divers	1.1
760	Signal and track switch repairers	1.4
762	Other installation, maintenance, and repair workers	97.4
Total		100.0

Appendix B. *(Continued)*

802	Milling and planing machine setters, operators & tenders, metal and plastic	0.5
812	Multiple machine tool setters, operators & tenders, metal and plastic	1.0
822	Metalworkers and plastic workers, all others	98.5
Total		100.0
843	Extruding and forming machine setters, operators & tenders, synthetic & glass fibers	1.0
844	Fabric and apparel patternmakers	10.5
846	Miscellaneous textile, apparel, and fur	88.5
Total		100.0
852	Model makers and patternmakers, wood	5.2
855	Woodworkers, all other	94.8
Total		100.0
884	Semiconductor processors	0.5
890	Cooling and freezing equipment operator	0.3
896	Production workers, all other	99.2
Total		100.0
911	Ambulance drivers and attendants, except emergency medical technicians	21.8
915	Motor vehicle operators, all other	78.2
Total		100.0
934	Bridge and lock tenders	27.4
942	Other transportation workers	72.6
Total		100.0
950	Conveyer operators and tenders	7.7
973	Shuttle car operators	7.6
974	Tank car, truck, and ship loaders	5.3
975	Material moving workers, all other	79.4
Total		100.0

[a] Data are weighted to population estimates.
[b] For example, in the 1% sample, information was given for two occupations: codes 183 (sociologists) and 186 (miscellaneous social scientists and related workers). In the 5% sample, these two occupations are collapsed into one code and one title. See <www.ipums.org/usa/volii/00occup/html>.

Appendix C
Distribution of Nam–Powers–Boyd occupational scores for categories of the experienced civilian labor force reference population, age 16 plus, in the United States, 2000.

	Percent distribution of scores						
	Mean score	Total	0–19	20–39	40–59	60–79	80–100
Total Population age 16+	50.0	100.0	12.8	27.3	20.8	19.4	19.6
Sex							
Male	51.0	100.0	11.4	28.6	18.5	21.7	19.8
Female	48.8	100.0	14.3	25.9	23.3	17.1	19.4
Age groups							
16–44	47.7	100.0	14.4	29.4	20.5	18.2	17.5
45–64	54.7	100.0	9.4	22.9	21.5	22.1	24.0
65+	48.6	100.0	14.4	28.6	20.7	18.8	17.4
Residential location							
Los Angeles	50.3	100.0	13.4	26.8	19.8	19.9	20.1
NY–North-East NJ	52.9	100.0	11.6	25.3	19.6	20.1	23.5
Chicago	52.7	100.0	10.9	25.8	20.4	20.1	22.8
San Francisco-Oakland-Vallejo	54.9	100.0	11.2	22.5	19.0	20.7	26.6
Washington, DC	59.3	100.0	9.2	19.5	17.1	21.3	32.9
Other SMA	51.5	100.0	12.0	25.8	20.8	20.2	21.3
Not in SMA	47.4	100.0	14.0	29.7	21.3	18.4	16.5
Race							
White	52.1	100.0	10.8	25.7	21.3	20.7	21.4
Black	42.4	100.0	18.4	33.8	20.3	15.9	11.5
American Indian	41.4	100.0	19.3	33.9	20.4	15.9	10.4
Chinese	58.1	100.0	13.9	18.6	15.2	14.9	37.4
Filipino	51.4	100.0	13.9	24.6	19.4	18.3	23.8
Asian Ind-Hindu	64.7	100.0	9.0	16.2	12.7	15.7	46.4
Korean	52.8	100.0	14.4	23.4	14.6	23.3	24.3
Vietnamese	44.7	100.0	14.5	39.7	15.8	13.2	16.8
All others	39.1	100.0	23.5	34.6	18.3	13.5	10.2
Hispanic origin							
Not Hispanic	51.5	100.0	11.3	26.3	21.1	20.2	21.0
Mexican	35.0	100.0	27.7	36.6	17.3	11.8	6.5

Appendix C. *(Continued)*

Puerto Rican	43.1	100.0	18.7	32.5	20.4	17.4	11.0
Cuban	49.2	100.0	14.0	26.4	22.6	18.6	18.4
Dominican	37.6	100.0	23.3	38.9	16.7	13.6	7.4
All other Hispanic	39.6	100.0	23.0	34.0	18.6	14.0	10.3
Nativity							
Native born	50.9	100.0	11.5	26.7	21.6	20.3	19.9
Foreign Born, arr. before 1990	46.3	100.0	18.2	29.7	17.6	16.4	18.1
Foreign Born, arr. 1991-2000	40.0	100.0	26.0	34.1	13.6	10.0	16.3
English speaking ability							
Does not speak English	23.9	100.0	45.2	39.6	8.8	4.7	1.7
Speaks only English	51.3	100.0	11.3	26.5	21.5	20.4	20.4
Speaks English very well	50.9	100.0	13.0	26.7	19.9	18.4	22.0
Speaks English well	41.4	100.0	20.5	34.8	18.2	13.9	12.6
Speaks English, but not well	31.1	100.0	33.4	39.5	13.1	8.8	5.2

Source: Scores in Appendix A**,** attached to the reference population, 1 percent sample, 2000 Census of Population. Data are weighted to population estimates.