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Legislative Anthropology as Applied to Congress—Being a Chapter in the Scientific Study of Modern Civilized Man

BY

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WASHINGTON, D. C.

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Legislative anthropology includes the legislative, political (not partisan), sociological, psychological, and physical status of members of a legislature or parliament.

The legislative status is based upon the number of bills, amendments, motions, and resolutions introduced and the number of these reported or passed either house or enacted into law; also upon the frequency of remarks (not length) on the floor, including number of subjects discussed; and also upon the number of appointments and designations. The legislative status is estimated mainly according to the difficulty of bills and resolutions, in passing through the regular legislative stages, up to and including enactment into law.

The political status consists in the political party to which a member belongs and in public offices held and political honors received previous to entering the legislature, also length of service in legislature or parliament.

The sociological and psychological status is concerned with predominant lineage or heredity, place and time of birth (including order of birth), profession, occupation, and degree of education of member previous to entering legislature; also any appropriate psychological tests.

The physical status includes fundamental anthropological measurements of the body, and what is most important, the health or hygienic condition of the member of a legislature.

In addition to the general importance of such data, one purpose is to find whether or not, and if so, in what degree, these different statuses are related or depend upon each other and to compare nations as to anthropological status.

LEGISLATURE BEST ORGANIZATION TO REPRESENT COUNTRY

The physical measurements of members of a legislature represent the anthropological status of the whole country better than measurements of any other body of men. More important still, these measurements can be a basis for the health of the nation, one of its greatest assets. The examination of members of a parliament by specialists include the stomach, heart, lungs, ear, nose, throat, genito-urinary organs, nervous system, skin and hair, blood, and eyes, X-ray and general physical examination, each by a different specialist.

MEMBERS OF CONGRESS AS AN OBJECT OF SCIENTIFIC STUDY

The Members of Congress are not only of special interest politically but scientifically. As chosen servants of the people, they have great importance; for coming from all sections of the United States, they are truly representative, and afford a good opportunity to establish an anthropological status of our country. It would be impracticable to study thousands or more of the adult population in all sections of this country. So mathematically speaking, for purposes of research, we can regard the 500 or more Members of Congress as representing the Nation. If Congress will set the example, it will help other countries to begin similar studies of their legislative bodies, until eventually we can establish a comparative anthropology of modern legislative man, and be able to distinguish between statesmen of different states and nations as to their general legislative and anthropological status. It is also probable that where the physical status of the legislature of a nation or state excels that of another nation or state, the general physical condition of that country or state itself is superior.

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In Table 1 are given anthropological measurements of 89 Members of Congress, including length, breadth, and height of head, with estimates of cranial capacity and brain weight; also stature, sitting height, arm reach, chest girth, and weight; also length and width of face and nose. Then physiological measurements were taken, including hand grasp; also disagreeable, uncomfortable, and threshold of pain pressure on the temples; also sociological data, giving educational status, predominant lineage, occupation, and place and time of birth.

SIGNIFICANCE OF BRAIN WEIGHT

In the animal kingdom in at least three-fourths of the cases, and very probably more, the species with the heavier brain show more intelligence, and this is specially striking when we come to man as compared with the lower animals. For as man's intelligence is so much greater than that of the animals, so his brain is correspondingly heavier. Thus in the animals near to man, as the gorilla, the brain weight is from 400 to 500 grams (14 to 17 ounces), while in man it is from 900 to 1,800 (31 to 63 ounces) or more grams, certainly a prodigious rise or, rather, jump, the average for man being from 1,350 to 1,450 grams (47 to 51 ounces).

These comparative brain weights, especially in man, refer to groups and not to individuals; and here let me, once for all, caution the reader as to a very common error; that is, because Congressman A has a heavier brain than Congressman B it does not in the least mean that Congressman A is the more intelligent, but it does seem to mean that a hundred Congressman A's, whose average weight of brain is greater than the average brain weight of 100 Congressman B's, are the more intelligent in at least three-fourths, and probably more, of group instances. In short, it is the general trend in the animal kingdom that brain weight and intelligence go together; there are exceptions, but they are comparatively so few as to prove the rule. But when we come to man, individuals vary so that no conclusion can be drawn as to this or that person. Yet after all is said, a heavy brain, especially in relation to body build or weight, is a favorable sign. The elephant has a weight of brain more than twice that of man, but in relation to his body weight he is as 1 to 500, while man's weight of body is to his brain weight as 1 to 36. The brains of about 100 distinguished persons have been weighed and studied, and in the great majority of cases the weight is distinctly above the average, and here again the exception only tends to confirm the rule, or general trend. Many of the exceptions cited of large brains and little wit are pathological, and are necessarily excluded from consideration, as in the case, for instance, of idiots and imbeciles, some of whom have large brains.

In his study of 20,000 Washington school children some 30 years ago the author found that for each age the average head circumference of the positively bright children was distinctly greater than that of dull children of the same age; and as the numbers were large, this could hardly be accidental.[1]

METHOD OF ESTIMATING BRAIN WEIGHT

After permission for an autopsy is obtained, and as soon after death as possible, and before rigor mortis has set in, each case is measured just as on the living, and then the brain is removed and weighed; then the estimated weight is compared with the actual weight and the difference is noted. In about half of the cases the estimated weight is more than the actual weight, and in the other half less than the actual weight; so that the average of a number of cases of estimated weight can be determined approximately, because the too muchs and too littles cancel each other. Thus from outside head measurements of the 18 Members of the delegation from Massachusetts, for instance, their average weight of brain can be found approximately.

In estimating the brain weight of the 89 Members of Congress, from outside measurements of the head, the following equation was used, called the "Lee formula," which gives the cranial capacity and is written:

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[1] See S. Doc. No. 186, 68th Cong., 3d sess., entitled "Man and Abnormal Man."

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TABLE 1.—*Anthropological measurements of 89 Members of Congress*

Number	Age	Head measurements (millimeters)			Estimate of—		Body					Face (millimeters)		Nose (millimeters)		Physiological								Sociological									
																Hand grasp (killograms)			Temporal algometer pressure (grams):						Education				Predominant lineage (heredity)	Occupation	Birth (time and place)			
																			Right hand			Left hand												
		Length	Breadth	Height	Cranial capacity (cubic centimeters)	Weight of brain (grams)	Stature (centimeters)	Sitting height (centimeters)	Arm reach (centimeters)	Chest girth (centimeters)	Weight (pounds)	Length	Width	Length	Width	Right	Left	Both hands	Least disagreeable	Uncomfortable	Threshhold of pain	Least disagreeable	Uncomfortable	Threshhold of pain	University	College	High school	Common school			Summer	Winter	City	Country
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1	29	198	160	145	1,664	1,581	178	92	179	107	210	97	140	32	20	49	39	88	800	1,050	1,500	1,100	1,200	2,450	---	x	---	---	French-Dutch. Irish-Scotch	Lawyer	---	x	---	x
2	31	184	146	138	1,405	1,306	175	90	174	88	134	102	130	47	32	50	41	91	1,600	-------	-------	1,650	-------	-------	x	---	---	---	Dutch-English German German.	do	x	---	---	x
3	35	186	156	137	1,483	1,379	185	89	193	85	215	97	136	36	21	49	41	90	1,800	1,150	2,000	2,000	1,500	2,100	x	---	---	---	French	do	x	---	x	---
4	35	194	152	140	1,527	1,435	182	89	182	89	157	111	126	36	14	-------	-------	-------	850	-------	-------	950	-------	-------	x	---	---	---	Norwegian	Business	---	---	---	x
5	36	201	152	146	1,625	1,543	180	95	178	90	167	105	122	42	13	-------	-------	-------	1,600	1,500	-------	1,700	1,250	-------	x	---	---	---	Scotch-Irish	Lawyer	---	x	---	x
6	37	194	150	141	1,520	1,428	172	88	164	86	140	93	124	31	12	28	30	58	1,300	2,050	2,950	1,500	1,950	3,150	---	x	---	---	Irish	Art or business	x	---	x	---
7	38	200	160	142	1,649	1,566	176	89	182	108	220	96	142	34	15	49	46	95	1,950	2,050	2,400	2,600	2,600	2,850	---	---	---	x	German	Farmer	---	x	x	---
8	39	191	164	140	1,603	1,523	171	89	166	93	------	95	142	33	16	25	23	48	1,300	-------	-------	1,100	-------	-------	x	---	---	---	English	Lawyer	x	---	x	---
9	39	192	152	149	1,593	1,499	176	90	180	89	154	92	130	30	12	43	34	77	1,950	1,700	2,350	1,575	2,100	2,650	x	---	---	---	English Welsh	do	---	---	---	x
10	41	188	156	144	1,556	1,462	191	97	195	120	228	95	144	33	17	50	45	95	1,000	1,200	950	1,250	1,250	750	x	---	---	---	Norwegian	do	---	x	---	x
11	41	196	156	135	1,527	1,435	177	85	183	95	163	100	132	26	14	35	31	66	850	-------	-------	1,000	-------	-------	---	x	---	---	English-German.	Teacher	x	---	---	x
12	42	196	151	145	1,576	1,481	173	93	171	93	158	99	126	37	19	35	30	65	1,250	1,700	2,100	1,150	1,750	2,500	x	---	---	---	Irish	Lawyer	x	---	---	x
13	43	200	160	150	1,724	1,655	170	91	177	111	210	92	126	30	22	38	38	76	1,500	2,500	2,300	1,950	2,400	2,200	x	---	---	---	Irish-English	do	---	x	---	x
14	44	190	150	145	1,529	1,437	177	84	170	102	181	93	140	29	19	34	29	63	1,600	-------	-------	1,800	-------	-------	x	---	---	---	English-French	do	x	---	---	x
15	44	194	148	138	1,591	1,495	174	82	176	90	150	100	124	37	14	47	38	85	2,300	1,700	1,750	2,500	1,150	2,000	x	---	---	---	Scotch	do	---	x	---	x
16	45	202	157	148	1,693	1,608	183	------	198	104	200	112	152	33	17	-------	-------	-------	-------	-------	-------	-------	-------	-------	---	x	---	---	Norwegian	Dentist	---	x	---	x
17	45	202	156	132	1,535	1,443	177	90	181	97	180	95	130	34	13	44	48	92	1,650	1,550	1,800	1,400	1,650	1,750	x	---	---	---	French-English	Lawyer	x	---	---	x
18	45	194	154	140	1,543	1,450	178	92	177	106	195	91	124	33	15	-------	-------	-------	1,500	2,100	2,600	1,550	2,000	3,150	x	---	---	---	English-Scotch	do	x	---	---	x
19	45	200	142	140	1,482	1,378	171	93	176	100	170	100	134	52	14	39	38	77	2,000	2,350	2,500	1,950	2,300	2,650	x	---	---	---	English-English.	do	x	---	---	x
20	46	196	156	151	1,671	1,587	182	95	183	99	195	99	122	31	16	40	38	78	1,650	1,800	2,450	1,016	2,200	2,800	x	---	---	---	Welsh-Norwegian.	do	---	x	x	---
21	46	200	154	145	1,626	1,545	188	91	185	99	165	110	122	46	32	48	43	91	1,600	-------	-------	850	-------	-------	x	---	---	---	Scotch-English	Engineer	x	---	x	---
22	46	188	156	140	1,521	1,430	164	87	165	100	179	98	140	40	14	35	32	67	1,000	1,000	1,050	1,100	1,400	1,050	x	---	---	---	Dutch	Lawyer	---	x	x	---
23	46	198	150	141	1,545	1,452	178	90	180	92	170	102	124	32	16	45	31	76	2,575	1,550	2,350	2,650	1,250	2,250	---	---	---	x	English-Irish	do	x	---	---	x
24	47	190	152	134	1,452	1,350	172	89	172	105	190	97	142	27	19	39	36	75	1,000	1,500	1,550	950	1,200	1,050	---	x	---	---	English-English.	do	x	---	---	x
25	47	194	150	137	1,486	1,382	168	81	164	92	150	115	130	37	15	30	30	60	855	-------	-------	950	-------	-------	---	---	---	x	Scotch-Irish	do	x	---	---	x
26	48	194	158	140	1,657	1,574	177	88	178	116	235	107	148	37	20	55	44	99	1,500	1,800	1,500	2,000	1,700	1,600	---	---	---	x	English-German.	Banker	x	---	x	---
27	48	196	162	143	1,575	1,480	182	95	182	108	202	111	140	32	17	41	30	71	1,500	1,750	2,400	1,800	2,250	2,300	x	---	---	---	English-Scotch	Lawyer	---	x	---	x
28	49	198	152	141	1,561	1,467	183	95	187	93	168	97	134	37	17	48	42	90	1,600	1,650	2,000	1,450	1,500	2,500	---	x	---	---	German-Welsh	Educator	---	x	---	x
29	49	186	156	136	1,475	1,371	177	89	180	93	150	95	132	29	13	30	26	56	1,550	1,700	1,800	1,350	1,600	1,950	x	---	---	---	English-Scotch	Lawyer	---	x	---	x
30	49	192	156	140	1,547	1,454	186	95	190	101	200	96	132	33	16	50	55	105	2,050	2,600	3,600	2,050	2,450	3,000	x	---	---	---	Dutch-English	Educator	x	---	---	x
31	50	212	164	151	1,857	1,801	193	------	211	122	258	118	148	36	23	58	52	110	2,300	1,650	2,300	2,700	1,700	2,700	---	x	---	---	Irish-Scotch	Manufacturer	---	---	---	---
32	50	206	152	130	1,587	1,492	179	84	188	111	------	103	146	36	22	55	50	105	850	-------	-------	800	-------	-------	x	---	---	---	English	Farmer	---	x	---	x
33	51	202	156	147	1,675	1,591	179	98	190	100	190	101	132	34	17	30	28	58	1,300	-------	-------	1,100	-------	-------	---	x	---	---	English-German.	Business	---	x	---	x
34	50	202	160	138	1,624	1,543	177	88	184	106	167	93	132	32	16	44	38	82	1,000	1,550	1,500	1,100	1,750	1,800	---	x	---	---	English-Scotch	Dentist	---	x	---	x
35	50	201	150	134	1,506	1,416	181	95	185	107	170	98	126	31	14	36	34	70	3,000	2,760	3,050	2,700	3,200	3,700	---	x	---	---	English-English.	Lawyer	x	---	---	x
36	50	194	156	141	1,568	1,473	191	94	199	104	191	93	124	32	18	40	29	69	2,100	1,750	1,500	2,000	1,750	1,950	x	---	---	---	Scotch-Irish	Farmer, teacher, lawyer.	---	x	---	x
37	50	188	156	134	1,470	1,367	183	93	180	105	200	93	126	33	13	48	45	93	1,700	1,800	1,800	2,000	1,600	1,800	x	---	---	---	English-English.	Lawyer	---	x	---	x
38	50	201	150	141	1,563	1,469	170	84	170	98	180	98	136	36	19	41	32	73	1,750	2,100	1,950	2,000	2,450	-------	---	---	x	---	German-Dutch	Farmer, banker	x	---	---	x
39	51	200	160	146	1,687	1,602	169	84	176	98	155	96	138	39	18	39	36	75	1,600	1,700	2,300	1,400	2,050	2,300	---	x	---	---	Scotch-Welsh-English	Lawyer	---	x	---	x
40	51	200	160	137	1,602	1,522	177	92	178	104	170	111	122	65	13	42	38	80	1,800	2,000	2,300	1,700	2,000	2,200	x	---	---	---	Scotch-Irish-English	do	---	x	---	x
41	51	192	146	141	1,476	1,372	177	92	172	97	167	98	120	32	11	35	29	64	1,750	-------	-------	1,650	-------	-------	---	x	---	---	English-Welsh	do	x	---	---	x
42	52	204	160	139	1,646	1,564	181	93	182	105	200	106	130	29	17	28	25	53	1,250	2,000	2,250	1,450	2,000	2,300	x	---	---	---	English-English.	do	---	x	---	x
43	52	198	162	146	1,691	1,605	177	88	181	93	167	93	128	27	17	41	40	81	1,250	-------	-------	1,150	-------	-------	---	---	x	---	English-Scotch	Educator	---	x	x	---
44	52	194	162	134	1,518	1,427	182	86	180	106	217	96	150	27	14	45	44	89	2,150	-------	-------	1,950	-------	-------	x	---	---	---	German-German.	Lawyer	---	x	x	---

45	52	196	160	145	1,642	1,560	167	90	171	104	169	107	136	37	16	34	35	69	2,000	2,800	4,000	2,400	3,800	4,000	---	x	---	---	Dutch-French	Editor-author.	---	x	---	x
46	53	192	150	134	1,432	1,332	178	91	178	105	196	103	130	32	16	31	32	63	1,200	-------	-------	1,500	-------	-------	---	x	---	---	Serbia-French-Spanish.	Physician	x	---	---	x
47	53	194	162	154	1,737	1,668	175	96	166	89	144	106	130	29	11	34	34	68	1,050	800	-------	1,150	750	-------	---	---	---	x	English-Scotch-Irish.	Lawyer	---	x	---	x
48	53	196	150	135	1,480	1,377	170	87	197	95	148	90	134	32	20	29	25	54	1,300	-------	-------	1,400	-------	-------	---	x	---	---	Scotch-Dutch-English.	do	x	---	---	x
49	53	196	150	136	1,489	1,384	171	83	175	106	205	95	114	28	17	31	25	56	953	1,050	1,400	950	1,550	1,100	---	---	---	x	English-Scotch.	do	x	---	---	x
50	54	192	160	136	1,541	1,448	171	87	176	101	175	99	140	32	18	38	29	67	1,100	1,250	1,250	1,800	1,500	2,050	---	x	---	---	Scotch-English.	do	---	x	---	x
51	54	182	144	133	1,341	1,234	173	92	167	94	156	98	134	32	13	45	38	83	1,600	1,400	-------	1,655	1,500	-------	---	---	x	---	do	Business	---	x	---	x
52	54	214	154	144	1,707	1,639	186	90	194	110	225	116	134	36	21	38	35	73	2,450	2,650	3,100	2,550	3,600	4,000	---	x	---	---	do	Lawyer, oil producer.	---	x	---	x
53	55	192	156	130	1,458	1,356	181	92	183	96	165	85	138	38	21	32	35	67	950	-------	-------	800	-------	-------	x	---	---	---	Scotch-Aryan	Lawyer	---	x	---	x
54	55	192	152	141	1,524	1,432	173	90	174	112	205	116	124	34	22	38	36	74	2,350	2,300	3,000	3,550	2,500	3,100	---	x	---	---	English-Dutch.	do	x	---	---	x
55	55	194	156	142	1,577	1,482	174	87	178	104	175	100	128	33	14	42	38	80	1,100	1,500	1,500	1,100	1,350	1,750	x	---	---	---	German-English.	Physician	x	---	---	x
56	56	196	156	141	1,581	1,486	177	84	167	99	178	97	124	30	16	26	24	50	1,500	2,000	2,000	950	2,000	2,900	x	---	---	---	Scotch-English.	Lawyer	---	x	---	x
57	56	212	154	147	1,723	1,654	184	93	177	109	225	88	130	27	20	31	24	55	1,600	2,100	2,650	2,050	2,200	2,250	x	---	---	---	English-Scotch.	do	---	x	---	x
58	56	192	160	144	1,615	1,534	175	84	173	112	175	97	142	28	16	----	----	----	1,800	-------	-------	2,000	-------	-------	x	---	---	---	Scotch	do	---	---	---	x
59	56	196	156	135	1,523	1,432	180	92	175	119	205	97	130	40	18	32	32	64	1,750	1,250	-------	2,300	1,450	-------	x	---	---	---	Norwegian	Business	---	x	x	---
60	56	188	144	131	1,358	1,250	177	80	182	85	133	97	122	32	17	34	33	67	1,500	1,100	1,000	1,700	1,100	1,000	x	---	---	---	do	Preacher	---	x	---	x
61	56	208	162	152	1,819	1,764	185	91	180	92	166	73	134	28	19	38	34	72	550	700	-------	1,000	900	-------	x	---	---	---	Scotch-Irish	Lawyer	x	---	---	x
62	57	194	150	159	1,675	1,591	178	92	173	89	178	93	134	32	15	29	29	58	1,200	1,500	1,450	1,250	1,150	1,500	x	---	---	---	do	do	x	---	---	x
63	57	202	152	139	1,568	1,473	172	86	167	120	174	96	140	33	12	42	20	62	1,500	-------	-------	1,200	-------	-------	---	---	---	x	do	do	x	---	---	x
64	57	201	154	150	1,675	1,591	174	------	168	99	176	97	124	32	15	36	37	73	2,100	-------	-------	2,050	-------	-------	x	---	---	---	English-English.	Lawyer, business.	---	x	x	---
65	57	184	160	143	1,552	1,459	175	89	178	95	158	96	128	42	13	30	28	58	1,000	-------	-------	950	-------	-------	x	---	---	---	Scotch-English.	Lawyer	---	x	---	x
66	58	198	158	139	1,591	1,495	163	88	165	104	174	104	128	35	16	22	16	38	1,300	1,700	2,050	2,000	1,800	2,250	---	x	---	---	English-English.	do	x	---	x	---
67	58	192	146	144	1,504	1,414	167	91	160	92	142	78	114	30	16	36	28	64	1,500	1,100	-------	2,150	1,250	-------	x	---	---	---	Scotch-French	do	x	---	---	x
68	59	212	162	148	1,807	1,753	176	99	177	90	264	112	138	37	21	55	55	110	1,650	2,050	2,500	1,750	2,400	2,500	x	---	---	---	Dutch-Irish	Farmer	---	x	---	x
69	60	206	160	138	1,649	1,566	187	93	189	108	203	101	152	46	20	------	------	------	800	-------	-------	800	-------	-------	---	---	x	---	English-English.	Merchant, farmer.	---	x	---	x
70	60	202	162	149	1,747	1,678	177	83	178	122	223	100	150	22	23	40	30	70	1,500	-------	-------	1,300	-------	-------	x	---	---	---	French-Welsh	Lawyer	x	---	x	---
71	60	199	154	144	1,610	1,529	184	------	194	107	268	103	142	45	17	25	32	57	1,250	1,650	2,050	1,150	1,650	2,050	x	---	---	---	Welsh-English.	do	---	x	x	---
72	60	192	154	137	1,505	1,415	178	87	181	105	184	103	140	34	17	35	32	67	1,400	1,550	2,250	1,990	2,000	2,450	x	---	---	---	{English / Scotch-Irish}	do	x	---	---	x
73	60	194	146	144	1,513	1,422	177	88	179	92	150	96	120	46	29	34	26	60	2,000	1,950	2,000	2,000	2,200	2,300	---	---	x	---	English-English.	do	---	x	---	x
74	62	194	142	130	1,367	1,258	179	88	183	106	193	93	120	33	18	38	35	73	1,750	1,500	1,750	1,625	1,250	1,000	---	x	---	---	Dutch	Lawyer	---	x	---	x
75	62	204	166	145	1,756	1,687	175	92	172	105	192	94	134	31	19	35	29	64	2,950	1,650	2,250	2,600	2,000	2,100	x	---	---	---	English-Scotch	do	x	---	---	x
76	63	188	152	133	1,432	1,332	182	97	185	104	202	97	136	35	13	41	38	79	3,000	2,000	2,600	3,800	2,250	3,000	---	x	---	---	Scotch-Irish	do	x	---	---	x
77	63	200	151	137	1,529	1,437	181	91	179	91	150	104	131	33	17	33	32	65	1,500	1,450	1,750	1,200	1,600	1,750	---	x	---	---	Welsh-English	Banker	---	x	x	---
78	63	202	146	138	1,509	1,418	188	96	189	105	202	116	130	28	22	------	34	------	1,050	-------	-------	1,050	-------	-------	---	---	x	---	English-Dutch	Business	---	x	x	---
79	63	198	154	143	1,595	1,499	173	90	173	101	190	98	124	34	18	22	19	41	1,300	1,650	1,750	1,400	1,500	1,800	x	---	---	---	Scotch-Irish-English.	Elevator conductor.	x	---	---	x
80	65	206	154	133	1,552	1,459	176	90	178	106	193	117	128	48	20	49	44	93	2,150	1,800	2,000	2,400	2,100	2,500	---	---	---	x	Scotch-English	Farmer	---	x	---	x
81	66	194	166	144	1,677	1,593	177	83	173	113	208	102	146	33	17	27	18	45	1,020	2,001	2,000	1,001	1,600	2,400	x	---	---	---	German-German.	Editor	---	x	x	---
82	66	194	162	137	1,579	1,484	171	82	175	89	149	101	132	15	17	36	28	64	1,750	2,350	2,200	1,900	2,500	2,700	x	---	---	---	Irish-Irish	Lawyer	x	---	---	x
83	66	200	151	135	1,511	1,420	176	84	168	101	180	89	136	27	25	27	27	54	700	-------	-------	750	-------	-------	x	---	---	---	English-Scotch	do	---	x	---	x
84	67	190	150	143	1,512	1,421	169	94	164	92	145	103	132	33	14	24	26	50	2,050	1,150	-------	1,750	2,000	-------	x	---	---	---	Scotch-Scotch	do	---	x	---	x
85	68	198	156	134	1,547	1,454	182	94	184	96	185	100	134	33	22	34	30	64	2,400	1,500	2,450	2,000	1,900	2,750	---	---	x	---	English-English.	Farmer	x	---	---	x
86	68	196	154	141	1,565	1,471	176	79	178	98	163	97	126	40	21	30	18	48	1,250	1,300	2,050	1,250	1,250	1,600	x	---	---	---	German-English.	Lawyer	---	x	x	---
87	69	196	152	146	1,593	1,497	181	91	184	110	217	110	140	33	16	32	30	62	1,800	1,800	2,400	1,800	1,800	2,350	---	---	---	x	English-Irish	Business	---	x	---	x
88	69	192	156	139	1,538	1,445	168	80	169	105	170	95	140	40	18	33	25	58	1,600	-------	-------	1,550	-------	-------	x	---	---	---	English-Scotch	Lawyer	---	x	---	x
89	75	182	150	135	1,399	1,286	180	88	183	110	183	95	154	------	------	27	17	44	760	-------	-------	1,000	-------	-------	x	---	---	---	Scotch-Scotch	do	---	x	---	x
Av.	53	{196	156	139	}	[1]1,450	{177	90	178	104	}	183	------	------	------	------	{38	38	70	1,582	1,784	2,166	1,662	1,855	2,356	}	{52	27	7	9	(2)	(3)	35	50	19	70
		Inches					*Inches*										*Pounds*					*Ounces*														
		{7.7	6.14	5.47			69	35	70	40							85	73	155	55	63	76	58	65	83											

[1] English, 32; Scotch, 28; German, 8; Norwegian, 6; Irish, 5; French, 4; Welsh, 3; Dutch, 3.

[2] Lawyers, 56; educators, 5; business men, 12; farmers, 8; physicians, 2; other professions, 6.

[(Head length−11)×(head breadth−11)×(head height−11)×.'000337]+406.01. In order to get the weight of brain from the cranial capacity, we use Welcker's formula thus:

WHEN CRANIAL CAPACITY RUNS—

From	1,200	to	1,300	cubic centimeters	multiply by .91=	=Brain weight in grams.
From	1,300	to	1,400	cubic centimeters	multiply by .92=	
From	1,400	to	1,500	cubic centimeters	multiply by .93=	
From	1,500	to	1,600	cubic centimeters	multiply by .94=	
From	1,600	to	1,700	cubic centimeters	multiply by .95=	

To illustrate, let us figure out the brain weight of Congressmen. As, for instance, his length of head is 201 millimeters (8 inches), width of head 152 millimeters (5 inches), and height of head 146 millimeters (5 inches). Applying the equation given above, we have:

[(201−11)×(152−11)×(146−11)×.000337]+406.01=1,625 cubic centimeters (98 cubic inches), which is the cranial capacity of the Congressmen. Looking at Welcher's table above, we find that to obtain the brain weight of one with a cranial capacity of 1,625 cubic centimeters, we must multiply this by .95, which gives 1,543 grams (54 ounces) as the estimated weight of this Congressman's brain. The results for each Member are given in Table 1, column 6.

HOMOGENEITY OF CONGRESS

In anthropological research the more homogeneous the subject matter, the more trustworthy the results. As will be seen from Table 1, column 29, the great majority (63) of the 89 Members of Congress studied, have English or Scotch as their predominant lineage, and those with other predominant lineage show a goodly sprinkling of English and Scotch blood.

Doubtless the 89 Members of Congress measured, as well as Congress as a whole, represent successful Americans in their prime of life, as their average age is 53 years (see col. 1, Table 1). It is to be regretted, however, that a larger number were not studied. yet the 89 that were may be regarded as a random sample of Congress as a whole, for they come from almost all sections of our country, as is shown in Table 1.

MEASUREMENTS OF MEMBERS OF CONGRESS BY STATE GROUPS

In Table 2 below the 89 Members of Congress, who were measured by myself personally, are arranged according to the usual geographical divisions by State groups, giving their head measurements, measurements for body build, and strength of hand grasp. Also an estimate of brain weights is given for each State group or geographical division.

The west South Central States—that is, Arkansas, Louisiana, Oklahoma, and Texas—show the greatest stature, 179 centimeters (70 inches), and at the same time the greatest brain weights, 1,571 grams (55 ounces); also the greatest length of head, 198 millimeters (8 inches). The next highest in brain weight, 1,525 grams (53 ounces), is shown by Members from the west North Central States—that is, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas. These are also high in stature, 177 centimeters. This tends to confirm other studies on larger numbers of a positive correlation of height and brain weight and still higher correlation between length of head and weight of brain. Also the lowest brain weight (1,419 grams, or 49 ounces) has the smallest length of head (191 millimeters, or 7 inches), as indicated in the measurements of the five Members from the Pacific States—that is, California, Washington, and Oregon.

The 13 Members of the east South Central States (Kentucky, Tennessee, Alabama, Mississippi), though having the greatest average brain weight, show the lowest figures for strength of hand grasp (34, 30 kilograms=91, 80 pounds). On the other hand, the five Pacific Coast Members have the greatest hand grasp (76 kilograms=203 pounds) but the lowest brain weight.

TABLE 2.—*Measurements of Members of Congress by State groups*

Number of Members	States—Members of Congress from—	Average head measurements (millimeters)			Average body measurements (centimeters)					Average hand grasp (kilograms)		Average estimated brain weight (grams)
		Length	Breadth	Height	Stature	Sitting height	Arm reach	Chest girth	Weight (lbs.)	Right	Left	
		1	2	3	4	5	6	7	8	9	10	11
11	New England and Middle Atlantic: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania	197	152	139	174	90	172	91	159	35	36	1,444
20	East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin	195	155	137	176	91	180	99	183	33	33	1,439
16	West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas	197	157	142	177	89	178	101	189	39	35	1,525
8	South Atlantic: Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida	196	155	140	179	90	180	108	189	37	35	1,472
13	East South Central: Kentucky, Tennessee, Alabama, Mississippi	197	155	140	178	86	182	117	191	36	32	1,476
13	West South Central: Arkansas, Louisiana, Oklahoma, Texas	198	161	143	179	91	178	100	147	34	30	1,571
3	Mountain: Utah, Nevada	195	153	140	175	81	174	100	175	38	32	1,449
5	Pacific: Washington, Oregon, California	191	151	141	175	89	177	104	183	40	36	1,419

TEMPLE PRESSURE MEASUREMENTS OF DISAGREEABLENESS, UNCOMFORTABLENESS, AND THRESHOLD OF PAIN

The instruments used in this study were the usual ones employed in anthropology with the exception of a temple algometer (designed by the author) to measure pain threshold and states up to it.

This algometer consists of a brass cylinder with a steel rod running through one of the ends of the cylinder. This rod is attached to a spring with a marker on the scale; this scale is graded from zero to 4,000 grams (141 ounces). The brass disk is 15 millimeters (one-half inch) in diameter. The whole instrument is 30 centimeters (12 inches) in length.

In using this algometer it is held in the right hand by the experimenter, who stands back of the subject and presses the disk against the right temporal muscle; then he moves in front of the subject, where he can conveniently press the disk against the left temple, or temporal muscle. As soon as the pressure feels the least bit disagreeable, the amount of pressure is read from the scale, as indicated by the marker. The pressure is gradually and slowly increased, the same words are said to each subject in the same manner, and otherwise the psychological part is made as uniform as possible. As soon as the pressure is felt to be the least disagreeable the amount of pressure is read by observing the marker on the scale.

The subject sometimes hesitates to say just when the pressure becomes disagreeable, but this intellectual factor forms part of the experiment. In fact, there are three inseparable elements in this experiment. First, the idea of disagreeable; second, the feeling disagreeable; and, third, the muscle itself; that is, one mental, one sensitive, and one physical element are all combined and do not exist separated. The intellectual part probably depends mainly upon the general idea of disagreeable formed from disagreeable experiences in life; the disagreeable feeling may be influenced by disagreeable pains and physical injuries suffered in the past. The experiment also is affected by the texture of the muscle itself, its thickness and that of the skin over it.

After the amount of pressure feeling becomes the least bit disagreeable it is recorded for each temple. The experiment is again made to find the lease pressure necessary to make an uncomfortable feeling. Here also, as in the first experiment, the intellectual, sensitive, and physical factors are combined in their influence on the resultant record. With the threshold of pain the same procedure is followed as in the other experiments for disagreeable and uncomfortable pressure.

INTERPRETATION OF THE PRESSURE EXPERIMENTS

When, for instance, a subject feels a 1,500-gram (53 ounces) pressure a least bit disagreeable and a 2,000-gram (70 ounces) pressure uncomfortable, the difference between these pressures, 500 grams (17 ounces), measures the difference between the disagreeable and the uncomfortable pressure feeling. When the same subject requires 3,000-gram (106 ounces) pressure to have the threshold of pain feeling, the difference between his 2,000-gram (70 ounces) uncomfortable feeling and this 3,000-gram (106

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ounces) threshold of pain feeling—that is, 1,000 grams (35 ounces)—measures the difference between these feelings. Since the muscle or physical factor in the experiment is practically constant, the mental and sensitive factors in the two following experiments for uncomfortable and threshold of pain feeling have increasingly greater influence; that is, this psychophysical experiment becomes more psychical, and thus to a certain extent the difference between the idea of disagreeable and that of uncomfortable or of threshold of pain can be measured in grams or ounces.

In general, the amount of pressure required to produce a disagreeable or uncomfortable or threshold of pain feeling varies with the resistance of the subject; that is, the more sensitive the subject the less the pressure required.

BODY BUILD

The body build or frame is obtained by dividing the chest circumference (at the armpits) by the stature. As body build increases, one passes from slenderness to stoutness in build; that is the chest girth is larger relatively to the height; that is the frame is broader relative to the stature. When chest circumference is large compared with height, we often call the man "thick set." These terms do not always have exactly the same meaning in actual use, but "slenderness" and stoutness, or thicksetness seem most appropriate. Stoutness does not necessarily mean vigor. Circumference has an almost constant relation to chest diameter, its ratio to stature probably serves as the best index of body build. This is preferable to weight, which is quite variable, as compared with chest circumference.

TABLE 3.—*Predominant lineage, temple pressure sensitiveness and brain weight*

Predominant lineage	Right temple (grams)			Left temple (grams)			Hand grasp	Average brain weight (grams)	Average for both temples (grams)			Summary of all sensitiveness
	Disagreeable	Uncomfortable	Threshold of pain	Disagreeable	Uncomfortable	Threshold of pain			Least disagreeable	Uncomfortable	Threshold of pain	
	1	2	3	4	5	6	7	8	9	10	11	12
English (32)	1,652	1,718	2,218	1,649	1,895	2,360	67	1,500	1,650	1,801	2,289	1,913
Scotch (30)	1,658	1,866	2,129	1,782	1,829	2,438	73	1,462	1,720	1,847	2,283	1,950
German (8)	1,565	1,692	2,042	1,712	1,871	2,166	74	1,484	1,638	1,781	2,104	1,841
Norwegian (6)	1,340	1,183		1,410	1,266		79	1,455	1,375	1,224		
Irish (5)	1,360	2,020	2,220	1,490	1,960	2,320	67	1,479	1,425	1,990	2,270	1,895
French (3)	1,216	1,300	1,650	1,333	1,425	2,100	81	1,452	1,274	1,362	1,875	1,503
Welsh (3)	1,433	1,600	1,866	1,233	1,616	1,916	59	1,445	1,333	1,608	1,891	1,670
Dutch (2)	1,825	2,425	3,250	2,075	3,100	3,250	89	1,656	1,950	2,762	3,250	2,656
Average of all	1,582	1,784	2,166	1,662	1,855	2,356	70	1,450	1,622	1,819	2,261	1,900
Average in ounces	55	63	76	58	65	83	[1] 154	50	57	64	79	67

[1] Pounds.

In Table 3 we will first compare in a general way the Members of Congress as to their sensitiveness to least disagreeable, uncomfortable, and threshold of pain pressure on the temporal muscles, and this in relation to their predominant lineage. It will be noted that almost without exception the Members require the least pressure for that considered disagreeable (1,622 grams (58 ounces)) (col. 9) and the most pressure for the threshold of pain (2,261 grams (79 ounces)) (col. 11). It will further be seen that the left temple is more sensitive than the right. In previous studies [1] of both children and adults the author found the same to be true.

[1] Man and Abnormal Man (S. Doc. 187, 58th Cong., 3d sess., pp. 178–179).

TABLE 4.—*Summary of the arithmetical means, standard deviations, correlation coefficients, and probable errors for disagreeable and threshold-pain-pressure, hand strength, body-buil and estimated brain weight of 89 Members of Congress as a whole, and also in connection with predominant lineage, educational status, and place of birth*

	Arithmetical mean grams	Probable error of mean	Standard deviation	Probable error of standard deviation	Arithmetical mean grams	Probable error of mean	Standard deviation	Probable error of standard deviation	Coefficient of correlation
Section A	Disagreeable pressure and strength of hand grasp								
89 Members in general	1657	47·47	664	33·53	70	1·440	16	·8080	·49±·054
35 English lineage	1532	61·78	542	43·68	66	1·482	13	1·0478	·60±·077
28 Scotch lineage	1771	53·58	658	59·28	73	2·159	17	1·531	·60±·074
23 other lineage	1520	53·20	380	37·77	71	2·240	16	1·584	·68±·077
Section B	Relation of body-build to disagreeable pressure								
	Body build				Disagreeable pressure				
89 Members in general	5,709	36·30	515	26·00	1,596	36·67	513	25·90	·64±·042
35 Members of English lineage	5,715	46·51	408	32·88	1,607	68·28	599	48·27	·62±·0709
Section C	Relation of body-build to estimated weight of brain								
89 Members in general	5,709	36·82	515	26·20	1,450	8·222	115	5·80	·63±·043
Section D	Relation of estimated brain weight to stature								
	Brain weight				Stature				
89 Members in general	1,450	8·222	115	5·80	177	414	5·8	·2939	·55±·053
Section E	Threshold of pain pressure sensitiveness								
15 Members city birth	2,048	91·52	526	64·69					
35 Members country birth	2,274	65·43	574	46·26					
29 Members university education	2,082	61·12	489	43·03					
21 Members with less education	2,377	92·16	627	65·20					

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MEANING OF CORRELATION COEFFICIENT

If your two hands were exactly alike, the relation between them would be 100, a perfect correlation; but if very nearly alike, say, 97 or 98, though not perfect, the correlation is of a very high degree; that is, very nearly perfect.

If you have, for example, the heights of 1,000 soldiers in one column and their weights in a corresponding column, the question is, What, if any, is the degree of relation between them; that is, are the taller soldiers heavier in weight or not; and if they weigh more, to what extent; that is, what is their correlation coefficient? The method of finding this coefficient is described in statistical works.

RELATION OF DISAGREEABLE PRESSURE TO STRENGTH OF HAND GRASP

In arranging the figures for disagreeable pressure the amounts for each temple were added together and then the result was divided by two, making a single quantity. The figures for hand grasp for each hand were combined to give one figure for the total hand strength of each Member. All these figures are based upon columns 18, 19, 20, 21, 22, 23, and 24 of Table 1. The Pearson correlation coefficient is worked out in Table 4 with body build and brain weight. In applying the same methods to determine the degree of relationship between disagreeable pressure upon the temples and strength of hand grasp, the correlation coefficient for Members of Congress in general (see Table 4, sec. A) is found to be 0.49 ± 0.054. The cause of this substantial relation between disagreeable pressure and strength of hand may be due to the fact that physically strong persons tend to be less sensitive. As Congressmen with a large body build tend to be strong, and as we see (Table 4) the correlation between body build and disagreeable pressure is high, being $.64 \pm .042$ (see Table 4, sec. B), this confirms still further this idea, that the greater the strength of hand of Members of Congress, the more resistant they are to disagreeable pressure, which suggests less sensitiveness to disagreeable experiences, which might be useful in the vicissitudes of political life.

RELATION OF THRESHOLD PAIN PRESSURE TO EDUCATIONAL STATUS

We have divided the Members of Congress studied into two classes according to degree of education received in earlier life (Table 1, cols. 25–28); one class are those which university education, and the second class, those with less than university education, as college, high-school, or common-school training. By university education, we mean those who have graduated from college or have been there a year or more and then studied for their profession in some university.

By examining table 4, section E, it will be found that those Members with university education show an average threshold pain pressure of 2,082 grams (73 ounces), and those with less education a threshold pain pressure of 2,377 grams (83 ounces). Thus the university-trained Members of Congress studied are more sensitive to the threshold of pain pressure than those with less education by 295 grams (10⅖ ounces). This suggests the idea that the higher the degree of education, the greater is the threshold pain pressure sensitiveness.

RELATION OF THRESHOLD PAIN PRESSURE TO PLACE OF BIRTH

We have also divided the Members into two classes—those born in the country and those born in the city—and then found the average of each for threshold of pain pressure. As will be noted from table 4, section E, the average for those born in the country is 2,274 grams (80 ounces), and for those of city birth, 2,048 grams (72 ounces); that is, those of country birth are less sensitive to the threshold of pain pressure by 226 grams (8 ounces) than those born in the city, which also suggests that country life tends to develop hardihood to be able to endure better that which is physically painful.

As those who live in the country are generally not as highly educated as those who dwell in the city, and as those with university education have just been shown to be more sensitive to threshold-pain-pressure than those with less education, the suggestion that country life tends to develop a hardihood to endure better, physical pain is strengthened.

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RELATION BETWEEN BODY BUILD AND DISAGREEABLE TEMPLE PRESSURE

In table 4, section b, are given the means, standard deviations, and correlation coefficients with their respective probable errors, for the relation between body build and disagreeable temple pressure for all 89 Members, and also for Members whose lineage is predominantly English.

There is practically no difference between the average body build of the Members in general and that of those with English lineage, the one being 5,709 and the other 5,715. The correlation coefficient for body build and disagreeable temple pressure is $.64 \pm .042$ for all the Members and $.62 \pm .0709$ for those with predominant English lineage. Here also the difference is insignificant. The correlation coefficients are distinctly high.

APPLICATION OF CORRELATION COEFFICIENT TO PREDOMINANT LINEAGE

In column 29 of Table 1 is given the predominant and other lineage of each Member of Congress measured. From Table 3 will be found the number of Members of Congress according to predominant lineage, the English numbering 32, the Scotch 30, the German 8, Norwegian 6, and so on. As already noted, the English and Scotch constitute the great majority for predominant lineage.

In determining the degree of relationship of disagreeable pressure and hand strength, in connection with predominant lineage, by working out the correlation coefficient, we find from Table 4, Section A that those Members with predominant English lineage have a coefficient of correlation of $.60 \pm .077$, the Scotch a correlation of $.60 \pm .074$, and those with other lineage combined (24 Members) have a coefficient of correlation of $.68 \pm .077$. These coefficients all indicate high degrees of correlation between disagreeable pressure and hand strength according to predominant lineage. The average disagreeable pressure for Members of Scotch lineage is 1,771 grams (62 ounces), that for those of English descent 1,532 grams (63 ounces), and those of other lineage 1,520 grams. Thus indicating that those with predominant Scotch descent are less sensitive to disagreeable pressure than the English by 239 grams (8 ounces); that is to say, that those with Scotch descent are the most resistant to disagreeable pressure of all, and might suggest a greater hardihood to disagreeable experiences in life.

Why the left temple should be more sensitive than the right may be due to the fact that the great majority of persons are right handed, having more physical activity and consequent blood flow on the right side, feeding the nerves more, and it may be making these more resistant to pain and also to deterioration on the right side. Thus it has been said by dentists that teeth decay more on the left side of the face than on the right.

It appears also that those with the heaviest estimated brain weight tend to resist pressure most, showing more hardihood. In Table 4, section B, this is indicated by the fact that the correlation of body build with brain weight is $.63 \pm .043$, and the correlation of body build with disagreeable pressure is $.64 \pm .042$, practically the same and distinctly high correlations. In connection with this, on the other hand, there are those with less brain weight, as in French and Welsh lineage, who show more sensitiveness, as indicated in column 12, Table 3, where all the averages are summed up and averaged.

Those members whose predominant lineage is Dutch, Scotch, English, or Irish show the least sensitiveness in order mentioned.

In distinguishing this pressure feeling as disagreeable and uncomfortable (Table 3) the Dutch show a difference of 812 grams (28 ounces), the Irish 565 grams (20 ounces), and the Welsh 275 grams (9 ounces), which is practically a quantitative measurement of the difference between disagreeable and uncomfortable pressure, as they experience it. To distinguish uncomfortable from the threshold of pain, those with French lineage require 513 grams (18 ounces) pressure, the Dutch, 488 grams (16 ounces), and English, 487 grams (17 ounces) pressure. Members with other lineage require much less pressure.

BRAIN WEIGHT AND STATURE

From Table 4, section D, it will be seen that the correlation coefficient for estimated brain weight and stature of all the 89 Members of Congress measured is $.55 \pm .53$, which is quite high when compared with the correlation of English brain weight with stature which as given by Blakeman is $.283 \pm .057$.

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Legislative Ability in Congress, Including a Study of the Senate of the Sixty-second Congress

By Dr. Arthur MacDonald, Washington, D. C., formerly Fellow of Johns Hopkins University

INTRODUCED

BY

HON. GERALD P. NYE

OF NORTH DAKOTA

IN THE SENATE OF THE UNITED STATES

(Printed in the CONGRESSIONAL RECORD)

In at least three-fourths (probably nine-tenths of cases) the Members of Congress who are most active, and also most successful in getting bills enacted into law, resolutions passed, and amendments adopted show the most legislative acumen or ability. There are always exceptions to this rule, but they only prove the rule. In general, a Member who introduces a bill and gets it enacted into law must devote much attention to the bill in the different stages through which it must pass before being enacted into law. This study is not concerned about the nature of the bill, resolution, or amendment, whether good or bad. A bill that subsequently proved to be a bad one might require more ability to get enacted into law than a good bill. In short, and in the long run, legislative success amounts to legislative ability, as in business it is the delivery of the goods that decides.

The method of estimating legislative ability, to be considered, and as illustrated in tables 1 and 2, will be found not to be arbitrary but to be based on actual results, and where that is not possible, upon the experience of those who have been long connected with both House and Senate.

SKEPTICISM AS TO ESTIMATING LEGISLATIVE ABILITY

While it may be admitted that, in general, legislative success spells legislative ability, yet there may be much skepticism as to estimating such success or ability by any method of calculation.

In any new effort in a line of study, especially when made for the first time anywhere, whether meritorious or not, there naturally arises some skepticism which may go so far as to make such study appear to be a freak. But most all new lines of research may be liable to be considered as very doubtful, if not visionary or freakish, and some are; but the mere fact of their newness is, of course, no proof of this.

The older Members of Congress form more or less of a club, or are like classmates in college: they know each other well; especially is this true in the Senate. If any experienced Member should be asked to name the first 20, 30, or 50 men in Congress who are doing most of the legislative work he would find little difficulty in telling. Though, in certain cases, there might be some difference of opinion, the great majority of the names mentioned would be undisputed. Such a general agreement as to who are doing most of the legislative work in Congress can not only be expressed in words but can be estimated approximately (though perhaps roughly) in figures. If there be some doubt here, it may be stated that in the Senate of the Sixty-second Congress, which the author studied (a study of the United States Senate, published in Metron (International Journal of Statistics), Padova, Italy, 1923, 80, 23 pages; also by the Anthropological Society of Bombay, India; also in Spanish in Revista Argentina de Ciencias politicas are VIII, t. 15. Buenos Aires, Argentina), those most experienced and least liable to be prejudiced were asked to name the first 30 Senators who were doing most of the work in the Senate. Comparing the lists named with the list based upon the author's estimate, depending upon percentages of legislative results, there was very little difference practically. The same method of estimating legislative ability is used here, with the addition of allowing something for initial legislative activity, which was not done in the former study.

In talking with Members the author has noticed in a few a tendency (which is natural and probably unconscious) to base their opinion of estimating legislative ability mainly upon their own experience; this is instructive, and to a certain extent desirable, from the point of view of science. It seemed to be assumed that the purpose was an exact estimate of legislative ability, which, of course, is not the case; in fact, it is probably impossible to make an exact estimate; though this be true, it does not follow that a rough approximate estimate may not be made.

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To estimate legislative ability in Congress is easier than to determine standing of students in college, because in Congress more data are recorded upon which the estimate is based.

It sometimes happens that a Member introduces a bill which is reported and passed by the House and reported in the Senate, but fails to become law because of late report by the committee or too much pressure for other bills, or shortness of session, or filibuster. The bill was a good one; there really was no serious objection to it, and in a normal course of events would have become law. Later the same bill, with few changes, is introduced by a member of the opposite party who have come into control of Congress. The bill is enacted into law, and the Member who first introduced it and is the real author gets no credit for it. But this is a very exceptional case, and only strengthens the general rule that Members must work continually for their bills if they expect other Members to help to enact them into law.

Another Member introduced a bill, a copy of which was incidentally sent to the White House, and was returned with the approval of the President. It was, therefore, made in committee a part of a large general bill which was reported out in the name of the chairman of the committee, who introduced the general bill. Of course, the real author of this bill, which was inserted into the general bill, received no credit publicly. But there are many Members with such legislative ability whose good work in different committees is not known generally, and for which no credit can be given by any method of estimating legislative ability. In fact, these able Members are not seeking personal credit but are only desirous to help all they can in enacting good laws. This, in fact, is the experience of many of the best men in Congress, and is generally so distributed that it is fair to all, or almost all, and, not being possible to estimate it, it can be omitted. These gentlemen are often chairman of important committees or leaders in their party, and have special opportunity to receive credit, by virtue of their high position and standing, for reporting of bills, or making motions and amendments, or for number of subjects discussed and frequency of remarks on floor, all of which are given due credit in Table 2 for initial legislative activities. These special opportunities for receiving credits serve to a large extent as an offset to the good work chairman and leaders do in committee, for which no credit is recorded.

THE MERIT OF SENIORITY

But some Member may say that high positions as leaders, and chairmen of committees, are due mainly to being in Congress a long time; that is, to seniority, and are not due to any special ability. It is true that the seniority of itself gives many advantages and has much weight. But seniority, in 9 cases out of 10, has much merit, for it depends mainly and ultimately on legislative success and political ability. For any Member to so act in Congress and at home, as to receive the majority of votes of his district or State for many years, shows political and legislative insight, which means ability, that consists in so adapting himself to both his congressional and district environment as to have the voters choose him to represent them, time and again, and this often, in spite of strong opponents in nomination in the primary, as well as in the election, who watch all of his work in Congress, always emphasizing and publishing his defects and mistakes in his district or State, but seldom or never mentioning the good work he does in Congress; yet he still remains, and often withstands even a political landslide against his own party.

The people instinctively know him, and sooner or later his opponents become weary of attacking him, though they usually are alert for any opportunity to criticize him. Such seniority shows legislative ability and political sagacity; legislative ability is put first, for any mistakes here are more serious and sure to be published, and often embellished for home consumption, and, whatever effect legislative errors produce, it reaches more the leading voters of the community who can usually influence the people, if they so desire, but often, to their credit, do not make the effort, as they prefer to let well enough alone in politics and not take chances on what an unknown opponent will do in Congress, not to mention the fact that a new Member must start at the bottom and is usually not able to accomplish much at first.

In short, it may be said that politics is a specialty, and to be successful in it, as in any specialty, ability and experience are required. There are exceptions, but again they only emphasize the rule. The conclusion is that seniority is, in the last analysis, almost wholly based upon legislative ability and political acumen, and whatever advantage it affords in an estimate of legislative ability should be given due credit.

It sometimes happens, but rarely, that a district will replace its Representative in Congress by a man whom they acknowledge is inferior. But their reason is that they prefer a man who represents them to one who does not, though he be superior; that is,

a Representative or Senator must be a good politician as well as a statesman. The author once asked a distinguished Senator (to whom he had written a letter) if he had received the letter. The Senator said, "There are more than 300 unanswered letters upon my desk; for three weeks all my time has been required to defend the President as his spokesman."

Through such neglect of his correspondence (not to mention the want of a good secretary who could answer most of his letters) he had made so many discontented in his State that some time before election he announced that he would not be a candidate for reelection. Knowing that he would have strong opposition, he preferred this course to taking chances of closing a long and distinguished public service by defeat. So he gracefully, and doubtless wisely, retired with honor. Yet, everyone, including his opponents, acknowledged that his statesmanship was of the highest order. Thus again it is seen that seniority required good politics as well as high-class statesmanship, and, as already noted, the legislative activities from advantages growing out of seniority should have due credit.

ESTIMATING LEGISLATIVE SUCCESS IN ABILITY

TABLE 1.—*Results of legislative ability in percentages*

	Reported	Passed Senate	Passed House	Passed both houses	Enacted into law	Adopted
Number of column	1	2	3	4	5	6
Private bills	3.2	2.4	2.6	1.8	1.8	----------
Public bills	5.7	3.3	4.5	2.7	2.4	----------
Amendments (pension bills)	----------	----------	----------	----------	9.8	48.9
Motions and resolutions	----------	----------	----------	----------	----------	64.2

SCALE OF UNIT VALUE

Number of column	7	8	9	10	11	12
Private bills	58	76	71	100	100	----------
Public bills	32	55	40	66	77	----------
Pension bills	----------	----------	----------	----------	18	----------
Amendments	----------	----------	----------	----------	----------	4
Motions and resolutions	----------	----------	----------	----------	----------	3
Appointments and designations	----------	----------	----------	----------	----------	10

In Table 1 is given the main basis upon which legislative success or, in general, ability is estimated. The estimate is based upon the difficulty in getting bills reported, through either House, or enacted into law, or resolutions or amendments adopted; in short, the difficulty of getting results in any of the legislative stages through which any kind of bill or resolution or amendment may pass.

Table 1 is divided into two parts, one part giving the percentages of bills introduced which are enacted into law (column 5) or reported (column 1) or passed Senate (column 2), or House (column 3), or both Houses (column 4); also percentages of amendments, motions or resolutions introduced which are adopted (column 6).

The second part of the table consists in a scale of credit marks, or units of value, based upon the percentages in the first part of the table. Thus, for the 89 Members of Congress studied, 1.8 per cent (column 5) of private bills introduced were enacted into law; 2.4 per cent of public bills introduced were enacted into law (column 5). The private bills were the most difficult to have enacted into law. If for every private bill enacted into law we allow 100 marks or units of value, then we must allow 77 marks for every public bill enacted into law. For, if 1.8 per cent for a private bill is given 100 marks, 2.4 per cent for a public bill will receive 77 marks—that is, 1.8 divided into 2.4 per cent is 1.3, and this divided into 100 equals 76.9, or 77.1. Again, 4.5 per cent of public bills passed the House (column 3); this divided by 1.8 equals 2.5, which divided into 100 equals 40 credit marks or units of value (column 9). So 48.9 per cent of amendments introduced were adopted; this divided by 1.8 equals 27.1, which divided into 100 gives 3.69, which we will call 4, meaning 4 credit marks. (In all cases where the decimal is 6 or more we give it the next number, so as to avoid fractions.)

All these results are not arbitrary, but are based upon the degree of difficulty of the different stages of legislation through which it passes until enacted into law.

INITIAL LEGISLATIVE ACTIVITY

There are Members of Congress who may not succeed in getting but few or no bills passed or amendments and resolutions adopted, but who are quite earnest in what may be called initial legislative activity; they may introduce many bills, and propose amendments to improve bills, trusting to get something done that may assist in legislation. Others make a point of watching legislation and frequently opposing it, if not blocking it, because they believed it is not for the public good. There are still others who feel it their duty to speak frequently on the floor so that the whole country may know the objections to and defects in whatever comes before Congress. There are also a very few who appear not only not to do anything, but not even to make any effort; they may feel discouraged or disgruntled or have concluded that they do not like the work at all and are not adapted to it; these, of course, would stand low in any estimate of legislative success or ability. Some have gone to such an extreme as to introduce bills to abolish either House or Congress itself.

It would seem that initial legislative activity should have some consideration in estimating legislative ability. The author consulted, as to his method with many who have had extensive experience in accounting for and recording initial legislative activities in both Houses. The following table (Table 2) gives the results:

TABLE 2.—*Initial legislative activities*

	Units of value
Petitions and memorials presented	¼
Private bills (including pension bills) introduced	½
Public bills and joint resolutions submitted	1
Motions and resolutions submitted	1
Number of subjects discussed on floor	1
Frequency of remarks on floor	1
Amendments submitted in advance or offered on floor	2
Reports for committees made by Member	5
Appointments and designations	10

In Table 2 are given the names of the various initial legislative activities in the order of their estimated value. It will be noted that four types of activity have the same credit mark or unit of value, because in such an estimate, fine distinctions should not be made, as the main purpose is a general approximate workable schedule.

Examining Table 2 in detail it will be noted that the introduction of a public bill, or joint resolution, or submission of simple resolution or motion, each count one unit of value or credit; likewise the number of subjects discussed on the floor, each count one; also the frequency of remarks on floor—that is, the number of different times remarks or speeches (without regard to length of time occupied) are made on the floor, each time counts one. As the Member speaking on different subjects is necessarily doing it publicly and submits himself to criticism, one unit at least should be allowed; the idea being to put the credits as low as feasible for initial legislative activity. Thus, one-fourth of a unit is given for every petition and memorial, and one-half of a unit for every private or pension bill introduced.

Amendments submitted in advance, or offered on the floor, are each counted two units, due to the fact that, in general, they probably require more legislative tact (ability) than mere introduction of public bills or resolutions.

Five units are allowed for each report by a Member from a committee. Some reports deserve much more; but, considering various reports as a whole, it was thought that five units would be about fair. For appointments and designations 10 units for each are allowed. An appointment to be a conferee on a large and important bill is a high legislative honor and usually, if not always, means a thorough knowledge of the bill, due to much experience and study of it in committee on the part of the Member appointed. Such an appointment deserves more than 10 units. Appointments, as chairmenships of special committees, to study some important matter, and report on it, or to make investigations of some irregularities, or public scandal, deserve more than 10 units. But there are other appointments, more or less formal, as attendance at funerals of Members, which deserve but one unit, if they do that. Also designations which are practically appointments vary much. So, on a general consideration of all kinds of appointments and designations it was thought that about 10 units for each one would be fair.

Distinctions might be made between different kinds of appointments and different credits given, but it would in many cases be too fine and too arbitrary. One thing may be said in regard to credits for appointments and designations, that certain leaders of experience who receive most of the appointments do not, as a rule, introduce many bills or resolutions, or get many through, because their time is taken up mostly in important committee work, for which they get little or no credit; but the 10 credits for each appointment act as an offset to make up for the lack of credits for high-class committee work, for which they receive no credit marks, and which could not be given them as work in committees is often more or less confidential.

Another question might arise as to difference between House and Senate, because Senators have more opportunities for legislative activities than Representatives, being much fewer in number, and passing upon all legislation coming from the House. But there are nearly three times as many bills, resolutions, and amendments introduced in the House than in the Senate (Sixty-ninth Congress: 18,312 in House, 6,417 in Senate), for which credit is given in the House not only for the introduction, but for every further legislative advance of the bills, many of which never reach the Senate, affording no possibility of Senators receiving credit from them. Moreover, the House makes many more committee reports than the Senate (Sixty-ninth Congress: House, 2,161; Senate, 1,717), for each of which five credits are allowed. But, nevertheless, admitting that Senators have more opportunities for credit marks, it must be remembered that usually it is much more difficult to become a Senator than a Representative, for the gaining of a senatorship is based not only on high standing at home and political acumen (ability), but often on previous successful and extensive experience either in the House of Representatives or in the State legislature. Since the chairmanship of a committee (as we have seen) affords special opportunities for legislative activity, giving

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credits, so being a Senator likewise furnishes special legislative advantages.

There is a further question as to advantages to a Member in receiving credits who belongs to the majority party in control of Congress. There is no doubt that this affords many advantages in gaining successful legislation and possibly more opportunity for legislative activity. But such advantages are more or less counterbalanced by the fact that minority Members, not being responsible for legislation, can attack it at every opportunity by making motions and amendments and frequent remarks, for all of which activities they receive credits, and frequently such opposition may show much legislative acumen or ability.

Moreover, some majority Members, who disagree with their leaders on some measure, refrain from making similar attacks on account of loyalty to their party, and lose such opportunities, while the minority Members may be encouraged by their own party to make such attacks, not to mention the fact that such activity whether merely partisan or not, often furnishes good material for home consumption, making the Member more popular in his district or State. In brief, Members by virtue of being of the minority party, are more encouraged to increase their legislative activity, especially the initial type, for which credits are given. But, notwithstanding such advantages, if it be admitted that the minority Members are still at a disadvantage, they could be allowed a certain percentage of increase in their credits in general, which might vary a little, according to special conditions in the Congress or session of the same Congress. Such percentage for increase of credits could be easily determined with approximate fairness to all. Moreover, the fact of one Member having five or ten more credits than another would signify little or nothing, but when the difference gets to be larger it begins to have some significance, which increases as the difference increases. It might be added that in the Senate of the Sixty-second Congress, studied by the author, 5 Democratic Senators were among the first 20 Senators. Also in this study Table 7 shows seven Democratic Senators to stand higher than the Republican Senators (in majority party).

We have endeavored to give all the main difficulties or objections that might be urged against estimating legislative success or ability. After all has been said, it will be found that on the whole, for every disadvantage in one respect there is most always a counterbalancing advantage in another respect, for which we have tried to provide our schedule for unit values or credits. In short, as frequently indicated, the main purpose of the schedule is to give a rough but approximate estimate of legislative ability, which we deem feasible from our experience in a study of the Senate of the Sixty-second Congress, and we feel that many objections to estimating legislative ability are not based upon any serious study of the subject, but upon special and exceptional experiences, if not a general prejudice against any estimate whatever. When psychology began to measure thought and feeling, it encountered many similar objections that might be raised against estimating legislative ability. But objections of this nature will disappear, as they did in psychology. (With another American, the author measured in thousandths of a second, how long it takes to think, feel, or make a judgment. This was one of the first efforts of its kind, and was made 40 years ago in Wundt's laboratory at Leipsic.)

If anyone will examine Table 4 of article in Medical Times for November, 1928, where each of the 89 Members studied is ranked according to the number of his credit marks, beginning with the lowest, 14, and so on in order up to the highest, 2,412, he will realize the impossibility of knowing whom any one of these numbers represents. In fact, the author could not tell, unless he referred to the originals, which he has laid away to keep, in case any Member studied desired to know his own record, which, of course, would be given him.

Now, to illustrate the actual estimation of legislative success or ability, let us take the case of one Member, as shown in Table 3, where all the items (from 1 to 37) are given that can be marked for credits. Thus, beginning at the top of Table 3, this Member introduced 83 public bills and joint resolutions; now, looking at Table 2, giving the schedule for initial legislative activities, we find 1 unit of value or credit given for each bill or joint resolution introduced, which makes 83 units of value; there were 22 amendments offered by this Member; looking at Table 2, again, we find 2 units allowed for each amendment, making 44, and so on through the first part of Table 3. Now, passing on to the second part of the table for results of legislative activities, we note that of he public bills and joint resolutions introduced by this Member, three never went further than to be reported; looking at the schedule in Table 1 for results of legislative activities, we find (column 7) 32 credits for public bills reported, making 96 units, and so on, until we reach the end of the table, where the total is given of 2,403 units. Thus, by referring to Tables 1 and 2, we find a number of credits allowed for any item in Table 3.

TABLE 3.—*Initial legislative activities*

No.		Units of value
1. Number of case	89	-----
2. Public bills and joint resolutions introduced	89	83
3. Private bills introduced	39	19½
4. Pension bills introduced	51	25½
5. Amendments offered	22	44
6. Motions and resolutions submitted	85	85
7. Petitions and memorials presented	34	3½
8. Number of subjects discussed on floor	265	265
9. Frequency of remarks on floor	653	653
10. Committee reports	25	125
		1,308
RESULTS OF LEGISLATIVE ACTIVITIES		
11. Public bills and joint resolutions reported only	3	96
12. Public bills and joint resolutions passing House only	0	0
13. Public bills and joint resolutions passing Senate only	3	165
14. Public bills and joint resolutions passing both Houses	1	66
15. Public bills and joint resolutions enacted into law	1	77
16. Concurrent resolutions passing Senate only	0	0
17. Concurrent resolutions passing House only	0	0
18. Concurrent resolutions passing both Houses	0	0
19. Senate resolutions adopted	0	0
20. Private bills reported only	0	0
21. Private bills pasing Senate only	0	0
22. Private bills passing House only	0	0
Number of case	89	
23. Private bills passing both Houses only	0	0
24. Private bills enacted into law	0	0
25. Pension bills reported only	0	0
26. Pension bills passing Senate only	0	0
27. Pension bills passing House only	0	0
28. Pension bills passing both Houses only	0	0
29. Pension bills enacted into law	8	144
30. Appointments and designations	24	240
31. Amendments adopted	34	136
32. Motions agreed to	73	219
33. Resolutions (except joint resolutions) passed	4	12
34. Quorum calls	---	---
35. Yea-and-nay calls	---	---
36. Quorum and yea-and-nay calls	---	---
37. Total number of units of value	---	2,463

TABLE 5.—*Political parties compared*

No.	DEMOCRATS	Average credits
32	Representatives	250
7	Senators	953
39	All	376
	REPUBLICANS	
39	Representatives	265
11	Senators	899
50	All	404

If we had all Members of Congress, we could compare State delegations with each other (always relative, of course, to the number in each delegation); also groups of Members from the South, North, East, or West; also according to length of service or continuous service, and all such groups both with and without regard to political party. This might tend to encourage a healthy rivalry between States in legislative work, if not more carefulness in such work.

As already indicated, this whole study, with its results, can serve only as an illustration of initial research work in what may be called legislative anthropology. It is therefore hoped that similar studies of other legislative bodies may be undertaken, not only in our State legislatures but in the parliaments of other countries, so that eventually we may have a foundation for the development of a comparative legislative anthropology, with the United States in the lead.

As all legislative bodies are usually competitive in their activities, success is necessarily connected with merit. Also most legislative activities are not arbitrary, but all have certain causes and follow a law yet unknown, which may in the future be discovered, and lead to changes in rules of legislative procedure.

EXPLANATORY STATEMENT

Legislative anthropology is an effort to make a study of those persons who are politically successful; many of them are statesmen. It is all the more necessary, for this class of citizens are often underrated and unjustly so. Take, for example, Congress, where thirty-five or more thousand bills are introduced every Congress; from one to two thousand of these bills are enacted into law; that leaves some thirty-three thousand that fail. On the average, about 100 persons are interested in each bill; this means several millions of dissatisfied or disgruntled citizens for every Congress, and this has been going on for many years. Such dissatisfaction is cumulative, making persons anticongressional. In addition to all this, the faults and mistakes of members of a legislature are published (usually exaggerated) as often as they come up for election. If the lawyer's errors, the doctor's mistakes, and the preacher's faults were published from time to time, how would these gentlemen compare with members of a legislature or Parliament?

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The United States Senate of the Sixty-second Congress

INTRODUCTION

There are three general ways of studying man—first, as an individual; second, as many individuals; and, third, as an organization.

The scientific study of man as an individual is comparatively recent [1]; the method is intensive. The study of man, as many individuals, has been undertaken mainly in anthropology.[2] Investigations of this nature have been made upon large numbers of school children and also upon soldiers,[3] especially in examination of recruits in military service.[4] The study of man as an organization is sometimes undertaken from a psychological point of view, but very little scientific study of modern civilized man as an organization has been done. This, however, is not true in the case of animals; thus, in any encyclopedia you can find out much exact information as to the workings and results of beehives and anthills. One reason why we have relatively so much more definite knowledge about animals than man is because animals have been studied by much more scientific methods. Modern psychology, however, is presenting more definite results and more rational ways of investigating man.

The tacit assumption in this whole study is that all organizations of men, especially those of long standing and still more particularly those that result from competitive methods are not haphazard, but act according to laws, most of all which are yet unknown. So the acts of the Senate as a whole are not accidental, but also work according to laws yet unknown. These, like all other laws, will be discovered not only through extensive, but more especially by scientific intensive study. Leading historians assume that the movements of history, including that of each nation, go by as yet unknown laws. If this be true, this power of law naturally controls all subordinate organizations, until it finally reaches the individual, who is the unit of the social organism. The scientific study of the individual shows that the effects upon him of both heredity and environment are also based upon laws of which we know very little.

THE SENATE OF THE UNITED STATES—THE TRAITS OF HUMAN NATURE THAT GUIDE ITS SENATORS

There is no more important organization of man in America than the United States Senate. This, with the additional fact that all its proceedings are carefully recorded, is one of the main reasons we have made this organization an object of study. It would be almost impossible for one person to make an intensive study of a large number of Senates of different Congresses, owing to the large amount of computations required. So the Senate of three sessions of the Sixty-second Congress was selected. It is, perhaps, as normal a Senate as any; and while the results here obtained only refer to the Sixty-second Senate nevertheless they may suggest ideas applicable to other Congresses. As a rule, the value of such studies and the probable truth of the conclusions would be proportionate to the number of Congresses studied. As in the case of all scientific study, names of persons and personalities are not necessary in the present inquiry.

QUORUM AND YEA-AND-NAY CALLS IN GENERAL

Before considering the attendance of divisions of Senators, or of individual Senators, on quorum and yea-and-nay calls, we may observe the general attendance of the Senate as a whole, as indicated in Table 1. In the first two lines of Table 1 are given the number of quorum and yea-and-nay calls for each session, and in the next two lines the total number of answers at all the quorum and yea-and-nay calls at such session.

If we multiply the number of Senators [5] (80) by the number of quorum calls for the first session, for instance, which is 70, we obtain 5,600, which represents 100 per cent of attendance, as the actual attendance on quorum calls in the first session was 3,705; this divided by 5,600 gives 66, the percentage of attendance of the Senate as a whole on quorum calls for the first session. The percentage for the other sessions, and for the yea-and-nay calls are found in a similar manner.

Observing the last two lines of Table 1, it will be seen that the per cent of attendance both on quorum and yea-and-nay calls in the first session is considerably higher than in the other sessions, the lowest figures being in the second session. That is to say, the Senators attend quorum calls 10 per cent better in the first session than in the second session, and 4 per cent better in the third session than in the second session. Their attendance on yea-and-nay calls is 13 per cent more in the first session than in the second and 10 per cent more than in the third. Why, then, the relatively high per cent of attendance on quorum and yea-and-nay calls in the first session? We are unable to say. It might be due to the fact, that in the first sessions legislation has not as yet taken sufficiently definite form, so that some Senators attend that otherwise might not, had they known more about the matters in question, and to what extent they were interested as would be more the case in the second and long session when they might choose not to be present, because of other more pressing matters, at the time, or in which they were more interested. The higher percentage of attendance in the third session than in the second session may be due to the fact that the last session is crowded with much important legislation, and also that Senators are more on the lookout for the passage of their bills, as it may be their last chance. But as said, we are not certain as to the causes of these general changes in quorum and yea-and-nay calls. Had we the statistics of several, or of a large number of Congresses with which to make comparisons, it might be possible to determine definitely the causes.

It will be noted also that the (see last line last column of table) attendance of Senators on yea-and-nay calls is 10 per cent higher than on quorum calls. This refutes the idea that Senators desire to avoid recording their vote, but at the same time appear to be present. Yet eight (10 per cent) Senators (Table 5) shows a higher relative attendance at quorum than at yea-and-nay votings.

Table 1.—*Quorum and yea-and-nay calls*

Senate	First session	Second session	Third session	All 3 sessions
Quorum calls	70	197	124	391
Yea-and-nay calls	92	186	109	387
Answers to quorum calls	3,705	8,830	5,978	18,513
Answers to yea-and-nay calls	5,748	9,693	5,953	21,394
Per cent of attendance at quorum calls	66	56	60	59
Per cent of attendance at yea-and-nay calls	78	65	6	69

QUORUM AND YEA-AND-NAY CALLS AND POLITICAL DIVISIONS

The per cent of attendance of political divisions of the Senate on quorum and yea-and-nay calls for each session and for all sessions is given in Table 2. These percentages are worked out as has been indicated in Table 1.

The Democratic and Republican Senators, the conservative and progressive Republicans, each and all have a higher percentage of attendance at yea-and-nay calls than at quorum calls. The Senate as a whole is 10 per cent higher in its attendance on yea-and-nay calls than in quorum calls, as already indicated.

Republican Senators show a higher percentage of attendance on both quorum and yea-and-nay calls for each session than Democratic Senators, and for all three sessions they are 7 per cent higher on quorum calls and 11 per cent higher on yea-and-nay calls than the Democrats. That the majority party attends better is to be expected, but how much less per cent the minority would be expected to have would depend upon a comparison with other Congresses.

Table 2

Sessions	Number	Per cent of attendance			
		First	Second	Third	All
Quorum calls:					
Senate	80	66	56	60	59
Democrats	34	60	53	54	55
Republicans	46	71	58	65	62
Conservative Republicans	34	70	59	64	63
Progressive Republicans	12	72	54	66	61
Yea-and-nay calls:					
Senate	80	78	65	68	69
Democrats	34	77	63	63	66
Republicans	46	78	67	72	77
Conservative Republicans	34	78	66	68	70
Progressive Republicans	12	78	70	80	75

Comparing the progressive Republicans with the conservative Republicans as to quorum calls, the progressives show higher percentages for the first and third sessions, but for all three sessions the conservative Republicans lead. As to yea-and-nay calls, the progressive Republicans are distinctly higher for each session except the first, and for all three sessions have a percentage of 75 over against 70 per cent for the conservative Republicans.

Why the progressive Republicans should have a lower percentage for quorum calls and a higher percentage for yea-and-nay calls than the conservative Republicans is not clear. It will be noted that the progressives lead for yea-and-nay votings is 5 per cent, while the conservatives lead in quorum calls by only 2 per cent. Here again the study of the Senate proceedings of many Congresses would make clear whether progressive movements show similar results from general laws or are simply tentative, due to special conditions at the time.

[1] See study (by author) Émile Zola, giving results of numerous specialists in Juvenile Crime and Reformation, Senate Document No. 532, 60th Congress, 1st session.

[2] See Experimental Study of Children (by author) in Annual Report of Commissioner of Education, 1897-98; also Man and Abnormal Man (by author). Senate Document 187, 58th Congress, 3d session.

[3] See Physical and Mental Examination of American Soldiers (by author), Modern Medicine, February, 1921, Chicago; also in Indian Medical Record, January, 1921, Calcutta, India; also in Tidskrift for Militaer-Medicin Christiania, 5th heft, 1920.

[4] Also Anthropometry of Soldiers (by author) in Medical Record, December 14, 1918; also in Proceedings of Anthropological Society of Bombay, India, read Wednesday, June 30, 1920.

[5] Senators have been omitted in this study, who had been absent a long time, or who had only recently come to the Senate. This left 80 Senators.

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TABLE 3.—*Attendance at all sessions*

Further division of Senators	Number	Per cent of attendance at—	
		Quorum calls	Yea-and-nay calls
Senators who were business men	17	61	66
Senators who were professional	63	58	69
Chairman of important committees	13	66	69
Senate	80	59	69
Democrats	34	55	66
Republicans	46	62	77
Conservative Republicans	34	63	70
Progressive Republicans	12	61	75

Table 3 gives the per cent of attendance at all sessions combined, of Senators who were engaged in some business before entering the Senate, Senators whose occupation was professional, and also Senators who are chairmen of important committees. The second part of the table is a repetition of a part of Table 2.

It will be noted, that Senators who were business men, have a higher per cent (61) of attendance at quorum calls, but a lower per cent (66) of attendance at yea and nay calls than Senators who had professional occupations, whose percentages are respectively 58 for quorum calls and 69 for yea-and-nay calls. If this should be true of the Senates of many Congresses, the explanation might be that business men are more regular in their work than professional men, and attendance at quorums is more a test of regularity than attendance at yea and nay voting.

As to chairmen of important committees, it will be seen from the table that they show the highest per cent (66) of all for attendance at quorum calls, but have a comparatively low per cent (69) of attendance at yea and nay calls as compared with the remaining Republicans, whose per cent is 77. It is to be remembered that the chairmen of important committees in this Congress were all Republicans.

DISPOSITION ON BILLS AND RESOLUTIONS OF THE SENATE OF THE SIXTY-SECOND CONGRESS

Table 4 gives a summary of the different kinds of bills and their general history showing both number and per cent introduced, reported, passed Senate and enacted into law and those not acted upon during three sessions of the Sixty-second Senate.

More than half (53 per cent) of the bills introduced are pension bills, about one-fifth (21 per cent) public bills, and a few less (18 per cent) private bills.

About five-sixths (87 per cent) of the private bills are not acted upon at all; also, about two-thirds (64 per cent) of the public bills and one-half of the pension bills are not acted upon.

Only 2½ per cent of private bills and 10 per cent of public bills are enacted into law, but 44 per cent of pension bills become law. In general, more than half (58 per cent) of all the bills and joint resolutions fail of passage.

That is, summing up this table in a general way, private bills are the most difficult to have enacted into law, public bills come next, then joint resolutions, then pension bills, then concurrent resolutions, and finally, the least difficult of all, Senate resolutions.

TABLE 4

Nature of bills and resolutions	Introduced		Reported		Passed Senate		Enacted into law		Not acted upon	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Private bills	1,519	16	184	12	152	10	38	2.5	1,335	87
Public bills	1,731	21	612	35	527	30	172	10	1,119	64
Joint resolutions	152	2	------	------	64	42	37	24	88	57
Pension bills	4,388	53	------	------	2,191	50	1,940	44	2,197	50
Concurrent resolutions	37	4	------	------	25	67	[1] 21	[1] 56	12	32
Senate resolutions	475	56	------	------	354	74	------	------	121	26
Total	8,302	100	------	------	3,313	39	2,208	26	4,872	58

[1] Concurrent resolutions are deducted from total, to base percentage upon.

TABLE 5.—*Legislative activity of the Senate of the Sixty-second Congress and its results: Also estimate of legislative ability*

Senators ranked in public legislation according to units of value for ability	Initial legislative activities								Results of various legislative activities																Percentage of attendance at—			Results from scale of units of value		
	Public bills and joint resolutions introduced	Private bills introduced	Pension bills introduced	Amendments offered	Motions and resolutions submitted	Petitions and memorials presented	Number of subjects discussed on floor of Senate	Frequence of remarks on floor of Senate	Number of reports made for committees	Public bills reported only	Public bills passing Senate only	Public bills enacted into law	Joint resolutions passing Senate only	Joint resolutions enacted into law	Concurrent resolutions passing Senate only	Concurrent resolutions passing Senate and House	Senate resolutions adopted	Private bills reported only	Private bills passing Senate only	Private bills enacted into law	Pension bills passed Senate only	Pension bills enacted into law	Honors bestowed by appointments and designations	Quorum calls	Yea and Nay calls	Quorum and Yea and Nay calls	For public legislative activity	For private legislative activity	For both public and private legislative activity
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Republican	155	8	27	62	106	235	178	495	74	23	44	14	2	4	1	0	25	1	2	2	0	25	20	69	78	71	993	395	1,388
2. Republican	95	35	122	124	14	61	91	222	99	0	20	10	0	1	0	1	6	2	7	2	4	59	11	76	90	83	442	789	1,231
3. Republican	66	14	49	36	27	100	83	234	64	7	18	7	0	1	0	0	6	7	18	1	1	33	17	70	77	74	396	353	749
4. Republican	53	18	15	18	7	156	16	40	31	6	16	8	0	0	0	0	7	5	16	7	0	6	12	91	89	90	391	61	452
5. Republican	50	18	43	25	96	9	177	507	70	4	12	7	1	1	0	3	15	2	3	0	4	15	11	89	94	91	372	303	675
6. Republican	66	15	63	8	7	46	10	38	24	0	17	8	0	0	0	0	2	0	1	0	1	47	13	29	39	34	342	312	654
7. Progressive Republican	43	5	89	18	20	10	97	423	15	7	7	7	0	0	0	0	8	0	0	0	5	50	5	66	77	69	304	325	629
8. Republican	39	21	51	69	93	94	174	555	47	3	7	4	1	3	0	0	14	1	6	0	4	23	18	74	87	80	245	328	573
9. Republican	32	11	51	32	18	66	55	275	19	0	4	7	1	1	0	0	7	0	3	1	5	31	7	68	86	77	244	386	630
10. Republican	48	24	33	21	21	73	129	638	69	3	10	2	1	4	0	0	9	0	4	1	2	8	29	64	58	61	224	258	482
11. Democrat	66	35	32	37	23	15	51	123	28	5	5	5	2	0	0	0	5	3	5	1	0	17	7	22	42	32	215	387	602
12. Democrat	35	119	19	22	20	16	45	84	88	1	4	5	0	0	0	0	8	0	2	1	2	8	11	63	74	68	188	172	360
13. Democrat	9	4	2	13	11	3	54	119	9	0	2	6	0	0	0	0	3	0	0	0	0	2	8	44	51	48	175	12	187
14. Republican	27	11	17	34	22	102	99	259	30	2	6	2	1	1	2	0	10	0	4	2	0	12	6	67	81	74	164	372	536
15. Republican	53	73	294	36	45	83	40	99	14	1	8	2	0	0	0	1	12	5	5	1	19	73	15	45	58	52	161	858	1,019
16. Democrat	15	13	9	31	10	6	133	480	6	4	5	2	2	2	0	0	3	0	0	0	5	3	25	76	70	73	159	49	208
17. Republican	46	33	113	69	22	25	104	485	77	2	5	4	0	0	0	0	1	1	3	0	16	81	20	68	65	67	157	601	758
18. Progressive Republican	26	16	36	14	18	21	41	120	15	0	9	2	2	1	0	0	4	0	1	1	3	22	4	69	80	74	156	272	528
19. Democrat	34	18	48	22	102	298	23	31	29	7	5	2	0	1	0	0	0	1	3	1	6	24	10	73	86	79	149	369	518
20. Republican	30	33	98	50	16	11	136	585	7	2	3	1	0	4	0	0	15	0	5	2	5	35	7	72	65	68	148	550	698
21. Progressive Republican	19	6	53	29	7	26	21	131	18	1	2	4	0	0	1	0	6	0	1	0	15	27	3	69	90	79	144	217	361
22. Progressive Republican	30	6	24	20	3	89	25	63	28	1	7	3	0	0	0	0	1	0	1	0	1	21	11	75	83	79	141	156	297
23. Democrat	21	7	5	19	33	19	68	327	7	1	3	4	0	1	0	0	0	2	1	0	0	3	1	74	90	82	141	83	224
24. Republican	20	6	17	10	4	5	28	99	66	0	5	3	0	1	0	3	1	0	1	0	2	10	7	70	62	67	140	95	235
25. Progressive Republican	20	11	17	30	31	81	53	168	20	0	6	3	1	0	0	0	2	1	4	1	1	10	2	27	37	32	135	265	400
26. Republican	26	93	427	22	36	58	59	161	28	0	3	3	2	0	0	0	6	1	2	1	19	134	17	64	65	65	132	1,069	1,201
27. Republican	19	34	151	20	16	34	62	216	15	0	4	2	0	2	0	1	8	0	1	0	7	22	11	42	57	50	130	192	322
28. Progressive Republican	22	11	38	16	12	3	20	38	15	4	3	2	0	0	0	0	7	0	4	0	1	15	6	43	81	54	123	190	313
29. Democrat	61	13	30	29	10	19	5	7	2	0	4	3	0	1	0	1	4	0	1	0	1	14	11	27	48	37	123	114	237
30. Republican	57	37	232	24	31	160	82	382	7	1	10	1	0	1	0	0	0	0	2	2	12	67	5	43	43	43	122	692	814
31. Progressive Republican	12	11	52	24	5	50	82	294	55	1	0	1	0	0	0	1	18	0	3	0	7	33	4	86	98	92	115	408	523
32. Progressive Republican	18	10	53	11	5	24	69	216	95	0	4	2	0	0	0	0	10	0	0	3	0	41	7	64	79	72	112	546	658

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TABLE 5.—*Legislative activity of the Senate of the Sixty-second Congress and its results: Also estimate of legislative ability*—Continued

Senators ranked in public legislation according to units of value for ability	Initial legislative activities								Results of various legislative activities												Percentage of attendance at—			Results from scale of units of value		
	Public bills and joint resolutions introduced	Private bills introduced	Pension bills introduced	Amendments offered	Motions and resolutions submitted	Petitions and memorials presented	Number of subjects discussed on floor of Senate	Frequence of remarks on floor of Senate	Number of reports made for committees	Public bills reported only	Public bills passing Senate only	Public bills enacted into law	Joint resolutions passing Senate only	Joint resolutions enacted into law	Concurrent resolutions passing Senate only	Concurrent resolutions passing Senate and House	Senate resolutions adopted	Private bills reported only	Private bills passing Senate only	Private bills enacted into law	Pension bills passed Senate only	Pension bills enacted into law	Honors bestowed by appointments and designations	Quorum calls	Yea and Nay calls	Quorum and Yea and Nay calls	For public legislative activity	For private legislative activity	For both public and private legislative activity
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
33. Democrat	11	15	42	15	18	15	44	78	3	1	0	4	0	0	0	0	0	0	1	2	1	20	10	37	56	47	107	350	457
34. Democrat	16	5	6	7	17	6	16	112	26	0	3	3	0	0	0	0	2	0	1	0	0	3	10	74	83	79	107	43	148
35. Republican	5	4	29	16	8	46	30	117	20	0	2	2	0	0	0	2	10	1	0	0	4	18	12	61	62	61	105	148	252
36. Republican	17	16	51	26	8	84	45	97	25	1	3	1	2	3	0	0	3	2	1	2	5	21	9	48	49	48	104	416	523
37. Progressive Republican	27	1	15	14	2	11	52	131	4	0	2	3	1	0	0	0	1	0	0	0	3	7	4	65	78	72	100	57	157
38. Democrat	19	27	8	23	22	120	49	196	15	0	5	2	0	0	0	0	1	0	2	0	0	0	7	70	82	77	97	50	143
39. Republican	12	7	120	15	8	56	8	10	17	0	3	2	0	0	0	0	5	0	1	0	4	37	7	75	80	77	89	267	356
40. Republican	13	20	10	13	7	105	34	97	92	0	3	2	0	0	0	0	5	0	4	1	0	3	2	28	44	36	89	218	307
41. Republican	14	12	30	18	3	17	47	225	26	0	6	1	1	1	0	0	3	0	1	0	1	19	6	68	79	74	88	144	232
42. Democrat	15	63	53	24	21	54	65	173	10	0	1	3	0	0	0	0	0	0	1	0	1	13	9	74	84	79	83	103	186
43. Progressive Republican	18	18	52	31	25	39	82	266	22	1	2	0	2	0	0	0	9	0	4	0	0	27	10	70	78	74	82	262	344
44. Democrat	25	32	14	7	11	15	28	82	16	0	6	0	0	1	0	1	6	0	3	0	1	0	13	74	76	75	80	80	160
45. Progressive Republican	14	14	90	16	4	61	10	21	1	0	2	0	0	0	0	0	3	0	1	0	7	29	7	55	64	59	75	234	309
46. Democrat	7	8	117	25	10	10	84	401	2	1	1	0	0	0	0	0	3	0	0	0	5	57	1	64	84	74	74	367	441
47. Democrat	11	16	25	28	21	21	61	164	10	0	2	2	0	0	0	0	1	0	1	0	0	16	3	38	59	49	69	121	190
48. Democrat	14	2	4	7	4	27	10	15	16	0	7	0	0	0	0	0	1	0	0	0	0	4	14	53	60	57	69	24	93
49. Democrat	13	11	3	31	14	18	130	538	7	0	4	1	0	1	0	0	3	1	1	0	1	0	2	36	50	43	68	50	118
50. Democrat	19	43	8	31	4	84	33	88	18	3	1	1	0	0	0	0	1	3	0	0	0	0	3	63	75	69	67	0	67
51. Democrat	11	26	14	13	7	19	21	35	3	0	2	2	0	0	0	0	0	2	2	0	2	4	5	50	68	59	66	74	140
52. Republican	12	40	152	10	14	86	23	62	17	0	5	1	0	0	0	0	0	0	1	3	17	107	5	47	61	54	65	1,052	1,117
53. Republican	21	12	109	9	2	9	14	19	17	0	1	2	0	0	0	0	2	1	0	0	1	59	1	53	56	55	64	379	443
54. Democrat	13	29	123	9	2	9	14	19	6	1	4	1	0	0	0	0	1	1	0	0	2	22	5	45	54	50	64	142	206
55. Democrat	13	14	135	11	14	144	41	86	3	0	2	1	0	1	0	0	4	0	0	1	11	80	16	63	83	73	63	635	698
56. Republican	12	18	64	25	9	127	33	84	25	1	2	1	0	0	0	2	1	0	4	1	2	48	10	67	77	72	58	468	527
57. Democrat	4	2	25	18	15	65	53	177	12	0	0	1	0	0	0	0	11	0	0	0	2	10	3	45	67	56	58	70	128
58. Democrat	29	9	13	31	9	52	45	70	4	0	5	0	0	0	0	1	4	0	1	0	2	5	7	64	83	74	56	65	121
59. Republican	10	2	117	3	0	51	0	0	4	0	7	0	0	0	0	0	0	0	0	0	2	62	0	53	53	53	56	382	438
60. Democrat	4	34	4	10	11	6	18	33	7	0	1	1	0	0	0	0	0	0	0	0	1	0	4	37	42	40	54	5	59
61. Democrat	5	68	1	3	0	9	27	44	11	0	3	1	0	0	0	0	0	0	1	1	0	1	7	73	78	75	49	131	180
62. Republican	14	5	4	2	38	13	48	106	18	1	1	0	0	1	0	3	4	0	0	1	1	2	8	66	64	65	45	117	162
63. Democrat	16	13	20	27	9	36	43	118	10	1	3	0	0	0	0	0	3	0	1	1	0	14	6	79	92	86	40	209	249
64. Democrat	7	0	1	6	8	29	42	106	6	1	0	1	3	0	0	0	2	0	0	0	0	1	4	52	59	56	38	11	49
65. Republican	3	3	20	9	6	40	16	89	2	1	0	1	0	0	0	0	1	0	1	0	0	18	5	97	98	98	35	133	168
66. Democrat	3	11	1	18	13	1	81	251	0	1	1	0	1	1	0	0	1	0	0	0	0	1	14	36	33	34	34	11	45
67. Democrat	9	2	1	41	13	5	80	293	5	2	0	0	0	1	0	0	3	0	0	0	0	0	9	38	55	51	33	0	33
68. Democrat	4	15	153	9	5	75	18	65	3	0	0	0	0	0	0	0	10	0	1	0	6	46	3	41	60	50	30	301	331
69. Republican	12	6	50	14	15	116	51	118	18	0	1	0	0	0	0	0	6	0	0	0	3	26	4	75	89	78	29	156	185
70. Republican	1	1	83	3	0	22	14	31	8	0	0	1	0	0	0	0	1	0	0	0	4	16	1	44	58	51	28	116	144
71. Progressive Republican	18	1	41	22	17	38	41	175	7	1	1	0	0	0	0	0	4	0	0	0	2	27	9	41	64	53	27	177	204
72. Republican	11	7	109	11	2	118	6	29	7	0	2	0	0	0	0	0	1	0	1	0	16	32	1	58	69	67	19	297	316
73. Republican	7	9	91	9	5	77	7	44	21	1	0	0	0	0	0	0	3	0	0	0	6	62	12	78	78	78	16	407	423
74. Democrat	8	1	2	10	1	7	23	59	49	1	0	0	0	0	0	0	3	1	0	0	0	1	4	74	85	80	16	26	42
75. Democrat	6	40	7	13	1	0	10	47	1	1	1	0	0	0	0	0	0	0	0	0	0	2	8	36	50	43	15	12	27
76. Democrat	10	10	12	15	12	54	65	109	9	0	1	0	0	0	0	0	1	2	0	0	1	9	7	83	88	85	11	99	110
77. Democrat	8	27	4	4	4	2	5	9	2	0	1	0	0	0	0	0	1	1	0	0	0	1	7	42	46	44	11	26	37
78. Republican	3	20	37	16	1	33	0	0	4	0	0	0	0	0	0	0	1	0	3	0	0	26	1	46	61	54	3	331	334
79. Republican	1	1	4	6	1	14	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	3	0	41	39	40	3	43	46
80. Democrat	1	8	14	3	2	8	15	86	2	0	0	0	0	0	0	0	0	0	0	0	0	7	4	35	49	42	0	42	42
Total	1,859	1,517	4,408	1,936	1,315	4,054	3,769	13,277	1,796	106	355	181	26	39	4	21	358	43	129	43	262	1,932	471	----	----	----	9,818	20,030	29,848
Average	23.2	19.0	55.1	24.2	16.4	50.6	47.1	166.0	22.4	1.3	4.4	2.3	0.32	0.49	0.05	0.16	4.5	0.5	1.5	0.5	3.3	24.1	5.9	59	69	64	122.7	250.4	373.1

Some Senators are omitted on account of long absence during this Congress.

GENERAL TESTS OF SENATORIAL ACTIVITIES

Table 5 may be regarded as the basis for general tests of senatorial activities. In column 1, the Senators are numbered from 1 to 80, according to their rank in success with public legislation. The rank of each Senator in column 1, is based upon the figures in column 28, which in turn depend upon the scale for legislative ability in table 2. The figures in columns 2 to 9, inclusive, refer to what may be called initial activity, showing the degree of willingness of the part of each Senator to undertake legislative work. One indication of this is the number of public bills and joint resolutions introduced by each Senator (column 2). Another sign is the number of private and pension bills introduced (columns 3 and 4), then come number of amendments offered (column 5), motions and resolutions submitted (column 6) and petitions and memorials presented (column 7). Initial legislative activity is not only indicated by the introduction of bills, or offering of amendments or submitting of motions, but by the number of subjects discussed and frequency (not length) of remarks on the floor of the Senate as shown for each Senator in columns 8 and 9 of Table 5.

In columns 10 to 24, inclusive, are presented the results of various legislative activities, showing, for each Senator the number of reports made in general for committees (column 10), and in particular on public bills (column 11) and private bills (column 19).

In column 12, are the number of public bills introduced by each Senator, which only passed the Senate but went no farther. Column 13 gives for each Senator the number of public bills introduced by him, which not only passed the Senate, but the House also, and were enacted into law. Columns 14 and 15 show figures for joint resolutions introduced by each Senator which either passed the Senate only or were enacted into law. The number of concurrent resolutions introduced which were agreed upon by the Senate but not by the House will be found in column 16; those which succeeded still further, and were passed by both House and Senate appear in column 17. In column 18 are the number of simple Senate resolutions introduced which were adopted by the Senate. In columns 19 to 23, inclusive, are the figures for each Senator, showing the results or degrees of success in his private legislative activities; that is to say, for instance, the number of private bills which he introduced which were reported only but did not progress further (column 19), or passed the Senate only after being reported (column 20), or as indicated in column 21, succeeded still better and were enacted into law.

In columns 22 and 23 will be found the number of pension bills introduced, which passed the Senate only, or those which succeeded better and were enacted into law. Column 24 indicates number of appointments and designations bestowed upon Senators, which practically are honors, such as appointments upon

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committees to wait upon the President or to represent the Senate or their party in any capacity.

The faithfulness of Senators in their attendance on quorum and yea-and-nay calls, or both combined, are indicated by percentages in columns 25, 26, and 27. Columns 28, 29, and 30 show the rank of each Senator for success in public and private legislative activity and both together.

FREQUENCY OF REMARKS IN THE CONGRESSIONAL RECORD

In the first part of Table 6 are given the number of pages in the CONGRESSIONAL RECORD on which remarks occur of Democratic, Republican, progressive Republican, and conservative Republican Senators, with their averages. All figures in this table are based upon those in column 9, Table 5. The highest average—242 (Table 6) is that of the progressive Republicans, which may illustrate the general truth, that those who are the most aggressive for reform or change of methods or of conditions must talk the most frequently; thus the average frequency of remarks for the conservative Republicans is only 167 as compared with 242 of the progressive Republicans.

Next to the lowest average for frequency of remarks in the CONGRESSIONAL RECORD is that of the Democrats, who were the minority party. But the minority does not consider itself responsible for legislation, and has less interest in it and generally less need to talk.

TABLE 6

Some divisions of Senators	Number	Number of pages in Congressional Record on which remarks occur	
			Average
Democrats	34	4,698	138
Republicans	46	3,622	187
Progressive Republicans	12	2,914	242
Conservative Republicans	34	5,708	167
With university education	20	5,662	233
With college education	38	5,591	147
With common school education	22	3,067	139
Business men	17	1,925	113
Professional men	63	11,395	180
Chairman of important committee	13	2,807	215

THE BEST EDUCATED SPEAK THE MOST FREQUENTLY IN THE SENATE

In the second half of Table 6, the Senators are classified according to their educational opportunities, as those with (1) university, (2) collegiate, and (3) common-school education. Those best educated talk most frequently, showing an average of 233, and those with only a common-school education showing the lowest average, 139. In general, the frequency of remarks in the CONGRESSIONAL RECORD varies according to the degree of education. The fact that professional men average (180) much higher than business men, whose average is 113 (the lowest of all) confirms this statement. Business men talk the least probably for two reasons; first, they are not as well educated as other Senators, and second, the habits of business life tend to action rather than talk.

The chairman of an important committee, whose average is 215, stands third for frequency of remarks, due probably to the necessity of speaking often and answering questions when in charge of the commitee bills on floor of the Senate.

PREVIOUS LIFE OF SENATORS

Table 7 presents a summary of details as to lives of Senators before entering the Senate, as given by the Senators themselves in the Congressional Directories for the Sixty-second Congress.

Beginning with the first line of the table, we note that more than half of the Senators (67 per cent) were reared in the country, 33 per cent being reared in the city. As to education, the largest number (47 per cent) had received a collegiate training, 28 per cent had only been in the common school, and 25 per cent had university training. Under the head of "Occupation," it will be seen that the great majority (71 per cent) were lawyers. Distinguishing between business and professional life, 21 per cent belonged to the former and 79 per cent to the latter.

TABLE 7.—*Life of Senators previous to entering the Senate*

	Number	Per cent
Reared in city	26	33
Reared in country	54	67
Education:		
University	20	25
Collegiate	38	47
Common school	22	28
Occupation:		
Lawyers	57	71
Bankers	7	8
Farmers	6	7
Teachers	[1]13	16
Miscellaneous	[1]13	16
Business life	17	21
Professional life	63	79

[1] Some Senators report several occupations.

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TABLE 7.—*Life of Senators previous to entering the Senate*—Con.

	Number	Per cent
Legislative experience:		
With	51	64
Without	29	36
In public office:		
Experience	48	60
No experience	32	40
Political honors:[2]		
Senators receiving them	34	42
Senators without them	46	53
Severe political defeats	12	15
Legislative service:		
In House of Representatives	26	32
In State legislature	36	45
Executive service:		
Governors	23	28
Members of Cabinet	2	
United States departmental service	8	10
Prosecuting attorneys	17	21
Mayors	3	
In Army and Navy	9	11
Both legislative and executive experience	23	28
Judges	6	7

[2] Delegate to national convention, etc. Some honors given while in Senate.

A distinct majority (64 per cent) had legislative experience before entering the Senate, and as many as 32 per cent had served in the House of Representatives, which, as we shall see later, is a valuable preparation for the Senate. Fifteen per cent had suffered previous serious political defeats. Some of the best Senators were among this number.

A good majority of Senators (60 per cent) had experience in public office. The 42 per cent of Senators receiving political honors as delegates to the national convention are usually strong party men. As seen from the table under the head on "Executive service," a relatively large number of Senators (28 per cent) have been governors of their States before entering the Senate, furnishing the Senator with a practical knowledge of the wants of his State. It would be interesting to know if such Senators held their seats in the Senate longest. This step from governor to Senator is a frequent one. Another good practical preparation for the Senate (also frequent) is experience as district attorney, then membership in the House of Representatives, and finally coming to the Senate. This is indicated from the fact, as seen from the table, that 21 per cent of the Senators have been district attorneys and 32 per cent Members of the House of Representatives.

DEMOCRATS AND REPUBLICANS COMPARED

It may not be without interest to make a few comparisons of a psychological and educational nature between the Democratic and Republican Senators, as shown in Table 8.

TABLE 8

	Number	Per cent
Democrats born in the city	9	26
Democrats born in the country	25	74
Republicans born in the city	17	37
Republicans born in the country	29	63
Democrats who are business men	5	14
Democrats who are professional men	29	86
Republicans who are business men	12	26
Republicans who are professional men	34	74
Democrats with university training	12	35
Democrats who have college training	13	38
Democrats who have common school training	9	27
Republicans with university training	8	17
Republicans with college training	25	54
Republicans with common school training	13	29

Of the Democratic Senators, 74 per cent were reared in the country, as over against 63 per cent of Republicans; 86 per cent of Democrats are professional men and 14 per cent business men, while 74 per cent of the Republicans are professional men and 26 per cent business men; that is about 10 per cent more Democrats than Republicans were reared in the country, and also about 10 per cent more Democrats than Republicans are professional men. While the Democrats greatly excel the Republicans in university training (35 per cent over against 17 per cent) the Republicans excel the Democrats in college training (54 per cent over against 38 per cent).

ESTIMATE OF LEGISLATIVE SUCCESS

As seen from Table 9, the last part of which is taken from Table 4, private bills were the most difficult to have acted upon in this Congress. Whether this be true generally could only be determined by a study of many Congresses. Only 2½ per cent of private bills were enacted into law. If we take the private bills as a criterion and let 2½ per cent equal 100 units of value, then dividing two and one-half by the different per cents for the different classes of bills, we will have a scale of evaluation based upon the actual results obtained, that is a scale which is not arbitrary. This scale is presented in Table 9.

TABLE 9.—*Percentages and scale of units*

	Per cent reported	Per cent passed Senate	Per cent became law	Scale for		
				Reported	Passed Senate	Enactment into law
Private bills	12	10	2½	20	25	100
Public bills	35	30	10	7	8	25
Joint resolutions	----------	42	24	----------	6	10
Pension bills	----------	50	44	----------	5	6
Concurrent resolutions	----------	67	56	----------	3	4
Senate resolutions	----------	74	----------	----------	2	----------

Thus, if every private bill passed counts 100; as 10 per cent of public bills were enacted into law, then every public bill enacted into law will count 25; as 24 per cent of joint resolutions passed, each joint resolution passed will count 10. That is, the more difficult it is to have action taken on any class of bills, the more that action counts in the scale.

Let us now, as an example, work out the standing of Senator No. 1, the highest of all as recorded in Table 5. Beginning with column 12 we note that Senator No. 1 was successful in having 23 public bills, introduced by him, reported out of committee only; if we revert to the scale of values in the second part of Table 9, we find that each public bill reported out only, counts 7, making 23 bills reported out, 161 units of value, based upon our standard of 100 units of value for every private bill enacted into law, as already explained.

Column 12 of Table 5 shows that 44 of the public bills introduced by Senator No. 1 passed the Senate only. Reverting to the scale in Table 9, we find that each public bill which passes the Senate counts 8, making for 44 bills, 352. Column 13 of Table 5 gives 14 public bills of Senator No. 1 enacted into law; reverting to the scale of Table 9, we find that each public bill enacted into law counts 25, so that 14 bills would make 350. Column 14 gives two joint resolutions as passing Senate only; according to the scale, each joint resolution passing Senate only, counts 6, making 12. Column 15 shows four joint resolutions were enacted into law; according to the scale each joint resolution enacted into law counts 10, making 40. Column 16 gives one concurrent resolution agreed to in Senate only which, according to the scale, makes 3. Column 18 gives 25 Senate resolutions agreed to which, according to scale (each counting 3), makes 75. Adding all these results as follows—

Public bills reported out, 23×7	161
Public bills passed Senate only, 44×8	352
Public bills enacted into law, 14×24	350
Joint resolutions passed Senate only, 2×6	12
Joint resolutions enacted into law, 4×10	40
Concurrent resolutions passed Senate, 1×3	3
Senate resolution agreed to, 25×3	75
	993

We have a total number of units of value for the public legislative results or success of Senator No. 1, which is 993. The results for each Senator have been worked out in a similar way for success in private legislative activity (column 29, Table 5), and for both public and private combined (column 30, Table 5).

DIFFICULT TO ESTIMATE A SENATOR'S STANDING

The difficulties of estimating the standing of a Senator for legislative success by any scale are evident at once and naturally produce skepticism. However, the attempt here is at best intended to be only approximate; that is, the difference of a few units between Senators would have little or no significance, but if it were a larger number it would have a certain weight. If, from a study of several Congresses, a Senator were shown to have relatively a similar standing, this would strengthen the value of the estimate.

TABLE 10

Political divisions	Number	Number of units for public legislative success	Average
Democrats	34	2,603	76
Republicans	46	7,215	156
Progressive Republicans	12	1,514	126
Conservative Republicans	34	5,701	167
Democrats, 2,603 plus 50 per cent (1,301)	34	3,904	114

Table 10 gives an estimate of the political divisions of Senators as to their success in public legislative activity. This estimate is made according to the scale given in the second part of Table 9. In the third column of Table 10 are given the total number of units of success for each of the political divisions; this total divided by the number of Senators in each political division gives the averages. As will be noted, the Democrats, who were the minority party in this Congress, average 76, being nearly 50 per cent less than 150 which is the average for the Republicans.

There are obvious reasons for this great difference in successful public legislative activity between the Democrats, or minority party, and the Republicans, or majority party. The majority party have all the important chairmanships; the majority party are held responsible for the legislative program and naturally desire to have charge of the bills, especially those which seem to have some chance of passing. This goes so far sometimes, that if a minority member has worked out and introduced such a bill, a majority member will introduce practically the same bill. For it is not considered good politics to have popular bills passed which bear the names of minority members. Such cases, however, are very infrequent and are only mentioned to illustrate how jealous the majority party are of their control of legislation.

Since for these and other reasons connected with the prestige of the majority party, the minority are at great disadvantage, and since they average 50 per cent less (76) than the majority (156) in successful public legislative activity, and assuming this to be an average or normal Congress, it would seem just in order to effect such disadvantages, to allow the minority 50 per cent increase. In all further estimates of public legislative success, therefore, we will add to the standing of each Democrat 50 per cent of his units of value. These units of value are given in Table 5, column 28. Thus, Senator No. 12, for instance, has 188 units of value; adding 50 per cent of 188 to 188 makes 282 as his standing for success in public legislative activity.

TABLE 11

Division of Senators	Number	Average units for public legislative success
Business men	17	106
Professional men	63	144
Chairmen of important committees	13	208
Remaining Republicans	33	138
Senators reared in the city	26	130
Senators reared in the country	54	143

Table 11 gives the standing for success in public legislative activity of Senators who were business men, professional men, chairmen of important committees (all Republicans) and remaining Republicans; also the degree of success of Senators reared in the city as compared with those reared in the country.

From the last column of the table, it will be seen that professional men as Senators are more successful in their public legislative activity than Senators who were business men, showing an average of 144 over against 106. This is to be expected as professional men, especially lawyers, are better equipped. The average of 208 for chairmen of important committees is very high as compared with that of the remaining Republicans, which is 138. This may be partially due to the fact that the chairmen sometimes introduce public bills for the committee, rather than for themselves. Still, the fact of being a chairman of an important committee is a credit.

PREVIOUS SERVICE IN HOUSE OF REPRESENTATIVES

Taking all the Senators who have served in the House of Representatives and considering their average for successful public legislative activity, we find it to be 177. This suggests the beneficial influence upon Senators of having had service in the House of Representatives previous to entering the Senate. For if we consider in contrast with this the average 119, which is that of Senators without previous legislative experience of any kind, the significance of the high average of 177 is evident.

Working out in a similar manner the average for Senators who have received political honors as delegates to a national political convention, we find their average to be 148, which is relatively high. As these Senators are usually strong party men, there is no indication that their interest in politics, as such, affects their faithfulness to their work in the Senate.

EDUCATION AND LEGISLATIVE ACTIVITY

Table 12 gives the average standing for success in public legislative activity of Senators with university education (124) as compared with Senators having merely a common-school training. It will be seen that the degree of success in both public and private legislation varies inversely with education, that is, the better educated the Senator, the less his success in legislative activity.

TABLE 12

Senators divided according to educational qualifications	Number	Per cent	Average units of value for results of legislative activity		
			Public	Private	Both
Senators with university education	20	25	124	142	266
Senators with college education	38	47	130	286	416
Senators with common school	22	28	184	286	470

This does not mean, of course, that education necessarily has anything to do with this result as a cause. There are many other things in the character of the men themselves that might act as causes. It may be said, however, that education sometimes tends to make men more reserved in their opinions and so less aggressive and intense in action.

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Brain

BY

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(Introduced by Senator JONES, of Washington, in the United States Senate)

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The brain is a mere extension of the spinal cord; both are of one piece. The spinal cord is fundamental, while the brain is more or less accidental. Though the brain be an adventitious part of the spinal cord, it has, nevertheless, become the head of the nervous system and is different enough to have a separate name.

Though the brain often has great relative bulk and high complexity, it must be remembered (Piersol) that the spinal cord is the fundamental and essential part of the nervous axis, so that the degree to which the brain is developed is accidental, being dependent upon the necessities of the animal in the use of the higher nervous functions.

Though from the point of view of nature the brain is an accidental growth, from the human viewpoint it is all important, being the basis of mind, the highest function in man.

In consonance with this idea of the accidentality of the brain, from the point of view of nature, is the opinion of a specialist (Bolton) that the extreme end of the frontal lobe, which is the seat of the higher processes of association, is the last region of the brain to be evolved, but the first to undergo dissolution in mental decadence or dementia. In amentia this region is not developed. Also a fact of comparative anatomy may not be without significance: The spinal cord in man weighs from 1 to 1½ ounces; and relatively to the brain is as 1 to 40, but as we go down the animal scale this ratio gradually decreases, till in the mouse it is 1 to 4. In cold-blooded animals the relation is reversed and the spinal cord is the heavier; in the newt 1 to 105 and lamprey 1 to 133. Thus, in the earlier and fundamental stages of nature the brain was most subordinate, if it barely existed. Now, this adventitious character of the brain as a mere offshoot of the spinal cord may have its parallel in the realm of mind. Thus the furthermost development of mind might be said to consist in the metaphysical theories of philosophers, which are also of an adventitious character, being the most complicated (like the brain), uncertain, and changeable forms of consciousness. Briefly, all those activities, which are called intellectual, are the distinctive expression of the brain, as the organ of mind, which is absolutely dependent upon the brain as far as knowledge goes.

As we shall see, in the consideration of cerebral localization (page 12406), in the higher animals, including man, there is no consciousness in any part of the nervous system from which the forebrain has been cut off. That is to say, that not only thought but consciousness itself is absolutely limited to the brain, which exists without mind, but there is not a single instance known to science of the existence of mind without a brain.

It is further suggestive to note that in the dying hour thought and consciousness are usually the first to cease acting, while the unconscious organic functions, being fundamental, are the last to disappear.

I. WEIGHT OF HUMAN BRAIN

While the statistics of brain weights have been gathered by many writers in the past, but usually by very elemental methods, the first one to study more exactly the question of variation of brain weight was Karl Pearson, of the Eugenics Laboratory in London.

Marchand, one of the pioneers in the statistics of brain weight, did not give the body weight, because, for autopsy purposes in hospitals, the weight of the subjects was too variable to consider in relation to brain weight.

Marchand's brain data indicate that the brain reaches its full growth between ages 15 and 20, remaining constant to about age 50, and then gradually becomes less in weight. It will be noted, as we give the data, especially concerning the brain, by leading specialists, that frequently there is much variation in opinion, but it only illustrates the actual status of brain investigation, which is merely in its beginning.

In girl and boy at birth the brain is about the same in weight; the brain of the female averages a little heavier than that of the male; boy 367 grams (12 ounces), girl 396 grams (13 ounces). The relative weight of the brain to body weight in the girl is greater than in boy; thus boy, 1 to 8.3; girl, 1 to 8.0; later in life, from birth on with age and weight, the absolute brain weight increases so that up to 15 years of age this increase is from threefold to nearly fourfold; and from this time on the absolute weight of brain is greater in man than in woman.

TABLE 1.—*Relation of brain weight to body weight*

New-born boy	1:8
End of fourth week	1:7
End of twelfth week	1:5
End of first year	1:6
End of second year	1:14

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TABLE 1.—*Relation of brain weight to body weight*—Continued

End of third year	1:18
End of seventh year	1:12
End of twelfth year	1:23
End of fourteenth year	1:15–25
End of fifteenth year	1:22

In man the maximum brain weight comes between ages 15 to 30; in woman at age 14. In higher ages the brain weight decreases in man from 60 to 70; in woman from 50 to 60; the decrease is about the same in both sexes. At age 7 the brain averages 40 ounces, and at age 14 the brain often reaches 48 ounces. Beyond age 50 the weight slowly but gradually decreases at the rate of about 1 ounce in 10 years.

European brain weight averages from 1,350 grams (47 ounces) to 1,360 grams, or 48 ounces (Bischoff). Topinard (11,000 cases) makes 1,361 grams (48 ounces) the average for man and 1,200 grams (42 ounces) for woman.

Brains under 1,250 grams (44 ounces) in weight are abnormally small and those more than 1,550 grams (55 ounces) are abnormally large (Marchand).

A number of specialists in a series of 278 cases showed the maximum brain weight to be 1,810 grams (64 ounces) and the minimum about 960 grams (34 ounces). The mean weight from 20 to 40 years of age is, according to Boyd, 1,360 grams (48 ounces) for the male and 1,230 grams (43½ ounces) for the female brain. The brain appears to be heaviest between 14 and 20 years of age, and at the age of 80 has lost 90 grams (or rather more than 3 ounces). Broca makes the average 1,421 grams (50 ounces). Spitzka showed that in distinguished men the senile decrease in weight was delayed about 10 years, their average weight being 1,473 (52 ounces), 100 grams (3 ounces) above the European average.

Table 2 shows that taller persons average greater brain weight than those shorter in stature.

TABLE 2.—*Relation of stature to brain weight (Bischoff)*

Cubic centimeteral	Cubic inches	Grams	Brain weight (ounce)
150	9.0	=8.7	0.30
160	9.0	=8.3	.29
165	10.0	=8.1	.28
170	10.3	=7.9	.26
180	10.9	=7.6	.28
190	11.5	=7.1	.24

Table 3 also indicates that those with less body weight have greater brain weight. Thus, smaller men and women show a higher relative average brain weight.

TABLE 3.—*Relation of body weight to brain weight (Bischoff)*

Grams	Body weight (ounces)	Per cent brain weight
30,000	1,058	=3.7
40,000	1,411	=2.9
50,000	1,764	=2.5
60,000	2,117	=2.1
70,000	2,470	=1.9
80,000	2,823	=1.5

The specific gravity of the brain averages 1.036.

From the examination of 10 brains (5 for each sex) Dahlberg found the gray matter to average 53.6 per cent of the volume of the entire cerebrum; the nuclei averaged 3.6 per cent and the white matter 42.8 per cent.

Damlewsky showed the weight of the cortex to be 33 per cent of the total weight of the brain, weighing 1,324 grams (47 ounces) and having a total surface of 169,200 square millimeters (262 square inches). Donaldson found the cortex to form about 50 per cent of the brain weight; also that the thickness of the cortex may vary from 1.55 millimeters to 3.50 millimeters (0.04 to 0.13 inch), the average being about 2.9 millimeters (0.10 inch). The average length of the brain is about 165 millimeters (6.49 inches) and its greatest transverse diameter is about 140 millimeters (5.5 inches). The larger and deeper convolutions are similar in the two hemispheres; most of them are individually variable, but each convolution is homologous with that of the other hemisphere. In broad-headed persons (brachycephalics) the longitudinal convolutions and transverse fissures tend to break up and thus the amount of surface, and so of gray matter, is increased relatively to the whole brain. Intelligence of normal character is probably not possible in a brain less than 32 ounces in weight. The taller the individual, the greater his brain weight, yet short people have relatively heavier brains than tall. The cerebellum is usually one-eighth of the weight of the entire brain. The cerebral cortex varies in thickness and becomes thinner in old age. The cerebellum or hind brain weighs 140 grams (5 ounces), or about 10 per cent of the entire encephalon; it averages larger in man than woman and is relatively larger in adults than children, the converse of the brain. The cerebellum has especially to do with equilibrium.

TABLE 4.—*Average difference between brain volume and inner space of head (Rudolph, O.)*

Normal male (adults) ages:	Average difference in percentages
17	9.6
18	5.1
18	5.6
23	9.6
25	7.0
29	5.4
32	6.0
32	7.7
33	7.9
35	5.5
37	7.0
37	9.0
40	6.4
40	8.5
43	6.1
46	6.9
48	9.1
50	9.9
51	5.7
59	7.4
64	7.1
65	8.3
65	4.3
	7.21
69	15.3
72	20.9
75	18.9
78	26.7
82	15.1
	19.3

DIFFERENCE BETWEEN BRAIN AND SKULL VOLUME

In Table 4 is given (in percentages) the average difference in adult males between the volume of the brain and the inner space of the head. This average difference is about 7½ per cent, with individual variations from 5 to 10 per cent.

This difference changes little in middle life, but after the age of 70 the difference is about double; that is, 15 per cent between brain volume and cranial capacity.

In a head with a cranial capacity of 1,400 cubic centimeters (85 cubic inches) there is about 100 cubic centimeters (6 cubic inches) of free space outside of the brain; but after the age of 70 this free space has about doubled, or is about 200 cubic centimeters (12 cubic inches).

The volume of the dura is on the average from 50 to 60 cubic centimeters (3 to 4 cubic inches).

BRAIN WEIGHT AND INTELLIGENCE IN ANIMALS

In general, it will be seen from Table 5 below that the larger the animal the smaller the relative size of brain. The whale's brain weighs 2,816 grams (99 ounces), and the elephant's 4,896 grams (173 ounces). While these are the largest brains among animals (Table 6), their weights relative to their body weight are very small (in the elephant, 1 to 500).

From Table 5 we see that small animals of the same vertebral class, as fish, amphibians, and reptiles, have, relative to body weight, larger brains. It is generally true in animals, as in man, that the brain weight is much greater, relative to body weight, in their young age than in their adulthood.

TABLE 5.—*Relation of brain weight to body weight (Ranke)*

Little European singing bird	1: 12	to 28
(Sajou)	1: 13	
Hapale penicillata	1: 22	
Saimiri	1: 24	
Sai	1: 25	
Magpie or jay	1: 28	
Uisti: Species of ape	1: 28	
Hylobates, leuciscus	1: 28	to 48
German woman	1: 35	
Mole, molewarp	1: 36	
German man	1: 36. 58	
Callitrix	1: 41	
Lemur anjuanesis	1: 42	
Half-grown orang-outang	1: 51	
Half-grown chimpanzee	1: 51	
Cat	1: 82	to 156
Makato	1: 96	
Grown gorilla about	1: 100	
Papio	1: 104	to 170
Dove	1: 104	
Eagle	1: 160	
(Eidechse) lizard	1: 160	
Frog	1: 172	
Dog	1: 214	to 307
Carp	1: 248	
Hen	1: 347	
Sheep	1: 351	
Goose	1: 360	to 467
Salamander	1: 380	
Horse	1: 400	
Young elephant	1: 500	

TABLE 5.—*Relation of brain weight to body weight (Ranke)*—Con.

Tiger and lion	1: 500	to 600
Ox	1: 500	to 800
Tadpole	1: 720	
Ostrich	1: 1,200	
Shad	1: 1,837	
Handschildkroto	1: 2,240	
Shark	1: 2,496	
Sea tortoise	1: 5,680	
Tunny fish	1: 37,440	

TABLE 6.—*Brain weights*

	Grams	Ounces
Elephant	4,896	173
Whale	2,816	99
Dolphin	1,775	62
	1,360	48
Cattle	754	27
Horse	517	18
Sea hog	504	17
Gorilla	416	14
Chimpanzee	387	13.6
Ass	377	13.3
Orang-outang	365	12.8
Stag	335	11.8
Papion	158	5.5
Wolf	133	4.6
Hog	122	
Wild boar	117	4.1
Dog (de terre)	116	4.0
Sheep	110	3.8
Gibbon	103	3.6
Baboon	94	3.3
Dog (de berger)	93	3.2
Macaroon	73	2.57
Wildcat	72	2.54
Jackall	71	2.50
Kangaroo	53	1.8
Dog	46	1.6
Dog (griffin)	45	1.58
Beaver	43	1.51
Cat	28	.98
Rabbit	26	.91
Ferret	8.70	.3
Dogfish	8.00	.27
Rat	1–4.00	.03–.14
Moles (24) average	.96	.02
Bat	.65	.01
Mouse	.37	.07
BIRDS		
Goose	30.0	1.05
Parrot (male)	7.65	.25
Parrot (female)	4.30	.15
Magpie (male)	3.00	.10
Magpie (female)	4.20	.09
Rooster	3.70	.11
Thrush	2.15	.08
Sparrow	1.90	.06
Canary bird	1.11	.03
	.68	.01
REPTILES (BATRACHIANS)		
Crocodile (70 kilos)	15.00	.62
Sea turtle	5.09	.18
Land turtle	.37	.01
Lizard	.05	.006
Frog	.01	.003
FISH		
Shark	9.4	.32
Pike	1.3	.45

Notwithstanding variations, it will be seen from Table 9 that there is a certain parallelism between brain weight and intelligence in animals.

The gorilla's brain (with a body weight nearly as much as man) weighs only 416 grams (13 ounces), which is less than one-third of man's brain weight, and is barely more than that of the human infant at birth.

THE RATIONALE OF COMPARATIVE BRAIN WEIGHT

As a general proposition, the higher the mental faculties are developed in the vertebrates, and especially in man at different ages, as well as in different individuals, the greater is the development of the cerebral hemispheres, in comparison with the rest of the cerebrospinal system.

In the same species or class the relative brain weight is greater in species of small stature than in those of large stature. It can be said that the influence of stature, or organic mass relative to brain weight, extends throughout the animal kingdom in such a way that with equal intelligence the small species have a relative superior brain weight to the large species; also, that the species of very small stature can excel species of very great stature and much superior in intelligence. Thus the influence of height on brain weight seems to overbalance that of intelligence. Thus the rabbit, whose brain weighs 26 grams (0.91 ounce), and the rat (much less in height), whose brain weighs one gram (0.03 ounce), are both, nevertheless, somewhat alike in intelligence.

It is natural to attach more importance to organs in proportion to their correlation with the brain. The function of nutrition, or at least locomotion, appears to be in relation with brain weight; the vegetative influence and that of locomotion over the brain weight can not be estimated, except in animals of the same class.

Thus, the crocodile, in spite of its mass and the size of its nerves, has a very small brain.

The nutrition of the brain in man is very much independent of the general nutrition of the body; thus very delicate children are often well developed cerebrally.

The small animal species are more sensitive than the larger species. The surface of the body is greater relatively to its mass, as the body is smaller, and the sensitive nerves are relatively more developed to the volume of the body, as the height is less.

The brain or nervous center does not receive as numerous sensations, as various, and as complex in inferior animals as in the superior. Also, the brain does not receive as numerous, as various, and as complex sensations in species of small stature as in those taller.

The relation existing between the surface sensitive organs and the development of the parts of the brain responding to them is shown by comparing the elephant with the dog. In the dog the sense of smell is at least as acute as in the elephant, yet its olfactive lobe is much smaller; but the olfactive lobe is connected with the volitions and movements of other organs, which in the elephant cover much more ground, so that, for this reason alone, the organ is larger, though the dog's sense of smell is more developed. Again, the elephant has a brain weighing 4,896 grams (173 ounces) and the whale 2,816 grams (99 ounces) (table). The elephant is intellectually superior and his senses and their number are greater; the variety and complexity of his movements involve an enormous mass and numerous coordinations requiring a large quantity of nervous elements, as the variety of actions with its trunk. Thus it surpasses the whale in intelligence.

The great weight (Table 5) of man's brain (1,360 grams=47 ounces) as compared with that of the gorilla (416 grams=14.6 ounces) may in part be explained in the comparison made between the elephant and whale. Thus in man the specialization of the thoracic organs, the many movements of the hand and movements for articulation, are more intimately connected with mental activity. Their relative volume appears to be related with the degree of influence exercised by the diverse organs over intelligence and with the degree of influence exercised reactionally by the brain over these organs. Thus, as to motor center, the brain controls less numerous, less various, and less complicated movements in the inferior species.

BRAIN WEIGHT AND INTELLIGENCE IN MAN

All the results of investigation of the brain do not appear to be in accord, and some are contradictory. This is especially the case in the question of the relation of brain weight and intelligence.

In the past this relationship was doubtless unduly emphasized, but at present certain mathematical specialists maintain that the relationship is so slight that it is negligible. Thus the pendulum has swung to the other extreme and, as usual, the truth may eventually be found in the golden mean.

Since no brain in a head less than 11 inches in circumference has been known to function normally, and since no brain weighing less than 32 ounces has been normal, it is evident that size and weight of brain have very much to do with intelligence, at least within certain limits. But the question is, Before we reach these limits what is the degree of relationship? In short, if after certain limits in size and weight the brain absolutely conditions normal intelligence, it is difficult to believe that this relation suddenly stops and has little or no significance. For this would involve a saltus, which is contrary to nature itself. The author is further doubtful, because there is relatively so little definitely settled about the brain that can be regarded as of a fundamental nature.

In the animal kingdom, in three-fourths of cases (see Tables 4 and 5), the species with the heavier brain show more intelligence, and this is especially striking when we come to man as compared with the lower animals. For, as man's intelligence is so much higher than that of the animal's, so his brain is correspondingly heavier. Thus in the animal nearest to man, as in the gorilla, the brain weight is from 400 to 500 grams (14 to 17 ounces), while in man it is from 950 to 1,800 grams (32 to 63 ounces). This certainly is a prodigious rise, or, rather, jump, the average for man being 1,350 to 1,450 grams (47 to 51 ounces), while the highest in the gorilla is but 500 grams (17 ounces). This saltus is not due to nature but to our ignorance of the doubtless many intervening species between the highest ape and the lowest man. These species may have been permanently destroyed, or are yet to be discovered.

TABLE 7.—*Criminals (M. H. Whiting, Biometrika, Vol. 81)*

Correlations of mentality with—

Age	$= -0.26 + 0.041$
Temperature	$= - .25 + .020$
Pulse	$= - .22 + .030$
Respiration	$= - .14 + .031$
Height	$= - .15 + .043$
Weight	$= - .32 + .040$

By mentalities in this table is meant the weak-minded. The table shows that all the correlations are significant, and that the feeble-minded or those with less mentality have less weight, less height and age, but greater temperature, quicker pulse and respiration than the mentally normal. Congenital and other morbid defects of the brain are, in general, accompanied with corresponding deficiency in the range or power of the mental faculties and the higher instincts. Thus, according to Du Catte, every skull with a horizontal circumference less than 48 centimeters (18 inches) belongs to an idiot or imbecile.

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TABLE 8.—*Anthropological study of 89 Members of Congress, with estimated brain weight and its correlations (MacDonald)*

Relation of physical and mental status	Arithmetical mean	Standard deviation	Coefficient correlation
Stature	177±0.41	5.8±0.29	0.55±0.05
Brain weight	1450±8.2	115±5.8	.63± .04
Body build	5709±36.3	515±26.0	

As this is the first[1] time any legislative body was ever studied from the scientific point of view, a few details may be given. The table shows that the degree of relationship between brain weight (estimated by an equation) and stature is 0.55±0.05, which is positively high, and the degree of correlation between brain weight and body build is still higher, being 0.63±0.04. The body build is obtained by dividing the chest girth (at armpits) by the stature. As body build increases we pass from slenderness to stoutness, or, rather, thicksetness. This high correlation (0.63±0.04) indicates that in general short, thickset people have heavier brains than slender persons. The correlation for height (0.55±0.05) is much higher than is usually the case, which is probably mainly due to the homogeneity of Congress. The average estimated brain weight of the 89 Members of Congress was 1,550 grams (55 ounces), which is much above the average (48 ounces).

TABLE 9.—*Brain weight and occupation (Matiegha)*

Occupation	Number	Brain weight	
		Grams	Ounces
Unskilled laborers	14	1,410	49
Skilled laborers	34	1,433	50
House servants	14	1,435	50.6
Expert workers	123	1,449	51
Mental workers	28	1,468	51.7
Professional workers	22	1,500	52

Table 9 gives the average brain weights of 255 persons, according to the nature of their occupation. It will be seen that as the intellectual status of the occupation increases the average brain weight increases. Though the numbers are not large, yet they are sufficient to create a probability of such tendency.

TABLE 10

	Number	Average age years	Brain weight	
			Grams	Ounces
Scientists (all)	57	64	1,463	51
Exact	12	67	1,532	54
Natural scientists	45	63	1,444	50
Artists and philosophers	25	59	1,482	52
Men of action (Government officials, statesmen)	14	65	1,490	53
Total	96			
Average			1,473	52

In Table 10 it will be seen that the representatives of exact science, such as mathematics, show the highest average brain weight (1,532 grams=54 ounces). Men of action, as statesmen and military men, come next (1,490 grams brain weight=53 ounces), then fellow artists and philosophers with a brain weight of 1,482 grams (52 ounces); and, finally, natural scientists, with a brain weight of 1,444 grams (50 ounces).

With exceptions, the intellectual status is indicated by the weight of brain. Thus the brains of men given to the most difficult intellectual thought, as in mathematics, perhaps involving the more complex mental mechanism, are shown in the exact scientists with an average brain weight of 1,532 grams (54 ounces).

Le Bon also shows 42 distinguished men with an average cranial capacity of 1,682 cubic centimeters (101 cubic inches) contrasted with the general average of 1,559 cubic centimeters (93 cubic inches). Also, 26 skulls (in the Museum of Natural History in Paris) of well-known men show 1,732 cubic centimeters (104 cubic inches) cranial capacity.

Also, Gladstone, in a study of a boys' school and medical students shows:

	Boys' head circumference		Medical students' head circumference	
	Millimeters	Inches	Millimeters	Inches
High intelligence	541	21	572	22.5
Average intelligence	526	20.5	562	22.12
Low intelligence	515	20.2	555	21.8

[1] The author made a statistical study of the United States Senate, published in Metron, Padua, Italy, 1923; also by La Revista Argentina de Ciencias Políticas, VIII, 15, and by the Anthropological Society of Bombay, India, 1923.

In the students the height of head showed a distinct increase compared with that of head length and head breadth. Binet calls attention to the distinctly greater head measurements of highly gifted children as compared with dull children.

More than 30 years ago the author made measurements (including head circumference) of 20,000 Washington school children. This was the first time head measurements were made on a large number of children. The bright showed a distinctly higher average head circumference to the dull in head circumference for each age (Table 11).

TABLE 11

Age	Number	Bright	Number	Average	Number	Dull
		Inches		*Inches*		*Inches*
8	320	20.57	326	20.57	101	20.27
9	384	20.65	340	20.64	102	20.48
10	392	20.78	355	20.74	118	20.53
11	322	20.83	386	20.85	97	20.59
12	349	20.98	459	20.93	128	20.85
13	306	21.06	421	20.98	131	21.01
14	227	21.26	371	21.24	143	21.07
15	167	21.61	220	21.41	116	21.32
16	104	21.78	144	21.67	80	21.55

When in doubt, the teachers marked the pupils average, so that we have the positively bright and dull to compare. As will be seen, for every age, the average head circumference of the bright is greater than that of the dull boys. The same is true for the girls.

These 20,000 children were divided into higher and lower classes to eliminate any influence of social status, yet the results were similar.

Parchappe (1836), Broca (1861), and, later, Lacassagne and Cliquet (1878) have shown that men whose occupations require high intelligence have larger heads. Thus Da Costa Ferreira, of Portugal, gives:

TABLE 11½

	Number	Cranial capacity		Greater or smaller than the average	
		Clear	Cubic centimeters	Cubic centimeters	Inches
Professional people	23	1,629	99	57.2	2.4
Commercial people	49	1,598	97	25.9	1.5
Government clerks	11	1,590	96	17.5	1.03
Private clerks	52	1,584	95	12.2	.7
Hand workers	150	1,573	93	.9	.06
Day laborers	164	1,570	93	2.7	.15

In Table 12 will be found the names of 96 distinguished men, with their occupations, ages, and brain weight as given by Spitzka, collected from others. Quite a number were old men at death, whose brains had normally lessened in weight.

It is known that stature, body weight, and build may influence brain weight, yet such data in many of these 96 cases are wanting, and so can not be considered. Gambetta's brain is omitted, for it lost much of its weight through the use of a zinc chloride solution; lessening it in one hour 10 grams (0.3 ounce). Duval estimated its weight to be 1,247 grams (44 ounces) originally, it being reduced to 1,160 grams (41 ounces).

The average brain weight of these 96 distinguished persons is 1,473 (52 ounces), which exceeds the various averages for European brains by 75 to 125 grams (1 to 4 ounces). This does not allow for the advanced age of the series, the average of 92 cases (all all but 4) being 63 years of age.

Dividing these cases by nationalities, we have:

TABLE 11¾

	Cases	Grams	Ounces
United States and Canada	21	1,518	53
British Islands	14	1,473	51
Germany and Austria	38	1,443	50
France	17	1,440	50

Table 11 ¾ would indicate that United States and Canada are distinctly of greater brain weight (1,518 = 53 ounces).

TABLE 12.—*The brain weights (in grams) of 96 distinguished personages with their occupations and ages*

Name	Occupation	Age	Brain weight	
			Grams	Ounces
Ivan Turgeneff	Poet and novelist	65	2,012	71
G. Cuvier	Naturalist	63	1,830	64
E. H. Knight	Physicist	59	1,814	64
Theologian of Freiburg University.		42	1,800	63
John Abercrombie	Physician	64	1,786	63

TABLE 12.—*The brain weights (in grams) of 96 distinguished personages with their occupations and ages*—Continued

Name	Occupation	Age	Brain weight	
			Grams	Ounces
Ben Butler	Lawyer	74	1,758	62
Edward Olney	Mathematician	59	1,701	60
Herman Levi	Composer	60	1,690	59
W. M. Thackeray	Humorist	52	1,658	58
Rudolph Lenz	Composer		1,636	57
John Goodsir	Anatomist	53	1,629	57
Hosea Curtice	Mathematician	68	1,612	56
C. G. Atherton	United States Senator		1,602	56
W. v. Siemens	Physicist	68	1,600	56
George Brown	Editor	61	1,596	56
A. Konstantinoff	Litterateur		1,595	56
R. A. Harrison,	Chief justice, Canada	45	1,590	56
F. B.W. v. Hermann	Economist	73	1,590	56
J. K. Riebeck	Philologist	61	1,580	55
Hans Büchner	Hygienist	51	1,560	55
K. Spurgheim	Anatomist and phrenologist	56	1,559	55
Edward D. Cope	Paleontologist	57	1,545	54
G. McKnight	Physician and poet	57	1,545	54
Harrison Allen	Anatomist	56	1,531	54
J. Y. Simpson	Physician	59	1,531	54
P. Dirichlet	Mathematician	54	1,520	54
C. A. De Morny	Statesman	54	1,520	54
Daniel Webster	U. S. Senator	70	1,518	53
Lord John Campbell	Lord Chancellor, England	82	1,517	53
Chauncey Wright	Philosopher	45	1,516	53
M. Schleich	Writer and orator	55	1,503	53
Thomas Chalmers	Theologian	67	1,503	53
Garrick Mallery	Ethnologist and explorer	63	1,503	53
Edwin C. Seguin	Neurologist	55	1,502	53
Napoleon III	Sovereign	55	1,500	52
K. H. Fuchs	Pathologist	62	1,499	52
Louis Agassiz	Naturalist	66	1,495	52
C. Giacomini	Anatomist	58	1,495	52
De Morgan	Mathematician	73	1,494	52
K. F. Gauss	do	78	1,492	52
Ch. Letourneau	Anthropologist	71	1,490	52
J. W. Powell	Geologist	68	1,488	52
K. v. Pfeufer	Physician	63	1,488	52
Wülfert	Jurist	64	1,485	52
Paul Broca	Anthropologist	55	1,484	52
G. de Mortillet	do	77	1,480	52
Lord Francis Jeffrey	Justice and editor	76	1,471	52
L. Asseline	Journalist	49	1,468	51
M. D. Skobeleff	General	39	1,457	51
Ch. H. E. Bischoff	Physician	79	1,452	51
Hugo Gylden	Astronomer	55	1,452	51
Larmarque	General	63	1,449	51
F. R. v. Kobell	Geologist and poet	79	1,445	50
Mihalkoviez	Embryologist	55	1,440	50
H. v. Helmholtz	Physiologist	73	1,440	50
Dupuytren	Surgeon	58	1,437	50
P. A. Siljestrom	Physician and pedagogue	76	1,422	50
Franz Shubert	Composer	70	1,420	50
A. T. Rice	Diplomat and editor	35	1,418	50
J. E. Oliver	Mathematician	65	1,416	49
Melchior Meyr	Philosopher and poet	61	1,415	49
Joseph Leidy	Morphologist	67	1,415	49
Philip Leidy	Physician	53	1,415	49
George Grote	Historian	75	1,410	49
Nussbaum	Surgeon	61	1,410	49
John Huber	Philosopher	49	1,409	49
C. Babbage	Mathematician and inventor	79	1,403	49
Jules Assezat	Journalist	45	1,403	49
A. Bertillon	Anthropologist	62	1,398	49
Fr. Goltz	Physiologist	68	1,395	49
Coudereau	Physician	50	1,390	49
Wm. Whewell	Philosopher	72	1,389	49
Henry Wilson	United States Vice President.	61	1,389	49
Rüdinger	Anatomist	64	1,380	48
Szilagyi	Statesman		1,380	48
H. T. v. Schmid	Litterateur	65	1,374	48
A. A. Hovelacque	Anthropologist	52	1,373	48
T. L. W. v. Bischoff	Anatomist	76	1,370	48
K. F. Herman	Philologist	51	1,358	48
Justus V. Liebig	Chemist	70	1,352	47
v. Schagintweit	Naturalist	51	1,352	47
J. P. Fallmerayer	Historian	71	1,349	47
John Hughes Bennet	Physician	63	1,338	47
Max v. Pettenkofer	Chemist	82	1,320	47
Seizel	Sculptor	50	1,312	46
J. G. Kolar	Dramatist	84	1,300	46
R. E. Grant	Astronomer	80	1,290	45
Walt Whitman	Poet	72	1,282	45
Robert Cory	Physician	55	1,276	45
Edouard Seguin	Psychiatrist	68	1,257	45
Fr. Tiedemann	Anatomist	79	1,254	44
v. Lasaulx	Philologist	57	1,250	44
L. v. Buhl	Anatomist	64	1,227	43
J. F. Hansmann	Mineralogist	77	1,226	43
B. G. Ferris	Jurist	89	1,225	43
F. G. Gall	Anatomist and phrenologist	70	1,198	42

Ninety-six persons in all. Average brain weight 1,473 (52 ounces).

Average age, 63.

There are cases of persons of ordinary ability, not to mention idiots, with brains of heavy weight; there are also cases of distinguished people with average, if not lower brain weight. Thus Shelley, Descartes, Foscolo, Donizetti and Schumann had small heads, and, presumably, small brains. But such cases are not the rule. The rule would seem to be three-fourths true and one-

fourth untrue. That is, the trend of leading specialists, as Ranke, Mannouvrier and Virchow, is that heavy brain weight suggests high mental capacity. The cases of heavy brains of idiots, feeble-minded, criminal, and insane are usually cases of disease. Also, large brains of ordinary people are often pathological. Then, also, abnormally large and heavy persons may for this reason alone have large heads, and so large brains. But, after all has been said, such cases are the exception and not the rule.

In Table 13 are given brain weights of additional distinguished men not in Table 12.

TABLE 13.—*Additional distinguished men*

Name	Occupation	Brain weight in grams	Cranial capacity in cubic centimeters
Robert Bruce	King of Scotland	1,499	1,595
Sir Thomas Browne	A writer	1,418	1,509
Ernst Haeckel (86 years old)	Scientist	1,575	
Name not permitted (Retzius)	Highly-gifted statesman	1,489	
Average		1,495	
Average, English skull			1,476

Multipying the cranial capacities of Bruce and Browne by 0.94 (Welchker), their estimated brain weights are 1,499 and 1,419 grams (53 and 50 ounces).

This table simply confirms the conclusions of almost all specialists that distinguished personages show distinctly higher brain weight than the general average.

BRAIN WEIGHT AND RACIAL INTELLIGENCE

It will be noted in the last half of Tables 14 and 16 that the more advanced nations have superior brain weight.

TABLE 14.—*J. B. Davis, Philos, Trans., 1868, 505–526*

	Number	Brain weight	
		Ounces	Grams
European races	299	48	1,367
Asiatic races	124	46	1,304
African races	53	45	1,293
American races	52	46	1,319
Australian	24	43	1,215
Oceanic races	210	46	1,319
		Grams	*Ounces*
Herzog: 113 Filipinos, average brain weight equals		1,333	47
Ziehen: Some 500 Europeans average brain weight equals		1,353	48

TABLE 15

	Grams	Ounces
105 English and Scotch (Peacock)	1,427	50
28 French (Parhoppe)	1,334	47
40 Germans (Huschke)	1,382	48
18 Germans (Wagner)	1,392	48.1
50 Austrians (Weisbach)	1,342	47.3
7 African Negroes (diverse specialists)	1,238	43
8 African Negroes (Broca)	1,289	45
78 Europeans (average)	1,403	
41 negroes	1,331	46.9
24 pure whites	1,424	50
25¾ white	1,390	48
47½ white	1,334	47
51¼ white	1,319	46
95⅛ white	1,308	46
22 1/16 white	1,280	43

The figures of Herzog and Ziehen, and also in Table 5, giving the results of some leading specialists, confirm the opinion that, as a rule, superior races have a superior brain weight.

TABLE 16—*Cranial capacity and race*

Races and nations	Number of skulls	Number of cubic centimeters
Australians	8	1,228 (73.3 c. in.).
Hottentots	3	1,233 (74 c. in.).
Peruvians	152	1,233 (74 c. in.).
Americans	341	1,315 (78.8 c. in.).
Negroes born in America	12	1,323 (79.3 c. in.).
Mexicans	25	1,338 (80.2 c. in.).
Negroes (in general)	76	1,347 (80.7 c. in.).
Negroes born in America	64	1,371 (82.2 c. in.).
Wild Indians	164	1,376 (82.5 c. in.).
Parisians	35	
Parisians (cemetery of)	117	1,409 (84.4 c. in.).
Parisians in twelfth century	115	1,425 (85.4 c. in.).
Germans	30	1,448 (86.8 c. in.).
Parisians of eighteenth century	125	1,461 (87.6 c. in.).
Anglo-Americans	7	1,474 (88.4 c. in.).
Parisians (private graves)	90	1,484 (89 c. in.).
German in general	38	1,534 (92 c. in.).
English	5	1,572 (94 c. in.).

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Not being able to obtain the direct weights of the brain in sufficient numbers in the various races, we must take the cranial capacities as a general index of the weight of brain.

PREHISTORIC BRAIN WEIGHT AND CRO-MAGNON RACE

A prehistoric indication of relationship between size of brain and racial intelligence will be found in the great Cro-Magnon race, which flourished some 25,000 or more years ago.

It is generally held that the superior races eventually occupied western Europe. The Cro-Magnon race entered Europe from the east.

In Table 17 is given the "cube brain capacity" of various races, as will be noted from an examination of the table.

TABLE 17.—*"Cube brain capacity" (Osborne)*

	Male	Female	Maximum
Cro-Magnon cavemen of Mentone	1,550		1,590
Average modern European	1,450	1,300	
Race of Ofnet	1,400		
Living broad head race of Czechoslovakia	1,230	1,000	1,800
Native Australian race	1,310	1,154	
Native Indian Veddaks	1,000	1,040	1,400
Papuas of New Guinea	1,236	1,125	

The Cro-Magnons, the Greeks of pre-history, rank very high; they represent a blend of long and broad heads. Their very high modern brain power is shown by their extreme accuracy of observation of animal form as noted on the walls of their cave dwellings. It was a race of warriors, hunters, painters and sculptors. Though long headed, its face is very broad for its height, a unique feature. The upper part of the face is almost vertical, as in the highest types. Keith pronounces the Cro-Magnon characters to represent one of the finest races the world has ever seen. According to Ripley, this race is perhaps the most striking known instance of a persistency of population, unchanged through thousands of years. Such facts appear to indicate, that the human brain in the last 25,000 or more years has been growing less in weight.

Had this Cro-Magnon race enjoyed the advantages of a written language, we might have had a prehistoric Phidias and Raphael, a Socrates and Plato, a Shakespeare and Dante. The author heard Virchow say, while holding up before his students a Cro-Magnon skull: "Would that any of us had such a skull and its brain within."

CLOSE RELATION BETWEEN CRANIAL CAPACITY AND BRAIN WEIGHT

The close relation between cranial capacity and brain weight is shown from the following table of Bolk:

TABLE 18.—*Relation of brain weight to cranial capacity (Bolk)*

Age	Brain weight	Cranial capacity (per cent)
30	73.7	94.0
40	90.0	96.5
50	90.0	95.6
60	89.2	93.4
70	88.1	93.8
80	85.2	90.0
90	84.1	88.4
Over 90		81.5

After the age of 20 years the cranial vault does not increase in volume, and in woman after 18 years of age (Marchand's Handmann). This is not in accord with Bolk's table above. This, as so often happens, shows normal differences between not only individuals and groups but locations, countries, and racial antecedents. In general (Martin), based upon many authorities, the average European cranial capacity is 1,450 (87 cubic inches) for men and 1,300 (78 cubic inches) for women. Under 1,200 (72 cubic inches) capacity, Hottentots show 51 per cent; Australians, 45 per cent; Germans, 8 per cent; Chinese, 2 per cent.

Over 1,300 cubic centimeters (78 cubic inches) the Hottentots show 16 per cent; Australians, 28; Germans, 75; and Chinese, 92 per cent (Buschan).

The shape of the head may have some influence, since brachycephaly has greater volume in relation to its surface.

According to Scharpff and Richard, the difference between cranial capacity and brain volume is normally 10 to 16 per cent; higher figures mean atrophy and lower ones indicate a swelling.

CRANIAL CAPACITY AND SIZE OF BODY

Table 19, showing cranial capacity in relation to size of body, indicates that races of small growth have an absolute low average cranial capacity, and vice versa. Amadi has shown the same is true to a certain extent within races. But the variation between individuals is very great, from 1,100 to 1,700 cubic centimeters (66 to 102 cubic inches), which is attributed to heredity. The physiological limits are still greater, 950 and 970 cubic centimeters minima (56 to 57 cubic inches) (Adamanen), and (Trooler) maxima, 1,950 and 2,020 cubic centimeters (116 and 121 cubic inches).

TABLE 19.—*Cranial capacity and size of body (Amadi)*

Capacity of skull	Size of body		
	Great	Medium	Small
	Per cent	*Per cent*	*Per cent*
Great	36	29	19
Medium	47	54	42
Small	16	17	38

Among the same people the size of body and cranial capacity are proportional; but the size of body reaches its maximum much sooner than the cranial capacity, so that very great size of body may belong to somewhat small cranial capacity (Ranke).

ESTIMATING CRANIAL CAPACITY

The estimation of cranial capacity is not only of importance in itself but it is necessary for the calculation of brain weight from outside measurements of either the head or of the skull. To find out the amount of space in a skull, it appears that the same measurer, by diverse methods, can obtain close results, but for two or more measures the results are not so close and may differ from 15 to 40 cubic centimeters (1 to 2 cubic inches), which is 1 to 3 per cent of discrepancy, due to personal equation. This difficulty has led to finding of an equation for calculating the capacity of the skull from outside measurements of it, without measuring its inner space by seed, shot, sand, or water. This difficulty of anthropologists has been solved by the mathematicians who have constructed equations or formulas by which the space in a skull can be estimated almost as correctly as different anthropologists can do by the laborious method of filling the skull with seed, sand, or shot, and shaking it until every crevice is filled, before pouring the seed, etc., out of the skull in order to measure it.

When we consider not only the personal errors of various anthropologists but their different methods of measuring the skull, a mathematical formula with an error of not more than 40 cubic centimeters will serve to measure cranial capacity; especially so where the skulls are too fragile to be filled with sand or seed or shot and be shaken.

The Lee-Pearson formula is one which may serve as well as any. It is:

For males:

Cranial capacity = 0.000337 × length × breadth × height of head + 406.01.

For females:

Cranial capacity = 0.000400 × length × breadth × height of head + 206.80.

The prediction of cranial capacity of the living individual can be done with an average error of 3 to 4 per cent, and the prediction of the cranial capacity of a race, without the use of sand, seed or shot, can be done to a degree of accuracy comparable with that of the direct method, owing to the personal equation of the measures even when using the same method of direct determination.

ESTIMATING WEIGHT OF BRAIN FROM HEAD MEASUREMENTS ON THE LIVING

The ratio that brain weight bears to the outside measurements of the head in case of death from accident, or from acute diseases, or in death from wasting disease, shows that the diminution of brain weight in wasting disease even, though measurable, is small (Gladstone). In other words, the brain weight appears in general to be little affected by body disease or other conditions. The estimation of brain weight from outside measurements of the head on the living is only affected by the thickness of the scalp and hair. After middle age the hair and scalp become thinner with age; also the weight of the brain lessens, so that the proportion between the outside measurements of the head and brain is not materially affected by age.

Attempts to estimate the brain weight of the living in connection with cranial capacity are relatively recent. The difficulties are numerous. In a normal skull of 1,400 cubic centimeters (84 cubic inches) capacity there is about 100 cubic centimeters (6 cubic inches) of free space (see Table 4) without the brain, which probably increases after the age of 60, or possibly before.

The estimating of brain weight upon the living by means of equations is in its beginning; and doubtless there will eventually be a large number of equations, or formulas, each adapted to different races, and in the same race to different classes of individuals or groups.

Blakeman and Pearson have worked out numerous formulas to estimate brain weight upon the living, which are called "prediction formulæ." One of their main formulas for males is:

1. W (brain weight) = 1,987 P + 8,644 U − 1.1910 A + 1.7508 S + 36.8559, where P is product of head length, breadth, and height; U is head circumference; A, age; and S, stature. In this equation the probable error of prediction is 48.5 grams (1.7 ounces) and error of mean 57.4 grams (2 ounces).

Another formula is:

2. Male brain weight = 0.2519 P + 374.7628.

The probable error of prediction is 49.9 grams (1.7 ounces) and error of mean 59 grams (2.7 ounces).

This formula requires much less time to use, and the difference from the first one in probable and mean errors is small. The addition of more elements to the formula does not always improve it. The product (P) of the three head measurements is the foundation of the formula, for it should be remembered that the volume of an eclipsoid is proportional to the product of its three diameters.

The Lee-Pearson formula for estimating cranial capacity from outside measurements of the head is (head length-11) × (head breadth-11) × (head height-11) × 0.000337 + 406.01.

MODIFICATION OF THE LEE-PEARSON FORMULA

The author tested this formula, based on the results of 117 autopsies, and found it necessary to change the formula as follows: (head length-6) × (head breadth-7) × (head height-5) × 0.000337 + 406.01 = cranial capacity in cubic centimeters.

Then Welcker's method is used to estimate the brain weight from the cranial capacity, thus:

When the cranial capacity is—

1,200 to 1,300 cu. cent. (73 to 78 cu. in.), it is multiplied by 0.91
1,300 to 1,400 cu. cent. (78 to 85 cu. in.), it is multiplied by 92
1,400 to 1,500 cu. cent. (85 to 90 cu. in.), it is multiplied by 93
1,500 to 1,600 cu. cent. (90 to 96 cu. in.), it is multiplied by
1,600 to 1,700 cu. cent. (96 to 100 cu. in.), it is multiplied by

The reasons for subtracting 6 millimeters instead of 11 millimeters from head length, and 7 millimeters instead of 11 from head breadth, and 5 from head height instead of 11 are based upon measurements made at 117 autopsies on white males.

These changes of the Lee-Pearson formula are based upon the following table:

TABLE 20.—*117 male white, thickness of scalp (117 autopsies)*

Length of head minus length of skull = 4.9 millimeters (0.192 inches).
Breadth of head minus breadth of skull = 6.2 millimeters (0.243 inches).
Height of head minus height of skull = 5.3 millimeters (0.202 inches).

In the Lee-Pearson formula 11 millimeters (0.433 inches) are subtracted from each of the three head measurements, the assumption being that the thickness of the scalp being approximately the same for each side of the head, and at the points from which the length and height are measured, should be doubled.

But at the autopsy table, first, the head and then the skull (after turning down the scalp) are measured. The results here are much less, as shown in Table 20; that is, instead of 11 millimeters, about half of 11 should be subtracted from the outside head measurements. To show the cause of this discrepancy, the author used a little pressure in measuring the thickness of the scalp directly in seven autopsy cases at the usual points for taking the three head measurements upon the living with the following results:

TABLE 21.—*Effect of pressure on scalp in millimeters in head measurements*

	Length	Breadth	Height
1	3.25 (0.127 in.)	3.50 (0.146 in.)	2.50 (0.098 in.)
2	2.50 (0.098 in.)	3.20 (0.125 in.)	2.50 (0.098 in.)
3	1.75 (0.066 in.)	1.50 (0.058 in.)	1.50 (0.058 in.)
4	3.00 (0.118 in.)	3.00 (0.118 in.)	2.00 (0.079 in.)
5	2.00 (0.079 in.)	2.00 (0.079 in.)	2.00 (0.079 in.)
6	2.00 (0.079 in.)	2.00 (0.079 in.)	2.00 (0.079 in.)
7	2.00 (0.079 in.)	2.00 (0.079 in.)	2.00 (0.079 in.)
Average	2.45 (0.095 in.)	2.06 (0.081 in.)	2.35 (0.091 in.)

Tweezers were used to bring slight pressure upon the scalp, as near as could be judged to the pressure made by the caliper points. The pressure on the scalp will vary, according to measurer, to bluntness or sharpness of caliper points and to haste or slowness in taking the measurements.

As is well known, most all brain estimates are based upon general hospital populations, which are not very representative of the general population of a country, as they are mostly from the lower middle classes. In addition, they are somewhat deteriorated from disease (especially chronic cases) and other various causes. In answering lay questions the author has humorously said: "Why, I find it almost impossible to get the brains of decent people."

It is probable, therefore, that most of the formulas [2] to estimate cranial capacity and brain weight upon the living from outside measurements of the head give results below the actual weight, especially when applied to the higher classes.

For estimating the cranial capacity from the skull circumference, instead of the diametrical product, the Lee-Pearson formula is:

For males:

Cranial capacity = 7.060 × circumference − 220.98; probable error = $\frac{47.72}{\sqrt{n}}$

For females:

Cranial capacity = 5.974 × circumference − 1,705.73; probable error = $\frac{38.78}{\sqrt{n}}$

[2] A number of specialists have given various formulas to estimate cranial capacity and brain weight upon the living. Pearl. Todd, Gladstone, in addition to Blakeman, Lee, and Pearson, would be useful to consult, as indicated in literature at the end of this article.

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CEREBRAL LOCALIZATION

To consider properly the subject of cerebral localization would take us far beyond the limits of this article. Still, certain things might be noted in the way of refreshing our memory. The cerebral cortex makes its first appearance in reptiles; the first appearance of the fissure of Rollando is in the carnivora.

The significance of various fissures and convolutions in the human brain has been determined mainly by the investigation of the brain in the higher animals, where the brain has same general form as in man. The fissures and convolution pattern in a certain species of small monkeys show the surface of the hemispheres to be nearly smooth. Between the brain of this monkey species, and that of man, a series of brains show a gradual increase in the number and complexity of the convolutions and fissures of similar types. Thus, the orang-outang, chimpanzee, and gorilla have much larger and more numerous fissures than the other species of apes. While the gorilla's brain approaches the human brain more than any of the other apes, it is, however, very much nearer to the apes than to man.

Those areas of the brain whose office is known embrace such functions as are considered primary, common to all animals, and necessary in some way to natural existence. There then remain the unknown regions, the superior development of which distinguishes the human brain, and which may include those functions which place man far above all other animals. The sunken or concealed surface of the brain is twice that of the exposed surface. These fissures or sulci (200 in number) between the convolutions vary much in depth; some are 25 millimeters (1 inch) or more deep, others are shallow; the average is about 10 to 12 millimeters (one-third to one-half inch).

There are considerable variations of the fissures and convolutions on the opposite sides of the same brain, as well as in different persons.

In different regions of the cortex there is much variation in size, form, and arrangement of the cells. The most striking differences are seen in the motor cortex of the frontal lobe, which has very large giant cells.

It seems to be generally held (Mingazzini) that the speech area in the third left frontal convolution is liable to be well developed in orators. Thus Gambetta's third left frontal convolution was greatly developed, though his brain was a small one. So, in the case of Professor La Borde and other orators and jurists the speech area was highly developed but is often very much reduced in deaf and dumb persons.

The author noted a case of a man in the Government hospital for the insane who continually cried out for weeks "My God." Certain brain cells or brain areas must have been exercised to great excess. There should be a histological study of such cases after death, to determine the effect on the brain. It would be a great discovery to localize the cells affected, which, with all due respect, might be called the "My God" cells or areas of the brain. All cases in which the patient keeps repeating the same words should be studied after death, with a view to cerebral localization.

In man the tumor of the brain can help to show the function of the part of brain where it is; also, if other pathological conditions destroy or affect certain parts of the brain, the functions affected or stopped indicate the office of this part of the brain.

In persons of high intelligence the whole frontal region is generally large. This was especially true of the mathematicians Wright and Oliver (see Table 12). Moreover, in genius in general it is the parietal lobe that seems to be highly developed, as in the chemist Liebig and anatomist Doellinger. So the sight center of great painters was thought to be well developed; thus Raphael's skull was greatly developed in this region. Flechsig compared the brains of distinguished men and believes that the sensory centers are not directly connected with each other, but indirectly through association areas. Injury and disease in these areas tend to show that the function of these areas is higher intellectual activity. Thus, the frontal area, when injured, causes weakness in attention, in reflection, and in control over anger, self-appreciation, and other personal volitions and emotions. In many cases in which brains of great men have been studied there is complexity, due partly to the greater development of second and tertiary fissures, and partly to the more curved surfaces of the sulci, especially in the frontal and parietal regions, and there may be even a relationship of a particular type of mind in a special part on the brain. Also, in some great mathematicians the supramarginal convolution is particularly well developed. In skilled artisans the part of the brain connected with voluntary movements of hands and fingers has been noted in several cases.

Flechsig thinks the posterior area is concerned with experiences founded upon visual and auditory sensations, showing especially musical development. The anterior area, being in closer connection with the body sense area, may be concerned with experiences based upon internal sensations (bodily appetites and desires), and in alterations or defective development of this part of the brain may give a physical explanation of mental or moral degeneracy. Thus, histological studies of the brains of those mentally deficient bear this idea out; here the brain shows a distinct thinning of the cortex, and the maximum focus of this change is found in the prefontal lobes (anterior association area). In idiots this area distinctly undeveloped, and in the inane the atrophy appears to be marked in proportion to the degrees of dementia.

DEMONSTRATION OF CEREBRAL LOCALIZATION

If the cerebrum in the frog be removed, but care be taken not to interfere with the optic nerves or the thalami, the frog attempts to catch flies and shows other signs of initiative; it will avoid objects. But the cerebrum of the frog is very low in the scale of development compared with the other vertebrates. Thus, in the removal of the cerebrum of the pigeon, leaving the basal nuclei intact, the animal can carry on many coordinate activities; it can stand and perch without difficulty; if placed on its back, it gains its equilibrium at once; if pushed off its perch, it flies till it reaches a firm support; if disturbed on its perch, it will walk away, showing it can coordinate its leg muscles. If left undisturbed, it will occasionally open its eyes, move its head and pick its feathers. But it spends most of its time sitting quietly as though asleep. If aroused, it shows little or no excitement or fright. At De Boi-Reymond's lecture in Berlin the author saw a pigeon, whose brain had been removed, which did not pay the least attention to light flashed into its eyes, or to the sound of a pistol shot off near it; but when pushed off its perch flew around the lecture room without hitting anything until it fell to the floor exhausted. Results of experiments on rabbits, rats, and dogs are somewhat similar. Goltz's dog, without brain, showed complete loss of memory and intelligence, being a mere automaton. Such experiments show what the function of the cerebral cortex is in connection with the mentality of the animal.

The author witnessed another demonstration on a monkey (by Horseley) on the outer surface stimulation of the upper part around the fissure of Rolando, causing movements of the leg; and stimulation of the middle part, causing movements of the arm, and of the lower part, causing face and mouth movements. A lesion in the third frontal convolution on the left side is always associated in man with the loss of the power of speech called motor aphasia; this part is close to the motor center for muscles of tongue and mouth, and is called speech center. In most persons (right-handed people) the speech movements are regulated from a particular part of the left hemisphere, the corresponding part of the right hemisphere remaining dormant. When this part of the brain is injured in man there is loss of voluntary speech, the patient can not utter words at all or uses the wrong words. With lesion of the posterior part of the first temporal convolution on the left side is associated word deafness. With lesion of the cortex of the hinder part of the parietal lobe (near the visual center) is associated word blindness.

After transection of spinal cord or of brain behind the forebrain mental actions do not belong to the reactions of the nervous arcs posterior to the transection, but they do accompany the reactions of the nervous arcs in front and still connected with the fore brain; thus, if the spinal cord is severed, one does not have consciousness of his limbs, whose afferent nerves lie behind the point of spinal severance, but he can see them with his eyes. In the higher animals there is no consciousness in any part of the nervous system from which the fore brain has been cut off.

CONCLUSIONS AS TO THE BRAIN

These conclusions are based upon the studies of specialistic scientists, most all of whom are recognized as authorities in their lines.

A few of these conclusions may not always be in accord, but this is to be expected in a subject about which comparatively little of a fundamental nature is definitely determined. Yet all general statements concerning a developing subject, which may be, so to speak, four-fifths true and one-fifth untrue (due to exceptions), are important because they indicate the trend or direction in which to look for future research.

1. From the point of view of nature the brain is an accidental extension of the spinal cord and is dependent upon the necessities of the animal in the use of the higher nervous functions. But,

2. From the human point of view the brain is all important, being the organ of mind, the highest function in man. Yet,

3. According to nature, the extreme end of the frontal lobe (though the seat of the higher mental processes) is the last to be evolved and the first to undergo dissolution in mental decadence. And, in consonance with this,

4. The brain in the early stages of evolution was much smaller than the spinal cord, being most subordinate, if not barely existing. But,

5. This accidental character of the brain, as a mere offshoot of the spinal cord, has its parallel in the realm of mind, the furthest development of which is said to consist in philosophical and metaphysical thinking and theories, which are likewise most complicated (like the brain), uncertain and unstable. Briefly,

6. All intellectual activities, being a distinctive expression through the brain as the organ of the mind, are, nevertheless, absolutely dependent upon the brain. Thus,

7. In the higher animals, including man, there is no consciousness in any part of the nervous system from which the fore brain has been cut off. That is to say,

8. The power of thought is absolutely limited to the fore brain, which can exist without mind, but no mind can exist without a brain. Thus the subordination of mind in nature's realm is further suggested by the fact that,

9. In the dying hour thought is usually the first to go, while the unconscious organic functions endure until the end.

10. The brain probably reaches its full growth between ages 15 and 20, remaining constant to about age 50, and then gradually becomes less in weight at the rate of about 1 ounce in 10 years.

11. The weight of brain, relative to body weight, is greater in the girl than in the boy, but after the age of 15 the absolute weight of brain is always greater in man than in woman.

12. In the world in general the average weight of the brain varies from 1,350 grams (47 ounces) to 1,450 grams (51 ounces). As smaller men have relatively heavier brains, so women with smaller bodies have larger brains relative to their body weight.

13. Brains under 1,250 grams (44 ounces) are abnormally small and those more than 1,550 grams (55 ounces) are abnormally large.

14. The average maximum brain weight is 1,810 grams (64 ounces) and the average minimum brain weight is 960 grams (34 ounces).

15. Between the ages of 20 and 40 the mean male brain weight is 1,360 grams (48 ounces) and the mean female brain weight is 1,230 grams (43 ounces) and the brain appears to be heaviest between ages 14 and 20. But,

16. At the age of 80 the brain has lost, on an average, 90 grams (3 ounces), except, it has been shown, that in distinguished men the senile decrease in brain weight is delayed about 10 years, as compared with the average man.

17. It has been found that the gray matter constitutes about 54 per cent, the white matter 43 per cent, and the nuclei 3 per cent of the entire cerebrum, and that the weight of the cortex is 33 per cent of the total weight of the brain.

18. The cerebellum, or little brain, weighs 140 grams (5 ounces), about 10 per cent of the entire brain; it averages larger in man than woman, and is relatively larger in adults than children, the converse of the brain.

19. The difference in volume between the inner space of the skull and the volume of the brain is about 7½ per cent, with individual variations from 5 to 10 per cent. This difference changes little in middle life, but after the age of 70 it becomes about 15 per cent instead of 7½ per cent; that is, this difference doubles. So,

20. In a skull with a volume of 1,400 cubic centimeters (85 cubic inches) there is about 100 cubic centimeters (6 cubic inches) of free space outside of the brain, and after the age of 70 this space approaches 200 cubic centimeters (12 cubic inches).

21. The larger the animal, the smaller the relative size of brain, and the smaller the animal, the larger the relative size of brain. This is generally true in man.

22. Brain weight, relative to body weight, is much greater in young animals than when they reach adulthood, which also is true of man.

23. There is a certain parallelism in animals between brain weight and intelligence, notwithstanding variations.

24. The brain weight of the gorilla, though nearest man, is only 416 grams (13 ounces), which is less than one-third of the human brain (1,400 grams=49 ounces).

25. The higher the mentality of the animal, especially man, the greater is the brain, in comparison with the rest of the cerebrospinal system.

26. The influence of stature on brain weight extends throughout the animal kingdom in such a way that with equal intelligence small species have a relatively superior brain weight to the large species, and to such a degree that species with very small stature can excel species of very great stature who are much superior in intelligence.

27. The nutrition of the brain seems greatly independent of the general nutrition of the body; thus very delicate children are often well developed cerebrally.

28. The brain receives in superior animals more numerous, various, and complex sensations than in inferior animals, and also in taller animals as compared with those small in stature; and

29. As to the motor center, the brain controls less numerous, less various, and less complicated movements in the lower species.

30. The surface of the brain relative to its volume is much greater in small than in large mammals.

31. As to the relation of brain weight to intelligence in man, some mathematical specialists claim it is slight; but,

32. Since no human brain in a head less than 11 inches in circumference has been known to function normally, and since no brain weighing less than 32 ounces has been normal, it is evident that size and weight of brain must have very much to do with intelligence within certain limits, and it is difficult to believe that such relationship suddenly stops, for such a saltus is not in accordance with nature.

33. It seems to be generally true that those occupations which require more thinking show heavier brain weight.

34. The most advanced nations appear in general to have superior brain weight. Likewise,

35. Distinguished men, as compared with average persons, have distinctly heavier brains.

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36. In 20,000 Washington school children the average head circumference of the bright was larger than in the dull for every age.

37. The great and superior Cro-Magnon race, existing 25,000 or more years ago, shows a higher cranial capacity than other races, and even higher than modern man, indicating that since that time, the human brain has been growing less in weight.

38. The complexity and depth of the convolutions of the brain, indicating area of gray matter, correspond with intelligence.

39. Naturally, skull capacity and brain weight are closely related in about a ratio of 100 to 90. This accords with the fact that the difference between skull capacity and brain volume is 10 to 16 per cent; more means atrophy, less means swelling.

40. Cranial capacity is less in races of small growth, and in the same race is proportional to size of body; but body size reaches its maximum much sooner than cranial capacity.

41. Cranial capacity may be estimated from its outside measurements almost as well as by direct methods of anthropologists, showing what mathematics can do. Likewise,

42. Brain weight of living persons may be estimated from outside measurements of the head by the following equation:

(Head length−6)×(head breadth−7)×(head height−5)× 0.000337+406.01, which multiplied by 0.90 gives the brain weight in grams. Thus by this equation

43. Measurements of 89 Members of Congress show their average brain weight to be 1,550 grams (55 ounces), which is very much above that of men in general.

44. To determine the functions of different parts of the brain depends mainly on the investigation of animals. Thus,

45. If the frog's brain be removed, it tries to catch flies, will avoid an object and shows other signs of initiative. Likewise,

46. After the brain of the pigeon is removed it can stand on the perch easily; if placed on its back, it rights itself at once. If pushed off its perch, it may fly until exhausted. If left undisturbed, it will occasionally open its eyes, move its head, and pick its feathers, but it spends most of its time as though asleep.

47. Results of experiments on rabbits, rats, and dogs are somewhat similar to the pigeon. One dog with brain removed showed complete loss of memory.

48. In a monkey stimulation of the upper part around the fissure of Rolando causes movements of the leg, of the middle part, causes movements of the arm and of the lower part, movements of face and mouth.

49. While the monkey brain in size approaches the human brain more than the brain of other animals, it is, however, very much nearer to the other animals than to man.

50. Those parts of the brain whose function is known are considered primary and are common to all animals, and also necessary in some way to their existence; but

51. There are unknown regions in the brain the superior development of which places man far above other animals. But in order to study these parts directly in man, human vivisection would be necessary, and it is sometimes performed by nature herself; thus,

52. If disease or tumor affects or stops action of certain parts of the brain, the functions so affected indicate the office of such parts or brain area; so

53. A lesion in the third left frontal convolution is always associated in man with the loss of speech, being close to the motor center for muscles of the tongue and mouth called the speech center, which has been found well developed in orators, as in Gambetta's brain, though otherwise a small brain; and

54. The sight center (in occipital lobe) of great painters is thought to be highly developed, as in the case of Raphael's skull in this region.

55. A lesion of the posterior part of the first temporal convolution on the left side causes word deafness, and a lesion of the hinder part of the left parietal lobe near the visual center results in word blindness.

56. Some specialists hold that the frontal region when injured causes weakness in attention, reflection, and lack of control over anger, and also defects in various volitions and emotions. And in general—

57. In persons of high intelligence, usually the whole frontal region is large, which is especially true of certain mathematicians' brains which have been studied.

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Scots and Scottish Influence in Congress—A Historico-Anthropological Study

REMARKS

BY

SENATOR NORBECK

OF SOUTH DAKOTA

IN THE SENATE OF THE UNITED STATES

Mr. NORBECK. Mr. President, I ask leave to have printed in the RECORD an article on Scots and Scottish Influence in Congress—An Historico-Anthropological Study by Dr. Arthur MacDonald, of Washington, D. C., formerly "Fellow" of Johns Hopkins University.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

[Reprinted from the transactions of the Illinois State Historical Society]

Being a chapter in the scientific study of modern civilized man by Dr. Arthur MacDonald, Washington, D. C., formerly "Fellow" of Johns Hopkins University

For many years the author has studied unfortunate and unsuccessful individuals in the community, all of whom were in institutions. Such persons are usually classed with the abnormal, but as a matter of fact, probably three-fourths of them (excepting the insane and feeble-minded) are as normal as other people. While it is important to investigate these so-called abnormals and unsuccessful ones, it is much more important to study those who are successful in the community, that is, persons of ability, talent, or genius. The methods of study are the same for both normal and abnormal.

ANTHROPOLOGY OF MODERN MAN

A study of the Scots and Scottish influence in Congress comes under the general head of anthropology, but anthropology of modern man and not of dead, savage, and prehistoric man, to which anthropologists have given almost all their attention.

That the study of modern man is a new direction for anthropological research is shown by the fact that the first scientific investigation ever made of a human being was that conducted upon Emil Zola by some 20 French specialists in anthropology, psychology, and medicine; this was published in 1897.

It may seem strange that anthropology has been occupied so little with the study of modern man. Whatever the cause of this neglect, it is due time that man, as he is now, be studied, if for no other reason than to remove the stigma of our ignorance of human beings as contracted with our much more accurate knowledge of animals.

From the anthropological point of view, history can be regarded as a subject for scientific investigation, with a view of understanding man better and assisting in his development and progress. Here man can be considered both as an individual, organization,[1] nation or group of nations.[2] It is true that other branches, like history and politics have pursued these fields, but unfortunately not always in the scientific spirit. To cite an ancient pun, it is his story, rather than all the facts.

HISTORY OF SCOTCH BLOOD

There is a tradition that the Scotch were originally a Greek tribe. Tacitus speaks of campaigns against the early Scotchmen, called Calledonians, as though often defeated in battle but never subdued. Scotch leaders may be conquered, but the people are very difficult to suppress.

The inhabitants of Scotland, called Scots or Scotch (after a Celtic tribe originally from Ireland) are derived from widely different stocks. The most primitive races were long-headed (dolicocephalic); following these, came a broad-headed (brachy-cephalic) people, tall, with large jaws and faces; the third ingredient is a teutonic long-headed race of lofty stature. From the stone age to the eleventh century, there is evidence of a continuous Scandinavian invasion, entering largely into the blood of the Scotch Highlanders, who are the tallest people in the world, with an average height of 1,746 meters. Their cephalic index is 76.2—77.9. The population of Scotland contains only a small number of non-Scots; in 1911, only 8 per cent were non-Scotch, and more than half of these were Irish. The foreign element is only about one-half of 1 per cent. The mass of the people are Presbyterians.

GENERAL CHARACTERISTICS OF THE SCOTCH

The chacteristics of the Scotch are found in almost all peoples, but some qualities seem to be more dominant in the Scotch than in other nations.

The Scots have been especially noted for three things: Independence, persistence, and zeal for education. Thus, the history of almost any of the Members of Congress with Scotch blood will illustrate these characteristics. The Scotchman sinks his nationality in the country of his adoption; he makes himself at home in all countries and is internationally popular. The Scotch are rational wanderers and good colonizers. It has been predicted that when the North Pole is finally discovered, a Scotchman will be found astride of it.

The Scotch have little fear, can endure great privation and peril, but they are not easy to live with if one does not agree with them. They are not fussy agitators, not visionaries, but cool, calculating, and practical, with hard-headed horse sense. Charlatanism and quackery have no place for the Scotsman.

Their family feeling was intense, yet it had little effusive expression; the men were not given to emotional exhibitions of any kind, yet the Scotchman will make any sacrifice for his family, and if necessary would not hesitate for a moment to give up his life. The Scotch have always accorded woman a very high place. The Scots were so thorough and persistent that when they went wrong they preferred grand rather than petty larceny, and if it were murder it was generally to hang.

In war if the enemy gave up entirely he was treated with magnanimity. The Scotch had their faults, but they were of force and violence, not of cowardice and treachery; they may have been hard at a bargain, but once made, it was carried out to the letter; their integrity was unquestioned. Their hatred for tyrants was inborn.

SCOTCH AS LEADERS IN EDUCATION

In 1496 popular education was strongly advocated in Scotland, even compulsory education for eldest sons of freeholders and persons of substances was the law.

Scotland recognized the value of Newton's work 35 years before England did. Napier in the sixteenth century of social and ecclesiastical turmoil, was the inventor of logarithms. The supremacy of the Scotch in the British Isles, elementary and secondary education is generally acknowledged. In proportion to population, Scotland has a much larger number of university students than England.

The Scotch-Irish schoolmaster was a familiar figure in the early formative period of American education. The American school system has a Scottish stamp; the American university resembles the Scotch more than the English. The Scotch had such great respect for learning that they would not listen even to a Calvanistic preacher unless he had a classical and theological education.

Of the college men in the Constitutional Convention, more than one-half were of Scotch descent.

SCOTCH IN AMERICA

The first notable Scotch arrivals in America were shipped as prisoners of war, sentenced to be transported to American plantations and sold into service. No man ever came under such discouraging conditions. Yet the Scotch have cut deeper into the history of the United States, probably, than any other nationality, though they have not been the most numerous or boastful.

The Scotch in America have shown practically the characteristics of their mother country. They are persons of few words, dislike of display, quiet and undemonstrative in behavior, but more firm and determined in spirit; cautious and reserved, but energetic and tenacious with a capacity for hard work which with patience, courage, and endurance is liable to result in success. "Vigorous initiative" is a phrase especially fitting the Scotch. Roosevelt in his "Winning of the West" calls the Scotch a "stern and virile people," and speaks of the leaders of national expansion, who had Scotch-Irish as "dominant strains" in their blood.

THE SCOTCH AS POLITICAL LEADERS

Bancroft, a typical New Englander, says that the first voice raised in America to dissolve all connection with Great Britain, did not come from Puritans in New England, nor Dutch in New York, but from Scotch-Irish Presbyterians.[3] It was Patrick Henry, a Scot, who said, "I know not what course others may take, but as for me, give me liberty or give me death." It was John Witherspoon, of New Jersey, James Wilson, of Pennsylvania, and Edward Rutledge, of South Carolina, who were of the 11 Scotchmen who signed the Declaration of Independence. Witherspoon said, "He that will not respond to its accents and strain every nerve to carry into effect its provisions, is unworthy of the name of freeman." On this appeal the Declaration of Independence was signed. It is the handwriting of a Scotchman (who was Secretary of the Congress), publicly read to the people by a Scotchman and first printed by still another Scotchman. Of the 54 members of the Convention for the new nation, 12 were of Scotch descent, but on many occasions they had much more influence than their numbers show. One Scot stood easily at the head, and for intellectual eminence and statesmanship outranks them all; it was Alexander Hamilton, who was a Member of Congress at 25 years of age.

In an original study of the "Distribution of Ability in the United States,"[4] by Senator Lodge, the distinguished author finds that in statesmen Virginia leads, with Massachusetts, New York, and Connecticut closely following; and that as to nationality, the Scotch-Irish and Scotch lead in statesmen.

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[1] See Senate Document (by author) No. 532, Sixtieth Congress, first session, where a summary of this study is given.

See a study of the United States Senate (by the author) published in Spanish, under the title of "Estudo del Senado de los Estados Unidos de America," in Revista Argentina de Ciencias Politicas, 21 de Enero de 1918. Buenos Aires, 1918.

[2] "Mentality of Nations" (by author). Open Court, Chicago, August, 1912. Here nations are compared as to their educational and intellectual status.

[3] Bancroft, George, History of the United States, vol. 5, p. 11.

[4] Lodge, Henry Cabot—"The Distribution of Ability in the United States," Century Magazine, September, 1891.

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From 1860 to 1900, there have been in the United States some 80 Senators of Scotch descent; among whom are Blair, Cameron, Cockrell, Logan, McPherson, Teller, McEnery, Vance, Blaine, Breckenridge, Morton, McCumber, and Beveridge.

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SCOTCH INFLUENCE IN THE SENATE OF THE SIXTY-SECOND CONGRESS

English, Irish, and other blood should be studied as to its influence in Congress as well as Scotch blood.

Inasmuch as the Senators who have favored me with the details of their Scotch ancestry have had very different lengths of service, it is impossible to estimate by statistical methods their legislative success or ability. As many of the Senators, however, both Scotch and non-Scotch, were Members of the Senate of the Sixty-second Congress, I shall utilize a detailed study which I made of that Senate, published in Spanish,[5] but not as yet in English.

The Senate of this particular Congress was selected because it might be called a normal Senate. The majority party had been in power for a long while, and the Senate had settled down to what might be called the regular order.

The present study of Scottish influence upon legislation in this Senate is new and an additional chapter to the study in Spanish. Thus opportunity will be afforded for comparison between Scotch and non-Scotch ingredients. Therefore, before presenting the main legislative activities of individual Scotch Senators, it will be more instructive and satisfactory to make an investigation in the Senate of the Sixty-second Congress. While the conclusions drawn apply only to this particular Senate, they are liable to be approximately true of other normal Senates.

SCOTCH MORE PROGRESSIVE AND MORE FAITHFUL IN VOTING

Table 1 gives percentages of attendance at quorum and yea-and-nay calls of the Senate of the Sixty-second Congress as a whole, of its political divisions, and the Senators with Scotch blood similarly classified. It may be noted incidentally that Senators as a body attend yea-and-nay calls 10 per cent more than they do quorum calls, contradicting a statement sometimes made that Senators dodge voting.

TABLE I.—*Quorum and yea-and-nay calls (percentages)*

	Number	Per cent	Quorum	Yea and nay	Increase in voting
The Senate	80	100	59	69	10
Democrats	34	43	55	66	11
Republicans	46	57	62	77	15
Senators with Scottish blood	18	22	57	68	11
Republicans with no Scottish blood	36	79	63	71	8
Republicans with Scottish blood	10	21	60	68	8
Democrats with no Scottish blood	26	77	55	65	10
Conservative Republicans with Scotch blood	5	50	60	63	3
Progressive Republicans with Scotch blood	5	50	60	73	13
Conservative Republicans	34	74	63	70	7
Progressive Republicans	12	26	61	75	16

It will be seen from this table that the progressive Republicans constitute 26 per cent of all Republicans, but that the Scotch progressive Republicans constitute 50 per cent of all Scotch Republicans; that is, Scotch blood flows relative almost double the amount of progressiveness, illustrating the reputation of the Scotch for persistence in demanding independence. It appears also that Scotch progressive Republicans attend quorum calls the same (60 per cent) as Scotch conservative Republicans, but in the yea-and-nay calls they excel the conservatives by 10 per cent. As between Democratic and Republican Senators, the relative number of Scotch is about the same. As between Democrats with Scotch blood and those without, the Scotch answer yea-and-nay calls 3 per cent more.

In Table II will be found percentages as to educational status and geographical position of all Senators with Scotch blood and those without Scotch blood; also, Scotch and non-Scotch Senators can be compared as to previous legislative experience in State legislatures and House of Representatives. In the last part of the table are given averages for frequency of remarks on the floor and number of subjects discussed. Beginning at the top of the table, it will be seen that 37 per cent of Senators with Scotch blood are university men and 52 per cent college men and only 11 per cent with common-school education. These percentages are much greater than those for all Senators and non-Scotch Senators, showing decided educational superiority of the Scotch. Also it will be seen that relatively a very large proportion (61 per cent) of Scotch Senators went to the Western States, confirming the pushing and aggressive nature of the Scotch. The Scotch have distinctly less (10 per cent) previous legislative experience before coming to the Senate than the non-Scotch.

TABLE II.—*Scotch superior in education and knowledge*

Educational, geographical, and legislative divisions	All Senators	Scotch Senators	Non-Scotch Senators
	Per cent	*Per cent*	*Per cent*
University men	25	37	20
College men	47	52	46
Common-school education	28	11	34
Eastern States	2	10	33
Western States	42	61	38
Southern States	29	29	29
Previous legislative experience	64	55	66
Previously in House of Representatives	32	22	35
Reared in rural districts	67	73	66
Reared in city	33	27	33
Professional men	79	89	76
Business men	21	11	24
Breadth of knowledge	(1)	(1)	(1)
Frequency of remarks	166	204	155
Number of subjects discussed	50	60	48
Age in years	59	56	59

[1] Average.

It will be noted that a much higher per cent of the Scotch (73) are reared in the country than other Senators.

As in their educational status, the Scotch stand much the highest, as they show distinctly the largest per cent (89) of professional men and lowest per cent (11) of business men, as compared with other Senators.

In regard to frequency of remarks on the floor, the Scotch average very much the highest (204), and likewise as to average number of subjects discussed they distinctly excel. The author has shown in his study of the Sixty-second Senate in Spanish that in general the best educated Senators stand the highest in frequency of remarks and number of subjects discussed. Frequency of remarks has no relation to long speeches, but indicates broader intellectual interest in legislation. Number of subjects discussed also shows greater breadth of knowledge. The Scotch are, in general, younger than other Senators, their average age being 56, as over against 59, the average of the Senate as a whole.

ESTIMATE OF LEGISLATIVE ABILITY

The schedule and scale of units of value on which an estimate of legislative ability is based are presented in Table III. By a careful examination of this table it will be seen that only 2½ per cent of private bills introduced, 10 per cent of public bills, 24 per cent of joint resolutions and 44 per cent of pension bills were enacted into law. The unit scale of value or of successful legislation is based upon private bills, the most difficult to have enacted into law. If we let 2½ per cent represent units of value, that is, if every private bill enacted into law counts 100 units, then, since 10 per cent of public bills became law every public bill enacted into law will count 25 units, every joint resolution 10 units, every pension bill 6 units, and so on. In short, the scale is based upon the degree of difficulty in passage of bills and resolutions. Thus, if a Senator introduces a private bill and gets it enacted into law, it counts 100 units; if it passes the Senate only, 25 units. While it is true, in exceptional cases, another Senator may get false credit, in the great majority of cases it is not true; also, exceptional cases may balance each other following the general law of averages.

TABLE III.—*Scale of units of value[1] and schedules*

Bills and resolutions	Per cent	Reported scale of units	Per cent	Passed Senate, scale of units	Enacted into law	
					Per cent	Scale of units
Private bills	12	20	10	25	2.5	100
Public bills	35	7	30	8	10	24
Joint resolutions	----------	----------	42	6	24	10
Pension bills	----------	----------	50	5	44	6
Concurrent resolutions	----------	----------	67	4	[2] 56	4
Senate resolutions	----------	----------	74	3	----------	----------

[1] Fractions are omitted in unit scale.
[2] Passing both houses.

[5] Estulio del Senado de los Estados Unidos re America, Revista Argentina de Ciencias Politicas, 12 de Enero de 1918. Buenos Aires, pp. 390–410.

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LEGISLATIVE SUPERIORITY OF SCOTCH BLOOD

Applying then our schedule of legislative units of value to the political divisions of the Senate of the Sixty-second Congress and to the Senators with and without Scotch blood, the results will be seen in Table IV.

The table shows that Democratic Senators, as a whole, are almost three times less successful in securing legislative results than the Republicans. This, however, is easily understood from the fact that minority parties do not hold themselves politically responsible for legislation. If the Senate were studied when the Democrats were the majority party, comparisons might be made.

It will be seen that the progressive Republicans are distinctly inferior in obtaining legislative results as compared with the conservative Republicans. This doubtless is due mainly to the fact that they do not always vote with their party and naturally could not expect to be assigned to important committees as frequently as those who are strict party men. Moreover, they are younger and have not been in the Senate as long as the conservative Republicans. In addition, their legislative efforts are liable to meet with stronger opposition than the legislative measures of the conservative Republicans.[6]

In regard to the influence of Scotch blood, it will be seen from Table IV that as between Senators with and Senators without Scotch blood there is practically no difference in legislative success, their average units value being nearly the same for both public and private bills. But comparing Scotch progressive Republicans with progressive Republicans not Scotch, thus eliminating the legislative disadvantage of progressivism, it will be seen that the Scotch blood is greatly superior to the non-Scotch, it being 409 units of value over against 298 similar units of value for public and private bills combined. That this legislative superiority of Scotch blood is not accidental is shown further by the fact that conservative Republicans with Scotch blood are distinctly superior in legislative results to conservative Republicans without Scotch blood, the average units of value being 626 over against 525.

TABLE IV.—*Application of unit value*

Political and Scotch divisions of Senators	Average units of values—Bills		
	Public	Private	Both
Democratic Senators	76	121	197
Republican Senators	156	343	499
Conservative Republicans	161	373	534
Progressive Republicans	126	259	385
The Senate as a whole	122	250	372
Senators with Scotch blood	121	251	372
Senators without Scotch blood	123	250	373
Scotch Progressive Republicans	109	300	409
Progressive Republicans, not Scotch	102	196	298
Scotch Conservative Republicans	201	425	626
Conservative Republicans, not Scotch	161	364	525

Practically considered, legislative success in obtaining results is synonymous with legislative ability, otherwise it might throw doubt upon the integrity of senatorial rules and activities.

TABLE V.—*Conclusions as to the Senate of the Sixty-second Congress*

In order to understand better the study of Scottish influence in the Senate of the Sixty-second Congress it will be helpful to state some of the conclusions based upon the history of the legislative activities of 80 Members of that Senate in detail, based upon Table V.

As already intimated, these conclusions apply only to this Senate, yet they create a presumption of their general application to other similar Senates.

As an illustration of the method of estimating the rank of a Senator we will take Senator No. 1 of Table V, who stood the highest in results of public legislative activity.

The units of value for the reporting, passing, and enacting into law bills and resolutions will be found in Table III.

1. The Republican progressives show a higher percentage of attendance at yea-and-nay calls than the conservative Republicans (70 per cent).

2. Senators who are business men have a higher percentage (61) of attendance at quorum calls than professional men (58) but a lower percentage (66) at yea-and-nay calls than professional men (69).

3. Chairmen of important committees show the highest percentage of attendance (66) at quorum calls.

4. In general more than half of the bills introduced in the Senate receive little or no attention.

5. The progressive Republicans held the highest average (240) in frequency of remarks on the floor, the conservative Republicans coming second (167), which is very much lower. The Democrats have a still lower average of 138.

6. Frequency of remarks on the floor increases as the degree of education increases; the average for university men is 233, college men 147, and Senators with common-school education 137.

7. Of the Democrats 35 per cent and of the Republicans 17 per cent are university men, but 54 per cent of the Republicans are college men over against 38 per cent of the Democrats.

8. Senators without previous legislative experience before coming to the Senate show the least legislative success or ability.

These conclusions apply only to groups of Senators, and not to individual Senators.

		Units of Value
Number of public bills reported only	(Column 11)	23× 7=161
Number of public bills passed by Senate only	(Column 12)	44× 8=352
Number of public bills enacted into law	(Column 13)	14×25=350
Joint resolutions passed by Senate only	(Column 14)	2× 6= 12
Joint resolutions enacted into law	(Column 15)	4×10= 40
Concurrent resolutions passing the Senate only	(Column 16)	1× 3= 3
Senate resolutions adopted	(Column 18)	25× 3= 75
Total units of value for public legislative activity		993

SCOTCH SUPERIOR IN INITIAL LEGISLATIVE ACTIVITY

Some Senators may not be very successful in obtaining legislative results, due either to their relatively short time in the Senate, or their belonging to the minority party, or their opposition to their own party. But, nevertheless, they may have shown much legislative effort or activity in the way of introducing bills, offering amendments, submitting motions and resolutions, petitions and memorials, or by frequency of remarks on the floor of the Senate. These activities come under the head of initial legislation, as indicated in Table VI.

From a general survey of Table VI, it will be seen that with few exceptions (mostly unimportant) the averages of initial legislative activity for Senators with Scotch blood are distinctly higher than for non-Scotch Senators. Beginning at the top of Table VI, it will be noted that Republicans with Scotch blood show distinctively higher averages than the non-Scotch Republicans in introducing public bills, offering amendments and in frequency of remarks on the floor of the Senate and in number of subjects discussed; but they have distinctively less averages for submitting motions and resolutions and presenting petitions and memorials; these last two forms of initial legislative activity are more of a formal nature. Also, the Scotch Democrats excel the non-Scotch in every form of initial activity except the introduction of private bills.

Eliminating the factor of progressivism, we find that the Scotch progressive Republicans and the Scotch conservative Republicans (especially) are superior to the non-Scotch. Comparing the Northern Democrats-Scotch and the Southern Democrats-Scotch with the non-Scotch, respectively, the Scotch distinctly excel in the introduction of public bills, in amendments offered, in frequency of remarks and number of subjects disclosed; that is, in the most important initial legislative activities.

TABLE VI.—*Initial legislation in Senate of Sixty-second Congress*

Political and geographical divisions and Scotch ancestry	Initial legislative activities in averages							
	Public bills and joint resolutions introduced	Private bills introduced	Pension bills introduced	Amendments offered	Motions and resolutions submitted	Petitions and memorials presented	Number of subjects discussed on floor of Senate	Frequency of remarks on floor of Senate
All Republicans—Scotch blood	34	16	69	33	14	48	59	212
All Republicans—non-Scotch	27	17	73	22	24	69	52	177
All Democrats—Scotch	20	15	48	23	13	42	61	193
All Democrats—non-Scotch	15	23	23	16	7	23	42	121
Progressive Republicans—Scotch	20	14	54	20	13	43	64	204
Progressive Republicans—non-Scotch	24	6	23	25	15	26	64	259
Conservative Republicans—Scotch	48	19	85	46	18	54	56	250
Conservative Republicans—non-Scotch	28	20	85	21	26	79	50	157
Northern Democrats—Scotch	26	20	62	29	14	32	50	160
Northern Democrats—non-Scotch	18	13	43	18	9	49	44	131
Southern Democrats—Scotch	19	11	15	23	13	31	69	211
Southern Democrats—non-Scotch	11	30	17	13	7	9	40	114
Northern Democrats (all)	20	14	47	21	15	45	45	138
Southern Democrats (all)	13	25	16	16	8	15	47	138

NUMBER OF GREAT STATESMEN DECREASING

It is a frequent remark that our modern statesmen do not seem to measure up to those in our early history. This is true, but it is a necessary result of biological law. Though the effects of education and environment are not inherited, they can be handed down to later generations through custom, tradition, and history. So while we do not inherit them through the germ cells, we do receive them from the social organism. In this sense "We are the heirs of all the ages."

[6] For further data on these points, see articles on the study of the Senate in Spanish already referred to.

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DECREASE OF GREAT MEN CAUSED BY MODERN CIVILIZATION

This social inheritance causes the environment to grow more and more complex, while our inherited natures remain unchanged. This produces disharmony and disturbance, and sometimes the elimination of those not able to adapt themselves to new conditions. Our mental and moral environment has come to us with ever-increasing increments, but our inherited natures and abilities have remained fixed. Social heredity has outrun germinal heredity. The struggle between these two forms of heredity, due to the requirements of modern civilization, fortunately is now better understood than in the past.

No modern race of men are equal to the ancient Greeks, who in two centuries produced a galaxy of illustrious men never found since. The average ability of the Athenian race at this period (530 to 430 B. C.) was (according to Galton), on the lowest possible estimate, as much greater than that of the English race of the present day, as the English race is above the African Negro in average ability.

POWER OF MEDIOCRITY DECREASES NUMBER OF GREAT MEN

It has been found that fathers 72 inches in height had sons with a mean stature of 70.8 inches, which is a regression toward the normal stature of the race. Again, fathers 66 inches in height had sons with a mean stature of 68.3 inches, which is a progression toward the normal. This tendency of average height or mediocrity of stature produces the regression or progression to the average or normal type and applies generally because man is subject to heredity in every aspect of his physical and mental make-up.

It has been found that extreme peculiarities of parents are less extreme in children, and that the most gifted parents can not expect to have children as gifted. This is called the law of filial regression, which is a tendency to the average or mediocrity. For ages the mountains have been washing down into the valleys, and while the general level has increased in height the peaks have been disappearing, so that we seem to be slowly approaching a generation of exaltation of mediocrity.

The Legislative Brain

REMARKS

OF

HON. ANTHONY J. GRIFFIN

OF NEW YORK CITY

IN THE HOUSE OF REPRESENTATIVES

Mr. GRIFFIN. Mr. Speaker, Senators COPELAND, FRAZIER, JONES, and NYE, during the past month or so, have had published in the CONGRESSIONAL RECORD a series of articles on brain measurements, and the deductions therefrom, on legislative ability.

The writer of these articles is Dr. Arthur MacDonald, formerly "fellow" of Johns Hopkins University, and a distinguished anthropologist, who has written a number of works on that and other allied subjects.

The learned doctor, who is a familiar figure around the Capitol, where he has been making his researches for many years, gives the palm to the Senate for size of brain and, inferentially, legislative ability. His conclusions have provoked more or less amusing controversy in the press and, perhaps, a little resentment and criticism among the Members of the lower House. Sensitiveness on the subject is hardly justified, however, as some of the most distinguished men in history have not been conspicuous for the mere size of their craniums.

A further explanation of Doctor MacDonald's findings is that the men with big heads were the first to accept the doctor's invitation to submit to his examinations. Who ever saw a man wearing a 7¼ hat and upwards who was not fond of slipping it over the head and ears of his usually more bashful friends who could boast of nothing larger than a 6⅞? Let the small heads take heart. The learned doctor uses other tests and data besides mere circumference. There are height about the ears and width and length to be taken into consideration as well.

Another explanation is that so few of the House Members have lent themselves to this experiment. Before any final conclusions can be drawn the full membership of both Houses should be measured. The Members of the House owe a duty to themselves and to their side of the Federal Legislature to jump into the breach and try to raise the House average.

I have spoken to some of our Members, both those with the small heads and those with the big heads, and found them somewhat suspicious that the tests might unduly penetrate the sanctity of their personal peculiarities. Doctor MacDonald assures me there is no ground for this fear, and hands me the following list of the questions—all confidential—which bear on his tests:

(Confidential data)

Name of person in full_____
Blond_____ Medium_____ Brunette_____
Lineage _____
Age_____ Race_____ Occupation_____
Height of body_____
Sitting height_____
Arm reach_____
Chest girth (at armpits)_____
Weight_____
Right-hand grasp (dynamometer)_____
Left-hand grasp (dynamometer)_____
Breadth of head_____
Length of head_____
Height of head (bregma) (auriculometer)_____
Height of head (vertex) (auriculometer)_____
Circumference of head_____
Length of face_____
Width of face (bizygomatic)_____
Length of nose_____
Breadth of nose_____

Temple algometer_____r.	Least disagreeable_____r.
Temple algometer_____l.	Least disagreeable_____l.
Uncomfortable_____r.	Threshold of pain_____r.
Uncomfortable _____l.	Threshold of pain_____l.
Cephalic index _____	Nasal index_____
Cranial capacity (estimated)___	Weight of brain (estimated)___

Remarks:

FOREIGN LEGISLATURES

The doctor also plans an extension of his researches so as to include the legislative bodies of all foreign nations. He is sending a circular letter to the officials of their respective parliaments urging their cooperation, as well as to foreign anthropologists and physicians to arouse their interest in this vast scientific study.

AMERICAN CONGRESS SHOULD COOPERATE

It is a well-known fact that foreign parliaments have a larger percentage of doctors and scientific men than is to be found in either the Federal Congress or in our State legislatures, and it is probable that they will show results which will outdistance us. I would, therefore, urge my colleagues to extend to the learned doctor their hearty cooperation.

Doctor MacDonald informs me that he will be glad to make appointments at the convenience of Members if communicated with at his address, No. 314 East Capitol Street.

Twenty-four specialists in the faculty of Johns Hopkins University have consented to examine gratis every Member of Congress who takes the physical anthropological measurements of Doctor MacDonald.

The medical examinations are supplementary to Doctor MacDonald's measurements, and may prove of value in discovering latent physical weaknesses or defects.

Incipient tendencies, not yet noticed, if discovered early by the specialist, usually can be remedied, but if undetected they may become serious, if not fatal. Each specialist makes a full report to Doctor MacDonald, and the Member examined can have a copy.

The one fundamental idea is to keep well, and every hour spent in these examinations may add many years to the Member's life and also spare him from much pain, suffering, and sickness, enabling him to be more efficient in his public service.

The problem is to have the normal decadence of life extended equally to all the vital organs, for the chain is never stronger than its weakest link.

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"Brain Weight and Legislative Ability in Congress"

by

Dr. Arthur Macdonald

Washington, D. C.

Introduced by

Senator Frazier

in the United States Senate

Printed in the CONGRESSIONAL RECORD of
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METHOD OF ESTIMATING BRAIN WEIGHT

In estimating the brain weight of the 89 Members of Congress, from outside measurements of the head, the following equation was used, called the "Lee formula," which gives the cranial capacity and is written:

[(Head length−11)×(head breadth−11)×(head height−11×.000337]+406.01. In order to get the weight of brain from the cranial capacity, we use Welcker's formula thus:

WHEN CRANIAL CAPACITY RUNS—

From 1,200 to 1,300 cubic centimeters (cubic inches), multiply by .91=
From 1,300 to 1,400 cubic centimeters (cubic inches), multiply by .92=
From 1,400 to 1,500 cubic centimeters (cubic inches), multiply by .93=
From 1,500 to 1,600 cubic centimeters (cubic inches), multiply by .94=
From 1,600 to 1,700 cubic centimeters (cubic inches), multiply by .95=
} =Brain weight in grams.

To illustrate, let us figure out the brain weight of Congressmen. As, for instance, his length of head is 201 millimeters (8 inches), width of head 152 millimeters (5 inches), and height of head 146 millimeters (5 inches). Applying the equation given above, we have:

[(201−11)×(152−11)×(146−11)×.000337]+406.01=1,625 cubic centimeters (98 cubic inches), which is the cranial capacity of the Congressmen. Looking at Welcker's table above, we find that to obtain the brain weight of one with a cranial capacity of 1,625 cubic centimeters, we must multiply this by .95, which gives 1,543 grams (54 ounces) as the estimated weight of this Congressman's brain. The results for each Member are given in Table 1.

TABLE 1.—*Estimated legislative ability and brain weight of 89 Members of Congress*

Rank of standing in legislative ability	Number of units of value or credits	Estimated brain weight in	
		Grams	Ounces
1	14	1,414	50
2	16	1,753	62
3	33	1,602	56
4	40	1,382	49
5	44	1,445	51
6	48	1,234	43
7	68	1,422	50
8	77	1,668	59
9	79	1,356	48
10	80	1,529	54
11	90	1,454	51
12	94	1,379	49
13	95	1,448	51
14	100	1,486	52
15	101	1,655	58
16	101	1,480	52
17	104	1,430	50
18	112	1,428	50
19	116	1,435	51
20	119	1,499	53
21	122	1,497	53
22	130	1,566	55
23	140	1,450	51
24	142	1,427	50
25	147	1,495	53
26	148	1,435	51
27	158	1,332	47

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TABLE 1.—*Estimated legislative ability and brain weight of 89 Members of Congress*—Continued

Rank of standing in legislative ability	Number of units of value or credits	Estimated brain weight in	
		Grams	Ounces
28	162	1,481	52
29	163	1,566	55
30	170	1,573	55
31	172	1,454	51
32	173	1,437	51
33	175	1,591	56
34	175	1,421	50
35	179	1,495	53
36	205	1,306	46
37	220	1,543	54
38	222	1,473	52
39	222	1,432	50
40	228	1,371	48
41	239	1,378	49
42	239	1,574	55
43	245	1,332	47
44	269	1,560	55
45	273	1,250	44
46	274	1,591	56
47	282	1,367	48
48	292	1,522	53
49	295	1,678	59
50	295	1,495	53
51	299	1,469	52
52	301	1,801	63
53	302	1,492	53
54	310	1,372	48
55	332	1,564	55
56	357	1,482	52
57	360	1,523	54
58	367	1,443	51
59	370	1,462	52
60	374	1,581	56
61	377	1,545	54
62	399	1,764	62
63	405	1,543	54
64	412	1,605	57
65	450	1,499	53
66	458	1,350	48
67	530	1,432	50
68	534	1,471	52
69	564	1,377	48
70	596	1,473	52
71	598	1,591	56
72	601	1,415	50
73	651	1,437	51
74	678	1,534	54
75	682	1,416	50
76	688	1,384	49
77	700	1,687	59
78	713	1,482	52
79	765	1,452	51
80	794	1,587	56
81	801	1,608	57
82	882	1,467	52
83	986	1,639	58
84	1,097	1,418	50
85	1,120	1,420	50
86	1,331	1,484	52
87	1,635	1,486	52
88	1,993	1,418	50
89	2,463	1,258	44
Average	292	1,450	51

[1] In charging grams to ounces fractions are omitted.

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There is, then, a distinct substantial relationship (48) between brain weight and legislative ability in the case of these 89 Members, as a group, and a distinct and high relationship (61) in the case of the 18 Senators, as a group. The 71 Representatives taken as a group might be regarded as a random sample of the 435 Members of the House, and the 18 Senators, as a random sample of the 96 Members of the Senate the proportions of those studied being about the same for each House, one-fifth for the Senate and one-sixth for the House. Taking them as random samples, they might be considered as representing the House and Senate as a whole, and the conclusions applied to the whole of Congress. But, as already indicated, the numbers studied are far too small to be used in this way, from the mathematical or statistical point of view.

In Table 2 is presented the general averages of credit marks for legislative ability, and also for brain weights (in grams and ounces) of all the Members studied, and also of the 18 Senators and 71 Representatives, by themselves, as will be seen from the table.

TABLE 2.—*Comparisons between*

No.	Division of Members	Legislative ability credits average	Brain average	Weight average
			Grams	*Ounces*
89	All Members studied	392	1,450	51
18	Senators studied	921	1,476	52
71	Representatives studied	258	1,444	50

Senators average the highest both in legislative ability (921 credits) and brain weight (1,476 grams, or 52 ounces). The 71 Representatives, as a group, stand lowest, both in credit marks (258) and brain weight (1,444 grams, or 50 ounces). All the 89 Members together average 392 credits for legislative ability and for brain weight.

Applying the Pearson correlation coefficient[1] to Table 1, we obtain the results given in the table (Table 3) which follows:

TABLE 3.—*Correlation between legislative ability and brain weight of 89 Members of Congress*

Number of cases	Members, all	Mean	Probable error of mean	Standard deviation	Probable error of standard deviation	Correlation coefficient
89	Legislative ability in credits	392	29	412	21	48+18
89	Brain weight in grams	1,450	89	111	6	
	Senators only:					
18	Legislative ability in credits	921	91	581	65	61+15
18	Brain weight in grams	1,476	16	107	11	
	Representatives only:					
71	Legislative ability in credits	258	15	194	11	50+17
71	Brain weight in grams	1,444	9	116	6	

In Table 2 above (last column) is given the correlation between the legislative ability and estimated brain weight of all the 89 Members of Congress; also of the 18 Senators by themselves and the 71 Representatives.

[1] Explanation of this correlation coefficient will be found in most of the modern works on statistical methods, to which the reader is referred.

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From the last column in the first part of Table 2 it will be seen that for all the 89 Members the relationship between their legislative ability and brain weight is 48, with a probable error of 18, which, on the scale of 100, shows a substantial relationship of nearly half.

If we take the 18 Senators by themselves, as indicated in the second part of the table, the relationship shown by the correlation coefficient (last column) is 61, with a probable error of 0.15, which is distinctly high on a scale of 100, approaching two-thirds. If, as indicated in the third part of the table, the 71 Representatives by themselves are considered, the relationship between their brain weight and legislative ability, as indicated by the correlation coefficient (last column) is 50, with a probable error of 0.17, which is a little more than when all the 89 Members are considered. The reader, however, is warned to make no positive conclusions from these figures, as the number studied is small. Yet they may indicate a probable approximate truth. In case larger numbers had been measured and it had been possible to have measured all the 90 Senators and 435 Representatives, we would have been practically certain of our results.

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P. A. Macdonald doszedł do przekonania, że członkowie ciał ustawodawczych (sejmu, rady miejskiej i t. d.) jako wybrani z różnych warstw ludności stanowią grupę, odtwarzającą stosunki panujące w całem społeczeństwie i dlatego zbadanie antropologiczne i lekarskie członków ciał ustawodawczych może dostarczyć najwiarygodniejszych informacyj o odnośnych stosunkach panujących w całej ludności danego kraju. Dane te zaś są niezbędne dla polepszenia stosunków zdrowotnych, zapobiegania chorobom i t. d. P. Macdonald chciałby zainteresować swym projektem ciała ustawodawcze i dlatego rozesłał swe artykuły do różnych towarzystw naukowych, które mają uczynić odpowiednie kroki w parlamentach i t. d.

Ponieważ chodzi tu [1] prawie wyłącznie o cele antropologiczne i lekarskie, [2] sam projekt nie wydaje się słuszny bez zastrzeżeń. wobec tego sądzę, że zajmowanie się tą sprawą nie należy do kompetencji naszego Towarzystwa i że należałoby odesłać broszury p. M. Donalda do Towarzystwa antropologicznego lub ew. do którego z p. posłów i powiadomić o tem p. Macdonalda.

Dr. W. Kretz