APPENDIX C

FREQUENCY DISTRIBUTIONS OF ENGLISH TETRAGRAPHS

Frequency distributions of English tetragraphs appearing in 50,000 letters of government plaintext telegrams.

Table C-1. The 54 tetragraphs appearing 50 or more times, arranged by absolute frequencies, accompanied by the logarithms of their assigned probabilities.

F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)
TION 218	2.34	.99	THIR..... 104	2.02	.87	ASHT..... 64	1.81	.79
EVEN..... 168	2.23	.95	EENT..... 102	2.01	.87	HUND..... 64	1.81	.79
TEEN..... 163	2.21	.94	REQU..... 98	1.99	.86	DRED..... 63	1.80	.79
ENTY..... 161	2.21	.94	HIRT..... 97	1.99	.86	RIOD..... 63	1.80	.79
STOP 154	2.19	.93	COMM 93	1.97	.85	ENTS..... 62	1.79	.78
NINE 153	2.18	.93	QUES..... 87	1.94	.84	FFIC 62	1.79	.78
WENT..... 153	2.18	.93	UEST..... 87	1.94	.84	IVED..... 62	1.79	.78
TWEN..... 152	2.18	.93	EQUE..... 86	1.93	.84	FROM 59	1.77	.78
THRE..... 149	2.17	.93	NDRE 77	1.89	.82	IRTY..... 59	1.77	.78
FOUR..... 144	2.16	.92	LLAR 71	1.85	.81	RTEE..... 59	1.77	.78
IGHT 140	2.15	.92	OMMA 71	1.85	.81	UNDR 59	1.77	.78
FIVE 135	2.13	.91	OLLA 70	1.85	.81	NAUG 56	1.75	.77
HREE..... 134	2.13	.91	VENT..... 70	1.85	.81	OURT..... 56	1.75	.77
DASH..... 132	2.12	.91	DOLL..... 68	1.83	.80	UGHT 56	1.75	.77
EIGH 132	2.12	.91	LARS 68	1.83	.80	STAT 54	1.73	.76
SEVE 121	2.08	.89	THIS 68	1.83	.80	AUGH 52	1.72	.76
ENTH 114	2.06	.89	PERI 67	1.83	.80	CENT..... 52	1.72	.76
MENT..... 111	2.05	.88	ERIO..... 66	1.82	.80	FICE 50	1.70	.75

Table C-2. The 54 tetragraphs appearing 50 or more times, arranged in alphabetic order by their first letters, then by absolute frequencies, accompanied by the logarithms of their assigned probabilities.

	F	L_{10} (F)	L_{244} (F)		F	L_{10} (F)	L_{244} (F)		F	L_{10} (F)	L_{244} (F)
ASHT	64	1.81	.79	HREE	134	2.13	.91	REQU	98	1.99	.86
AUGH	52	1.72	.76	HIRT	97	1.99	.86	RIOD	63	1.80	.79
				HUND	64	1.81	.79	RTEE	59	1.77	.78
COMM	93	1.97	.85								
CENT	52	1.72	.76	IGHT	140	2.15	.92	STOP	154	2.19	.93
				IVED	62	1.79	.78	SEVE	121	2.08	.89
DASH	132	2.12	.91	IRTY	59	1.77	.78	STAT	54	1.73	.76
DOLL	68	1.83	.80								
DRED	63	1.80	.79	LLAR	71	1.85	.81	TION	218	2.34	.99
				LARS	68	1.83	.80	TEEN	163	2.21	.94
EVEN	168	2.23	.95					TWEN	152	2.18	.93
ENTY	161	2.21	.94	MENT	111	2.05	.88	THRE	149	2.17	.93
EIGH	132	2.12	.91					THIR	104	2.02	.87
ENTH	114	2.06	.89	NINE	153	2.18	.93	THIS	68	1.83	.80
EENT	102	2.01	.87	NDRE	77	1.89	.82				
EQUE	86	1.93	.84	NAUG	56	1.75	.77	UEST	87	1.94	.84
ERIO	66	1.82	.80					UNDR	59	1.77	.78
ENTS	62	1.79	.78	OMMA	71	1.85	.81	UGHT	56	1.75	.77
				OLLA	70	1.85	.81				
FOUR	144	2.16	.92	OURT	56	1.75	.77				
FIVE	135	2.13	.91					VENT	70	1.85	.81
FFIC	62	1.79	.78	PERI	67	1.83	.80				
FROM	59	1.77	.78								
FICE	50	1.70	.75	QUES	87	1.94	.84	WENT	153	2.18	.93

Table C-3. The 54 tetragraphs appearing 50 or more times, arranged in alphabetic order by their second letters, and then according to their absolute frequencies, accompanied by the logarithms of their assigned probabilities.

F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)
DASH..... 132	2.12	.91	TION 218	2.34	.99	HREE..... 134	2.13	.91
LARS 68	1.83	.80	NINE 153	2.18	.93	ERIO..... 66	1.82	.80
NAUG 56	1.75	.77	FIVE 135	2.13	.91	DRED..... 63	1.80	.79
			EIGH 132	2.12	.91	FROM 59	1.77	.78
NDRE 77	1.89	.82	HIRT..... 97	1.99	.86	IRTY 59	1.77	.78
			RIOD..... 63	1.80	.79			
TEEN..... 163	2.21	.94	FICE 50	1.70	.75			
WENT..... 153	2.18	.93				ASHT..... 64	1.81	.79
SEVE 121	2.08	.89	LLAR 71	1.85	.81			
MENT..... 111	2.05	.88	OLLA 70	1.85	.81			
EENT..... 102	2.01	.87				STOP 154	2.19	.93
REQU..... 98	1.99	.86				RTEE..... 59	1.77	.78
UEST..... 87	1.94	.84	OMMA 71	1.85	.81	STAT 54	1.73	.76
VENT..... 70	1.85	.81						
PERI 67	1.83	.80	ENTY..... 161	2.21	.94			
CENT..... 52	1.72	.76	ENTH 114	2.06	.89	QUES..... 87	1.94	.84
			ENTS..... 62	1.79	.78	HUND..... 64	1.81	.79
FFIC 62	1.79	.78	UNDR 59	1.77	.78	OURT..... 56	1.75	.77
						AUGH 52	1.72	.76
IGHT 140	2.15	.92	FOUR..... 144	2.16	.92			
UGHT 56	1.75	.77	COMM 93	1.97	.85			
			DOLL..... 68	1.83	.80	EVEN..... 168	2.23	.95
THRE..... 149	2.17	.93				IVED..... 62	1.79	.78
THIR..... 104	2.02	.87						
THIS..... 68	1.83	.80	EQUE..... 86	1.93	.84	TWEN..... 152	2.18	.93

Table C-4. The 54 tetragraphs appearing 50 or more times, arranged in alphabetic order by their third letters, then by absolute frequencies, accompanied by the logarithms of their assigned probabilities.

F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)	F	L_{10} (F)	L_{244} (F)
LLAR 71	1.85	.81	THIR..... 104	2.02	.87	REQU..... 98	1.99	.86
STAT 54	1.73	.76	THIS 68	1.83	.80			
			ERIO 66	1.82	.80	THRE..... 149	2.17	.93
FICE 50	1.70	.75	FFIC 62	1.79	.78	HIRT..... 97	1.99	.86
						NDRE 77	1.89	.82
UNDR 59	1.77	.78	OLLA 70	1.85	.81	LARS 68	1.83	.80
			DOLL 68	1.83	.80	PERI 67	1.83	.80
EVEN..... 168	2.23	.95				OURT..... 56	1.75	.77
TEEN..... 163	2.21	.94						
TWEN..... 152	2.18	.93	COMM 93	1.97	.85	DASH..... 132	2.12	.91
HREE..... 134	2.13	.91	OMMA 71	1.85	.81	UEST 87	1.94	.84
QUES..... 87	1.94	.84						
DRED..... 63	1.80	.79	NINE 153	2.18	.93	ENTY..... 161	2.21	.94
IVED..... 62	1.79	.78	WENT 153	2.18	.93	ENTH 114	2.06	.89
RTEE..... 59	1.77	.78	MENT..... 111	2.05	.88	ENTS..... 62	1.79	.78
			EENT..... 102	2.01	.87	IRTY 59	1.77	.78
			VENT..... 70	1.85	.81			
			HUND..... 64	1.81	.79	FOUR..... 144	2.16	.92
EIGH 132	2.12	.91	CENT..... 52	1.72	.76	EQUE..... 86	1.93	.84
AUGH 52	1.72	.76				NAUG 56	1.75	.77
			TION 218	2.34	.99			
IGHT 140	2.15	.92	STOP 154	2.19	.93			
ASHT..... 64	1.81	.79	RIOD..... 63	1.80	.79	FIVE 135	2.13	.91
UGHT 56	1.75	.77	FROM 59	1.77	.78	SEVE 121	2.08	.89

Table C-5. The tetragraphs appearing 50 or more times, arranged in alphabetic order by their fourth letters, then by absolute frequencies, accompanied by the logarithms of their assigned probabilities.

	F	L_{10} (F)	L_{244} (F)		F	L_{10} (F)	L_{244} (F)		F	L_{10} (F)	L_{244} (F)
OMMA	71	1.85	.81	DASH	132	2.12	.91	QUES	87	1.94	.84
OLLA	70	1.85	.81	EIGH	132	2.12	.91	LARS	68	1.83	.80
				ENTH	114	2.06	.89	THIS	68	1.83	.80
				AUGH	52	1.72	.76	ENTS	62	1.79	.78
FFIC	62	1.79	.78								
				PERI	67	1.83	.80				
								WENT	153	2.18	.93
HUND	64	1.81	.79	DOLL	68	1.83	.80	IGHT	140	2.15	.92
DRED	63	1.80	.79					MENT	111	2.05	.88
RIOD	63	1.80	.79	COMM	93	1.97	.85	EENT	102	2.01	.87
IVED	62	1.79	.78	FROM	59	1.77	.78	HIRT	97	1.99	.86
								UEST	87	1.94	.84
				TION	218	2.34	.99	VENT	70	1.85	.81
NINE	153	2.18	.93	EVEN	168	2.23	.95	ASHT	64	1.81	.79
THRE	149	2.17	.93	TEEN	163	2.21	.94	OURT	56	1.75	.77
FIVE	135	2.13	.91	TWEN	152	2.18	.93	UGHT	56	1.75	.77
HREE	134	2.13	.91					STAT	54	1.73	.76
SEVE	121	2.08	.89	ERIO	66	1.82	.80	CENT	52	1.72	.76
EQUE	86	1.93	.84								
NDRE	77	1.89	.82	STOP	154	2.19	.93				
RTEE	59	1.77	.78					REQU	98	1.99	.86
FICE	50	1.70	.75	FOUR	144	2.16	.92				
				THIR	104	2.02	.87				
				LLAR	71	1.85	.81	ENTY	161	2.21	.94
NAUG	56	1.75	.77	UNDR	59	1.77	.78	IRTY	59	1.77	.78