Addenda to the Book: Donker, Gerald J., *The Text of the Apostolos in Athanasius of Alexandria*.

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[1] The Table numbering here continues on from the numbering in the book.

Table 100: Complete Corpus of Acts: Percentage ± Error Bound (95% Confidence Level)

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	Ψ	049	81	383	614	630	945	1073	1175	1352	1704	1739	1891
Ath	-																							
$\mathfrak{P}^{74}$	14	-																						
ℵ	13	14	-																					
A	13	10	12	-																				
B	13	14	12	13	-																			
C	15	14	15	14	15	-																		
D	16	17	15	16	15	17	-																	
E	15	15	15	14	15	15	16	-																
H	14	15	15	15	15	15	16	15	-															
L	17	17	17	17	17	18	20	17	11	-														
P	14	15	15	15	15	15	17	14	10	13	-													
Ψ	13	14	14	14	15	15	15	15	14	17	14	-												
049	14	15	15	15	14	15	16	15	8	11	10	14	-											
81	13	14	14	13	14	15	16	15	15	18	15	14	15	-										
383	21	21	21	21	21	23	21	21	19	19	17	21	19	23	-									
614	15	15	14	14	14	15	16	15	13	17	13	14	13	15	19	-								
630	13	15	14	14	14	14	16	15	14	17	13	13	14	14	20	14	-							
945	14	14	14	14	14	13	16	15	14	17	14	14	14	13	21	15	7	-						
1073	14	15	15	15	15	15	16	14	9	8	9	14	9	15	18	14	14	15	-					
1175	13	14	13	13	14	13	16	15	14	17	15	14	14	14	21	15	13	12	15	-				
1352	14	15	15	15	14	15	16	15	10	11	8	14	10	15	18	13	14	14	9	15	-			
1704	13	14	14	14	14	14	16	15	14	17	14	13	14	13	21	15	6	4	14	13	14	-		
1739	14	14	14	13	14	13	15	14	15	17	15	14	15	13	20	15	11	9	15	12	15	10	-	
1891	13	14	14	13	14	14	16	15	14	17	14	14	15	13	21	15	10	9	15	13	14	8	10	-

Table 101: Acts Corpus: Comparison Counts

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	044	049	81	383	614	630	945	1073	1175	1352	1704	1739	1891
Ath	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
$\mathfrak{P}^{74}$	43	43	43	43	43	39	34	43	43	32	43	43	43	39	21	43	43	43	43	43	43	43	43	43
ℵ	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
A	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
B	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
C	41	39	41	41	41	41	32	41	41	28	40	41	41	41	17	41	41	41	41	41	41	41	41	41
D	36	34	36	36	36	32	36	36	36	23	35	36	36	32	21	36	36	36	36	36	36	36	36	36
E	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
H	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
L	32	32	32	32	32	28	23	32	32	32	32	32	32	28	21	32	32	32	32	32	32	32	32	32
P	44	43	44	44	44	40	35	44	44	32	44	44	44	40	21	44	44	44	44	44	44	44	44	44
044	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
049	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
81	41	39	41	41	41	41	32	41	41	28	40	41	41	41	17	41	41	41	41	41	41	41	41	41
383	21	21	21	21	21	17	21	21	21	21	21	21	21	17	21	21	21	21	21	21	21	21	21	21
614	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
630	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
945	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1073	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1175	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1352	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1704	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1739	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45
1891	45	43	45	45	45	41	36	45	45	32	44	45	45	41	21	45	45	45	45	45	45	45	45	45

Table 102: Acts 1–12: Comparison Counts

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	044	049	81	614	630	945	1073	1175	1352	1704	1739	1891
Ath	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
$\mathfrak{P}^{74}$	17	17	17	17	17	17	13	17	17	6	17	17	17	17	17	17	17	17	17	17	17	17	17
ℵ	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
A	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
B	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
C	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
D	15	13	15	15	15	15	15	15	15	2	14	15	15	15	15	15	15	15	15	15	15	15	15
E	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
H	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
L	6	6	6	6	6	6	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
P	18	17	18	18	18	18	14	18	18	6	18	18	18	18	18	18	18	18	18	18	18	18	18
044	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
049	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
81	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
614	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
630	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
945	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1073	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1175	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1352	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1704	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1739	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19
1891	19	17	19	19	19	19	15	19	19	6	18	19	19	19	19	19	19	19	19	19	19	19	19

Table 103: Acts 13–28: Comparison Counts

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	044	049	81	383	614	630	945	1073	1175	1352	1704	1739	1891
Ath	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
$\mathfrak{P}^{74}$	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
ℵ	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
A	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
B	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
C	22	22	22	22	22	22	17	22	22	22	22	22	22	22	17	22	22	22	22	22	22	22	22	22
D	21	21	21	21	21	17	21	21	21	21	21	21	21	17	21	21	21	21	21	21	21	21	21	21
E	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
H	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
L	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
P	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
044	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
049	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
81	22	22	22	22	22	22	17	22	22	22	22	22	22	22	17	22	22	22	22	22	22	22	22	22
383	21	21	21	21	21	17	21	21	21	21	21	21	21	17	21	21	21	21	21	21	21	21	21	21
614	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
630	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
945	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1073	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1175	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1352	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1704	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1739	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26
1891	26	26	26	26	26	22	21	26	26	26	26	26	26	22	21	26	26	26	26	26	26	26	26	26

Table 104: Acts (Complete): Dissimilarity (Simple Matching Distance)

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	Ψ	049	81	383	614	630	945	1073	1175	1352	1704	1739	1891
Ath	-																							
$\mathfrak{P}^{74}$	0.326	-																						
ℵ	0.289	0.302	-																					
A	0.267	0.140	0.200	-																				
B	0.244	0.326	0.222	0.289	-																			
C	0.366	0.308	0.342	0.293	0.390	-																		
D	0.611	0.588	0.694	0.639	0.667	0.563	-																	
E	0.489	0.488	0.533	0.422	0.511	0.512	0.500	-																
H	0.400	0.442	0.489	0.467	0.556	0.488	0.611	0.444	-															
L	0.406	0.438	0.406	0.438	0.531	0.429	0.565	0.438	0.125	-														
P	0.341	0.419	0.455	0.409	0.477	0.450	0.486	0.364	0.136	0.156	-													
Ψ	0.267	0.349	0.400	0.333	0.467	0.439	0.667	0.444	0.333	0.438	0.341	-												
049	0.422	0.465	0.511	0.489	0.578	0.537	0.556	0.444	0.089	0.125	0.136	0.378	-											
81	0.220	0.256	0.293	0.244	0.293	0.342	0.688	0.561	0.415	0.393	0.350	0.293	0.439	-										
383	0.476	0.476	0.429	0.524	0.619	0.412	0.571	0.571	0.286	0.286	0.191	0.381	0.286	0.412	-									
614	0.511	0.605	0.622	0.622	0.667	0.585	0.639	0.511	0.289	0.375	0.273	0.378	0.267	0.585	0.286	-								
630	0.289	0.395	0.378	0.356	0.422	0.317	0.611	0.489	0.333	0.375	0.273	0.289	0.356	0.293	0.333	0.400	-							
945	0.311	0.349	0.356	0.333	0.356	0.244	0.611	0.556	0.400	0.406	0.318	0.311	0.422	0.244	0.381	0.467	0.067	-						
1073	0.400	0.442	0.489	0.467	0.556	0.463	0.528	0.422	0.111	0.063	0.114	0.356	0.111	0.415	0.238	0.333	0.378	0.444	-					
1175	0.289	0.302	0.267	0.244	0.311	0.220	0.611	0.489	0.422	0.406	0.409	0.356	0.422	0.317	0.476	0.511	0.289	0.222	0.489	-				
1352	0.422	0.465	0.533	0.489	0.578	0.537	0.556	0.444	0.133	0.125	0.091	0.422	0.133	0.439	0.238	0.267	0.311	0.378	0.111	0.467	-			
1704	0.289	0.349	0.378	0.311	0.378	0.268	0.611	0.533	0.378	0.406	0.318	0.289	0.400	0.244	0.381	0.444	0.044.	0.022	0.422	0.244	0.356	-		
1739	0.311	0.302	0.311	0.289	0.311	0.220	0.667	0.622	0.467	0.469	0.409	0.356	0.511	0.244	0.333	0.533	0.178	0.111	0.533	0.222	0.467	0.133	-	
1891	0.244	0.326	0.356	0.244	0.356	0.268	0.611	0.533	0.422	0.406	0.364	0.333	0.444	0.220	0.429	0.489	0.133	0.111	0.467	0.289	0.400	0.089	0.133	-

Table 105: Acts 1–12: Dissimilarity (Simple Matching Distance)

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	Ψ	049	81	614	630	945	1073	1175	1352	1704	1739	1891
Ath	-																						
$\mathfrak{P}^{74}$	0.412	-																					
ℵ	0.316	0.294	-																				
A	0.316	0.177	0.211	-																			
B	0.211	0.353	0.211	0.421	-																		
C	0.421	0.294	0.211	0.211	0.421	-																	
D	0.600	0.385	0.667	0.533	0.600	0.467	-																
E	0.632	0.529	0.632	0.421	0.790	0.526	0.533	-															
H	0.421	0.412	0.526	0.421	0.579	0.526	0.533	0.263	-														
L	0.500	0.333	0.333	0.333	0.667	0.167	0.500	0.167	0.167	-													
P	0.444	0.412	0.611	0.444	0.556	0.500	0.429	0.278	0.111	0.333	-												
Ψ	0.316	0.412	0.421	0.421	0.474	0.526	0.533	0.368	0.211	0.333	0.333	-											
049	0.474	0.471	0.579	0.474	0.632	0.579	0.600	0.316	0.053	0.333	0.167	0.263	-										
81	0.211	0.412	0.316	0.421	0.316	0.421	0.600	0.632	0.421	0.333	0.389	0.421	0.474	-									
614	0.579	0.471	0.684	0.579	0.737	0.684	0.733	0.421	0.158	0.333	0.278	0.368	0.105	0.579	-								
630	0.368	0.529	0.474	0.474	0.474	0.474	0.667	0.526	0.263	0.333	0.278	0.368	0.316	0.421	0.316	-							
945	0.368	0.471	0.368	0.474	0.368	0.368	0.600	0.632	0.368	0.333	0.333	0.368	0.421	0.368	0.421	0.105	-						
1073	0.474	0.471	0.579	0.474	0.632	0.474	0.467	0.316	0.158	0.167	0.167	0.263	0.211	0.474	0.316	0.421	0.526	-					
1175	0.421	0.412	0.211	0.316	0.421	0.211	0.600	0.526	0.421	0.167	0.500	0.421	0.474	0.421	0.474	0.263	0.158	0.579	-				
1352	0.474	0.471	0.684	0.474	0.632	0.579	0.533	0.316	0.158	0.333	0.056	0.368	0.211	0.474	0.211	0.211	0.316	0.211	0.474	-			
1704	0.316	0.471	0.421	0.421	0.421	0.421	0.600	0.579	0.316	0.333	0.333	0.316	0.368	0.368	0.368	0.053	0.053	0.474	0.211	0.263	-		
1739	0.316	0.294	0.211	0.316	0.211	0.316	0.600	0.737	0.526	0.500	0.500	0.526	0.579	0.316	0.579	0.263	0.158	0.684	0.211	0.474	0.211	-	
1891	0.158	0.353	0.368	0.263	0.368	0.368	0.600	0.579	0.368	0.333	0.389	0.368	0.421	0.263	0.421	0.211	0.211	0.526	0.263	0.316	0.158	0.158	-

Table 106: Acts 13–28: Dissimilarity (Simple Matching Distance)

	Ath	$\mathfrak{P}^{74}$	ℵ	A	B	C	D	E	H	L	P	Ψ	049	81	383	614	630	945	1073	1175	1352	1704	1739	1891
Ath	-																							
$\mathfrak{P}^{74}$	0.269	-																						
ℵ	0.269	0.308	-																					
A	0.231	0.115	0.192	-																				
B	0.269	0.308	0.231	0.192	-																			
C	0.318	0.318	0.455	0.364	0.364	-																		
D	0.619	0.714	0.714	0.714	0.714	0.647	-																	
E	0.385	0.462	0.462	0.423	0.308	0.500	0.476	-																
H	0.385	0.462	0.462	0.500	0.539	0.455	0.667	0.577	-															
L	0.385	0.462	0.423	0.462	0.500	0.500	0.571	0.500	0.115	-														
P	0.269	0.423	0.346	0.385	0.423	0.409	0.524	0.423	0.154	0.115	-													
Ψ	0.231	0.308	0.385	0.269	0.462	0.364	0.762	0.500	0.423	0.462	0.346	-												
049	0.385	0.462	0.462	0.500	0.539	0.500	0.524	0.539	0.115	0.077	0.115	0.462	-											
81	0.227	0.136	0.273	0.091	0.273	0.273	0.765	0.500	0.409	0.409	0.318	0.182	0.409	-										
383	0.476	0.476	0.429	0.524	0.619	0.412	0.571	0.571	0.286	0.286	0.191	0.381	0.286	0.412	-									
614	0.462	0.692	0.577	0.654	0.615	0.500	0.571	0.577	0.385	0.385	0.269	0.385	0.385	0.591	0.286	-								
630	0.231	0.308	0.308	0.269	0.385	0.182	0.571	0.462	0.385	0.385	0.269	0.231	0.385	0.182	0.333	0.462	-							
945	0.269	0.269	0.346	0.231	0.346	0.136	0.619	0.500	0.423	0.423	0.308	0.269	0.423	0.136	0.381	0.500	0.039	-						
1073	0.346	0.423	0.423	0.462	0.500	0.455	0.571	0.500	0.077	0.039	0.077	0.423	0.039	0.364	0.238	0.346	0.346	0.385	-					
1175	0.192	0.231	0.308	0.192	0.231	0.227	0.619	0.462	0.423	0.462	0.346	0.308	0.385	0.227	0.476	0.539	0.308	0.269	0.423	-				
1352	0.385	0.462	0.423	0.500	0.539	0.500	0.571	0.539	0.115	0.077	0.115	0.462	0.077	0.409	0.238	0.308	0.385	0.423	0.039	0.462	-			
1704	0.269	0.269	0.346	0.231	0.346	0.136	0.619	0.500	0.423	0.423	0.308	0.269	0.423	0.136	0.381	0.500	0.039	0.000	0.385	0.269	0.423	-		
1739	0.308	0.308	0.385	0.269	0.385	0.136	0.714	0.539	0.423	0.462	0.346	0.231	0.462	0.182	0.333	0.500	0.115	0.077	0.423	0.231	0.462	0.077	-	
1891	0.308	0.308	0.346	0.231	0.346	0.182	0.619	0.500	0.462	0.423	0.346	0.308	0.462	0.182	0.429	0.539	0.077	0.039	0.423	0.308	0.462	0.039	0.115	-

Table 107: Pauline Epistles Corpus: Comparison Counts

	Ath	$\mathfrak{P}^{46}$	ℵ	ℵ^{c}	A	B	C	D	F	G	K	L	P	044	049	33	104	223	876	1739	2423
Ath	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
$\mathfrak{P}^{46}$	126	126	126	126	114	114	86	126	87	87	107	126	123	126	74	126	126	121	126	126	120
ℵ	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
ℵ^{c}	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
A	155	114	155	155	155	128	106	155	106	116	135	154	151	155	86	155	154	150	155	155	135
B	141	114	141	141	128	141	99	141	104	114	119	140	137	141	99	141	140	136	141	141	135
C	118	86	118	118	106	99	118	118	89	99	99	118	116	118	80	118	118	118	118	118	103
D	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
F	119	87	119	119	106	104	89	119	119	119	99	118	115	119	87	119	118	119	119	119	99
G	129	87	129	129	116	114	99	129	119	129	109	128	125	129	97	129	128	129	129	129	109
K	146	107	146	146	135	119	99	146	99	109	146	145	142	146	80	146	145	141	146	146	126
L	167	126	167	167	154	140	118	167	118	128	145	167	163	167	98	167	167	162	167	167	147
P	164	123	164	164	151	137	116	164	11 5	125	142	163	164	164	96	164	163	159	164	164	144
044	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
049	99	74	99	99	86	99	80	99	87	97	80	98	96	99	99	99	98	99	99	99	94
33	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
104	167	126	167	167	154	140	118	167	118	128	145	167	163	167	98	167	167	162	167	167	147
223	163	121	163	163	150	136	118	163	119	129	141	162	159	163	99	163	162	163	163	163	143
876	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
1739	168	126	168	168	155	141	118	168	119	129	146	167	164	168	99	168	167	163	168	168	148
2423	148	120	148	148	135	135	103	148	99	109	126	147	144	148	94	148	147	143	148	148	148

Table 108: 1 Corinthians: Comparison Counts

	Ath	$\mathfrak{P}^{46}$	ℵ	ℵ^{c}	A	B	C	D	F	G	K	L	P	044	049	33	104	223	876	1739	2423
Ath	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
$\mathfrak{P}^{46}$	35	35	35	35	33	35	28	35	33	33	20	35	33	35	23	35	35	35	35	35	35
ℵ	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
ℵ^{c}	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
A	38	33	38	38	38	38	31	38	36	36	22	38	36	38	26	38	38	38	38	38	38
B	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
C	33	28	33	33	31	33	33	33	31	31	17	33	32	33	23	33	33	33	33	33	33
D	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
F	38	33	38	38	36	38	31	38	38	38	22	38	36	38	27	38	38	38	38	38	38
G	38	33	38	38	36	38	31	38	38	38	22	38	36	38	27	38	38	38	38	38	38
K	22	20	22	22	22	22	17	22	22	22	22	22	20	22	13	22	22	22	22	22	22
L	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
P	38	33	38	38	36	38	32	38	36	36	20	38	38	38	27	38	38	38	38	38	38
044	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
049	28	23	28	28	26	28	23	28	27	27	13	28	27	28	28	28	28	28	28	28	28
33	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
104	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
223	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
876	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
1739	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40
2423	40	35	40	40	38	40	33	40	38	38	22	40	38	40	28	40	40	40	40	40	40

Table 109: 2 Corinthians–Titus: Comparison Counts

	Ath	$\mathfrak{P}^{46}$	ℵ	ℵ^{c}	A	B	C	D	F	G	K	L	P	044	049	33	104	223	876	1739	2423
Ath	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
$\mathfrak{P}^{46}$	47	47	47	47	37	47	36	47	46	46	47	47	46	47	43	47	47	47	47	47	41
ℵ	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
ℵ^{c}	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
A	60	37	60	60	60	45	40	60	59	59	60	59	58	60	39	60	59	60	60	60	40
B	56	47	56	56	45	56	38	56	55	55	56	55	54	56	50	56	55	56	56	56	50
C	50	36	50	50	40	38	50	50	49	49	50	50	49	50	38	50	50	50	50	50	35
D	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
F	70	46	70	70	59	55	49	70	70	70	70	69	68	70	49	70	69	70	70	70	50
G	70	46	70	70	59	55	49	70	70	70	70	69	68	70	49	70	69	70	70	70	50
K	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
L	70	47	70	70	59	55	50	70	69	69	70	70	68	70	49	70	70	70	70	70	50
P	69	46	69	69	58	54	49	69	68	68	69	68	69	69	48	69	68	69	69	69	49
044	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
049	50	43	50	50	39	50	38	50	49	49	50	49	48	50	50	50	49	50	50	50	45
33	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
104	70	47	70	70	59	55	50	70	69	69	70	70	68	70	49	70	70	70	70	70	50
223	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
876	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
1739	71	47	71	71	60	56	50	71	70	70	71	70	69	71	50	71	70	71	71	71	51
2423	51	41	51	51	40	50	35	51	50	50	51	50	49	51	45	51	50	51	51	51	51

Table 110: Hebrews: Comparison Counts

	Ath	$\mathfrak{P}^{46}$	ℵ	ℵ^{c}	A	B	C	D	K	L	P	044	33	104	223	876	1739	2423
Ath	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
$\mathfrak{P}^{46}$	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
ℵ	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
ℵ^{c}	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
A	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
B	24	24	24	24	24	24	9	24	24	24	24	24	24	24	19	24	24	24
C	16	16	16	16	16	9	16	16	16	16	16	16	16	16	16	16	16	16
D	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
K	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
L	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
P	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
044	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
33	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
104	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
223	31	31	31	31	31	19	16	31	31	31	31	31	31	31	31	31	31	31
876	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
1739	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36
2423	36	36	36	36	36	24	16	36	36	36	36	36	36	36	31	36	36	36

Table 111: Catholic Epistles: Comparison Counts

	Ath	$\mathfrak{P}^{72}$	ℵ	A	B	C	L	044	049	33	105	201	323	325	1022	1424	1739	2423
Ath	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
$\mathfrak{P}^{72}$	6	6	6	6	6	4	6	6	6	6	6	6	6	6	6	6	6	6
ℵ	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
A	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
B	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
C	9	4	9	9	9	9	9	9	9	8	9	9	9	5	9	9	9	9
L	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
044	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
049	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
33	11	6	11	11	11	8	11	11	11	11	11	11	11	8	11	11	11	11
105	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
201	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
323	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
325	8	6	8	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8
1022	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
1424	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
1739	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12
2423	12	6	12	12	12	9	12	12	12	11	12	12	12	8	12	12	12	12

Table 112: Catholic Epistles: Dissimilarity (Simple Matching Distance)

	Ath	$\mathfrak{P}^{72}$	א	A	B	C	L	Ψ	049	33	105	201	323	325	1022	1424	1739	2423
Ath	-																	
$\mathfrak{P}^{72}$	0.667	-																
א	0.750	0.667	-															
A	0.583	0.333	0.417	-														
B	0.833	0.500	0.333	0.333	-													
C	0.556	0.750	0.556	0.778	0.667	-												
L	0.500	0.667	0.667	0.583	0.750	0.333	-											
Ψ	0.583	0.333	0.417	0.417	0.583	0.333	0.583	-										
049	0.667	0.667	0.667	0.667	0.750	0.333	0.167	0.583	-									
33	0.727	0.500	0.727	0.455	0.636	0.625	0.455	0.727	0.546	-								
105	0.500	0.667	0.667	0.583	0.750	0.333	0.000	0.583	0.167	0.455	-							
201	0.500	0.667	0.667	0.583	0.750	0.333	0.000	0.583	0.167	0.455	0.000	-						
323	0.667	0.500	0.667	0.500	0.500	0.333	0.333	0.583	0.333	0.273	0.333	0.333	-					
325	0.625	0.667	0.375	0.375	0.500	0.400	0.125	0.625	0.250	0.375	0.125	0.125	0.250	-				
1022	0.583	0.667	0.583	0.500	0.667	0.333	0.083	0.583	0.167	0.364	0.083	0.083	0.250	0.000	-			
1424	0.583	0.667	0.583	0.500	0.667	0.333	0.083	0.583	0.167	0.364	0.083	0.083	0.250	0.000	0.000	-		
1739	0.500	0.500	0.667	0.500	0.417	0.333	0.500	0.583	0.500	0.364	0.500	0.500	0.167	0.500	0.417	0.417	-	
2423	0.583	0.667	0.583	0.500	0.667	0.333	0.083	0.583	0.167	0.364	0.083	0.083	0.250	0.000	0.000	0.000	0.417	-

2
Source Data Matrices

Table 113: Acts: Source Data Matrices

Var#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ms	Acts.1.8.1	Acts.2.22.1	Acts.2.22.2	Acts.2.23.1	Acts.2.23.2	Acts.2.23.3	Acts.2.36.1	Acts.2.36.2	Acts.2.36.3	Acts.7.50.1	Acts.7.56.1	Acts.7.56.2	Acts.7.56.3	Acts.8.20.1	Acts.8.32.1	Acts.8.33.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P74	NA	NA	1	1	1	1	1	1	2	2	2	2	1	1	2	2
U1	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	2
A	1	1	1	1	1	1	1	1	2	2	1	1	2	1	2	2
B	2	2	1	1	1	1	1	1	1	1	3	1	1	1	1	2
C	2	2	1	1	1	1	2	1	2	2	1	1	2	1	2	1
D	3	3	1	2	1	1	2	3	2	2	2	1	1	1	NA	NA
E	1	1	2	2	2	1	1	2	2	2	2	1	2	1	2	1
H	1	1	3	2	2	1	1	2	2	1	2	1	1	1	2	1
L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	2	1
P	NA	1	3	2	2	1	1	2	2	2	2	1	1	1	1	1
U44	1	1	3	2	1	1	1	1	1	1	2	1	1	1	2	1
U49	1	1	3	2	2	1	1	2	2	1	2	1	1	2	2	1
M81	4	4	1	1	1	1	1	2	1	1	1	1	1	1	1	1
M383	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M614	1	1	3	2	2	2	1	2	2	1	2	2	1	2	2	1
M630	1	2	3	2	2	2	1	1	2	1	1	1	1	1	1	1
M945	2	2	3	2	1	2	1	1	2	1	1	1	1	1	1	1
M1073	1	1	3	2	2	1	2	2	1	2	2	1	1	1	2	1
M1175	2	2	1	2	1	2	1	1	2	1	1	1	2	1	2	1
M1352	1	1	3	2	2	2	1	2	2	2	2	1	1	1	1	1
M1704	1	2	3	2	1	2	1	1	2	1	1	1	1	1	1	1
M1739	2	2	1	1	1	2	1	1	2	1	1	1	1	1	1	2
M1891	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1

Acts (continued)

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Acts.8.34.1	Acts.8.34.2	Acts.10.38.1	Acts.13.22.1	Acts.13.22.2	Acts.13.23.1	Acts.13.23.2	Acts.13.32.1	Acts.14.15.1	Acts.14.15.2	Acts.14.15.3	Acts.14.15.4	Acts.14.15.5	Acts.14.15.6	Acts.14.17.1	Acts.14.17.2	Acts.14.17.3	Acts.14.17.4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	1	1	3	1	1	1	2	1	1	1	1	2	1	1
2	1	1	2	1	1	1	1	1	1	2	1	1	2	1	1	2	1
2	1	1	2	1	1	1	1	1	1	2	1	1	1	1	2	2	1
1	1	1	2	2	1	1	1	1	1	2	1	1	1	1	2	2	1
2	1	1	3	1	2	1	1	1	2	2	1	1	1	1	2	1	1
NA	NA	2	4	1	2	2	2	2	1	2	2	2	1	2	1	3	2
2	2	3	3	2	1	1	2	1	1	2	3	1	1	2	1	2	2
2	1	1	3	1	1	3	1	1	3	2	1	2	2	1	1	1	3
2	1	3	3	1	1	3	1	1	1	2	1	2	2	1	1	4	2
2	1	1	3	1	1	1	1	1	1	2	1	2	2	1	1	1	2
2	2	1	3	1	1	1	1	1	2	1	4	1	1	1	1	1	1
2	1	1	3	1	1	3	1	2	1	2	1	2	2	1	1	1	2
2	1	1	3	1	1	1	1	1	1	2	1	1	1	1	2	1	1
NA	NA	NA	3	1	1	4	1	1	2	2	1	2	2	1	1	1	2
2	1	1	3	1	2	1	1	1	2	1	4	2	2	1	1	1	2
2	1	1	3	1	2	1	1	1	1	2	1	1	1	1	1	1	1
2	1	1	3	1	2	1	1	1	1	2	1	1	1	1	2	1	1
2	1	1	3	1	1	3	1	1	1	2	1	2	2	1	1	1	2
2	1	1	2	1	1	1	1	2	2	2	1	1	1	1	2	1	1
2	1	1	3	1	1	3	1	1	1	2	1	2	2	1	1	1	2
2	1	1	3	1	2	1	1	1	1	2	1	1	1	1	2	1	1
2	1	1	3	1	3	1	1	1	2	2	1	1	1	1	2	1	1
2	1	1	3	1	2	1	1	1	1	2	1	1	1	1	2	5	1

Acts (continued)

35	36	37	38	39	40	41	42	43	44	45
Acts.14.17.5	Acts.14.17.6	Acts.17.28.1	Acts.17.30.1	Acts.17.30.2	Acts.17.31.1	Acts.25.16.1	Acts.25.16.2	Acts.25.16.3	Acts.25.16.4	Acts.25.16.5
1	1	1	1	1	1	1	1	1	1	1
2	2	1	1	1	1	1	1	1	1	2
1	2	1	2	1	1	1	1	2	1	1
2	2	1	1	1	1	1	1	1	1	1
1	1	1	2	1	1	1	1	1	2	1
1	1	NA	NA	NA	NA	2	1	1	1	2
1	1	2	1	2	1	NA	NA	NA	NA	NA
1	1	1	1	1	1	1	1	1	2	2
1	1	1	1	3	2	1	2	1	1	1
1	1	1	1	3	2	1	2	1	1	1
1	1	1	1	3	1	1	2	1	1	1
2	2	1	1	3	1	1	1	1	1	1
1	1	1	1	3	2	1	2	1	1	1
2	2	NA	NA	NA	NA	1	1	1	1	1
1	2	2	1	3	1	NA	NA	NA	NA	NA
1	1	3	1	3	1	1	2	3	2	1
1	2	1	1	3	1	2	1	1	1	1
1	2	1	1	3	1	2	1	1	1	1
1	1	1	1	3	2	1	2	1	1	1
1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	3	2	1	2	3	1	1
1	2	1	1	3	1	2	1	1	1	1
1	2	1	1	3	1	2	1	1	1	1
1	2	1	1	3	1	2	1	1	1	1

Table 114: Pauline Epistles: Source Data Matrices

Var#	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
Ms	Rom.1.19.1	Rom.1.19.2	Rom.1.21.1	Rom.1.24.1	Rom.1.26.1	Rom.1.27.1	Rom.1.27.2	Rom.1.27.3	Rom.1.27.4	Rom.1.27.5	Rom.3.29.1	Rom.3.30.1	Rom.6.18.1	Rom.8.22.1	Rom.8.28.1	Rom.8.28.2	Rom.9.32.1	Rom.10.20.1	Rom.10.20.2	Rom.12.4.1	Rom.15.19.1	1Cor.1.4.1	1Cor.1.23.1	1Cor.1.24.1	1Cor.2.4.1	1Cor.2.9.1	1Cor.3.16.1	1Cor.3.16.2	1Cor.3.20.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	1	2	1	1	2	1	2	NA	NA	1	2	1	1	1	2
U1	1	1	1	2	1	2	1	1	2	1	1	2	3	1	2	2	1	1	1	1	2	2	1	2	4	1	1	1	2
U1C	1	1	1	2	1	2	1	1	2	1	1	1	2	1	2	2	2	1	1	1	2	1	1	2	3	1	1	1	2
A	1	1	1	2	1	1	1	1	2	1	1	2	2	1	1	2	1	1	1	2	2	1	1	2	3	2	1	1	2
B	1	1	1	2	1	2	2	2	1	2	1	2	2	2	1	2	2	2	2	1	2	2	1	2	4	2	1	2	2
C	1	1	1	2	1	3	1	1	1	1	1	2	3	1	2	2	NA	1	1	NA	2	1	1	2	3	2	1	1	2
D	2	1	2	1	2	1	2	2	1	1	1	1	2	2	2	2	1	2	2	1	4	1	1	2	4	1	1	1	2
F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	1	2	2	2	2	1	1	2	1	4	1	1	2	2	1	NA	1	2
G	2	1	2	1	2	1	2	2	1	1	2	1	2	2	2	2	1	1	2	1	4	1	1	2	2	1	NA	1	2
K	1	2	1	1	1	2	1	2	1	2	1	3	2	1	2	2	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
L	1	2	1	1	1	2	1	2	1	1	3	1	2	1	2	1	2	1	1	2	3	1	1	2	3	1	1	1	2
P	1	2	1	1	1	1	1	2	1	1	3	1	2	1	2	2	2	1	1	2	2	1	1	2	3	1	1	2	2
U44	1	1	1	1	1	1	1	2	1	1	3	1	2	1	2	2	2	1	1	2	2	1	1	2	3	1	1	1	2
U49	1	2	1	1	1	3	1	2	1	1	3	1	2	1	2	1	2	1	1	2	2	1	2	2	3	1	1	1	2
M33	1	1	1	2	1	1	1	1	2	1	3	1	2	2	2	2	2	1	1	2	2	1	1	2	4	1	1	2	1
M104	1	2	1	2	1	1	1	2	1	2	1	1	2	2	2	2	2	1	1	2	2	1	1	2	3	1	2	1	2
M223	1	1	1	1	1	3	1	2	1	1	3	1	2	1	2	2	2	1	1	2	2	1	2	2	5	1	1	1	2
M876	1	2	1	1	1	3	1	2	1	1	3	1	2	1	2	2	2	1	1	2	2	1	2	2	3	1	2	1	1
M1739	1	1	1	2	1	1	2	1	2	1	1	2	2	1	2	2	2	1	1	2	2	1	2	2	4	1	1	2	2
M2423	1	1	1	1	1	2	2	2	1	1	3	1	2	1	2	2	2	1	1	2	2	1	2	2	3	1	1	1	2

Pauline Epistles (continued)

Var#	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
Ms	1Cor.4.6.1	1Cor.4.6.2	1Cor.4.6.3	1Cor.4.6.4	1Cor.4.6.5	1Cor.5.4.1	1Cor.5.7.1	1Cor.5.13.1	1Cor.6.10.1	1Cor.8.6.1	1Cor.8.8.1	1Cor.9.16.1	1Cor.9.16.2	1Cor.9.22.1	1Cor.10.13.1	1Cor.11.2.1	1Cor.11.2.2	1Cor.11.3.1	1Cor.12.26.1	1Cor.14.33.1	1Cor.15.10.1	1Cor.15.22.1	1Cor.15.33.1	1Cor.15.45.1	1Cor.15.47.1	1Cor.15.48.1	1Cor.15.53.1	1Cor.15.54.1	1Cor.15.55.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	2	1	1	1	2	2	NA	2	1	1	1	1	1	2	1	1	2	2	2	2	2	1	1	1	2	2	1	1	2
U1	3	1	1	1	2	3	1	1	1	2	1	1	1	2	1	1	2	1	2	3	3	1	1	1	1	1	1	2	2
U1C	2	1	1	2	2	3	2	1	1	1	2	2	1	4	1	1	2	1	2	3	1	1	1	1	3	1	1	4	3
A	NA	NA	1	1	2	3	1	1	1	1	1	1	1	2	1	1	2	1	2	4	1	1	1	1	3	1	2	3	3
B	2	1	1	1	2	3	1	1	1	2	1	1	2	2	1	1	2	1	2	3	3	1	1	2	1	1	2	4	2
C	2	1	1	1	2	NA	1	1	1	NA	NA	1	2	4	1	1	4	2	2	NA	NA	NA	NA	1	1	1	2	1	2
D	2	1	2	1	3	3	3	1	1	1	2	1	2	3	2	2	3	1	2	3	3	1	1	1	1	2	2	4	4
F	2	2	2	1	4	1	1	1	NA	1	3	1	2	3	2	2	3	2	2	2	3	1	1	1	1	2	3	5	4
G	2	2	2	1	4	1	1	1	NA	1	3	1	2	3	2	2	3	2	2	2	3	1	1	1	1	2	3	5	4
K	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	2	1	4	1	2	2	2	1	3	1	2	1	2	3	1	2	4	3
L	2	1	2	2	2	1	2	3	1	1	2	2	1	4	1	2	2	2	1	3	1	1	1	1	3	1	2	4	3
P	2	1	1	2	2	2	2	1	1	1	2	1	1	4	1	1	2	2	NA	NA	1	1	1	1	3	1	2	4	3
U44	2	1	1	1	2	2	2	1	1	1	2	2	1	3	1	2	2	2	1	3	1	1	1	1	3	1	2	4	3
U49	3	1	2	2	2	1	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	1	1	1	1	3	1	2	4	3
M33	2	1	1	2	2	4	1	1	1	1	1	1	1	4	1	2	2	1	2	3	1	1	1	1	1	1	2	6	1
M104	2	1	1	2	2	1	2	1	1	1	2	2	1	4	1	2	2	2	1	3	1	2	1	1	3	1	2	4	3
M223	2	1	2	2	2	1	2	3	2	1	2	2	1	4	1	2	2	2	1	3	1	1	2	1	3	1	2	4	3
M876	3	2	2	2	2	1	2	3	2	1	2	2	1	4	1	2	2	2	1	3	1	1	2	1	3	1	2	4	3
M1739	2	1	1	1	2	4	1	2	1	1	1	1	1	2	1	1	2	2	1	3	3	2	2	1	1	1	2	1	2
M2423	2	1	2	1	5	1	2	3	2	1	2	2	1	4	1	2	2	2	1	3	1	1	2	1	3	1	2	4	3

Pauline Epistles (continued)

Var#	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
Ms	1Cor.16.22.1	1Cor.16.23.1	1Cor.16.23.2	2Cor.1.10.1	2Cor.2.15.1	2Cor.4.11.1	2Cor.5.10.1	2Cor.5.10.2	2Cor.5.10.3	2Cor.5.14.1	2Cor.5.14.2	2Cor.5.14.3	2Cor.5.15.1	2Cor.5.17.1	2Cor.5.18.1	2Cor.5.21.1	2Cor.11.3.1	Gal.1.8.1	Gal.1.8.2	Gal.4.6.1	Gal.4.8.1	Eph.1.3.1	Eph.1.11.1	Eph.2.15.1	Eph.2.15.2	Eph.3.15.1	Eph.3.18.1	Eph.3.19.1	Eph.3.19.2
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	1	NA	NA	1	2	2	2	2	2	NA	2	3	3	2	1	1	1	NA	NA	1	1	2	1	2	2	1	1	1	2
U1	1	2	2	1	2	1	3	2	1	1	2	2	1	2	1	1	1	3	2	1	1	2	1	2	1	1	2	1	1
U1C	2	2	1	1	2	1	3	2	1	1	1	1	1	2	1	2	2	4	2	1	1	2	1	1	1	1	2	1	1
A	1	1	1	2	2	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	2	1	1	2	2	2	1	1	2	1	1
B	1	2	2	1	2	1	3	2	2	1	2	1	1	2	1	1	1	5	2	2	1	2	1	2	1	1	1	1	2
C	1	2	1	1	2	1	3	2	1	1	1	1	1	2	1	1	NA	NA	NA	1	1	NA	NA	NA	NA	1	1	1	1
D	2	2	1	2	2	1	4	1	2	1	2	1	1	2	2	1	3	6	3	1	1	2	2	1	1	1	1	2	1
F	2	2	1	3	2	2	4	1	2	1	2	1	2	2	2	1	4	2	5	1	2	2	3	2	2	1	1	2	1
G	2	2	1	3	2	2	4	1	2	1	2	1	2	2	2	1	1	2	3	1	2	2	2	1	2	1	1	2	1
K	3	2	1	3	1	1	3	2	2	1	2	1	1	3	1	2	2	7	2	1	3	1	1	1	3	1	2	1	1
L	2	1	1	3	2	1	5	3	2	1	2	1	1	3	1	2	2	8	2	1	2	2	1	1	1	1	2	1	1
P	3	1	1	1	NA	1	3	2	2	2	2	1	1	3	1	2	2	7	2	1	1	2	1	2	1	2	1	1	1
U44	2	2	1	2	2	3	3	4	2	1	2	3	3	3	1	2	2	2	2	1	2	2	1	1	1	1	2	1	1
U49	2	2	1	3	2	1	3	2	2	1	2	3	3	3	1	2	2	7	2	1	2	NA	NA	1	1	1	2	1	1
M33	1	1	2	1	2	3	3	2	1	2	2	1	1	1	1	1	1	7	2	1	1	2	1	2	1	1	1	1	2
M104	2	2	1	3	2	1	3	2	2	1	1	1	1	3	1	2	1	4	2	1	1	2	1	2	1	2	2	1	1
M223	3	1	1	3	2	1	3	2	2	1	1	1	1	1	1	2	2	7	2	1	2	3	1	1	1	1	2	1	1
M876	2	2	1	3	2	1	3	2	2	1	1	1	1	2	1	2	2	8	2	1	2	3	1	1	1	1	2	1	1
M1739	1	2	1	3	2	1	3	2	1	1	1	1	1	2	3	1	2	5	4	2	1	2	1	2	1	1	2	1	1
M2423	2	2	1	3	2	1	3	2	2	1	1	1	1	2	1	2	2	8	2	NA	NA	3	NA	NA	NA	1	2	1	1

Pauline Epistles (continued)

Var#	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116
Ms	Eph.4.9.1	Eph.4.24.1	Eph.4.24.2	Eph.4.26.1	Eph.5.19.1	Eph.6.12.1	Phil.1.17.1	Phil.2.5.1	Phil.2.5.2	Phil.2.6.1	Phil.2.8.1	Phil.2.9.1	Phil.2.10.1	Phil.2.11.1	Phil.3.13.1	Phil.3.14.1	Col.1.12.1	Col.1.12.2	Col.1.14.1	Col.1.16.1	Col.1.16.2	Col.1.17.1	Col.1.18.1	Col.1.18.2	Col.1.18.3	Col.1.18.4	Col.2.3.1	1Thess.3.11.1	1Thess.5.18.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	2	2	1	NA	2	1	NA	2	2	2	1	2	1	1	1	1	2	1	NA	3	2	2	2	2	2	1	2	NA	NA
U1	1	1	1	2	1	1	2	1	2	1	1	2	2	1	1	1	3	1	1	3	2	1	1	1	2	1	2	2	1
U1C	1	2	1	1	1	2	1	2	2	1	1	2	1	1	1	1	3	1	1	2	1	1	1	1	1	1	3	2	1
A	1	2	1	2	1	1	1	1	2	1	1	2	1	2	1	1	4	1	1	2	1	1	1	1	1	2	3	2	2
B	1	2	1	2	2	1	2	1	2	1	1	2	1	1	1	1	2	3	1	3	2	1	1	2	1	1	2	2	1
C	1	NA	NA	NA	NA	NA	NA	1	2	1	1	2	1	2	NA	NA	4	1	1	1	1	1	1	1	1	1	2	NA	NA
D	2	2	2	1	1	1	1	2	2	1	2	1	1	2	2	2	4	2	2	3	1	4	1	1	1	1	2	3	2
F	2	2	2	1	1	1	2	2	2	2	2	1	1	2	2	2	5	2	1	3	1	3	2	1	1	1	NA	4	2
G	2	2	2	1	1	1	2	2	2	2	2	1	1	2	2	2	5	2	1	3	1	3	2	1	1	1	NA	4	2
K	1	2	1	1	1	2	1	2	1	1	1	1	1	2	1	2	4	1	1	4	1	1	1	1	1	1	3	4	1
L	1	2	1	1	1	2	NA	2	1	1	1	1	1	2	1	2	4	1	1	2	1	1	1	1	1	1	3	4	1
P	1	2	1	1	1	2	1	2	1	1	1	1	1	2	1	2	4	1	1	2	1	1	1	1	1	1	3	NA	1
U44	1	2	1	1	1	2	2	1	1	1	1	1	1	2	1	1	4	1	1	3	2	1	1	1	1	1	2	2	1
U49	1	2	1	1	1	2	1	2	1	1	1	1	1	2	NA	NA	4	1	1	2	1	1	1	1	1	1	3	4	NA
M33	1	2	1	1	1	1	1	1	2	1	1	2	1	2	1	1	4	2	1	3	2	4	1	3	1	2	2	2	1
M104	1	2	1	1	1	2	NA	2	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	2	1	1	3	4	1
M223	1	2	1	1	1	2	1	2	1	1	1	1	1	1	1	2	1	1	3	2	1	1	1	1	1	1	2	4	1
M876	1	2	1	1	1	2	1	2	1	1	1	1	2	2	1	2	4	1	3	2	1	1	1	1	1	1	3	4	1
M1739	1	2	1	2	1	1	2	2	2	1	1	2	1	1	1	1	4	1	1	3	2	1	1	2	1	1	2	2	1
M2423	NA	2	1	1	1	2	1	2	1	1	1	1	1	1	1	2	4	1	3	2	1	1	1	1	1	1	2	4	1

Pauline Epistles (continued)

Var#	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
Ms	1Thess.5.18.2	1Tim.1.8.1	1Tim.3.2.1	1Tim.6.13.1	2Tim.1.8.1	2Tim.1.10.1	2Tim.1.10.2	2Tim.2.13.1	2Tim.2.14.1	2Tim.2.14.2	2Tim.2.17.1	2Tim.2.18.1	2Tim.3.12.1	2Tim.4.6.1	2Tim.4.8.1	Titus.2.8.1	Heb.1.2.1	Heb.1.3.1	Heb.1.3.2	Heb.1.3.3	Heb.1.4.1	Heb.1.12.1	Heb.1.12.2	Heb.1.12.3	Heb.1.14.1	Heb.2.1.1	Heb.2.2.1	Heb.2.14.1	Heb.2.17.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	2	2	1	2	1	2	1	2	1	1	1	1
U1	2	1	2	2	2	2	2	1	1	1	1	2	2	1	1	1	1	3	2	1	1	2	2	1	2	2	1	1	1
U1C	1	1	2	2	2	1	2	2	2	3	1	2	2	1	1	1	1	3	1	1	1	3	2	1	2	2	1	1	1
A	2	2	2	1	2	2	2	1	1	2	1	1	2	1	1	1	1	3	2	1	1	1	2	1	2	1	1	1	2
B	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	3	2	1	2	1	2	1	2	1	1	1	1
C	NA	NA	NA	NA	1	1	2	1	1	2	1	1	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	1
D	1	1	2	1	2	2	1	1	2	1	2	1	1	2	2	1	1	5	2	1	1	2	3	1	2	1	1	1	1
F	1	1	2	1	2	1	2	1	3	1	2	2	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G	1	1	2	1	2	1	2	1	3	1	2	2	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
K	1	1	1	2	1	1	2	2	2	1	1	1	1	2	1	2	2	4	3	1	1	1	1	1	2	3	1	2	1
L	1	1	1	2	2	1	2	1	2	1	1	1	1	2	1	2	2	4	3	1	1	1	1	1	2	3	1	2	1
P	1	2	1	1	2	1	2	1	1	1	1	1	2	1	1	1	2	3	2	1	1	1	1	1	2	3	1	1	1
U44	1	1	1	1	1	1	2	2	2	1	1	1	1	2	1	2	2	3	4	1	1	1	1	1	2	6	2	2	2
U49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M33	1	1	2	1	2	1	2	1	1	1	1	2	2	1	1	1	1	3	1	1	1	1	1	2	2	4	2	1	2
M104	1	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	1	3	3	1	1	1	1	2	1	3	1	2	1
M223	1	1	1	2	1	1	2	2	2	1	1	1	1	2	1	2	NA	NA	NA	NA	NA	1	1	1	2	3	1	2	1
M876	1	1	1	2	1	1	2	2	2	1	1	1	1	2	1	1	2	1	3	2	1	1	1	1	2	5	1	2	1
M1739	1	1	1	1	1	1	2	1	2	1	1	1	2	1	2	1	2	4	2	1	1	1	2	1	2	7	1	1	1
M2423	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	4	3	2	1	1	1	1	2	3	1	2	1

Pauline Epistles (continued)

Var#	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
Ms	Heb.3.1.1	Heb.4.12.1	Heb.4.12.2	Heb.7.19.1	Heb.7.22.1	Heb.7.22.2	Heb.7.22.3	Heb.8.6.1	Heb.8.6.2	Heb.8.6.3	Heb.8.6.4	Heb.9.23.1	Heb.9.24.1	Heb.11.3.1	Heb.11.32.1	Heb.11.32.2	Heb.11.32.3	Heb.11.38.1	Heb.12.18.1	Heb.12.18.2	Heb.12.23.1	Heb.13.6.1	Heb.13.8.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P46	1	1	1	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2	1	2	2
U1	1	1	2	1	2	2	2	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	2
U1C	1	1	1	1	1	1	2	1	3	2	1	1	1	1	1	1	1	1	2	3	1	2	2
A	1	1	1	1	2	1	2	1	2	1	1	1	2	1	1	1	1	1	2	1	1	2	2
B	1	1	1	1	2	2	2	2	3	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	1	2	1	1	2	2	2	NA	NA	NA	NA	1	1	NA	NA	NA	NA	NA	2	1	1	1	2
D	1	2	3	2	2	1	2	2	2	1	2	2	2	1	3	2	2	2	1	1	1	2	2
F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
K	2	1	3	1	1	1	2	1	2	2	2	1	1	2	2	2	2	2	1	4	2	2	1
L	2	1	1	1	1	1	1	1	2	1	1	1	1	2	2	2	2	2	1	3	1	2	1
P	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	2	2	1	1	1	1	1	1
U44	2	1	1	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	1	2	1	2	1
U49	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
M33	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2
M104	2	1	1	1	1	1	2	1	1	1	1	1	1	2	2	2	1	2	1	1	1	2	1
M223	2	1	3	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	1	3	2	2	1
M876	2	1	3	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	1	3	2	2	1
M1739	1	1	1	2	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1	3	1	1	2
M2423	2	1	3	1	1	1	2	1	3	1	1	1	1	2	2	2	2	2	1	3	2	2	1

Table 115: Catholic Epistles: Source Data Matrices

Var#	1	2	3	4	5	6	7	8	9	10	11	12
Ms	Jam.1.12.1	Jam.1.12.2	Jam.1.17.1	Jam.1.20.1	1Pet.3.18.1	1Pet.4.1.1	1Pet.4.19.1	1Pet.4.19.2	1Pet.5.8.1	2Pet.1.17.1	1In.3.5.1	1In.5.20.1
Ath	1	1	1	1	1	1	1	1	1	1	1	1
P72	NA	NA	NA	NA	1	3	1	2	2	3	NA	NA
U1	2	2	2	2	2	2	1	2	1	2	1	2
A	2	2	1	2	1	1	1	2	1	3	2	2
B	2	2	2	2	2	3	1	3	1	3	2	2
C	3	3	1	1	2	3	NA	NA	1	2	1	NA
L	3	4	1	1	2	1	2	2	1	3	1	1
U44	3	2	1	2	1	3	1	2	1	2	1	3
U49	3	4	1	1	2	4	2	2	1	3	1	4
M33	3	1	1	NA	2	1	3	2	2	3	2	2
M105	3	4	1	1	2	1	2	2	1	3	1	1
M201	3	4	1	1	2	1	2	2	1	3	1	1
M323	3	1	1	1	2	3	2	2	1	3	2	2
M325	NA	NA	NA	NA	2	1	2	2	1	3	1	2
M1022	3	4	1	1	2	1	2	2	1	3	1	2
M1424	3	4	1	1	2	1	2	2	1	3	1	2
M1739	3	1	1	1	2	3	1	1	1	3	2	2
M2423	3	4	1	1	2	1	2	2	1	3	1	2

3
Scripts

PYTHON SCRIPT:

The Python script *MssCompare.py* reproduced below is used to calculate Percentage Agreement matrices and Dissimilarity matrices from the source data displayed in Appendix C. It is also used to calculate Comparison Count matrices which are used to calculate error margins associated with the Percentage agreement matrices. The Python script is run from within a Python interpreter. The Python source files are open source and freely available for all major computing platforms. The required source files for the latest version of Python can be freely downloaded from the Python website: www.python.org.[1] Once Python is installed the script can be called and processed using the appropriate switches to calculate whichever matrix is required.

The option switches are:
Options:

--version	show program's version number and exit
-h,	--help show this help message and exit
-A,	--percent-agreement,--agreement-percent, --percentage-agreement, --agreement percentage
-a,	--count-agreement, --agreement-count
-c,	--comparison-count, --count-comparison
-l,	--lacuna-count, --count-lacuna
-D,	--dissimilarity-simple_distance, --dissimilarity
-d,	--count-disagreement, --disagreement-count
-T,	--total-weight
-U,	--unweighted
-W,	--weighted. Weight output for each comparison based on the number of other comparisons which were the opposite

To use Python:

Start the Python interpreter (*Python.exe* file) (It will open in its own window): To do so double click the Python program icon which is available after Python has been installed.

Run the Python script. For example to calculate a Percentage Agreement matrix the following command is typed at the Python command prompt (C:\...\Python>):

[1] The relevant Python tutorial manuals may also be accessed on the Python website: www.python.org

msscompare.py –A *SourceDatafile.csv>OutputFileName.csv*

where *SourceDatafile.csv* is the appropriate name of the source data file (.csv file) and *OutputFileName.csv* is an appropriate identification name for the Percentage Agreement matrix (.csv file) that will be produced. The above command syntax assumes that the script and source data files are located in the same folder as the *Python.exe* program. If the script or source data files are located elsewhere then the full path to these files must be specified.To produce a dissimilarity matrix the following command (with appropriate switch) is required:

msscompare.py –D *SourceDatafile.csv>OutputFileName.csv*

To produce a Comparison Count matrix the following command (with appropriate switch) is required:

msscompare.py –c *SourceDatafile.csv>OutputFileName.csv*

The .csv source file processed by the Python interpreter requires the data to be provided in the following format (typical view):

Ath	P46	U1	U1C	A	B	C	D	F
1	NA	1	1	1	1	1	2	NA
1	NA	1	1	1	1	1	1	NA
1	NA	1	1	1	1	1	2	NA
1	NA	2	2	2	2	2	1	NA
1	NA	1	1	1	1	1	2	NA
1	NA	2	2	1	2	3	1	NA
1	NA	1	1	1	2	1	2	NA
1	NA	1	1	1	2	1	2	NA
1	NA	2	2	2	1	1	1	NA
1	NA	1	1	1	2	1	1	NA
1	NA	1	1	1	1	1	1	2
1	NA	2	1	2	2	2	1	1
1	NA	3	2	2	2	3	2	2
1	2	1	1	1	2	1	2	2
1	1	2	2	1	1	2	2	2
1	2	2	2	2	2	2	2	2
1	1	1	2	1	2	NA	1	1
1	1	1	1	1	2	1	2	1
1	2	1	1	1	2	1	2	2

That is, the first row lists the names of the witnesses and the data is listed in columns below each witness. As such the data is transposed relative to the source

files displayed in Chapter 2.[2] All other extraneous data is removed from the .csv source file such as column labels, Scripture references, variation unit numbers, etc. The Python script will fail if any witness is completely lacunose (NA) in the section of text covered by the respective file. This is the case for F G and 049 in Hebrews. Therefore the columns for these witnesses must be removed prior to running the script on the Hebrews source data file.[3]

Python script: *MssCompare.py*

```
#!/usr/bin/python
# Calculates Percentage Agreement and Dissimilarity
matrices.
# Design: G.J. Donker
# Programming: G. Baker
# 2008-08-08
import fileinput
import csv
import optparse
import string

option _ parser = optparse.OptionParser(
 version="$Id",
 description="This program takes an argument of a
CSV file with document alternatives as grid data,
and outputs a CSV of comparison ratings",
 usage="usage: %prog filename"
 )

option _ parser.add _ option("--percent-agreement","--
agreement-percent","-A",
"--percentage-agreement","--agreement-percentage",
dest="output",
action="store _ const",
const="agreement _ percent",
#help="print out percentage of agreement"
default="agreement _ percent")
option _ parser.add _ option("--count-agreement","--
agreement-count","-a",
dest="output",
action="store _ const",
```

[2] A transpose function is provided in most spreadsheet programs.

[3] This is also the case for ms 383 in Acts 1-12. Therefore this witness is removed from the matrix prior to running the script on the Acts 1-12 source data file. The .csv source files are available in the folder: *SourceData* and the transposed .csv source files are located within the sub-folder: *Transposed Source Data Files*.

```
const="agreement _ count")

option _ parser.add _ option("--comparison-count","--
count-comparison","-c",
 dest="output",
 action="store _ const",
 const="comparison _ count")

option _ parser.add _ option("--lacuna-count","--count-
lacuna","-l",
 dest="output",
 action="store _ const",
 const="lacuna _ count")

option _ parser.add _ option("--dissimilarity-
simple _ distance","--dissimilarity",
 "-D",
 dest="output",
 action="store _ const",
 const="dissimilarity")

option _ parser.add _ option("--count-disagreement","--
disagreement-count","-d",
 dest="output",
 action="store _ const",
 const="disagreement _ count")

option _ parser.add _ option("--total-weight","-T",
 dest="output",
 action="store _ const",
 const="total _ weight")

option _ parser.add _ option("--unweighted","-U",
 dest="weighting",
 action="store _ false")

option _ parser.add _ option("--weighted","-W",
 dest="weighting",
 action="store _ true",
 default=False,
 help="weight output for each comparison based on
the number of other comparisons which were the
opposite ")
```

```
(options,args) = option _ parser.parse _ args()

if options.output == 'total _ weight': options.weight-
ing = True

class DocumentComparison:
 def _ _ init _ _ (self,author1=None,author2=None):
 # I should add a method for doing the comparison
of fragments.
 self.agreements = 0
 self.differences = 0
 self.lacuna = 0
 self.author1=author1
 self.author2=author2
 def add(self,fragment1,fragment2,agreemen
t _ weight=1,disagreement _ weight=1,reference=None):
 if fragment1 is None or fragment1 == "NA" or frag-
ment1 == "N/A":
 self.lacuna = self.lacuna + 1
 return None
 if fragment2 is None or fragment2 == "NA" or frag-
ment2 == "N/A":
 self.lacuna = self.lacuna + 1
 return None
 if fragment1 == fragment2:
 self.agreements = self.agreements +
agreement _ weight
 return True
 self.differences = self.differences +
disagreement _ weight
 return False
 def agreement _ percent(self):
 return "%.4f" % (100.0 * self.agreements / (self.
agreements + self.differences))
 def agreement _ count(self):
 return `self.agreements`
 def comparison _ count(self):
 return `self.agreements + self.differences`
 def lacuna _ count(self):
 return `self.lacuna`
 def disagreement _ count(self):
 return `self.differences`
```

```
 def dissimilarity(self):
 return "%.4f" % (1.0 * self.differences / (self.
agreements + self.differences))
 def total _ weight(self):
 return `self.agreements + self.differences + self.
lacuna`

for file in args:
 f = open(file)
 c = csv.reader(f)
 headers = c.next()
 reader = csv.DictReader(f,headers)
 analysis = {}
 weighted _ analysis = {}
 author _ pairs = [ (author1,author2) for author1 in
headers for author2 in headers ]

 for author1 in headers:
 analysis[author1] = {}
 weighted _ analysis[author1] = {}
 for (author1,author2) in author _ pairs:
 analysis[author1][author2] = DocumentComparison(auth
or1,author2)
 weighted _ analysis[author1][author2] = DocumentCompa
rison(author1,author2)
 for row in reader:
 if [ 1 for author in headers if row[author].strip()
!= '' ] == []:
 continue
 weights = { True : 0, False : 0, None : 0 }
 for (author1,author2) in author _ pairs:
 x = analysis[author1][author2].
add(row[author1],row[author2])
 weights[x] = weights.get(x,0) + 1
 #print weights[False],weights[True],weights[None]

 for (author1,author2) in author _ pairs:
 weighted _ analysis[author1][author2].add(row[author1],
row[author2],weights[False],weights[True])

 print string.join(["/"]+headers,",")
 if options.weighting:
 a = weighted _ analysis
```

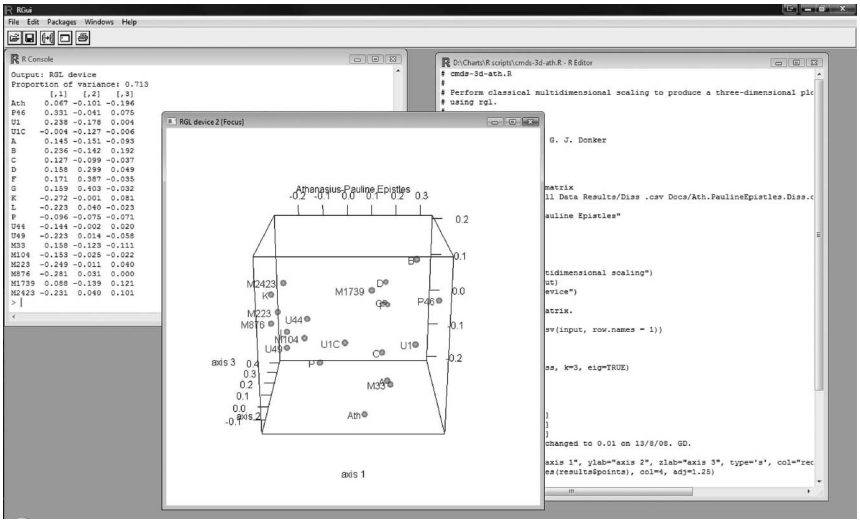
```
 else:
 a = analysis

 for author1 in headers:
 func = DocumentComparison. _ _ dict _ _ [options.
output]
 print string.join([author1]+[func(a[author1][author2])
for author2 in headers],",")
```

***R* SCRIPTS:**

The *R* scripts reproduced below are used to calculate critical values of dissimilarity (*montecarlo.r*), 2D MDS maps (*cmds-ath-2d.r*), 3D MDS maps (*cmds-ath-3d.r*) and dendrograms and optimal cluster maps (*cluster.r*). The *R* scripts are run from within the *R* Graphics User Interface (GIU). The *R* program source files are open source and freely available for all major computing platforms.[4] Once *R* is installed the script can be called and processed using the appropriate switches to calculate whichever matrix is required.

To use *R*: Start the R GUI (*R.exe* file) (It will open in its own window): To do so double click the *R* program icon which is available after *R* has been installed. The window appears as below.[5]



[4] The latest version *R* installation source files and Tutorial manuals may be freely accessed on the *R* website; http://www.r-project.org/

[5] This window is as the GUI appears on a Windows™ platform.

When the GUI first opens, only the *R* 'console' window will be visible. First load the required extra libraries, *rgl* and *exactRankTests*. They can be installed automatically by clicking on the 'Packages' drop down menu item listed on the top bar of the main window.[6] Then select-click the 'Install package(s)...' sub-menu item (ensure internet access is enabled when selecting this menu item). Select the most appropriate CRAN mirror site and then click OK. A list of available packages will open in a new window. Look for *rgl*, select it and click OK. Do the same for *exactRankTests*.

Once installed these packages will need to be loaded (this is only required the first time these packages are used). Click again on the 'Packages' drop down menu item listed on the top bar of the main window. Then select the 'Load package...' option. Look for *rgl*, select it and click OK. Do the same for *exactRankTests*. Once loaded they can be used again any time without loading again. To use the *R* scripts provided on the SBL website, copy all the files on the website with an equivalent folder structure onto the C drive of your computer. The new folder structure should have a top level folder located on the C:/ drive with the name 'mva' (=**m**ulti**v**ariate **a**nalysis) (i.e., C:/mva/DissMatrices/...; C:/mva/SourceData/...; etc.). Ensure that you have read and write access to these folders so that the *R* scripts can be called from within the *R* GUI.

The scripts have been set up to look for the source files in the appropriate folder under the 'mva' top level folder if installed on the 'C' drive, without requiring editing of source file location. If the file/folder structure was installed elsewhere (for example on another drive other than 'C', then it is still possible to use the scripts but they will need to be edited before running to point them to the correct location of the source files. This is however easily done. If the file structure has been copied unmodified onto the 'C' drive then the scripts can be run 'as is'. Simply select the 'File' menu item on the top bar of the *R* main window (first ensure the *R* Console window has the focus) and then select 'Source R code...'. Locate the script you wish to run (most likely one of the preset 3D MDS map scripts; e.g. *cmds-PaulineEpistles-3d.r*) and either double click the appropriate script or select the script and then click 'Open'.

In the case of the MDS map scripts, the output will be presented in a new window. This window can then be resized as required using common window modifying operations. To dynamically manipulate the 3D map; zoom the view in or out by clicking in the view and using the scroll wheel on a wheel mouse or right clicking and dragging left or right, up or down. To rotate the view, click with the left mouse button and drag in any desired direction. In this way it is possible to view the map from any desired viewpoint to observe the location of witnesses relative to each other. The scripts for the MDS maps also output axis coordinates for all the witnesses. These can be seen in the *R* Console window. They can be copied if desired and used elsewhere.

[6] For Windows Vista™ users, ensure that *R* is run with Administrator privileges when installing packages in order to allow installation of all required files including help files.

As noted earlier, if the folder structure was not copied exactly onto the 'C' drive then the scripts will reside in another location and they will need to be edited before running in order to point them to the correct location of the source files. This is easily done. Select the 'File' menu item on the top bar of the R main window and then select 'Open script...'. Locate the script you wish to edit (most likely one of the preset 3D MDS map scripts; e.g. *cmds-PaulineEpistles-3d.r*) and either double click the appropriate script or select the script and then click 'Open'. The script will open in a new window. Locate the line which begins with the word *input*. The name and location of the source data file will be specified at the right. Edit this line as required to point the script to the correct location of the source data file. Once you have edited the file then save the file by clicking 'File' then 'Save' or just clicking the 'Save file' icon located on the row of icons below the main menu items of the *R* GUI. Run the script as indicated earlier. It is also possible to run the script from within the *R* Console window by typing (at the command prompt): **source("*filename.r*")** where *filemane.r* is the filename of the appropriate script.

R* script: *montecarlo.r

```
# montecarlo.R
#
# Estimate critical values using a Monte Carlo calculation
#
# T. J. Finney
# 2007-07-16
# User supplied data
# Input data matrix
input <- "C:/mva/SourceData/Ath.PaulineEpistles.SourceData.csv"
# Witness of interest
witness <- "P46"
# Distance measure ("simple", "Jaccard", or "Euclidean")
distance <- "simple"
# Alpha value
alpha <- 0.05
# Number of trials
trials <- 10000
# Function definitions
# Calculate dissimilarity of two row vectors.
dissimilarity <- function(row1, row2, length, distance) {
  if (distance == "simple") {
    sum(row1 != row2) / length
  }
  else if (distance == "Jaccard") {
    sum(row1 != row2) / sum((row1 == "1") | (row2 == "1"))
```

```
  }
  else if (distance == "Euclidean") {
    sqrt(sum(row1 != row2))
  }
  else stop("Unrecognised distance measure.")
}
# Script
# Display information.
message("Critical values of dissimilarity (Monte Carlo estimate)")
message("Input: ", input)
message("Witness: ", witness)
message("Distance: ", distance)
message("Alpha: ", alpha)
message("Trials: ", trials)
# Start timing.
t_start <- Sys.time()
# Read the full data matrix.
full <- read.csv(input, row.names=1)
# Extract witness of interest.
counter <- 0
for (index in 1:dim(full)[1]) {
  if (attributes(full[index,])$row.names == witness) {
    counter <- index
    break
  }
}
if (counter == 0) {
  stop("The data matrix lacks the specified witness.")
} else {
  wit <- full[counter,]
}
# Reduce data matrix by eliminating NAs. Columns where the witness of
interest
# has NA are eliminated first then rows that still contain one or more NAs.

keep <- rep(0, times=sum(as.numeric(!is.na(wit))))
counter <- 1
for (index in 1:length(full)) {
  if (!is.na(as.numeric(wit)[index])) {
    keep[counter] <- index
    counter <- counter + 1
  }
}
```

```
reduced <- full[keep]
# Use simple matching distance if data matrix is multistate.
cols <- dim(reduced)[2]
for (index in 1:cols) {
  if (max(na.omit(reduced[index])) > 1) {
    distance <- "simple"
    break
  }
}
# Summarise variables.
summary <- list()
for (i in 1:cols) {
  summary[[i]] <- as.data.frame(table(reduced[,i]))
}
# Create vectors.
diss <- vector(mode = "numeric", length = trials)
v1 <- v2 <- vector(mode = "numeric", length = cols)
# Generate initial random vector.
for (n in 1:cols) {
  v1[n] <- sample(
    as.vector(summary[[n]]$Var1),
    1,
    replace = TRUE,
    as.vector(summary[[n]]$Freq)
  )
}
# Perform trials.
for (m in 1:trials) {
  # Generate current random vector.
  for (n in 1:cols) {
    v2[n] <- sample(
      as.vector(summary[[n]]$Var1),
      1,
      replace = TRUE,
      as.vector(summary[[n]]$Freq)
    )
  }
  # Calculate and store dissimilarity of current and previous random vector.
  diss[m] <- dissimilarity(v1, v2, cols, distance)
  # Replace previous with current random vector.
  v1 <- v2
}
# Sort generated dissimilarities.
```

```
diss <- sort(diss)
# Select critical values.
lower <- as.integer(trials * alpha / 2)
upper <- trials - lower
# Stop timing.
t_exec <- Sys.time() - t_start
# Display information.
message("Critical values of dissimilarity")
message("Lower: ", signif(diss[lower], 3), " Upper: ", signif(diss[upper], 3))
message("Execution time: ", signif(as.numeric(t_exec), 3), " ",
attr(t_exec, "units"))
# Clean up
rm(alpha, cols, counter, diss, dissimilarity, distance, full, i, index, input,
keep, lower, m, n, reduced, summary, t_exec, trials, t_start, upper, v1, v2,
wit, witness)
```

R* script: *cmds-ath-2d.r

```
# cmds-ath-2d.R
#
# Perform classical multidimensional scaling.
#
# T. J. Finney
# 2007-07-16
#
# Renamed and adapted: G.J. Donker
# 2009-04-22
# User supplied data
# Input dissimilarity matrix
input <- "C:/mva/DissMatrices/Ath.PaulineEpistles.diss.csv"
# Output plot
output <- "C:/mva/Ath.PaulEps.png"
# Plot label
label <- "Athanasius: Pauline Epistles"
# Script
# Display information.
message("Classical multidimensional scaling")
message("Input: ", input)
message("Output: ", output)
# Read dissimilarity matrix.

diss <- as.dist(read.csv(input, row.names = 1))
# Perform scaling.
coords <- cmdscale(diss)
```

```
# Plot result.
x <- coords[,1]
y <- coords[,2]
plot(x, y, type="n", xlab="axis 1", ylab="axis 2", main=label)
text(x, y, rownames(coords), cex=0.8)
# Write plot.
dev.print(png, file=output, width=480, height=480)
# Display information.
print(round(coords, digits = 3))
# Clean up.
rm(coords, diss, input, label, output, x, y)
```

R* script: *cmds-ath-3d.r

```
# cmds-ath-3d.R
#
# Perform classical multidimensional scaling to produce a three-dimensional
plot
# using rgl.
#
# T. J. Finney
# 2007-10-29
#
# Renamed and adapted by G.J. Donker
# 2008-04-15
# User supplied data
# Input dissimilarity matrix
input <- "C:/mva/DissMatrices/Ath.PaulineEpistles.Diss.csv"
# Plot label
label <- "Athanasius: Pauline Epistles"
# Script
# Display information.
message("Classical multidimensional scaling")
message("Input: ", input)
message("Output: RGL device")
# Read dissimilarity matrix.
diss <- as.dist(read.csv(input, row.names = 1))
# Perform scaling.
results <- cmdscale(diss, k=3, eig=TRUE)
# Plot result.
library(rgl)
x <- results$points[,1]
y <- results$points[,2]
z <- results$points[,3]
```

```
# Radius was 0.06 but changed to 0.01 on 13/8/08. GD.
open3d()
plot3d(x, y, z, xlab="axis 1", ylab="axis 2", zlab="axis 3", type='s', col="green",
alpha=0.3, radius=0.01, main=label)
text3d(x, y, z, rownames(results$points), col=4, adj=1.25)
# Display information.
pov <- round(results$GOF[1], digits = 3)
message("Proportion of variance: ", pov)
print(round(results$points, digits = 3))
#barplot(results$eig)
# Clean up.
rm(diss, input, label, pov, results, x, y, z)
```

R* script: *cluster.r

```
# cluster.r
#
# Perform cluster analysis.
#
# T. J. Finney
# 2009-04-11
# User supplied data
# Reference witness. (Use empty string "" if none required.)
wit <- "Ath"
# Minimum number of variation units for inclusive method
min <- 12
# Dissimilarity coefficient (SMD, JD, ED)
dc <- "SMD"
# Method (agglomerative, divisive, optimal)
method <- "agglomerative"
# Criterion for agglomerative method (single, complete, average, ward)
criterion <- "ward"
# Number of clusters if using optimal method
k <- 3
# Input data matrix
input <- "C:/mva/SourceData/Ath.PaulineEpistles.SourceData.csv"
# Output directory
output_dir <- "C:/mvs/"
# Functions
# CV(): Construct a matrix of common variable counts.
# M: A matrix.
# Return: A matrix.
CV <- function(M) {
  R <- nrow(M)
```

```
  counts <- matrix(nrow=R, ncol=R)
  for (r in 1:R) {
    for (c in 1:R) {
      counts[r, c] <- sum(!is.na(M[r,]) & !is.na(M[c,]))
    }
  }
  counts
}
# diss_mat(M, dc): Construct a dissimilarity matrix.
# M: A matrix.
# dc: A dissimilarity coefficient.
# Return: A matrix.
diss_mat <- function(M, dc) {
  if (dc == "SMD") {
    M <- as.data.frame(M)
    # Make variables into factors.
    for (c in 1:ncol(M)) {M[,c] <- as.factor(M[,c])}
    # Use daisy() to make dissimilarity matrix.
    require(cluster)
    as.matrix(daisy(M))
  } else if (dc == "JD") {
    if (max(M[!is.na(M)]) < 2) {
      # Use dist() with binary method.
      as.matrix(dist(M, method="binary"))
    } else stop("Binary data matrix required.")
  } else if (dc == "ED") {
    if (max(M[!is.na(M)]) < 2) {
      # Use dist() with euclidean method.
      as.matrix(dist(M, method="euclidean"))
    } else stop("Binary data matrix required.")
  } else stop("Unknown dissimilarity measure.")
}
# reduce(M, min): Reduce a matrix using inclusive method.
#
# M: A matrix.
# min: Minimum number of defined elements per row.
# Return: A matrix.
reduce <- function(M, min) {
  # Drop rows without enough defined elements.
  message("Drop rows with < ", min, " defined elements...")
  M <- as.data.frame(M)
  x <- logical()
  for (r in 1:nrow(M)) {
```

```
  x[r] <- (sum(!is.na(M[r,])) >= min)
 }
 if (sum(!x) > 0) {
  cat(rownames(M)[!x], "\n")
  M <- subset(M, x)
 } else { message("None dropped.") }
 # Drop rows without enough shared defined elements.
 message("Drop rows with < ", min, " shared defined elements...")
 counts <- CV(M)
 while (as.logical(sum(counts < min))) {
  R <- nrow(counts)
  i <- which.min(counts)
  r <- i %/% R
  c <- i %% R
  if (c) { r <- r + 1 } else { c <- R }
  name_r <- rownames(M)[r]
  name_c <- rownames(M)[c]
  if (sum(!is.na(M[r,])) < sum(!is.na(M[c,]))) { i <- r } else { i <- c }
  message(cat(name_r, "and", name_c, "share only", counts[r, c],
  "defined elements:"))
  x <- !logical(length = R)
  x[i] <- FALSE
  if (sum(!x) > 0) { message(cat(rownames(M)[!x], "dropped")) }
  M <- subset(M, x)
  counts <- CV(M)
 }
 M
}
# subset(M, x): Return a subset of row or column vectors from a matrix M.
# Vectors to keep are specified with the logical vector x. If the length of x
# equals the number of rows then rows are dropped; if the length equals the
# number of columns then columns are dropped.
#
# M: A matrix.
# x: A logical vector specifying which vectors to keep.
# Return: A matrix.
subset <- function(M, x) {
 len <- length(x)
 if (len == nrow(M)) {
  t(as.data.frame(t(M))[x])
 } else if (len == ncol(M)) {
  as.matrix(M[x])
 } else {
```

```
  as.matrix(M)
 }
}
# Script
# Construct output file name.
parts <- unlist(strsplit(input, "/"))
parts <- unlist(strsplit(parts[length(parts)], "\\."))
if (wit != "") {
 parts[length(parts)] <- wit
} else {
 length(parts) <- length(parts) - 1
}
parts[length(parts) + 1] <- min
parts[length(parts) + 1] <- dc
parts[length(parts) + 1] <- method
if (method == "agglomerative") {parts[length(parts) + 1] <- criterion}
if (method == "optimal") {parts[length(parts) + 1] <- k}
parts[length(parts) + 1] <- "png"
name <- parts[1]
for (index in 2:length(parts)) { name <- paste(name, parts[index], sep=".")}
output <- paste(output_dir, name, sep="")
# Display information.
message("Cluster analysis.")
if (wit != "") {
 message("Reference witness: ", wit)
}
message("Minimum number of variation units: ", min)
message("Dissimilarity coefficient: ", dc)
message("Method: ", method)
if (method == "agglomerative") {
 message("Criterion: ", criterion)
}
if (method == "optimal") {
 message("Number of clusters: ", k)
}
message("Input: ", input)
message("Output: ", output)
# Read data matrix as a data frame. (Data frames and matrices behave
differently
# when subscripting.)
data <- read.csv(input, row.names=1)
# Drop columns absent from ref. witness if one is specified.
if (wit == "") {} else {
```

```
  message("Drop columns absent from ", wit)
  data <- subset(data, as.logical(!is.na(as.data.frame(data)[wit,])))
}
# Reduce data matrix using inclusive method.
if (dim(data)[2] >= min) {
  data <- reduce(data, min)
} else {
  stop("The remaining number of columns is less than the minimum required.")
}
# Make dissimilarity matrix.
diss <- as.dist(diss_mat(data, dc))
# Perform clustering, plot result, and display information.
require(cluster)
if (method == "agglomerative") {
  cl <- hclust(diss, method=criterion)
  plot(cl, main="", cex=0.8)
} else if (method == "divisive") {
  cl <- diana(diss)
  plot(cl, which=2, main="", cex=0.8)
} else if (method == "optimal") {
  cl <- pam(diss, k)
  plot(cl, which=1, labels=2, main="", cex=0.8)
  print(cl)
} else stop("Unknown clustering method.")
# Write plot.
dev.print(png, file=output, width=720, height=720)
# Clean up.
rm(cl, criterion, CV, data, dc, diss, diss_mat, index, input, k, method, min,
name, output, output_dir, parts, reduce, subset, wit)
```