		Controls	preHD-A versus controls	preHD-B versus controls	Early HD versus controls
Brain volume (VBM)					
Caudate[§]		0.5155 (0.5049 to 0.5261)	-0.05 (-0.07 to -0.04; p<0.0001; q<0.0001)	-0.10 (-0.12 to -0.08; p<0.0001; q<0.0001)	-0.15 (-0.17 to -0.13; p<0.0001; q<0.0001)
White matter[§]		0.3176 (0.3128 to 0.3224)	-0.01 (-0.02 to -0.0003; p=0.04; q=0.07)	-0.01 (-0.02 to -0.003; p=0.004; q=0.006)	-0.02(-0.03 to -0.01; p<0.0001; q<0.0001)
Grey matter[§]		0.4512 (0.4443 to 0.4581)	-0.01 (-0.02 to 0.0001; p=0.05; q=0.07)	-0.01 (-0.02 to -0.003; p=0.01; q=0.01)	-0.03 (-0.04 to -0.01; p<0.0001; q<0.0001)
Cortical thickness (mm)					
Premotor cortex (BA6)		2.6852 (2.6590 to 2.7114)	0.001 (-0.05 to 0.05; p=0.97; q=0.97)	-0.08 (-0.12 to -0.04; p<0.0001; q=0.0003)	0.09 (-0.14 to -0.05; p<0.0001; q=0.0006)
Somatosensory cortex (BA2)		2.2353 (2.2099 to 2.2607)	0.01 (-0.04 to 0.05; p=0.72; q=0.97)	-0.04 (-0.07 to -0.01; p=0.02; q=0.04)	-0.06 (-0.11 to -0.01; p=0.02; q=0.03)
Somatosensory cortex (BA3a)		1.6850 (1.6598 to 1.7102)	-0.03 (-0.07 to 0.01; p=0.17; q=0.97)	-0.04 (-0.07 to -0.009; p=0.01; q=0.04)	-0.07 (-0.11 to -0.03; p=0.0006; q=0.002)
Somatosensory cortex (BA1)		2.3187 (2.2852 to 2.3522)	-0.00269 (-0.05110 to 0.04572; p=0.9122; q=0.9723)	0.02364 (-0.1051 to -0.01144; p=0.0152; q=0.0354)	-0.07925 (-0.1543 to -0.00420; p=0.039; q=0.0545)
Somatosensory cortex (BA2)		2.2353 (2.2099 to 2.2607)	0.008070 (-0.03636 to 0.05250; p=0.7180; q=0.9723)	-0.04265 (-0.07976 to -0.00554; p=0.0247; q=0.0433)	-0.06331 (-0.1143 to -0.01234; p=0.016; q=0.0279)
Motor cortex (BA4a)		2.6629 (2.6244 to 2.7014)	0.01463 (-0.05047 to 0.07972; p=0.6557; q=0.9723)	-0.02544 (-0.07921 to 0.02833; p=0.3506; q=0.4090)	-0.08815 (-0.1535 to -0.02284; p=0.009; q=0.0210)
Motor cortex (BA4b)		2.4495 (2.4052 to 2.4938)	0.03572 (-0.03568 to 0.1071; p=0.3224; q=0.9723)	0.04015 (-0.01765 to 0.09794; p=0.1718; q=0.2405)	-0.00184 (-0.07559 to 0.07192; p=0.96; q=0.96)
DTI tractography					
Motor cortex – motor thalamus	FA	0.4757 (0.4694 to 0.4820)	-0.01 (-0.02 to 0.002; p=0.11; q=0.22)	-0.01 (-0.02 to -0.003; p=0.01; q=0.02)	-0.00036 (-0.01 to 0.01; p=0.95; q=0.95)
	RD*	0.511 (0.506 to 0.517)	0.0011 (0.0028 to 0.02; p=0.01; q=0.11)	0.019 (0.010 to 0.027; p=0.0001; q=0.0001)	0.017 (0.007 to 0.026; p=0.001; q=0.002)
	AD*	0.713 (0.708 to 0.717)	0.021 (-0.01 to 0.016; p=0.11; q=0.22)	0.011 (-0.028 to 0.025; p=0.12; q=0.13)	0.033 (0.018 to 0.048; p<0.0001; q=0.0002)
Premotor cortex – motor thalamus	FA	0.4923 (0.4856 to 0.4990)	-0.01 (-0.02 to 0.002; p=0.10; q=0.22)	-0.01 (-0.02 to -0.002; p=0.02; q=0.04)	-0.00285 (-0.01467 to 0.008970; p=0.63; q=0.71)
	RD*	0.494 (0.488 to 0.499)	0.010 (0.0016 to 0.019; p=0.02; q=0.11)	0.017 (0.0086 to 0.026; p=0.0001; q=0.0004)	0.018 (0.0084 to 0.028; p=0.0006; q=0.001)
	AD*	1.121 (1.112 to 1.131)	-0.0015 (-0.02 to 0.013; p=0.80; q=0.89)	0.0089 (-0.005 to 0.023; p=0.21: q=0.21)	0.032 (0.015 to 0.048; p=0.0003; q=0.0008)

Somatosensory cortex – Sensory thalamus	FA	0.4784 (0.4725 to 0.4843)	-0.005 (-0.02 to 0.006; p=0.35; q=0.5)	-0.01 (-0.02 to 0.00001; p=0.05; q=0.06)	0.003064 (-0.00682 to 0.01294; p=0.53; q=0.66)
	RD*	0.517 (0.511 to 0.522)	0.0082 (-0.001 to 0.017; p=0.08; q=0.22)	0.018 (0.0096 to 0.026; p=0.0001; q=0.0001)	0.014 (0.005 to 0.023; p=0.003; q=0.004)
	AD*	1.140 (1.131 to 1.149)	0.0048 (-0.0018 to 0.018; p=0.46; q=0.57)	0.016 (0.0015 to 0.030; p=0.03; q=0.04)	0.036 (0.021 to 0.052; p<0.0001; q<0.0001)
Cortico-spinal tract	FA	0.5254 (0.5200 to 0.5308)	-0.004 (-0.01 to 0.005; p=0.39; q=0.52)	-0.01 (-0.02 to -0.001; p=0.04; q=0.05)	0.002152 (-0.00797 to 0.01227; p=0.67; q=0.71
	RD*	0.479 (0.474 to 0.484)	0.0055 (-0.0025 to 0.014; p=0.17; q=0.31)	0.015 (0.0074 to 0.023; p=0.0002; q=0.0004)	0.013 (0.0038 to 0.022; p=0.006; q=0.008)
	AD*	1.175 (1.167 to 1.184)	0.000086 (-0.01 to 0.01; p=0.99; q=0.99)	0.010 (0.0028 to 0.024; p=0.1219; q=0.13)	0.034 (0.019 to 0.050; p<0.0001; q=0.0002)
Dynamic causal modelling					
Premotor cortex – Motor thalamus		0.1853 (0.1470 to 0.2237)	-0.04206 (-0.1015 to 0.01743; p=0.1631; q=0.6930)	-0.06057 (-0.1239 to 0.002718; p=0.0604; q=0.5137)	-0.09966 (-0.1542 to -0.04507; p=0.0005; q=0.0093)
Premotor cortex self-connection		-0.03134 (-0.03444 to -0.02823)	-0.00374 (-0.00855 to 0.001060; p=0.1246; q=0.6930)	-0.00828 (-0.01657 to 0.000006208; p=0.0502; q=0.5137)	-0.00818 (-0.01465 to -0.00170; p=0.0145; q=0.1227)
Electrophysiology					
SEP N20 latency (ms)		19.81 (19.60 to 20.01)	0.02 (-0.33 to 0.38; p=0.89; q=0.94)	0.54 (0.15 to 0.93; p=0.007; q=0.04)	0.70 (0.23 to 1.16; p=0.004; q=0.04)
SEP N20/P25 amplitude (sqr mV)		1.87 (0.66 to 3.09)	0.07 (-0.13 to 0.27; p=0.46; q=0.84)	-0.31 (-0.48 to -0.14; p=0.0006; q=0.01)	-0.27 (-0.43 to -0.11; p=0.001; q=0.03)
Grip force					
Orientation index (log)		1.46 (1.39 to 1.54)	0.09 (-0.03416 to 0.21; p=0.15; q=0.27)	0.06 (-0.05711 to 0.18; p=0.31; q=0.31)	0.49 (0.3394 to 0.65; p<0.0001; q<0.0001)
Position index (log)		0.47 (0.40 to 0.54)	0.07 (-0.05639 to 0.19; p=0.27; q=0.27)	0.10 (-0.00314 to 0.20; p=0.057; q=0.17	0.58 (0.4269 to 0.73; p<0.0001; q<0.0001
Composite index (log)		1.93 (1.80 to 2.07)	0.16 (-0.08384 to 0.40; p=0.20; q=0.27)	0.16 (-0.05186 to 0.37; p=0.14; q=0.21)	1.07 (0.7757 to 1.37; p<0.0001; q<0.0001

Supplementary Table 1. Individual modality results of variables included in principle component analysis.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15
SEP amplitude	0·242	-0·412	-0·282	0·185	0·100	0·174	**0·552**	-0·426	0·266	-0·055	0·225	0·073	0·039	0·027	-0·007
SEP latency	-0·228	0·077	-0·154	0·166	**0·645**	**0·575**	-0·139	0·196	-0·129	0·182	0·141	0·128	0·013	-0·004	-0·015
PMC – Thalamus	0·334	0·126	0·389	**-0·505**	-0·040	-0·017	0·151	0·402	**0·431**	0·169	0·180	0·176	0·019	0·015	0·038
PMC – PMC	0·240	0·280	0·039	**-0·591**	0·344	0·116	0·437	-0·064	-0·168	0·029	-0·323	-0·226	0·026	-0·030	0·018
S1 - M1	-0·229	0·149	-0·111	0·178	**-0·589**	**0·637**	0·144	0·156	0·112	0·008	-0·262	0·007	0·028	0·037	0·003
S1 – Thalamus AD	**-0·450**	**0·630**	**-0·439**	0·080	-0·014	-0·238	0·205	0·101	0·120	0·062	0·001	0·083	0·012	-0·169	-0·195
PMC– Thalamus AD	**-0·398**	**0·588**	**-0·513**	0·214	0·079	-0·235	0·142	0·134	0·075	0·041	0·064	-0·119	-0·016	0·148	0·199
PMC– Thalamus RD	**-0·460**	0·326	**0·649**	0·165	-0·048	0·032	0·271	-0·155	-0·143	0·109	0·081	0·065	-0·299	0·031	-0·010
S1 – Thalamus RD	**-0·406**	0·277	**0·701**	0·358	0·081	-0·084	0·129	-0·048	-0·038	-0·024	0·007	-0·015	0·323	0·027	-0·002
BA6 thickness	**0·732**	**0·554**	-0·027	0·015	-0·021	0·039	-0·155	-0·134	0·022	0·098	0·055	-0·106	0·009	0·242	-0·168
BA3a thickness	**0·532**	**0·592**	-0·067	-0·023	-0·016	-0·002	-0·084	-0·260	-0·117	-0·083	-0·143	0·483	0·029	-0·039	0·096
BA2 thickness	**0·578**	**0·564**	0·139	0·170	-0·085	0·234	-0·127	-0·076	0·085	-0·103	0·252	-0·299	-0·021	-0·200	0·071
GM volume	**0·577**	-0·200	-0·140	0·172	-0·300	-0·112	0·257	0·178	**-0·466**	0·364	0·148	0·014	0·064	-0·040	0·019
WM volume	**0·471**	-0·174	0·126	**0·571**	0·222	-0·150	-0·051	-0·016	0·318	0·313	-0·352	-0·045	-0·058	-0·054	0·023
Caudate volume	**0·570**	-0·049	0·082	0·389	0·169	-0·060	0·255	0·456	-0·093	-0·435	-0·049	0·050	-0·069	0·033	-0·041

Supplementary Table 2: Principal Component (PC) Analysis correlations of the observed variables from all modalities with PCs in Huntington's disease participants.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13	PC14	PC15
SEP amplitude	**-0·531**	0·080	-0·012	0·251	-0·130	**0·547**	0·390	0·023	0·297	0·127	0·172	0·206	-0·059	0·022	0·001
SEP latency	-0·304	-0·011	-0·018	-0·367	0·283	**0·495**	-0·453	**0·490**	-0·039	-0·001	0·008	-0·025	-0·003	0·015	-0·006
PMC – Thalamus	0·352	-0·077	**0·459**	**-0·524**	0·186	-0·205	0·269	0·088	-0·112	0·388	0·226	0·118	-0·010	-0·008	-0·001
PMC – PMC	0·204	0·255	0·122	0·086	**0·619**	0·400	0·065	**-0·509**	-0·228	0·042	-0·044	-0·091	-0·005	-0·017	0·001
S1 - M1	0·315	0·070	-0·124	0·403	**0·534**	-0·177	0·349	**0·480**	-0·038	-0·194	0·072	-0·002	0·068	0·018	0·012
S1 – Thalamus AD	***0·321***	**0·765**	**-0·434**	-0·167	-0·049	0·029	0·086	0·049	0·147	0·063	-0·039	-0·004	0·112	-0·166	-0·125
PMC– Thalamus AD	***0·291***	**0·712**	**-0·499**	-0·201	-0·049	-0·002	0·103	0·038	0·094	0·177	-0·146	-0·070	-0·022	0·148	0·126
PMC– Thalamus RD	0·223	**0·498**	**0·734**	0·153	-0·226	0·126	-0·056	0·132	-0·028	-0·053	-0·039	-0·009	0·080	-0·164	0·116
S1 – Thalamus RD	0·289	**0·647**	**0·600**	0·115	-0·165	0·021	-0·031	0·088	-0·128	-0·097	-0·066	0·037	-0·111	0·179	-0·107
BA6 thickness	**0·854**	-0·182	-0·173	-0·073	-0·066	0·124	0·068	0·069	0·043	-0·139	0·047	-0·064	-0·369	-0·096	0·011
BA3a thickness	**0·715**	-0·204	-0·132	0·156	-0·323	0·255	-0·043	0·013	-0·118	0·082	0·347	-0·254	0·157	0·065	-0·012
BA2 thickness	**0·778**	-0·094	-0·245	-0·101	-0·050	0·123	-0·152	-0·118	-0·134	-0·227	0·021	**0·422**	0·110	0·030	0·026
GM volume	**0·435**	**-0·595**	0·045	0·109	-0·138	0·231	0·228	0·177	-0·132	0·254	**-0·448**	0·001	0·059	-0·005	-0·028
WM volume	**0·452**	-0·271	0·400	-0·299	0·146	0·066	0·091	-0·106	**0·590**	-0·223	-0·077	-0·096	0·104	0·058	-0·007
Caudate volume	**0·483**	-0·004	0·043	**0·463**	0·217	-0·145	**-0·483**	-0·008	0·322	0·369	0·017	0·088	-0·042	0·000	-0·006

Supplementary Table 3: Principal Component (PC) Analysis correlations of the observed variables from all modalities with PCs in control participants.