GGAIT

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Prior remark:

- **S**: when the exact value is not known because it depends on the length of the recording/ number of steps / of trials.

INTERFACE VARIABLES

General nomenclature:

- BNxxx refers to push button names
- RBxxx refers to radio button names
  - *get(handles.RBxxx,'Value') returns true if checked.*
- PMxxx refers to pop menu names
  - *get(handles.PMxxx,'Value') returns the index of the selected item.*
- EDxxx refers to edit text names
  - *get(handles.EDxxx,'String') returns the edited string.*
- TXxxx refers to static text names
- LGxxx refers to static text names concerning axis titles
- AXxxx refers to axis handles

SET UP

handles.RBgait_file
*Check this radio button if GAIT data file exists (*_GAIT.csv). If not checked, EVENT_DETECTION window appears to load KINEMATIC data file (*_KIN.csv), detect gait events and create a GAIT data file.*

handles.RBgait_swing
Check this radio button if swing events have been marked.

handles.RBgait_auto
Check this radio button if automatic detection of GAIT events must be performed.

handles.RBgait_manual
Check this radio button if manual detection of GAIT events must be performed.

handles.RBforce
Check this radio button if force plate data are available.

handles.RBladder
Check this radio button if ladder was present (and ladder markers were recorded).

handles.RBnoise
Check this radio button if 40Hz noise should be removed from EMG data.

handles.RBeuler
Check this radio button if Euler angles computation should be performed.

handles.RBemg
Check this radio button if EMG data are available.

handles.EDemg
Edit this edit text if EMG gain was not 1000 for all muscles.

handles.PMsetup
Select the actual project setup.

handles.PMgaittype
Select the type of gait (bipedal or quadrupedal).

handles.BNload
Click on this button (once all suitable radiobuttons are checked and the project and gait type are specified) to load the data files (.csv and .c3d).

CONDITIONS

handles.EDanimal
Write the animal's iD in there.

handles.PMcond1
Select the actual condition 1.

handles.PMcond2
Select the actual condition 2.

handles.PMcond3
Select the actual condition 3.

handles.PMspeed
Select the actual treadmill speed.

handles.PMbws
Select the actual body weight support (in percent).

PROCESS

handles.BNgaitprocess
Compute GAIT parameters depending on specified conditions in Conditions *panel.*

handles.BNdisplay
Display computed GAIT parameters concerning the desired limb. Desired limb is selected through LIMB_SELECTION *interface.*

handles.BNreject
Reject gait cycles selected by the user (these gait cycles will not be considered for further analyses). Or unreject gait cycles by a right click on a rejected cycle.

COMPARE and WRITE FILES

handles.BNaverage
Average EMG, FORCE and KINEMATIC data and plot them. ENDPOINT trajectories are equally displayed (ENDPOINT being the MTP or Wrist marker depending on the considered limb).

handles.BNcompare
Compare handles.ANGLE_* data to reference data (from a non-disabled animal).The reference animal used here depends on the selected string in handles.PMkinref. In 'Own ref' case the user will have to select the .txt files containing reference data.

handles.PMkinref
Select the animal of reference for KINEMATIC data ('Mean ref' or 'Own ref').

handles.BNemganalysis

Display EMG signals on EMG *interface to analyze EMG. For each EMG channels (LTA, LMG, RTA and RMG) select contraction onset and end at each gait cycle (automatic or manual). Co-contraction can then be calculated and displayed and probability distribution of two EMG signals (JPD) can be displayed.*

How to use EMG interface:

1. select an EMG signal to process and a reference EMG signal
2. push on START button (it resets and displays EMG signals)
3. either push on AUTOMATIC button and place threshold on EMG signal to process
   or push on NEXT button and then on ONSET button, select onset time, push on END button, select end time, push on NEXT button and continue until the end of the process.
4. redo steps 1 to 3 for each of the EMG signals of the considered limb (MG, TA, …)
5. click on Co-Contraction button
6. select two EMG signals to compare, (select the gait cycles to look at if wished), choose a resolution and push on JPD button

Display (s) *specifies the time length of EMG signal to display before and after a gait cycle.*
REJECT *button allows rejecting one gait cycle from analysis (not available in automatic mode).*
Freq. *specifies the frequency [Hz] of the low pass filter applied during automatic processing of EMG signal (10Hz by default).*
SELECT *button allows selecting gait cycles for JPD analysis.*
Resol. *specifies the resolution of the JPD display (highest the number, highest the resolution). To display JPD, EMG signals of both muscles first go through moving average and are resampled, before being normalized (so each signal ranges from 0 to 1).Then they are averaged over the selected gait cycles (if no gait cycle was selected, then all the gait cycles are taken) if* Average *is checked. Finally the distribution of the two muscles activation is estimated and displayed: the color of a point in the 2D map depends on the number of samples at which EMG1 value falls in x range and EMG2 value falls in y range at the same time (range size depends on the chosen resolution: range = 1/resolution; the color is linearly proportional to the log10 value of the numbers of samples).*

handles.BNemgforce

Display EMG/FORCE *interface enabling to select onset and end of a feature for each EMG channel and each force axis for right and left hindlimbs. Four parameters are computed from the onset and end time chosen by the user for each EMG channel and force axis: onset time, offset time, duration and mean amplitude of the feature. The EMG and force values displayed are the averaged EMG and averaged force over the non-rejected gait-cycles.*

handles.PMsave

Specify the files to write ('SUM' or 'ALL').

handles.BNwritefiles

Create files specified by handles.PMsave *and save data in.*

GRAPH

handles.BNgraph_sequence
Display graphs of various parameters (kinematic, EMG, force, CoP, CoM, neuron data).

handles.BNgraph_average
Display graphs of various averaged parameters (kinematic, EMG, force, CoP, CoM, neuron data).

handles.BNgraph_stick
Display various stick sequences for one, several or all gait cycles.

handles.BNgraph_timing
Display timing about interlimb coordination.

VISUALIZATION

handles.axes1, handles.axes2, …, handles.axes16
To represent gait phase, joint kinematics, EMGs and forces.

handles.LGphase, handles.LGkin1, …, handles.LGkin4, handles.LGemg1, …, handles.LGemg11
Axis titles are changed accordingly to represented data on the various axes.

INTERNAL VARIABLES

SET UP

handles.PATHNAME [cell]
String specifying path to the folder where data files are found or created.

handles.FILENAME [cell]
String specifying file name from where data are loaded.

handles.setups [15x1 cell]
List of the different projects / setups

Value	String	Comments
1	ZNZ	
2	MONOAMINE	
3	Multi-EMGs #341	
4	HEMISECTION 2HLs+FL	
5	HEMISECTION 2HL+4FL	
6	HEMISECTION 4FL	
7	HEMISECTION 5FL	
8	ZNZ_NEU	
9	NIKO	
10	ZNZ NO SHOULDER	
11	HUMAN LU	
12	HUMAN LOCOMOTION	
13	HUMAN REACHING	
14	MOUSE	
15	DIVAS	

// ARE THEY ALL STILL USED? If one setup is no more used, please email me (camille.legoff).

handles.setup [double]
Index of selected project.

handles.gaittypes [2x1 cell]
List of the different gait types: BIPEDAL, QUADRUPEDAL.

handles.gait_type [double]
Index of selected gait type (1=bipedal; 2=quadrupedal).

handles.is_force [bool]
True if force data are available.

handles.is_ladder [bool]
True if ladder was present and data are available.

handles.is_noise [bool]
True if denoising processing is required on EMG data (bandstop filter around 40Hz).

handles.is_euler [bool]
True if Euler angles computation is required.

handles.type_euler [double]
Type of Euler computation to perform on angles (=1 by default).

handles.is_emg [bool]
True if EMG data are available.

handles.EMG_gain [double]
EMG gain set on the amplifier. Default value set to 1000. If EMG gain is set to any other value in the edit textbox, a new panel pops up to select the muscles whose EMG gain was set to that value.

handles.is_gait_file [bool]
*True if *_GAIT.csv file exists.*

handles.is_gait_swing [bool]
True if SWING events have been detected (using VICON/NEXUS).

handles.is_gait_auto [bool]
True if automatic detection of gait events is required.

handles.is_gait_manual [bool]
True if manual detection of gait events is required.

handles.is_right [bool]
True if right side only (depends on the project).

handles.is_NEU [bool]
*True if NEU project (i.e. if *_NEU files exist).*

handles.is_swing [bool]
True if SWING events are present in handles.GAIT_INFO *matrix.*

handles.is_BWstepping [bool]
True if backward stepping.

handles.is_SWstepping [bool]
True if sideward stepping.

handles.FORCE [3x1 double]
Force channels [1;2;3].

Depends on the selected project:

- handles.section_to_filter_EMG=[1;4];
- handles.emgChLeft=[1;3]; handles.emgChRight=[2;4];
- handles.emgChLeft_FL=[]; handles.emgChRight_FL=[];
- handles.pairs=[2 4; 1 3];
- handles.pairsLH=[1 3]; handles.pairsRH=[2 4]; handles.pairsLF=[]; handles.pairsRF=[];

handles.emgChLeft_n [double], handles.emgChRight _n [double], handles.emgChLeft_FL_n [double], handles.emgChRight_FL_n [double]
Number of EMG channels on left hindlimb, right hindlimb, left forelimb, right forelimb resp.

CONDITIONS

handles.animal_iD [double]
Animal iD.

handles.conds1 [Sx1 cell]
List of possible conditions. Depends on the project.

handles.conds2 [Sx1 cell]
List of possible conditions. Depends on the project.

handles.conds3 [Sx1 cell]
List of possible conditions. Depends on the project.

handles.speeds [Sx1 double]
List of possible treadmill speeds. Depends on the project.

handles.speed [double]
Selected treadmill speed.

handles.bwss [20x1 double]
Array of possible body weight support (in percent). Range from 100 to 0 by step of 5 (i.e. 100:-5:0).

handles.bws [double]
Selected body weight support (in percent).

COMPARE and WRITE FILES

handles.kinrefs [2x1 cell]
'Mean ref' and 'Own ref'. To specify the reference data to use; 'Own ref' allows selecting the data to compare with.

handles.save_options [2x1 cell]
'SUM' and 'ALL'. To specify if only SUM files are written or also AVERAGE files.

VISUALIZATION

handles.plotsPHASE
Handle first axis for stance, dragging and swing representation.

handles.plotsKIN
Handle four axes for joint angles displaying.

handles.plotsEMG
Handle ten axes for EMG signals and/or force signals displaying.

handles.legendKIN
Handle legends of the four joint angles axes.

handles.legendEMG
Handle legends of the ten EMG signals and/or force axes.

handles.TXkin_HL, handles.TXkin_FL
Titles for the four joint angles axes in HINDLIMB case, FORELIMB case respectively.

GAIT VARIABLES

KINEMATIC DATA

handles.DATA_KIN [Sx44 double]

3D position of the markers (x, y, z; left and right, hindlimb and forelimb). See handles.DATA_KIN_HL_header, handles.DATA_KIN_FL_header.

handles.DATA_KIN_HL_header [1x44 cell]

Header of KINEMATIC data (see handles.DATA_KIN*) for hindlimbs.*

Column	Header	Comments
1	FRAME	Time index
2	TIME	FRAME divided by acquisition frequency (handles.freq)
3	Scap left X	
4	Scap left Y	
5	Scap left Z	
6	Crest left X	
7	Crest left Y	
8	Crest left Z	
9	Hip left X	
10	Hip left Y	
11	Hip left Z	
12	Knee left X	
13	Knee left Y	
14	Knee left Z	
15	Ankle left X	
16	Ankle left Y	
17	Ankle left Z	
18	MetaTarso left X	
19	MetaTarso left Y	
20	MetaTarso left Z	
21	TIP left X	
22	TIP left Y	
23	TIP left Z	
24	Scap right X	
25	Scap right Y	
26	Scap right Z	
27	Crest right X	
28	Crest right Y	
29	Crest right Z	
30	Hip right X	
31	Hip right Y	
32	Hip right Z	
33	Knee right X	
34	Knee right Y	
35	Knee right Z	
36	Ankle right X	
37	Ankle right Y	
38	Ankle right Z	
39	MetaTarso right X	
40	MetaTarso right Y	
41	MetaTarso right Z	

42	TIP right X
43	TIP right Y
44	TIP right Z

handles.DATA_KIN_FL_header [1x80 cell]

Header of KINEMATIC data (see handles.DATA_KIN*) for hindlimbs & forelimbs.*

Column	Header	Comments
1	FRAME	Time index
2	TIME	FRAME divided by acquisition frequency (handles.freq)
3	Shoulder left X	
4	Shoulder left Y	
5	Shoulder left Z	
6	Crest left X	
7	Crest left Y	
8	Crest left Z	
9	Hip left X	
10	Hip left Y	
11	Hip left Z	
12	Knee left X	
13	Knee left Y	
14	Knee left Z	
15	Ankle left X	
16	Ankle left Y	
17	Ankle left Z	
18	MetaTarso left X	
19	MetaTarso left Y	
20	MetaTarso left Z	
21	TIP left X	
22	TIP left Y	
23	TIP left Z	
24	Shoulder right X	
25	Shoulder right Y	
26	Shoulder right Z	
27	Crest right X	
28	Crest right Y	
29	Crest right Z	
30	Hip right X	
31	Hip right Y	
32	Hip right Z	
33	Knee right X	
34	Knee right Y	
35	Knee right Z	
36	Ankle right X	
37	Ankle right Y	
38	Ankle right Z	
39	MetaTarso right X	
40	MetaTarso right Y	
41	MetaTarso right Z	
42	TIP right X	
43	TIP right Y	
44	TIP right Z	
45	Elbow left X	

46	Elbow left Y	
47	Elbow left Z	
48	Wrist left X	
49	Wrist left Y	
50	Wrist left Z	
51	Elbow right X	
52	Elbow right Y	
53	Elbow right Z	
54	Wrist right X	
55	Wrist right Y	
56	Wrist right Z	
57	Scap left X	
58	Scap left Y	
59	Scap left Z	
60	Scap right X	
61	Scap right Y	
62	Scap right Z	
63	T12 X	
64	T12 Y	
65	T12 Z	
66	HeadFront X	
67	HeadFront Y	
68	HeadFront Z	
69	Ear left X	
70	Ear left Y	
71	Ear left Z	
72	Ear right X	
73	Ear right Y	
74	Ear right Z	
75	Toe left X	
76	Toe left Y	
77	Toe left Z	
78	Toe right X	
79	Toe right Y	
80	Toe right Z	
81	Trunk X	These fields exist only if Trunk marker is present is present in quadrupedal case
82	Trunk Y	
83	Trunk Z	

handles.ENDPOINT _Vel_HL [100x6 double], handles.ENDPOINT _Vel_FL [100x6 double]

Means and standard deviations of hindlimb (_HL) or forelimb (_FL) endpoint velocity. Velocity is calculated as the module of the time derivative of MTP marker positions on X and Y axes.
Data (velocity during SWING phase) are first resampled so to fit to 100 samples per gait cycle. Then the mean and standard deviation are calculated over the non-rejected gait cycles.

Column	Comments
1	Mean values of left limb velocity during swing
2	Mean plus standard deviation values of left limb velocity during swing
3	Mean minus standard deviation values of left limb velocity during swing
4	Mean values of right limb velocity during swing
5	Mean plus standard deviation values of right limb velocity during swing
6	Mean minus standard deviation values of right limb velocity during swing

handles.ENDPOINT_Angle_HL [100x6 double], handles.ENDPOINT_Angle_FL [100x6 double]

Means and standard deviations of hindlimb (_HL) or forelimb (_FL) endpoint angular velocity. Angular velocity is calculated as the arctangent between the time derivatives of MTP marker position on X and Y axes.

Data (angular velocity during SWING phase) are first resampled so to fit to 100 samples per gait cycle. Then the mean and standard deviation are calculated over the non-rejected gait cycles.

Column	Comments
1	Mean values of left limb angular velocity during swing
2	Mean plus standard deviation values of left limb angular velocity during swing
3	Mean minus standard deviation values of left limb angular velocity during swing
4	Mean values of right limb angular velocity during swing
5	Mean plus standard deviation values of right limb angular velocity during swing
6	Mean minus standard deviation values of right limb angular velocity during swing

handles.ENDPOINT_PCA [2x10 double]

PCA performed on MTP marker position (1st row: left limb; 2nd row: right limb).

MTP position on X, Y or Z axis of left or right limb is resampled to 100 samples per gait cycles and collected in a two dimensional matrix [100x$N_{gaitcycles}$] on which a PCA is applied. See handles.ENDPOINT_PCA_header.

handles.ENDPOINT_PCA_header [1x10 cell]

Column	Header	Comments
1	ANIMAL	Animal iD
2	COND1	Index of condition 1
3	COND2	Index of condition 2
4	SIDE	Limb side (left=1 ; right=2)
5	SPEED	Treadmill speed (in cm/s)
6	PCAx	Variance on first PC (PCA applied on X MTP values)
7	PCAy	Variance on first PC (PCA applied on Y MTP values)
8	PCAz	Variance on first PC (PCA applied on Z MTP values)
9	PCAxy	Mean of PCAx and PCAy
10	PCAxyz	Mean of PCAx, PCAy and PCAz

Here, variance on first PC corresponds to the normalized eigenvalue of the first PC.

EMG DATA

handles.DATA_EMG [SxN_{EMG} double]

EMG signals. Number of columns depends on the number of recorded EMG channels.

handles.DATA_EMG_header [1xN_{EMG} cell]

Labels of EMG channels.

handles.EMG_LHL [Sx(8xn_{EMG_LHL}) double], handles.EMG_RHL [Sx(8xn_{EMG_RHL}) double], handles.EMG_LFL [Sx(8xn_{EMG_LFL}) double], handles.EMG_RFL [Sx(8xn_{EMG_RFL}) double]

Various parameters about EMG burst. They are computed when EMG bursts are selected through EMG Analysis *interface. For each EMG channel CHAN and at each gait cycle, the eight following parameters are computed:*

Header	Comments
CHAN_onset	Onset time of EMG burst
CHAN_end	Offset time of EMG burst
CHAN_%onset	Onset time of EMG burst in percent of the gait duration

CHAN_%end	Offset time of EMG burst in percent of the gait duration
CHAN_burst duration	Burst duration (Offset time minus Onset time)
CHAN_meanAMP	Mean amplitude of rectified EMG during burst
CHAN_iEMG	Area under the curve of rectified EMG during burst (using trapeze method)
CHAN_RMS	Root mean square of rectified EMG during burst

handles.EMG_RHL_mean [S_1x(3xN_{EMG_RHL}) double], handles.EMG_LHL_mean [S_1x(3xN_{EMG_LHL}) double], handles.EMG_RFL_mean [S_1x(3xN_{EMG_RFL}) double], handles.EMG_LFL_mean [S_1x(3xN_{EMG_LFL}) double]

Mean values of handles.EMG *(first $N_{EMG\_??L}$ parameters), mean values plus SEM of* handles.EMG *(next $N_{EMG\_??L}$ parameters) and mean values minus standard deviation (last $N_{EMG\_??L}$ parameters).*
Data are first resampled so to fit to 1000 samples: the first N samples are during STANCE phase while the last 1000-N are during SWING phase. N is calculated so to correspond to the mean normalized time of stance end / swing onset. Then the average value at each normalized time for each parameter is computed over the non-rejected gait cycles.
SEM: standard deviation divided by the square root of S_1.

handles.EMG_CoCo_LHL [S_1xS_2 double], handles.EMG_CoCo_RHL [S_1xS_2 double], handles.EMG_CoCo_LFL [S_1xS_2 double], handles.EMG_CoCo_RFL [S_1xS_2 double]

Percent of cocontraction of each pair of antagonist muscles on left hindlimb (_LHL), right hindlimb (_RHL), left forelimb (_LFL) or right forelimb (_RFL). EMG signals are first filtered (1. Highpass at 50Hz, 2. Notch at 50Hz, 3. Lowpass at 30Hz), then for each gait cycle their amplitude is normalized (signal is divided by its maximal value during the gait cycle and multiplied by 100). Finally, for each gait cycle, the sum of the minimal values between the two EMG signals is divided by the sum of the two EMG signals and multiplied by 2.

handles.EMG_features_LHL [2xN_{EMG_LHL} double], handles.EMG_features_RHL [2xN_{EMG_RHL} double]

Features parameters on mean EMG (i.e. EMG resampled to 1000 samples and averaged over non-rejected gait cycle) from left limb muscles (_LHL) or from right limb muscles (_RHL). Second row in handles.EMG_features_LHL *and first row in* handles.EMG_features_RHL *are '0' rows. See* handles.EMG_features_header_L *and* handles.EMG_features_header_R.

handles.EMG_features_header_L [1xN_{EMG_LHL} cell], handles.EMG_features_header_R [1xN_{EMG_RHL} cell]

For each EMG channel CHAN on the left (_L) or on the right (_R) limb that was processed through EMG/FORCE *interface:*

#	String	Comments
	onset_CHAN	Onset time of EMG feature
	end_CHAN	Offset time of EMG feature
	DUR_CHAN	Duration of EMG feature (Offset time minus Onset time)
	MEAN_CHAN	Mean amplitude of EMG during feature observation

Remark: the EMG signal here is the mean EMG signal over the non-rejected gait cycles

FORCE DATA

handles.DATA_FORCE [Sx8 double]

Forces and moments on X, Y, Z axes. See handles.DATA_FORCE_header.

handles.DATA_FORCE_header [1x8 cell]

Column	Header	Comments

1	FRAME	Time index
2	TIME	FRAME divided by acquisition frequency (handles.freq)
3	Force X	
4	Force Y	
5	Force Z	
6	Moment X	
7	Moment Y	
8	Moment Z	

handles.FORCE_L [Sx8 double], handles.FORCE_R [Sx8 double]
Like handles.DATA_FORCE *except that during swing of considered hindlimb (L=left; R=right) the value is set to '0'.*

handles.FORCE_LHL_mean [100x9 double], handles.FORCE_RHL_mean [100x9 double], handles.FORCE_LFL_mean [100x9 double], handles.FORCE_RFL_mean [100x9 double]
Mean values of handles.DATA_FORCE *(first 3 parameters), mean values plus standard deviation of* handles.DATA_FORCE *(next 3 parameters) and mean values minus standard deviation (last 3 parameters).*
Data are first resampled so to fit to 100 samples: the first N samples are during STANCE phase while the last 100-N are during SWING phase. N is calculated so to correspond to the mean normalized time of stance end / swing onset. Then the average value at each normalized time for each parameter is computed over the non-rejected gait cycles.

handles.FORCE_features [2x12 double]
Features parameters for the three axes of the mean force (i.e. see handles.FORCE_?HL_mean*). First row corresponds to mean force calculated on left limb, the second row goes for the right limb.*
See handles.FORCE_features_headers*.*

handles.FORCE_features_header [1x12 cell]
For each Force axis AXE (X, Y and Z) that was processed through EMG/FORCE *interface:*

#	String	Comments
	onset_AXE	Onset time of force feature
	end_AXE	Offset time of force feature
	DUR_AXE	Duration of force feature (Offset time minus Onset time)
	MEAN_AXE	Mean amplitude of force during feature observation

Remark: the force signal here is the mean force signal over the non-rejected gait cycles

handles.DATA_CoP [Sx4 double]
Position of center of pressure on force plate. See handles.DATA_CoP_header*.*

handles.DATA_CoP_header [1x4 cell]

Column	Header	Comments
1	FRAME	Time index
2	TIME	FRAME divided by acquisition frequency (handles.freq)
3	CoP X	X position of CoP in force plate reference frame
4	CoP Y	Y position of CoP in force plate reference frame

handles.CoP_LHL_mean [100x6 double], handles.CoP_RHL_mean [100x6 double], handles.CoP_LFL_mean [100x6 double], handles.CoP_RFL_mean [100x6 double]
Mean values of handles.DATA_CoP *(first 2 parameters), mean values plus standard deviation of* handles.DATA_CoP *(next 2 parameters) and mean values minus standard deviation (last 2 parameters).*

Data are first resampled so to fit to 100 samples: the first N samples are during STANCE phase while the last 100-N are during SWING phase. N is calculated so to correspond to the mean normalized time of stance end / swing onset. Then the average value at each normalized time for each parameter is computed over the non-rejected gait cycles.

NEURON DATA

handles.DATA_NEU [SxN$_{NEU}$ double]

Neuron data recorded by analog channels. See handles.DATA_NEU_header.

handles.DATA_NEU_header [1xN$_{NEU}$ cell]

Column	Header	Comments
1	FRAME	Time index
2	TIME	FRAME divided by acquisition frequency (handles.freq)
3	Neu#1	
4	Neu#2	
5	Neu#3	
…	Neu#...	

ANGLE DATA

handles.ANGLE_LHL [Sx12 double], handles.ANGLE_RHL [Sx12 double]

*Various computed angles on right (*_RHL) or left (*_LHL) hindlimb. See* handles.ANGLE_LHL_header.

handles.ANGLE_LHL_header [1x12 cell], handles.ANGLE_RHL_header [1x12 cell]

Column	Header	Comments
1	ELEV Crest	Elevation angle – Crest-Hip
2	ELEV Thigh	Elevation angle – Hip-Knee
3	ELEV Leg	Elevation angle – Knee-Ankle
4	ELEV Foot	Elevation angle – Ankle-MTP
5	ELEV Toe	Elevation angle – MTP-TIP
6	Hindlimb	Limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
7	JOINT Hip	Joint angle – Hip
8	JOINT Knee	Joint angle – Knee
9	JOINT Ankle	Joint angle – Ankle
10	JOINT MTP	Joint angle – MTP
11	Hindlimb_LAT	Limb axis angle in YZ plane – Crest-MTP
12	Foot_ROT	Foot angle in XZ plane – Ankle-TIP

handles.ANGLE_RFL [Sx12 double], handles.ANGLE_LFL [Sx12 double]

*Various computed angles on right (*_RFL) or left (*_LFL) forelimb. See* handles.ANGLE_RFL_header.

handles.ANGLE_RFL_header [1x12 cell], handles.ANGLE_LFL_header [1x12 cell]

Column	Header	Comments
1	ELEV Scapula	Elevation angle – Scap-Shoulder
2	ELEV Arm	Elevation angle – Shoulder-Elbow
3	ELEV Forearm	Elevation angle – Elbow-Wrist
4	ELEV Hand	Elevation angle – Wrist-Toe
5	ELEV Finger	'0'
6	Forelimb	Limb axis angle in XY plane – Scap-Wrist

7	JOINT Scap	Joint angle – Scap (angle between Scap-Shoulder elevation and Trunk elevation)
8	JOINT Shoulder	Joint angle – Shoulder
9	JOINT Elbow	Joint angle – Elbow
10	JOINT Wrist	Joint angle – Wrist
11	Forelimb_LAT	Limb axis angle in YZ plane – Scap-Elbow
12	EMPTY	'0'

handles.ANGLE_trunk [Sx15 double]

Various positions and elevations about Trunk. XY plane: sagittal plane; XZ plane: transverse plane.

handles.ANGLE_trunk_header [1x15 cell]

Column		Comments
1	MidSh_X	Mid-shoulder X coordinate
2	MidSh_Y	Mid-shoulder Y coordinate
3	MidSh_Z	Mid-shoulder Z coordinate
4	MidHip_X	Mid-hip X coordinate
5	MidHip_Y	Mid-hip Y coordinate
6	MidHip_Z	Mid-hip Z coordinate
7	ELEV MidTrunk1	Mid-trunk elevation angle (in XY plan)
8	ELEV TrunkR	Trunk elevation angle on right side (in XY plan)
9	ELEV TrunkL	Trunk elevation angle on left side (in XY plan)
10	ELEV MidTrunk2	Mid-trunk elevation angle (in XY plan; complementary angle to angle from column #7)
11	Shoulders	Shoulder elevation angle (in XZ plan)
12	Hips	Hip elevation angle (in XZ plan)
13	MidCrest_X	Mid-crest X coordinate
14	MidCrest_Y	Mid-crest Y coordinate
15	MidCrest_Z	Mid-crest Z coordinate
16	JOINT Trunk	Joint angle – Trunk This field exists only if Trunk marker is present in quadrupedal case

handles.ANGLES_HL_header [1x39 cell]

Header of ANGLE data (see handles.ANGLE_?HL*) concerning hindlimbs.*

Column	Header	Comments
1	ELEV CrestL	LHL, Elevation angle – Crest-Hip
2	ELEV ThighL	LHL, Elevation angle – Hip-Knee
3	ELEV LegL	LHL, Elevation angle – Knee-Ankle
4	ELEV FootL	LHL, Elevation angle – Ankle-MTP
5	ELEV ToeL	LHL, Elevation angle – MTP-TIP
6	hindlimbL	LHL, Limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
7	JOINT HipL	LHL, Joint angle – Hip
8	JOINT KneeL	LHL, Joint angle – Knee
9	JOINT AnkleL	LHL, Joint angle – Ankle
10	JOINT MTPL	LHL, Joint angle – MTP
11	hindlimbL_LAT	LHL, Limb axis angle in YZ plane – Crest-MTP
12	FootL_ROT	LHL, Foot angle in XZ plane – Ankle-TIP
13	ELEV CrestR	RHL, Elevation angle – Crest-Hip
14	ELEV ThighR	RHL, Elevation angle – Hip-Knee
15	ELEV LegR	RHL, Elevation angle – Knee-Ankle
16	ELEV FootR	RHL, Elevation angle – Ankle-MTP

17	ELEV ToeR	RHL, Elevation angle – MTP-TIP
18	hindlimbR	RHL, Limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
19	JOINT HipR	RHL, Joint angle – Hip
20	JOINT KneeR	RHL, Joint angle – Knee
21	JOINT AnkleR	RHL, Joint angle – Ankle
22	JOINT MTPR	RHL, Joint angle – MTP
23	hindlimbR_LAT	RHL, Limb axis angle in YZ plane – Crest-MTP
24	FootR_ROT	RHL, Foot angle in XZ plane – Ankle-TIP
25	MidSh_X	Mid-shoulder X coordinate
26	MidSh_Y	Mid-shoulder Y coordinate
27	MidSh_Z	Mid-shoulder Z coordinate
28	MidHip_X	Mid-hip X coordinate
29	MidHip_Y	Mid-hip Y coordinate
30	MidHip_Z	Mid-hip Z coordinate
31	TRUNK_sag	Mid-trunk elevation angle (in XY plan)
32	Trunk_R	Trunk elevation angle on right side (in XY plan)
33	Trunk_L	Trunk elevation angle on left side (in XY plan)
34	TRUNKsag	Mid-trunk elevation angle (in XY plan; complementary angle to angle at column 33)
35	Shoulders	Shoulder elevation angle (in XZ plan)
36	Hips	Hip elevation angle (in XZ plan)
37	MidCrest_X	Mid-crest X coordinate
38	MidCrest_Y	Mid-crest Y coordinate
39	MidCrest_Z	Mid-crest Z coordinate
40	JOINT Trunk	Joint angle – Trunk This field exists only if Trunk marker is present in quadrupedal case

LHL: left hindlimb; RHL: right hindlimb

handles.ANGLES_FL_header [1x24 cell]

Header of ANGLE data (see handles.ANGLE_?HL*) concerning forelimbs.*

Column	Header	Comments
1	ELEV ScapulaL	LFL, Elevation angle – Scap-Shoulder
2	ELEV ArmL	LFL, Elevation angle – Shoulder-Elbow
3	ELEV ForearmL	LFL, Elevation angle – Elbow-Wrist
4	ELEV HandL	LFL, Elevation angle – Wrist-Toe
5	ELEV FingerL	'0'
6	ForelimbL	LFL, Limb axis angle in XY plane – Scap-Wrist
7	JOINT ScapL	LFL, Joint angle – Scap
8	JOINT ShoulderL	LFL, Joint angle – Shoulder
9	JOINT ElbowL	LFL, Joint angle – Elbow
10	JOINT WristL	LFL, Joint angle – Wrist
11	ForelimbL_LAT	LFL, Limb axis angle in YZ plane – Scap-Elbow
12	EMPTY	'0'
13	ELEV ScapulaR	RFL, Elevation angle – Scap-Shoulder
14	ELEV ArmR	RFL, Elevation angle – Shoulder-Elbow
15	ELEV ForearmR	RFL, Elevation angle – Elbow-Wrist
16	ELEV HandR	RFL, Elevation angle – Wrist-Toe
17	ELEV FingerR	'0'
18	ForelimbR	RFL, Limb axis angle in XY plane – Scap-Wrist
19	JOINT ScapR	RFL, Joint angle – Scap

20	JOINT ShoulderR	RFL, Joint angle – Shoulder
21	JOINT ElbowR	RFL, Joint angle – Elbow
22	JOINT WristR	RFL, Joint angle – Wrist
23	ForelimbR_LAT	RFL, Limb axis angle in YZ plane – Scap-Elbow
24	EMPTY	'0'

LFL: left forelimb; RFL: right forelimb

handles.ANGLEspeed_LHL [Sx12 double], handles.ANGLEspeed_LHL [Sx12 double], handles.ANGLEspeed_LFL [Sx12 double], handles.ANGLEspeed_LFL [Sx12 double], handles.ANGLEspeed_trunk [Sx15 double]

Time derivatives (i.e. velocity) of computed angles on right (_R) or left (_L*) hindlimb (HL) or forelimb (FL). For computed angles, see* handles.ANGLE_*.

handles.ANGLE_LHL_mean [100x36 double], handles.ANGLE_LHL_mean [100x36 double], handles.ANGLE_LFL_mean [100x36 double], handles.ANGLE_LFL_mean [100x36 double], handles.ANGLE_trunk_mean [100x36 double]

Mean values of handles.ANGLE_??L *(first 12 parameters), mean values plus standard deviation of* handles.ANGLE_??L *(next 12 parameters) and mean values minus standard deviation (last 12 parameters).*

Data are first resampled so to fit to 100 samples per gait cycle: the first N samples are during STANCE phase while the last 100-N are during SWING phase. N is calculated so to correspond to the mean normalized time of stance end / swing onset. Then the average value at each normalized time for each parameter is computed over the non-rejected gait cycles.

For hindlimbs:

Column	Header	Comments
1	CREST	Mean of elevation angle – Crest-Hip
2	THIGH	Mean of elevation angle – Hip-Knee
3	LEG	Mean of elevation angle – Knee-Ankle
4	FOOT	Mean of elevation angle – Ankle-MTP
5	TOE	Mean of elevation angle – MTP-TIP
6	LIMB	Mean of limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
7	HIP	Mean of joint angle – Hip
8	KNEE	Mean of joint angle – Knee
9	ANKLE	Mean of joint angle – Ankle
10	MTP	Mean of joint angle – MTP
11	AB/AD_PELVIS	Mean of limb axis angle in YZ plane – Crest-MTP
12	ROT_PELVIS	Mean of foot angle in XZ plane – Ankle-TIP

For forelimbs:

Column	Header	Comments
1	SCAPULA	Mean of elevation angle – Scap-Shoulder
2	ARM	Mean of elevation angle – Shoulder-Elbow
3	FOREARM	Mean of elevation angle – Elbow-Wrist
4	HAND	Mean of elevation angle – Wrist-Toe
5	EMPTY	'0'
6	LIMB	Mean of limb axis angle in XY plane – Scap-Wrist
7	SCAP	Mean of joint angle – Scap
8	SHOULDER	Mean of joint angle – Shoulder
9	ELBOW	Mean of joint angle – Elbow

10	WRIST	Mean of joint angle – Wrist
11	LAT-LIMB	Mean of limb axis angle in YZ plane – Scap-Elbow
12	EMPTY	'0'

handles.ANGLEspeed_LHL_mean [100x36 double], handles.ANGLEspeed_LHL_mean [100x36 double], handles.ANGLEspeed_LFL_mean [100x36 double], handles.ANGLEspeed_LFL_mean [100x36 double], handles.ANGLEspeed_trunk_mean [100x36 double]
Time derivative of handles.ANGLE_??L _mean*.*

REFERENCE DATA

handles.NonDisabled_LHL [100x12 double], handles.NonDisabled_RHL [100x12 double], handles.NonDisabled_LFL [100x12 double], handles.NonDisabled_RFL [100x12 double]
Contains reference values of some KINEMATIC data (see handles.NonDisabled_header*). LHL, RHL, LFL and RFL stand for left hindlimb, right hindlimb, left forelimb and right forelimb.*

handles.NonDisabled_header [1x12 cell]

Column	Header	Comments
1	ELEV Crest	Elevation angle – Crest-Hip
2	ELEV Thigh	Elevation angle – Hip-Knee
3	ELEV Leg	Elevation angle – Knee-Ankle
4	ELEV Foot	Elevation angle – Ankle-MTP
5	ELEV Toe	Elevation angle – MTP-TIP
6	Hindlimb	Limb axis angle in XY plane – Crest-MTP
7	JOINT Hip	Joint angle – Hip
8	JOINT Knee	Joint angle – Knee
9	JOINT Ankle	Joint angle – Ankle
10	JOINT MTP	Joint angle – MTP
11	Hindlimb_LAT	Limb axis angle in YZ plane – Crest-MTP
12	Foot_ROT	Foot angle in XZ plane – Ankle-TIP

handles.NonDisabled_Speed_LHL [100x8 double], handles.NonDisabled_Speed_RHL [100x8 double], handles.NonDisabled_Speed_LFL [100x8 double], handles.NonDisabled_Speed_RFL [100x8 double],
Time derivatives of the 8 last parameters of the corresponding handles.NonDisabled_??L *matrix (see* handles.NonDisabled_header*). LHL, RHL, LFL and RFL stand for left hindlimb, right hindlimb, left forelimb and right forelimb.*

STANCE – SWING PHASES DATA

handles.gait_data [Sx5 cell]
Collect labels and times when events appear. Remark: Column 5 is identical to column 3.

Column	Header	Comments
1	Animal iD	
2	Limb side	« Left » or « Right »
3	Event	« Foot Strike », « Foot Off » or « Event »
4	Time	in seconds
5	Event	« Foot Strike », « Foot Off » or « Event »

handles.GAIT_INFO [Sx9 double],
handles.GAIT_INFO_FL [Sx9 double]
*Gait info (stance, swing, drag) about hindlimbs (left and right) or about forelimbs (*_FL; left and right). Values of each column are sorted in chronological order.*

Column	Header	Comments
1	EMPTY	
2	Left strike	Time at foot strike (in seconds)
3	Left MIN limb	Time at stance end (in seconds) (defined as the time at minimal axis angle in the case dragging events were not in _GAIT file, otherwise the time value is retrieved from _GAIT file)
4	Left off	Time at toe off (in seconds)
5	EMPTY	
6	EMPTY	
7	Right strike	Time at foot strike (in seconds)
8	Right MIN limb	Time at minimal limb axis angle (in seconds) (defined as the time at minimal axis angle in the case dragging events were not in _GAIT file, otherwise the time value is retrieved from _GAIT file)
9	Right off	Time at toe off (in seconds)

handles.GAIT_SS [Sx3 double]
Separation of gait cycle between stance and swing phases.

Column	Comments
1	Time (in seconds)
2	Left side ; '1' if in stance phase on the left side, '0' otherwise
3	Right side ; '1' if in stance phase on the right side, '0' otherwise

handles.FORCE_SS [Sx3 double]
Separation of gait cycle between stance and swing phases.

Column	Comments
1	Time (in seconds)
2	Left side ; '1' if in stance phase on the left side, '0' otherwise
3	Right side ; '1' if in stance phase on the right side, '0' otherwise

SumAverage DATA

handles.DATA_SumAverage [2x251 double],
handles.DATA_SumAverage_FL [2x251 double]
One row corresponds to one limb side (1st row: left; 2nd row: right).
Parameters from columns 6 to 37 are computed from handles.ANGLEspeed_??L_mean *matrices. Max amplitude is calculated as the maximal value minus the minimal value of the parameter. Mean amplitude is calculated as the average of the values subtracted from the minimal value of the parameter.*
Parameters from columns 38 to 49 are computed from handles.ANGLE_??L_mean *matrices. Standard deviation is calculated as the average of standard deviations of the parameter.*
Parameters from columns 50 to 59 are computed from handles.ANGLE_??L_mean *matrices and* handles.NonDisabled_??L *matrices. For each parameter the maximal R and its corresponding lag are obtained by performing a cross correlation between the values from the actual animal and the ones from the reference animal.*
Parameters from columns 60 to 69 are computed from handles.ANGLEspeed_??L_mean *matrices and* handles.NonDisabled_Speed_??L *matrices. For each parameter the maximal R and its corresponding*

lag are obtained by performing a cross correlation between the values from the actual animal and the ones from the reference animal.
Parameters from columns 70 to 101 are computed from handles.ANGLE_??L *matrices (only joint angles are analyzed). The maximal R and its corresponding lag are calculated for every combination of joint angles of the considered limb.*
Parameters from columns 102 to 107 are computed from limb axis angle values of the considered and the contralateral limbs (values found in handles.ANGLE_??L *matrices).*
Parameters from columns 108 to 251 are computed from handles.ANGLE_??L_mean *matrices. The standard deviation values are first retrieved and then each parameter is resampled so to fit to 10 samples. For each parameter, 'SD 0-10' is thus directly the value of the first sample; 'SD 10-20' is the second value and so forth. It is assumed that the samples 2 to 5 correspond to mid-stance phase while the samples 8 to 9 correspond to the mid-swing phase.*

handles.DATA_SumAverage_header [1x251 cell]

Column	Header	Comments
1	Animal	Animal iD
2	Condition1	Index of condition 1 (index minus 1)
3	Condition2	Index of condition 2 (index minus 1)
4	LimbSide	Limb side (left=1 ; right=2)
5	Speed	Treadmill speed
6	MinFootspeed	Min of mean of elevation angle velocity – MTP-TIP
7	MaxFootspeed	Max of mean of elevation angle velocity – MTP-TIP
8	AMPFootspeed	Max amplitude of mean of elevation angle velocity – MTP-TIP
9	MeanFootspeed	Mean amplitude of mean of elevation angle velocity – MTP-TIP
10	MinLimbspeed	Min of mean of limb axis angle velocity in XY plane (Crest-MTP)
11	MaxLimbspeed	Max of mean of limb axis angle velocity in XY plane (Crest-MTP)
12	AMPLimbspeed	Max amplitude of mean of limb axis angle velocity in XY plane (Crest-MTP)
13	MeanLimbspeed	Mean amplitude of mean of limb axis angle velocity in XY plane (Crest-MTP)
14	MinHipspeed	Min of mean of joint angle velocity – Hip
15	MaxHipspeed	Max of mean of joint angle velocity – Hip
16	AMPHipspeed	Max amplitude of mean of joint angle velocity – Hip
17	MeanHipspeed	Mean amplitude of mean of joint angle velocity – Hip
18	MinKneespeed	Min of mean of joint angle velocity – Knee
19	MaxKneespeed	Max of mean of joint angle velocity – Knee
20	AMPKneespeed	Max amplitude of mean of joint angle velocity – Knee
21	MeanKneespeed	Mean amplitude of mean of joint angle velocity – Knee
22	MinAnklespeed	Min of mean of joint angle velocity – Ankle
23	MaxAnklespeed	Max of mean of joint angle velocity – Ankle
24	AMPAnklespeed	Max amplitude of mean of joint angle velocity – Ankle
25	MeanAnklespeed	Mean amplitude of mean of joint angle velocity – Ankle
26	MinMTPspeed	Min of mean of joint angle velocity – MTP
27	MaxMTPspeed	Max of mean of joint angle velocity – MTP
28	AMPMTPspeed	Max amplitude of mean of joint angle velocity – MTP
29	MeanMTPspeed	Mean amplitude of mean of joint angle velocity – MTP
30	MinAB/AD PELVISspeed	Min of limb axis angle velocity in YZ plane (Crest-MTP)
31	MaxAB/AD PELVISspeed	Max of limb axis angle velocity in YZ plane (Crest-MTP)
32	AMPAB/AD PELVISspeed	Max amplitude of limb axis angle velocity in YZ plane

		(Crest-MTP)
33	MeanAB/AD PELVISspeed	Mean amplitude of limb axis angle velocity in YZ plane (Crest-MTP)
34	MinROT PELVISspeed	Min of foot angle velocity in XZ plane (Ankle-TIP)
35	MaxROT PELVISspeed	Max of foot angle velocity in XZ plane (Ankle-TIP)
36	AMPROT PELVISspeed	Max amplitude of foot angle velocity in XZ plane (Ankle-TIP)
37	MeanROT PELVISspeed	Mean amplitude of foot angle velocity in XZ plane (Ankle-TIP)
38	SD crest	Standard deviation on elevation angle – Crest-Hip
39	SD thigh	Standard deviation on elevation angle – Hip-Knee
40	SD leg	Standard deviation on elevation angle – Knee-Ankle
41	SD foot	Standard deviation on elevation angle – Ankle-MTP
42	SD toe	Standard deviation on elevation angle – MTP-TIP
43	SD limb	Standard deviation on limb axis angle in XY plane – Crest-MTP
44	SD hip	Standard deviation on joint angle – Hip
45	SD knee	Standard deviation on joint angle – Knee
46	SD ankle	Standard deviation on joint angle – Ankle
47	SD MTP	Standard deviation on joint angle – MTP
48	SD AB/AD pelvis	Standard deviation on limb axis angle in YZ plane – Crest-MTP
49	SD ROT pelvis	Standard deviation on foot angle in XZ plane – Ankle-TIP
50	lag LIMB	Lag between limb axis angle in XY plane (Crest-MTP) of studied vs reference animal
51	R LIMB	R max between limb axis angle in XY plane (Crest-MTP) of studied vs reference animal
52	lag HIP	Lag between Hip angle of studied vs reference animal
53	R HIP	R max between Hip angle of studied vs reference animal
54	lag KNEE	Lag between Knee angle of studied vs reference animal
55	R KNEE	R max between Knee angle of studied vs reference animal
56	lag ANKLE	Lag between Ankle angle of studied vs reference animal
57	R ANKLE	R max between Ankle angle of studied vs reference animal
58	lag MTP	Lag between MTP angle of studied vs reference animal
59	R MTP	R max between MTP angle of studied vs reference animal
60	lag LIMBspeed	Lag between limb axis angle velocity in XY plane (Crest-MTP) of studied vs reference animal
61	R LIMBspeed	R max between limb axis angle velocity in XY plane (Crest-MTP) of studied vs reference animal
62	lag HIPspeed	Lag between Hip angle velocity of studied vs reference animal
63	R HIPspeed	R max between Hip angle velocity of studied vs reference animal
64	lag KNEEspeed	Lag between Knee angle velocity of studied vs reference animal
65	R KNEEspeed	R max between Knee angle velocity of studied vs reference animal
66	lag ANKLEspeed	Lag between Ankle angle velocity of studied vs reference animal
67	R ANKLEspeed	R max between Ankle angle velocity of studied vs reference animal
68	lag MTPspeed	Lag between MTP angle velocity of studied vs reference animal

69	R MTPspeed	R max between MTP angle velocity of studied vs reference animal
70	LAG HIP-HIP	Lag between hip and hip angles for maximal R → USEFUL?
71	R HIP-HIP	R max between hip and hip angles → USEFUL?
72	LAG HIP-KNEE	Lag between hip and knee angles for maximal R
73	R HIP-KNEE	R max between hip and knee angles
74	LAG HIP-ANKLE	Lag between hip and ankle angles for maximal R
75	R HIP-ANKLE	R max between hip and ankle angles
76	LAG HIP-MTP	Lag between hip and MTP angles for maximal R
77	R HIP-MTP	R max between hip and MTP angles
78	LAG KNEE-HIP	Lag between knee and hip angles for maximal R →?
79	R KNEE-HIP	R max between knee and hip angles → USEFUL?
80	LAG KNEE-KNEE	Lag between knee and knee angles for maximal R →?
81	R KNEE-KNEE	R max between knee and knee angles → USEFUL?
82	LAG KNEE-ANKLE	Lag between knee and ankle angles for maximal R
83	R KNEE-ANKLE	R max between knee and ankle angles
84	LAG KNEE-MTP	Lag between knee and MTP angles for maximal R
85	R KNEE-MTP	R max between knee and MTP angles
86	LAG ANKLE-HIP	Lag between ankle and hip angles for maximal R
87	R ANKLE-HIP	R max between ankle and hip angles → USEFUL?
88	LAG ANKLE-KNEE	Lag between ankle and knee angles for maximal R
89	R ANKLE-KNEE	R max between ankle and knee angles → USEFUL?
90	LAG ANKLE-ANKLE	Lag between ankle and ankle angles for maximal R
91	R ANKLE-ANKLE	R max between ankle and ankle angles → USEFUL?
92	LAG ANKLE-MTP	Lag between ankle and MTP angles for maximal R
93	R ANKLE-MTP	R max between ankle and MTP angles
94	LAG MTP-HIP	Lag between MTP and hip angles for maximal R
95	R MTP-HIP	R max between MTP and hip angles → USEFUL?
96	LAG MTP-KNEE	Lag between MTP and knee angles for maximal R
97	R MTP-KNEE	R max between MTP and knee angles → USEFUL?
98	LAG MTP-ANKLE	Lag between MTP and ankle angles for maximal R
99	R MTP-ANKLE	R max between MTP and ankle angles → USEFUL?
100	LAG MTP-MTP	Lag between MTP and MTP angles for maximal R
101	R MTP-MTP	R max between MTP and MTP angles → USEFUL?
102	DURATION	Duration between first gait cycle onset and last gait cycle onset
103	lag LIMB Left-Right	Lag between limb axis angles (in XY plane (Crest-MTP)) of considered limb and contralateral limb for minimal R
104	R LIMB Left-Right	R min between limb axis angles (in XY plane (Crest-MTP)) of considered limb and contralateral limb
105	DURATION	Duration between first gait cycle onset and last gait cycle onset → USEFUL? cf column 102
106	Rmin at t=0 ← this is not a R***min***!	R between limb axis angles (in XY plane (Crest-MTP)) of considered limb and contralateral limb without time shift
107	FFT INTERLIMB	Absolute difference between mean phases of limb axis angles (in XY plane (Crest-MTP)) of considered limb and contralateral limb (obtained by FFT)
108	SD crest 0-10	Standard deviation on the mean Crest-Hip elevation angle during the first 10% of the gait cycle duration
109	SD crest 10-20	Standard deviation on the mean Crest-Hip elevation angle between the 10% and 20% of the gait cycle duration
110	SD crest 20-30	Standard deviation on the mean Crest-Hip elevation angle between the 20% and 30% of the gait cycle duration

111	SD crest 30-40	‘’
112	SD crest 40-50	‘’
113	SD crest 50-60	‘’
114	SD crest 60-70	‘’
115	SD crest 70-80	‘’
116	SD crest 80-90	‘’
117	SD crest 90-100	Standard deviation on the mean Crest-Hip elevation angle during the last 10% of the gait cycle
118	SD crest MID-STANCE	Standard deviation on the mean Crest-Hip elevation angle during the mid-stance phase (between the 20% and 50% of the gait cycle duration)
119	SD crest MID-SWING	Standard deviation on the mean Crest-Hip elevation angle during the mid-swing phase (between the 80% and 90% of the gait cycle duration)
120	SD thigh 0-10	Standard deviation on the mean Hip-Knee elevation angle
121	SD thigh 10-20	‘’
122	SD thigh 20-30	‘’
123	SD thigh 30-40	‘’
124	SD thigh 40-50	‘’
125	SD thigh 50-60	‘’
126	SD thigh 60-70	‘’
127	SD thigh 70-80	‘’
128	SD thigh 80-90	‘’
129	SD thigh 90-100	‘’
130	SD thigh MID-STANCE	‘’
131	SD thigh MID-SWING	‘’
132	SD leg 0-10	Standard deviation on the mean Knee-Ankle elevation angle
133	SD leg 10-20	‘’
134	SD leg 20-30	‘’
135	SD leg 30-40	‘’
136	SD leg 40-50	‘’
137	SD leg 50-60	‘’
138	SD leg 60-70	‘’
139	SD leg 70-80	‘’
140	SD leg 80-90	‘’
141	SD leg 90-100	‘’
142	SD leg MID-STANCE	‘’
143	SD leg MID-SWING	‘’
144	SD foot 0-10	Standard deviation on the mean Ankle-MTP elevation angle
145	SD foot 10-20	‘’
146	SD foot 20-30	‘’
147	SD foot 30-40	‘’
148	SD foot 40-50	‘’
149	SD foot 50-60	‘’
150	SD foot 60-70	‘’
151	SD foot 70-80	‘’
152	SD foot 80-90	‘’
153	SD foot 90-100	‘’
154	SD foot MID-STANCE	‘’
155	SD foot MID-SWING	‘’
156	SD toe 0-10	Standard deviation on the mean MTP-TIP elevation angle

157	SD toe 10-20	‘’
158	SD toe 20-30	‘’
159	SD toe 30-40	‘’
160	SD toe 40-50	‘’
161	SD toe 50-60	‘’
162	SD toe 60-70	‘’
163	SD toe 70-80	‘’
164	SD toe 80-90	‘’
165	SD toe 90-100	‘’
166	SD toe MID-STANCE	‘’
167	SD toe MID-SWING	‘’
168	SD limb 0-10	Standard deviation on the mean limb axis angle (Crest-Hip) in XY plane
169	SD limb 10-20	‘’
170	SD limb 20-30	‘’
171	SD limb 30-40	‘’
172	SD limb 40-50	‘’
173	SD limb 50-60	‘’
174	SD limb 60-70	‘’
175	SD limb 70-80	‘’
176	SD limb 80-90	‘’
177	SD limb 90-100	‘’
178	SD limb MID-STANCE	‘’
179	SD limb MID-SWING	‘’
180	SD hip 0-10	Standard deviation on the mean Hip angle
181	SD hip 10-20	‘’
182	SD hip 20-30	‘’
183	SD hip 30-40	‘’
184	SD hip 40-50	‘’
185	SD hip 50-60	‘’
186	SD hip 60-70	‘’
187	SD hip 70-80	‘’
188	SD hip 80-90	‘’
189	SD hip 90-100	‘’
190	SD hip MID-STANCE	‘’
191	SD hip MID-SWING	‘’
192	SD knee 0-10	Standard deviation on the mean Knee angle
193	SD knee 10-20	‘’
194	SD knee 20-30	‘’
195	SD knee 30-40	‘’
196	SD knee 40-50	‘’
197	SD knee 50-60	‘’
198	SD knee 60-70	‘’
199	SD knee 70-80	‘’
200	SD knee 80-90	‘’
201	SD knee 90-100	‘’
202	SD knee MID-STANCE	‘’
203	SD knee MID-SWING	‘’
204	SD ankle 0-10	Standard deviation on the mean Ankle angle
205	SD ankle 10-20	‘’
206	SD ankle 20-30	‘’
207	SD ankle 30-40	‘’
208	SD ankle 40-50	‘’

209	SD ankle 50-60	‘’
210	SD ankle 60-70	‘’
211	SD ankle 70-80	‘’
212	SD ankle 80-90	‘’
213	SD ankle 90-100	‘’
214	SD ankle MID-STANCE	‘’
215	SD ankle MID-SWING	‘’
216	SD MTP 0-10	Standard deviation on the mean MTP angle
217	SD MTP 10-20	‘’
218	SD MTP 20-30	‘’
219	SD MTP 30-40	‘’
220	SD MTP 40-50	‘’
221	SD MTP 50-60	‘’
222	SD MTP 60-70	‘’
223	SD MTP 70-80	‘’
224	SD MTP 80-90	‘’
225	SD MTP 90-100	‘’
226	SD MTP MID-STANCE	‘’
227	SD MTP MID-SWING	‘’
228	SD ABpelvis 0-10	Standard deviation on the mean limb axis angle (Crest-MTP) in YZ plane
229	SD ABpelvis 10-20	‘’
230	SD ABpelvis 20-30	‘’
231	SD ABpelvis 30-40	‘’
232	SD ABpelvis 40-50	‘’
233	SD ABpelvis 50-60	‘’
234	SD ABpelvis 60-70	‘’
235	SD ABpelvis 70-80	‘’
236	SD ABpelvis 80-90	‘’
237	SD ABpelvis 90-100	‘’
238	SD ABpelvis MID-STANCE	‘’
239	SD ABpelvis MID-SWING	‘’
240	SD ROTpelvis 0-10	Standard deviation on the mean foot angle (Ankle-TIP) in XZ plane
241	SD ROTpelvis 10-20	‘’
242	SD ROTpelvis 20-30	‘’
243	SD ROTpelvis 30-40	‘’
244	SD ROTpelvis 40-50	‘’
245	SD ROTpelvis 50-60	‘’
246	SD ROTpelvis 60-70	‘’
247	SD ROTpelvis 70-80	‘’
248	SD ROTpelvis 80-90	‘’
249	SD ROTpelvis 90-100	‘’
250	SD ROTpelvis MID-STANCE	‘’
251	SD ROTpelvis MID-SWING	‘’

handles.DATA_SD_REF [23x1 double],
handles.DATA_SD _header [23x1 cell]

Standard deviation (SD) of some gait parameters. The handles.DATA_SD_REF *refers to the column number in* handles.GAIT_LHL*, or* handles.GAIT_RHL*, or* handles.GAIT_LFL *or* handles.GAIT_RFL*.*

Column	Header	Comments	Ref
1	SD DURATION	SD of the duration of gait cycle (in seconds)	11

2	SD STRIDE	SD of the stride length (defined as the distance between the 3D positions of the ankle marker at gait cycle onset and gait cycle end; takes into account treadmill speed)	12
3	SD ST DUR	SD of stance duration (time between gait cycle onset and stance end; in seconds)	15
4	SD SW DUR	SD of swing duration (time between stance end and gait cycle end; in seconds)	16
5	SD WIDTH	SD of the distance between MTP markers at stance end on Z axis	19
6	SD SD TRUNKsag	SD of the SD on mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	24
7	SD SD TRUNKsag SPEED	SD of the SD on mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	25
8	SD NOR STEP HEIGHT	SD of the normalized step height (step height subtracted by mean of the positions of ankle marker between the first 10 and 20% of the gait cycle)	29
9	SD HIP-END BW	SD of the maximal backward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally backward)	30
10	SD HIP-END FW	SD of the maximal forward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally forward)	31
11	SD ST contra HL	SD of the duration between gait cycle onset (of the considered limb) and stance start of contralateral limb (in percent of gait cycle)	32
12	SD PATH LENGTH	SD of the path length of ankle marker (i.e. distance travelled by ankle marker from swing start to the end of the gait cycle)	34
13	SD PEAK ENDPOINT VEL	SD of the maximal speed of MTP (maximal speed over the entire gait cycle; speed is the module of the time derivative of MTP marker positions on X and Y axes)	35
14	SD TIME PEAK Vend	SD on the time of maximal speed of MTP (for a normalized gait cycle duration; time of at which the maximal speed over the entire gait cycle occurs; speed is the module of the time derivative of MTP marker positions on X and Y axes)	36
15	SD DRAG DUR	SD of drag duration (defined as the duration between start of swing and end of drag; in seconds; set to '0' if negative)	63
16	SD PH2 PH1	SD of the difference between phases of two elevation angles: Hip-Knee minus Crest-Hip	90
17	SD PH3 PH2	SD of the difference between phases of two elevation angles: Knee-Ankle minus Hip-Knee	91
18	SD PH4 PH3	SD of the difference between phases of two elevation angles: Ankle-MTP minus Knee-Ankle	92
19	SD PH5 PH4	SD of the difference between phases of two elevation angles: MTP-TIP minus Ankle-MTP	93
20	SD DOULBE STANCE	SD of double stance duration (in percent of gait cycle duration)	108
21	SD Acc ENDPOINT	SD of the acceleration of MTP at swing onset (calculated as the mean acceleration over the first 5% of instantaneous accelerations during swing phase; acceleration is the module of the double time derivative of MTP marker positions on X and Y axis)	109
22	SD V enpoint	SD of the speed of MTP at swing onset (calculated as the mean speed over the first 5% of instantaneous speeds during swing	112

		phase; speed is the module of the time derivative of MTP marker positions on X and Y axes)	
23	SD angle V endpoint	SD of the angular velocity of MTP at swing onset (calculated as the mean angular velocity over the first 5% of instantaneous angular velocities during swing phase; angular velocity is the arctangent of the time derivative of MTP marker positions on X and Y axes)	113

GAIT DATA

handles.GAIT_LHL [Sx189 double], handles.GAIT_RHL [Sx189 double], handles.GAIT_LFL [Sx189 double], handles.GAIT_RFL [Sx189 double]

Various gait parameters concerning left hindlimb (_LHL), right hindlimb (_RHL), left forelimb (_LFL) or right forelimb (_RFL).

Distances are in cm, times in seconds. X axis = horizontal axis (parallel to the walking direction); Y axis = vertical axis (upward=positive); Z axis = medio-lateral axis.

Column	Comments	GROUPS	
1	Animal iD	A	-10
2	Index of condition 1 (e.g. post-lesion timing (P0, P3, …))	A	-9
3	Index of condition 2 (e.g. type of stimulation (spont., stim., pharma., combo))	A	-8
4	Considered limb side (left: 1; right: 2)	A	-7
5	Treadmill speed	A	-6
6	Gait cycle number	B	-5
7	Time of gait cycle onset (at foot strike; in seconds)	B	-4
8	Time of gait cycle end (at next foot strike; in seconds)	B	-3
9	Frame number at gait cycle onset (at foot strike)	B	-2
10	Frame number at gait cycle end (at next foot strike)	B	-1
11	Duration of gait cycle (in seconds)	B	1
12	Stride length (defined as the distance between the 3D positions of the ankle marker at gait cycle onset and gait cycle end; takes into account treadmill speed)	B	20
13	Speed of animal during stride (i.e. ref #12 divided by ref #11)	B	2
14	Time at stance end / swing onset (if not defined, computed as the time when the angle amplitude of the limb axis is minimal; in seconds)	C	500
15	Stance duration (time between gait cycle onset and stance end; in seconds)	C	3
16	Swing duration (time between stance end and gait cycle end; in seconds)	C	4
17	Stance duration (in percent; i.e. ref #15 divided by ref #11 times 100)	C	5
18	Step length (defined as the distance between the 3D positions of the ankle marker at stance end and gait cycle end (i.e. Euclidian distance travelled by ankle marker during swing); takes into account treadmill speed)	C	21
19	Distance between MTP markers at stance end on Z axis	D	41
20	SD of mid-shoulder on Y axis during one gait cycle	E	49
21	SD of mid-shoulder on Z axis during one gait cycle	E	50
22	SD of mid-hip on Y axis during one gait cycle	E	48
23	SD of mid-hip on Z axis during one gait cycle	E	47
24	SD of mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	E	45
25	SD of velocity of mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	E	46
26	SD of shoulder elevation angle in XZ plane during one gait cycle	E	60

27	SD of hip elevation angle in XZ plane during one gait cycle	E	61
28	Step height (maximal position of ankle marker on Y axis)	C	501
29	Normalized step height (step height subtracted by mean of the positions of ankle marker between the first 10 and 20% of the gait cycle)	C	25
30	Maximum backward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally backward)	D	23
31	Maximum forward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally forward)	D	24
32	Duration between gait cycle onset (of the considered limb) and stance start of contralateral limb (in percent of gait cycle)	F	13
33	Duration between gait cycle onset (of the considered limb) and swing start of contralateral limb (in percent of gait cycle duration)	F	14
34	Path length of ankle marker (i.e. distance travelled by ankle marker from swing start to the end of the gait cycle)	D	22
35	Maximal speed of MTP (maximal speed over the entire gait cycle; speed is the module of the time derivative of MTP marker positions on X and Y axes)	N	26
36	Time of maximal speed of MTP (for a normalized gait cycle duration; time of at which the maximal speed over the entire gait cycle occurs; speed is the module of the time derivative of MTP marker positions on X and Y axes)	N	27
37	BWS (body weight support; in percent)	A	173
38	Max of elevation angle – Crest-Hip	G	76
39	Min of elevation angle – Crest-Hip	G	70
40	Max of elevation angle – Hip-Knee	G	77
41	Min of elevation angle – Hip-Knee	G	71
42	Max of elevation angle – Knee-Ankle	G	78
43	Min of elevation angle – Knee-Ankle	G	72
44	Max of elevation angle – Ankle-MTP	G	79
45	Min of elevation angle – Ankle-MTP	G	73
46	Max of elevation angle – MTP-TIP	G	80
47	Min of elevation angle – MTP-TIP	G	74
48	Max of limb axis angle in XY plane – Crest-MTP	G	81
49	Min of limb axis angle in XY plane – Crest-MTP	G	75
50	Max of joint angle – Hip	G	82
51	Min of joint angle – Hip	G	88
52	Max of joint angle – Knee	G	83
53	Min of joint angle – Knee	G	89
54	Max of joint angle – Ankle	G	84
55	Min of joint angle – Ankle	G	90
56	Max of joint angle – MTP	G	85
57	Min of joint angle – MTP	G	91
58	Max of lateral limb axis angle in YZ plane – Crest-MTP	G	86
59	Min of lateral limb axis angle in YZ plane – Crest-MTP	G	92
60	Max of foot angle in XZ plane – Ankle-TIP	G	87
61	Min of foot angle in XZ plane – Ankle-TIP	G	93
62	Time of drag end	C	502
63	Drag duration (defined as the duration between start of swing and end of drag; in seconds; set to '0' if negative)	C	31
64	Drag duration in percent of swing duration	C	32
65	PC1 variance resulting from PCA applied on elevation angles of the limb	J	130
66	PC2 variance resulting from PCA applied on elevation angles of the limb	J	503
67	PC3 variance resulting from PCA applied on elevation angles of the limb	J	504

68	PC4 variance resulting from PCA applied on elevation angles of the limb	J	505
69	PC5 variance resulting from PCA applied on elevation angles of the limb	J	506
70	PC1 variance resulting from PCA on elevation angles of the two hindlimbs	J	507
71	PC2 variance resulting from PCA on elevation angles of the two hindlimbs	J	508
72	PC3 variance resulting from PCA on elevation angles of the two hindlimbs	J	509
73	PC4 variance resulting from PCA on elevation angles of the two hindlimbs	J	510
74	Lag between limb axis angle of the considered limb and the one of the contralateral limb (limb axis angle in XY plane – Crest-MTP) for minimal R	L	511
75	R min between limb axis angle of the considered limb and the one of the contralateral limb (limb axis angle in XY plane – Crest-MTP)	L	6
76	Lag between limb axis angle of the considered limb and the one of the ipsilateral forelimb (limb axis angle in XY plane – Crest-MTP) for minimal R	L	512
77	R min between limb axis angle of the considered limb and the one of the ipsilateral forelimb (limb axis angle in XY plane – Crest-MTP)	L	15
78	Lag between limb axis angle of the considered limb and the one of the contralateral forelimb (limb axis angle in XY plane – Crest-MTP) for minimal R	L	513
79	R min between limb axis angle of the considered limb and the one of the contralateral forelimb (limb axis angle in XY plane – Crest-MTP)	L	16
80	Phase of elevation angle Crest-Hip at maximal amplitude (obtained by FFT)	K	514
81	Maximal amplitude of elevation angle Crest-Hip (obtained by FFT)	K	515
82	Phase of elevation angle Hip-Knee at maximal amplitude (obtained by FFT)	K	516
83	Maximal amplitude of elevation angle – Hip-Knee (obtained by FFT)	K	517
84	Phase of elevation angle Knee-Ankle at maximal amplitude (obtained by FFT)	K	518
85	Maximal amplitude of elevation angle – Knee-Ankle (obtained by FFT)	K	519
86	Phase of elevation angle Ankle-MTP at maximal amplitude (obtained by FFT)	K	520
87	Maximal amplitude of elevation angle – Ankle-MTP (obtained by FFT)	K	521
88	Phase of elevation angle MTP-TIP at maximal amplitude (obtained by FFT)	K	522
89	Maximal amplitude of elevation angle – MTP-TIP (obtained by FFT)	K	523
90	Difference between phases of two elevation angles: Hip-Knee minus Crest-Hip	K	131
91	Difference between phases of two elevation angles: Knee-Ankle minus Hip-Knee	K	132
92	Difference between phases of two elevation angles: Ankle-MTP minus Knee-Ankle	K	133
93	Difference between phases of two elevation angles: MTP-TIP minus Ankle-MTP	K	134
94	Lag between Crest-Hip and Hip-Knee elevation angles for maximal R	L	524
95	R max between Crest-Hip and Hip-Knee elevation angles	L	135
96	Lag between Hip-Knee and Knee-Ankle elevation angles for maximal R	L	525
97	R max between Hip-Knee and Knee-Ankle elevation angles	L	136
98	Lag between Knee-Ankle and Ankle-MTP elevation angles for maximal R	L	526
99	R max between Knee-Ankle and Ankle-MTP elevation angles	L	137
100	Lag between Ankle-MTP and MTP-TIP elevation angles for maximal R	L	527
101	R max between Ankle-MTP and MTP-TIP elevation angles	L	138
102	Lag between Hip and Knee angles for maximal R	L	528
103	R max between Hip and Knee angles	L	139
104	Lag between Knee and Ankle angles for maximal R	L	529
105	R max between Knee and Ankle angles	L	140
106	Lag between Ankle and MTP angles for maximal R	L	530
107	R max between Ankle and MTP angles	L	141

108	Double stance duration (in percent of gait cycle duration)	F	7
109	Acceleration of MTP at swing onset (calculated as the mean acceleration over the first 5% of instantaneous accelerations during swing phase; acceleration is the module of the double time derivative of MTP marker positions on X and Y axis)	N	28
110	Lateral displacement during swing (defined as the distance between the two positions on Z axis of the ankle marker at start and end of swing)	D	40
111	'0' if gait cycle is rejected, '1' otherwise	B	531
112	Speed of MTP at swing onset (calculated as the mean speed over the first 5% of instantaneous speeds during swing phase; speed is the module of the time derivative of MTP marker positions on X and Y axes)	N	29
113	Angular velocity of MTP at swing onset (calculated as the mean angular velocity over the first 5% of instantaneous angular velocities during swing phase; angular velocity is the arctangent of the time derivative of MTP marker positions on X and Y axes)	N	30
114	Difference between max and min values of elevation angle – Crest-Hip	G	94
115	Difference between max and min values of elevation angle – Hip-Knee	G	95
116	Difference between max and min values of elevation angle – Knee-Ankle	G	96
117	Difference between max and min values of elevation angle – Ankle-MTP	G	97
118	Difference between max and min values of elevation angle – MTP-TIP	G	98
119	Difference between max and min values of limb axis angle in XY plane – Crest-MTP	G	99
120	Difference between max and min values of joint angle – Hip	G	100
121	Difference between max and min values of joint angle – Knee	G	101
122	Difference between max and min values of joint angle – Ankle	G	102
123	Difference between max and min values of joint angle – MTP	G	103
124	Difference between max and min values of lateral limb axis angle in YZ plane – Crest-MTP	G	104
125	Difference between max and min values of foot angle in XZ plane – Ankle-TIP	G	105
126	Normalized maximal position of hip marker on Y axis	D	42
127	Normalized minimal position of hip marker on Y axis	D	43
128	Difference between normalized max and min positions of hip marker on Y axis	D	44
129	Mean force during stance phase on X axis	H	172
130	Mean force during stance phase on Y axis	H	170
131	Mean force during stance phase on Z axis	H	171
132	Mean force during single support stance phase on X axis	H	532
133	Mean force during single support stance phase on Y axis	H	533
134	Mean force during single support stance phase on Z axis	H	534
135	Lag between limb axis angle of *reference* vs considered limb (limb axis angle in XY plane – Crest-MTP) for minimal R	L	180
136	R min between limb axis angle of *reference* vs considered limb (limb axis angle in XY plane – Crest-MTP)	L	181
137	Lag between Hip angle of *reference* vs considered limb for minimal R	L	182
138	R min between Hip angle of *reference* vs considered limb	L	183
139	Lag between Knee angle of *reference* vs considered limb for minimal R	L	184
140	R min between Knee angle of *reference* vs considered limb	L	185
141	Lag between Ankle angle of *reference* vs considered limb for minimal R	L	186
142	R min between Ankle angle of *reference* vs considered limb	L	187
143	Lag between MTP angle of *reference* vs considered limb for minimal R	L	188
144	R min between MTP angle of *reference* vs considered limb	L	189
145	Duration between min of Crest-Hip elevation angle and min of Hip-Knee	M	142

	elevation angle (in percent of gait cycle duration; [-50;50])		
146	Duration between max of Crest-Hip elevation angle and max of Hip-Knee elevation angle (in percent of gait cycle duration; [-50;50])	M	143
147	Duration between min of Hip-Knee elevation angle and min of Knee-Ankle elevation angle (in percent of gait cycle duration; [-50;50])	M	144
148	Duration between max of Hip-Knee elevation angle and max of Knee-Ankle elevation angle (in percent of gait cycle duration; [-50;50])	M	145
149	Duration between min of Knee-Ankle elevation angle and min of Ankle-MTP elevation angle (in percent of gait cycle duration; [-50;50])	M	146
150	Duration between max of Knee-Ankle elevation angle and max of Ankle-MTP elevation angle (in percent of gait cycle duration; [-50;50])	M	147
151	Duration between min of Ankle-MTP elevation angle and min of MTP-TIP elevation angle (in percent of gait cycle duration; [-50;50])	M	148
152	Duration between max of Ankle-MTP elevation angle and max of MTP-TIP elevation angle (in percent of gait cycle duration; [-50;50])	M	149
153	Max of limb axis angle velocity (in XY plane – Crest-MTP)	G	115
154	Min of limb axis angle velocity (in XY plane – Crest-MTP)	G	110
155	Difference between max and min values of limb axis angle velocity (in XY plane – Crest-MTP)	G	120
156	Max of joint angle velocity – Hip	G	116
157	Min of joint angle velocity – Hip	G	111
158	Difference between max and min values of joint angle velocity – Hip	G	121
159	Max of joint angle velocity – Knee	G	117
160	Min of joint angle velocity – Knee	G	112
161	Difference between max and min values of joint angle velocity – Knee	G	122
162	Max of joint angle velocity – Ankle	G	118
163	Min of joint angle velocity – Ankle	G	113
164	Difference between max and min values of joint angle velocity – Ankle	G	123
165	Max of joint angle velocity – MTP	G	119
166	Min of joint angle velocity – MTP	G	114
167	Difference between max and min values of joint angle velocity – MTP	G	124
168	Duration between gait cycle onset (of the considered limb) and stance start of forelimb on the same side (in percent of gait cycle)	F	535
169	Duration between gait cycle onset (of the considered limb) and swing start of forelimb on the same side (in percent of gait cycle)	F	536
170	Duration between gait cycle onset (of the considered limb) and stance start of contralateral forelimb (in percent of gait cycle)	F	537
171	Duration between gait cycle onset (of the considered limb) and swing start of contralateral forelimb (in percent of gait cycle)	F	538
172	Percent of no stance (no limb touches ground) during the full gait cycle duration	F	8
173	Percent of single stance (a single limb touches ground) during the full gait cycle duration	F	9
174	Percent of double stance (two limbs touch ground) during the full gait cycle duration	F	10
175	Percent of triple stance (three limbs touch ground) during the full gait cycle duration	F	11
176	Percent of quadruple stance (four limbs touch ground) during the full gait cycle duration	F	12
177	Difference between max and min position of the virtual COM on X axis – horizontal movement	I	62
178	Difference between max and min position of the virtual COM on Z axis – lateral movement	I	63

179	Difference between max and min position of the virtual COM on Y axis – vertical movement	I	64
180	Path length of virtual COM (i.e. distance travelled by the virtual center of mass during the full gait cycle)	I	65
181	Relative horizontal position of the foot-rung during stance	O	36
182	Relative vertical position of the foot-rung during stance	O	37
183	Relative horizontal position of the foot (percent distance between rungs)	O	38
184	Max of joint angle – Trunk	G	539
185	Min of joint angle – Trunk	G	540
186	Difference between max and min values of joint angle – Trunk	G	541
187	Max of joint angle velocity – Trunk	G	542
188	Min of joint angle velocity – Trunk	G	543
189	Difference between max and min values of joint angle velocity – Trunk	G	544

SUBGROUPS:

A. params fixed for the whole recording (animal iD, conditions, treadmill speed, BWS)
B. params concerning the full gait cycle
C. params concerning STANCE, SWING, DRAG
D. params concerning markers position (distance between 2 markers or travelled by a marker)
E. variation of params during the gait cycle
F. params concerning inter-limbs coordination
G. params concerning angle and angular velocity
H. params concerning force
I. params concerning the virtual COM (i.e. virtual center of mass)
J. params about PCA
K. params about FFT
L. params about correlation
M. params about kinematic timing
N. params about angle, velocity, acceleration at swing onset
O. params about ladder condition

REMARKS:

- 129 – 134: NaN, if force data are not recorded
- 168 – 176: NaN, if in bipedal mode (i.e. if GAIT_INFO_FL is empty)
- 181 – 183: NaN, if no ladder
- 184 – 189: NaN, if trunk marker is absent
- The **virtual COM** is defined as the mean position between Mid-Hip and Mid-Crest positions; Mid-Hip position is defined as the middle point between left and right hip markers, similarly for Mid-Crest position
- **PCA** refers to Principal Component Analysis, and **PC** to Principal Component; PC1 is the first PC, i.e. it has the largest variance (or eigenvalue), PC2 is the second and so on.
- **R max** is the maximal correlation between the two signals (resampled to 100 samples), **lag** represents the delay between the two signals to maximally correlate (in number of samples (after resampling to 100 samples))
- **HINDLIMB vs FORELIMB**: if considered limb is not a hindlimb but a forelimb, MTP is replaced by Wrist, Ankle by Elbow, Knee by Shoulder, Hip by Scap or Crest by Scap, TIP by Toe.

FUNCTIONS:

- ___ : computed in params_gait
- ___ : computed in params_PCA_FFT_cross
- ___ : computed in params_KIN_timing
- ___ : computed in params_ENDPOINT
- ___ : computed in params_compare_crosscor

handles.DATA_GAIT_header [1x198 cell]
handles.DATA_GAIT_header_REF [1x198 double]

handles.GAIT_??L *and their header* handles.DATA_GAIT_header *are reorganized according to* handles.DATA_GAIT_header_REF *before saving the data into* _SUM *file. Below is the reorganized version (Ref column refers to position of data before reorganization).*

#	String	Comments	Ref
1	ANIMAL	Animal iD	1
2	CONDITION 1	Index of condition 1 (e.g. post-lesion timing (P0, P3, …))	2
3	CONDITION 2	Index of condition 2 (e.g. type of stimulation (spont., stim., pharma., combo))	3
4	LIMB SIDE	Considered limb side (left: 1; right: 2)	4
5	SPEED	Treadmill speed	5
6	CYCLE	Gait cycle number	6
7	G ONSET	Time of gait cycle onset (at foot strike; in seconds)	7
8	G END	Time of gait cycle end (at next foot strike; in seconds)	8
9	T ONSET	Frame number at gait cycle onset (at foot strike)	9
10	T END	Frame number at gait cycle end (at next foot strike)	10
11	DURATION	Duration of gait cycle (in seconds)	11
12	VELOCITY	Speed of animal during stride (i.e. ref #12 divided by ref #11)	13
13	ST DUR	Stance duration (time between gait cycle onset and stance end; in seconds)	15
14	SW DUR	Swing duration (time between stance end and gait cycle end; in seconds)	16
15	%ST DUR	Stance duration (in percent; i.e. ref #15 divided by ref #11 times 100)	17
16	Rt=0 HINDLIMBS	R between limb axis angle of the considered limb and the one of the contralateral limb (limb axis angle in XY plane – Crest-MTP) with no time shift	75
17	DOUBLE STANCE	Double stance (in percent of gait cycle duration)	108
18	FLIGHT	Percent of no stance (no limb touches ground) during the full gait cycle duration	172
19	STANCE ONE LIMB	Percent of single stance (a single limb touches ground) during the full gait cycle duration	173
20	STANCE TWO LIMBS	Percent of double stance (two limbs touch ground) during the full gait cycle duration	174
21	STANCE THREE LIMBS	Percent of triple stance (three limbs touch ground) during the full gait cycle duration	175
22	STANCE FOUR LIMBS	Percent of quadruple stance (four limbs touch ground) during the full gait cycle duration	176
23	ST contra HL	Duration between gait cycle onset (of the considered limb) and stance start of contralateral limb (in percent of gait cycle)	32
24	SW contra HL	Duration between gait cycle onset (of the considered limb) and swing start of contralateral limb (in percent of gait cycle duration)	33
25	Rt=0 HL IPSIFL	R min between limb axis angle of the considered limb and the one of the ipsilateral forelimb (limb axis angle in XY plane – Crest-MTP)	77
26	Rt=0 HL CONFL	R min between limb axis angle of the considered limb and the one of the contralateral forelimb (limb axis angle in XY plane – Crest-MTP)	79
27	L STRIDE	Stride length (defined as the distance between the 3D positions of the ankle marker at gait cycle onset and gait cycle end; takes into account treadmill speed)	12
28	L STEP	Step length (defined as the distance between the 3D positions of the ankle marker at stance end and gait cycle end (i.e. Euclidian distance travelled by ankle marker during swing); takes into account treadmill speed)	18

29	L PATH	Path length of ankle marker (i.e. distance travelled by ankle marker from swing start to the end of the gait cycle)	34
30	HIP-END BW	Maximum backward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally backward)	30
31	HIP-END FW	Maximum forward position (X position of crest marker minus X position of ankle marker at gait cycle time when ankle is maximally forward)	31
32	STEP HEIGHT nor	Normalized step height (step height subtracted by mean of the positions of ankle marker between the first 10 and 20% of the gait cycle)	29
33	MAX ENDPOINT Vel	Maximal speed of MTP (maximal speed over the entire gait cycle; speed is the module of the time derivative of MTP marker positions on X and Y axes)	35
34	T MAX ENDPOINT Vel	Time of maximal speed of MTP (for a normalized gait cycle duration; time of at which the maximal speed over the entire gait cycle occurs; speed is the module of the time derivative of MTP marker positions on X and Y axes)	36
35	Acc ENDPOINT	Acceleration of MTP at swing onset (calculated as the mean acceleration over the first 5% of instantaneous accelerations during swing phase; acceleration is the module of the double time derivative of MTP marker positions on X and Y axes)	109
36	Vel ENDPOINT	Speed of MTP at swing onset (calculated as the mean speed over the first 5% of instantaneous speeds during swing phase; speed is the module of the time derivative of MTP marker positions on X and Y axes)	112
37	Angle Vel ENPOINT	Angular velocity of MTP at swing onset (calculated as the mean angular velocity over the first 5% of instantaneous angular velocities during swing phase; angular velocity is the arctangent of the time derivative of MTP marker positions on X and Y axes)	113
38	T DRAG	Drag duration (defined as the duration between start of swing and end of drag; in seconds; set to 0 if negative)	63
39	%DRAG	Drag duration in percent of swing duration	64
40	FootLADDER_h	Relative horizontal position of the foot-rung during stance	181
41	FootLADDER_v	Relative vertical position of the foot-rung during stance	182
42	Perc_FootLADDER	Relative horizontal position of the foot (percent distance between rungs)	183
43	FOOT SW LAT	Lateral displacement during swing (defined as the distance between the two positions on Z axis of the ankle marker at start and end of swing)	110
44	STEP WIDTH	Distance between MTP markers at stance end on Z axis	19
45	MAX HipY nor	Normalized maximal position of hip marker on Y axis	126
46	MIN HipY nor	Normalized minimal position of hip marker on Y axis	127
47	AMP HipY	Difference between normalized max and min positions of hip marker on Y axis	128
48	SD MidTrunk XY	SD of mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	24
49	SD MidTrunk XY Vel	SD of velocity of mid-trunk elevation in XY plane (sagittal plane) during one gait cycle	25
50	SD MidHip Z	SD of mid-hip on Z axis during one gait cycle	23
51	SD MidHip Y	SD of mid-hip on Y axis during one gait cycle	22
52	SD MidSh Y	SD of mid-shoulder on Y axis during one gait cycle	20
53	SD MidSh Z	SD of mid-shoulder on Z axis during one gait cycle	21
54	SD Shoulders	SD of shoulder elevation angle in XZ plane during one gait cycle	26
55	SD Hips	SD of hip elevation angle in XZ plane during one gait cycle	27

56	L VirtCOM fw	Difference between max and min position of the virtual COM on X axis – horizontal movement	177
57	L VirtCOM lat	Difference between max and min position of the virtual COM on Z axis – lateral movement	178
58	L VirtCOM vert	Difference between max and min position of the virtual COM on Y axis – vertical movement	179
59	L VirtCOM 3D	Path length of virtual COM (i.e. distance travelled by the virtual center of mass during the full gait cycle)	180
60	MIN ELE 1	Min of elevation angle – Crest-Hip	39
61	MIN ELE 2	Min of elevation angle – Hip-Knee	41
62	MIN ELE 3	Min of elevation angle – Knee-Ankle	43
63	MIN ELE 4	Min of elevation angle – Ankle-MTP	45
64	MIN ELE 5	Min of elevation angle – MTP-TIP	47
65	MIN ELE 6	Min of limb axis angle in XY plane – Crest-MTP	49
66	MAX ELE 1	Max of elevation angle – Crest-Hip	38
67	MAX ELE 2	Max of elevation angle – Hip-Knee	40
68	MAX ELE 3	Max of elevation angle – Knee-Ankle	42
69	MAX ELE 4	Max of elevation angle – Ankle-MTP	44
70	MAX ELE 5	Max of elevation angle – MTP-TIP	46
71	MAX ELE 6	Max of limb axis angle in XY plane – Crest-MTP	48
72	MAX JOINT 1	Max of joint angle – Hip	50
73	MAX JOINT 2	Max of joint angle – Knee	52
74	MAX JOINT 3	Max of joint angle – Ankle	54
75	MAX JOINT 4	Max of joint angle – MTP	56
76	MAX LIMBLAT	Max of lateral limb axis angle in YZ plane – Crest-MTP	58
77	MAX FOOTROT	Max of foot angle in XZ plane – Ankle-TIP	60
78	MIN JOINT 1	Min of joint angle – Hip	51
79	MIN JOINT 2	Min of joint angle – Knee	53
80	MIN JOINT 3	Min of joint angle – Ankle	55
81	MIN JOINT 4	Min of joint angle – MTP	57
82	MIN LIMBLAT	Min of lateral limb axis angle in YZ plane – Crest-MTP	59
83	MIN FOOTROT	Min of foot angle in XZ plane – Ankle-TIP	61
84	AMP ELE 1	Difference between max and min values of elevation angle – Crest-Hip	114
85	AMP ELE 2	Difference between max and min values of elevation angle – Hip-Knee	115
86	AMP ELE 3	Difference between max and min values of elevation angle – Knee-Ankle	116
87	AMP ELE 4	Difference between max and min values of elevation angle – Ankle-MTP	117
88	AMP ELE 5	Difference between max and min values of elevation angle – MTP-TIP	118
89	AMP LIMB	Difference between max and min values of limb axis angle in XY plane – Crest-MTP	119
90	AMP JOINT 1	Difference between max and min values of joint angle – Hip	120
91	AMP JOINT 2	Difference between max and min values of joint angle – Knee	121
92	AMP JOINT 3	Difference between max and min values of joint angle – Ankle	122
93	AMP JOINT 4	Difference between max and min values of joint angle – MTP	123
94	AMP LIMBLAT	Difference between max and min values of lateral limb axis angle in YZ plane – Crest-MTP	124
95	AMP FOOTROT	Difference between max and min values of foot angle in XZ plane – Ankle-TIP	125

96	MIN SPEEDLIMB 1	Min of limb axis angle velocity (in XY plane – Crest-MTP)	154
97	MIN SPEEDJOINT 1	Min of joint angle velocity – Hip	157
98	MIN SPEEDJOINT 2	Min of joint angle velocity – Knee	160
99	MIN SPEEDJOINT 3	Min of joint angle velocity – Ankle	163
100	MIN SPEEDJOINT 4	Min of joint angle velocity – MTP	166
101	MAX SPEEDLIMB 1	Max of limb axis angle velocity (in XY plane – Crest-MTP)	153
102	MAX SPEEDJOINT 1	Max of joint angle velocity – Hip	156
103	MAX SPEEDJOINT 2	Max of joint angle velocity – Knee	159
104	MAX SPEEDJOINT 3	Max of joint angle velocity – Ankle	162
105	MAX SPEEDJOINT 4	Max of joint angle velocity – MTP	165
106	AMP SPEEDLIMB 1	Difference between max and min values of limb axis angle velocity (in XY plane – Crest-MTP)	155
107	AMP SPEEDJOINT 1	Difference between max and min values of joint angle velocity – Hip	158
108	AMP SPEEDJOINT 2	Difference between max and min values of joint angle velocity – Knee	161
109	AMP SPEEDJOINT 3	Difference between max and min values of joint angle velocity – Ankle	164
110	AMP SPEEDJOINT 4	Difference between max and min values of joint angle velocity – MTP	167
111	PC1	PC1 variance resulting from PCA applied on elevation angles of the hindlimb	65
112	PH2 PH1	Difference between phases of two elevation angles: Hip-Knee minus Crest-Hip	90
113	PH3 PH2	Difference between phases of two elevation angles: Knee-Ankle minus Hip-Knee	91
114	PH4 PH3	Difference between phases of two elevation angles: Ankle-MTP minus Knee-Ankle	92
115	PH5 PH4	Difference between phases of two elevation angles: MTP-TIP minus Ankle-MTP	93
116	R CREST-THIGH	R max between Crest-Hip and Hip-Knee elevation angles	95
117	R THIGH-LEG	R max between Hip-Knee and Knee-Ankle elevation angles	97
118	R LEG-FOOT	R max between Knee-Ankle and Ankle-MTP elevation angles	99
119	R FOOT - TOE	R max between Ankle-MTP and MTP-TIP elevation angles	101
120	R HIP-KNEE	R max between Hip and Knee angles	103
121	R KNEE-ANKLE	R max between Knee and Ankle angles	105
122	R ANKLE-MTP	R max between Ankle and MTP angles	107
123	CREST-THIGH timingMIN	Duration between min of Crest-Hip elevation angle and min of Hip-Knee elevation angle (in percent of gait cycle duration; [-50;50])	145
124	CREST-THIGH timingMAX	Duration between max of Crest-Hip elevation angle and max of Hip-Knee elevation angle (in percent of gait cycle duration; [-50;50])	146

125	THIGH-LEG timingMIN	Duration between min of Hip-Knee elevation angle and min of Knee-Ankle elevation angle (in percent of gait cycle duration; [-50;50])	147
126	THIGH-LEG timingMAX	Duration between max of Hip-Knee elevation angle and max of Knee-Ankle elevation angle (in percent of gait cycle duration; [-50;50])	148
127	LEG-FOOT timingMIN	Duration between min of Knee-Ankle elevation angle and min of Ankle-MTP elevation angle (in percent of gait cycle duration; [-50;50])	149
128	LEG-FOOT timingMAX	Duration between max of Knee-Ankle elevation angle and max of Ankle-MTP elevation angle (in percent of gait cycle duration; [-50;50])	150
129	FOOT-TOE timingMIN	Duration between min of Ankle-MTP elevation angle and min of MTP-TIP elevation angle (in percent of gait cycle duration; [-50;50])	151
130	FOOT-TOE timingMAX	Duration between max of Ankle-MTP elevation angle and max of MTP-TIP elevation angle (in percent of gait cycle duration; [-50;50])	152
131	Yfor STANCE	Mean force during stance phase on Y axis	130
132	Zfor STANCE	Mean force during stance phase on Z axis	131
133	Xfor STANCE	Mean force during stance phase on X axis	129
134	BWS	BWS (body weight support; in percent)	37
135	LIMB_lag	Lag between limb axis angle of *reference* vs considered limb (limb axis angle in XY plane – Crest-MTP) for minimal R	135
136	LIMB_R	R min between limb axis angle of *reference* limb and the one of the considered limb (limb axis angle in XY plane – Crest-MTP)	136
137	HIP lag	Lag between Hip angle of *reference* vs considered limb for minimal R	137
138	HIP R	R min between Hip angle of *reference* vs considered limb	138
139	KNEE lag	Lag between Knee angle of *reference* vs considered limb for minimal R	139
140	KNEE R	R min between Knee angle of *reference* s considered limb	140
141	ANKLE lag	Lag between Ankle angle of *reference* vs considered limb for minimal R	141
142	ANKLE R	R min between Ankle angle of *reference* vs considered limb	142
143	MTP lag	Lag between MTP angle of *reference* vs considered limb for minimal R	143
144	MTP R	R min between MTP angle of *reference* vs considered limb	144
145	STANCE	Time at stance end / swing onset (if not defined, computed as the time when the angle amplitude of the limb axis is minimal; in seconds)	14
146	STEP HEIGHT	Step height (maximal position of ankle marker on Y axis)	28
147	T DRAG END	Time of drag end	62
148	PC2	PC2 variance resulting from PCA applied on elevation angles of the limb	66
149	PC3	PC3 variance resulting from PCA applied on elevation angles of the limb	67
150	PC4	PC4 variance resulting from PCA applied on elevation angles of the limb	68
151	PCA5	PC5 variance resulting from PCA applied on elevation angles of the limb	69
152	PC1	PC1 variance resulting from PCA on elevation angles of the two hindlimbs	70
153	PC2	PC2 variance resulting from PCA on elevation angles of the two hindlimbs	71
154	PC3	PC3 variance resulting from PCA on elevation angles of the two hindlimbs	72
155	PC4	PC4 variance resulting from PCA on elevation angles of the two hindlimbs	73
156	LAG HINDLIMBS	Lag between limb axis angle of the considered limb and the one of the contralateral limb (limb axis angle in XY plane – Crest-MTP) for minimal R	74
157	LAG HL IPSIFL	Lag between limb axis angle of the considered limb and the one of the ipsilateral forelimb (limb axis angle in XY plane – Crest-MTP) for minimal R	76
158	LAG HL CONFL	Lag between limb axis angle of the considered limb and the one of the contralateral forelimb (limb axis angle in XY plane – Crest-MTP) for minimal R	78
159	PH1	Phase of elevation angle Crest-Hip at maximal amplitude (obtained by FFT)	80
160	AMP1	Maximal amplitude of elevation angle Crest-Hip (obtained by FFT)	81
161	PH2	Phase of elevation angle Hip-Knee at maximal amplitude (obtained by FFT)	82

162	AMP2	Maximal amplitude of elevation angle – Hip-Knee (obtained by FFT)	83
163	PH3	Phase of elevation angle Knee-Ankle at maximal amplitude (obtained by FFT)	84
164	AMP3	Maximal amplitude of elevation angle – Knee-Ankle (obtained by FFT)	85
165	PH4	Phase of elevation angle Ankle-MTP at maximal amplitude (obtained by FFT)	86
166	AMP4	Maximal amplitude of elevation angle – Ankle-MTP (obtained by FFT)	87
167	PH5	Phase of elevation angle MTP-TIP at maximal amplitude (obtained by FFT)	88
168	AMP5	Maximal amplitude of elevation angle – MTP-TIP (obtained by FFT)	89
169	LAG CREST-THIGH	Lag between Crest-Hip and Hip-Knee elevation angles for maximal R	94
170	LAG THIGH-LEG	Lag between Hip-Knee and Knee-Ankle elevation angles for maximal R	96
171	LAG LEG-FOOT	Lag between Knee-Ankle and Ankle-MTP elevation angles for maximal R	98
172	LAG FOOT - TOE	Lag between Ankle-MTP and MTP-TIP elevation angles for maximal R	100
173	LAG HIP-KNEE	Lag between Hip and Knee angles for maximal R	102
174	LAG KNEE-ANKLE	Lag between Knee and Ankle angles for maximal R	104
175	LAG ANKLE-MTP	Lag between Ankle and MTP angles for maximal R	106
176	Kin AVE	‘0’ if gait cycle is rejected, ‘1’ otherwise	111
177	Xfor singleSTANCE	Mean force during single support stance phase on X axis	132
178	Yfor singleSTANCE	Mean force during single support stance phase on Y axis	133
179	Zfor singleSTANCE	Mean force during single support stance phase on Z axis	134
180	Stance IPSIFORE	Duration between gait cycle onset (of the considered limb) and stance start of forelimb on the same side (in percent of gait cycle)	168
181	Swing IPSIFORE	Duration between gait cycle onset (of the considered limb) and swing start of forelimb on the same side (in percent of gait cycle)	169
182	Stance CONTRAFORE	Duration between gait cycle onset (of the considered limb) and stance start of contralateral forelimb (in percent of gait cycle)	170
183	Swing CONTRAFORE	Duration between gait cycle onset (of the considered limb) and swing start of contralateral forelimb (in percent of gait cycle)	171
184	MAX JOINT TRUNK	Max of joint angle – Trunk	184
185	MIN JOINT TRUNK	Min of joint angle – Trunk	185
186	AMP JOINT TRUNK	Difference between max and min values of joint angle – Trunk	186
187	MAX SPEEDJOINT TRUNK	Max of joint angle velocity – Trunk	187
188	MIN SPEEDJOINT TRUNK	Min of joint angle velocity – Trunk	188
189	AMP SPEEDJOINT TRUNK	Difference between max and min values of joint angle velocity – Trunk	189

FILES

TXT FILES

_GAIT_SUM.txt

For each gait cycle, various gait parameters are saved.

Header:

- Default: [handles.FILE_header, GAIT_header, [1,2]]
    1. If EMG analysis: DATA_EMG_header
    2. If CoContraction analysis: DATA_CoCo_header

Rows:

- Gait cycle

_MEAN_SUM.txt

For each limb, various gait parameters are averaged over the non-rejected gait cycles.

Header:

- Default: [handles.FILE_header, handles.ENDPOINT_PCA_header, [1, 2, 3, 4], GAIT_header, handles.DATA_SD_header]
    1. If comparison with NonDisabled animal: handles.DATA_SumAverage_header
    2. If EMG features on LHL: handles.EMG_features_header_L
    3. If EMG features on RHL: handles.EMG_features_header_R
    4. If Force features: handles.FORCE_features_header

Rows:

- Limb

_RIGHT_HL.txt, _LEFT_HL.txt, _RIGHT_FL.txt, _LEFT_FL.txt

For each limb (i.e. for each file), means and standard deviations of computed angles (angles values over during a gait cycle are resampled to 100 samples and averaged over the non-rejected gait cycles.

Header:

- For hindlimbs (_HL.txt): [HEADER_HL]
- For forelimbs (_FL.txt): [HEADER_FL]

Rows:

- 1 row represent 1% of the mean gait cycle

_KIN.txt, _KINA.txt

For bipedal (_KIN.txt) or quadrupedal (_KINA.txt) case, save angles and kinematics values for each gait cycle.

Header:

- If bipedal (_KIN.txt): [handles.TIME_header, handles.ANGLES_HL_header, handles.DATA_KIN_HL_header(3:end)]
- If quadrupedal (_KINA.txt): [handles.TIME_header, handles.ANGLES_HL_header, handles.ANGLES_FL_header, handles.DATA_KIN_FL_header(3:end)]

Rows:

- Gait cycle

_EMG.txt

If EMG data exist and "ALL" option from save menu is selected, EMG data for each gait cycle are saved.

Header:

- [handles.TIME_header, handles.DATA_EMG_header]

Rows:

- Gait cycle

_FORCE.txt
If FORCE data exist and "ALL" option from save menu is selected, FORCE data for each gait cycle are saved.
Header:
- [handles.DATA_FORCE_header]

Rows:
- Gait cycle

_NEU.txt
If NEURON data exist and "ALL" option from save menu is selected, NEURON data for each gait cycle are saved.
Header:
- [handles.DATA_NEU_header]

Rows:
- Gait cycle

HEADERS

handles.FILE_header

#	String	Comments
	PATHNAME	
	FILENAME	
	TIMEPOINT	
	TESTING	
	TRAINING	
	ANIMAL ID	
	GAIT	
	LIMB	
	SIDE	

handles.TIME_header

#	String	Comments
	FRAME	Time index
	TIME	FRAME divided by acquisition frequency (handles.freq)

GAIT_header
Reorganized version of handles.DATA_GAIT_header.

DATA_EMG_header
For each gait cycle and each EMG channel CHAN that was processed through EMG Analysis *interface:*

#	String	Comments
	CHAN_onset	Onset time of EMG burst
	CHAN_end	Offset time of EMG burst
	CHAN_%onset	Onset time of EMG burst in percent of the gait duration
	CHAN_%end	Offset time of EMG burst in percent of the gait duration
	CHAN_burst duration	Burst duration (Offset time minus Onset time)
	CHAN_meanAMP	Mean amplitude of rectified EMG during burst

	CHAN_iEMG	Area under the curve of rectified EMG during burst (using trapeze method)
	CHAN_RMS	Root mean square of rectified EMG during burst

DATA_CoCo_header

For each gait cycle and each pair of antagonist muscles which EMG signals (EMG1 and EMG2) were processed through EMG Analysis *interface:*

#	String	Comments
	CoCo EMG1_EMG2	Percent of co-contraction of a pair of antagonist muscles

HEADER_HL

#	String	Comments
1	MEAN CREST	Mean of elevation angle – Crest-Hip
2	MEAN THIGH	Mean of elevation angle – Hip-Knee
3	MEAN LEG	Mean of elevation angle – Knee-Ankle
4	MEAN FOOT	Mean of elevation angle – Ankle-MTP
5	MEAN TOE	Mean of elevation angle – MTP-TIP
6	MEAN LIMB	Mean of limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
7	MEAN HIP	Mean of joint angle – Hip
8	MEAN KNEE	Mean of joint angle – Knee
9	MEAN ANKLE	Mean of joint angle – Ankle
10	MEAN MTP	Mean of joint angle – MTP
11	MEAN AB/AD_PELVIS	Mean of limb axis angle in YZ plane – Crest-MTP
12	MEAN ROT_PELVIS	Mean of foot angle in XZ plane – Ankle-TIP
13	SD CREST	SD of elevation angle – Crest-Hip
14	SD THIGH	SD of elevation angle – Hip-Knee
15	SD LEG	SD of elevation angle – Knee-Ankle
16	SD FOOT	SD of elevation angle – Ankle-MTP
17	SD TOE	SD of elevation angle – MTP-TIP
18	SD LIMB	SD of limb axis angle in XY plane – Crest-MTP ! corrected for backward stepping (i.e. multiplied by '-1') ! corrected for sideward stepping (i.e. set to value from column 11)
19	SD HIP	SD of joint angle – Hip
20	SD KNEE	SD of joint angle – Knee
21	SD ANKLE	SD of joint angle – Ankle
22	SD MTP	SD of joint angle – MTP
23	SD AB/AD_PELVIS	SD of limb axis angle in YZ plane – Crest-MTP
24	SD ROT_PELVIS	SD of foot angle in XZ plane – Ankle-TIP

HEADER_FL

#	String	Comments
1	MEAN SCAPULA	Mean of elevation angle – Scap-Shoulder
2	MEAN ARM	Mean of elevation angle – Shoulder-Elbow
3	MEAN FOREARM	Mean of elevation angle – Elbow-Wrist
4	MEAN HAND	Mean of elevation angle – Wrist-Toe
5	MEAN EMPTY	'0'
6	MEAN LIMB	Mean of limb axis angle in XY plane – Scap-Wrist

7	MEAN SCAP	Mean of joint angle – Scap
8	MEAN SHOULDER	Mean of joint angle – Shoulder
9	MEAN ELBOW	Mean of joint angle – Elbow
10	MEAN WRIST	Mean of joint angle – Wrist
11	MEAN LAT-LIMB	Mean of limb axis angle in YZ plane – Scap-Elbow
12	MEAN EMPTY	'0'
13	SD SCAPULA	SD of elevation angle – Scap-Shoulder
14	SD ARM	SD of elevation angle – Shoulder-Elbow
15	SD FOREARM	SD of elevation angle – Elbow-Wrist
16	SD HAND	SD of elevation angle – Wrist-Toe
17	SD EMPTY	'0'
18	SD LIMB	SD of limb axis angle in XY plane – Scap-Wrist
19	SD SCAP	SD of joint angle – Scap
20	SD SHOULDER	SD of joint angle – Shoulder
21	SD ELBOW	SD of joint angle – Elbow
22	SD WRIST	SD of joint angle – Wrist
23	SD LAT-LIMB	SD of limb axis angle in YZ plane – Scap-Elbow
24	SD EMPTY	'0'