

Quintic Software

Tutorial 9b

Quintic Multi Trial
Analysis

v29

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1. Folder Setup

Multi trial analysis allows you to display the averages of multiple trials on the same graph.

In order to complete this analysis, all of the relevant files for each trial must be placed in the same folder.

Video file (AVI in picture below) – The video file format must be one that is compatible with Quintic. At least one of the trials must have the original corresponding video file, in order to open the video and begin analysis.

CAL – The CAL file contains the information of the known length used to calibrate the corresponding video file. All calibration files must be present with the corresponding video file.

QDF – The QDF file contains the coordinates of the raw digitisation trace for a given video. The QDF of each trial is required.

QBC – The QBC file contains the parameters of the Butterworth filter applied to the digitised trace. This file isn't necessary as it is possible to analyse raw data. However, if you wish to analyse smoothed data, every QDF file must have a corresponding QBC file. You cannot analyse data with a mix of raw and smoothed data.

MRK – The MRK file is the location of up to 10 frame markers placed on the video within Quintic. These files aren't essential when analysing data, however, can be used to synchronise video traces to a common time event. If you wish to synchronise the videos relative to a common marker then all MRK files must be present and correspond to a QDF file.

Name	Date modified	Type	Size
Left_Fore_1	23/07/2014 16:11	AVI File	63,476 KB
Left_Fore_1	16/01/2017 16:35	CAL File	1 KB
Left_Fore_1	16/01/2017 12:38	FPS File	1 KB
Left_Fore_1	16/01/2017 16:35	HCAL File	1 KB
Left_Fore_1	16/01/2017 12:40	MRK File	1 KB
Left_Fore_1	16/01/2017 12:39	QBC File	1 KB
Left_Fore_1.qdf	16/01/2017 12:39	QDF File	98 KB
Left_Fore_1	16/01/2017 12:38	VCAL File	1 KB
Left_Fore_2	23/07/2014 16:12	AVI File	70,505 KB
Left_Fore_2	16/01/2017 12:40	CAL File	1 KB
Left_Fore_2	16/01/2017 12:42	MRK File	1 KB
Left_Fore_2	16/01/2017 12:41	QBC File	1 KB
Left_Fore_2.qdf	16/01/2017 12:41	QDF File	103 KB
Left_Fore_3	23/07/2014 16:13	AVI File	67,001 KB
Left_Fore_3	16/01/2017 12:42	CAL File	1 KB
Left_Fore_3	16/01/2017 12:43	MRK File	1 KB
Left_Fore_3	16/01/2017 12:43	QBC File	1 KB
Left_Fore_3.qdf	16/01/2017 12:43	QDF File	92 KB
Left_Fore_4	23/07/2014 16:15	AVI File	46,407 KB
Left_Fore_4	16/01/2017 12:43	CAL File	1 KB
Left_Fore_4	16/01/2017 12:47	MRK File	1 KB
Left_Fore_4	16/01/2017 12:47	QBC File	1 KB
Left_Fore_4.qdf	16/01/2017 12:47	QDF File	75 KB

A folder containing all the files necessary for multi linear/angular analysis of the left fore leg of a horse during equine gait analysis.

Above is an example of the files (highlighted) required to complete multi-trial averaging with traces synchronised to a common frame marker. Analysis can be completed with a folder containing extra files, such as the video files for each trial shown above. However, this is not essential.

If you wish to compare one average against another (eg. that of the right fore leg during equine analysis) then add the relevant files for each trial to the same folder as above.

2. Analysis

Once data has been collected and the correct files placed into a single folder, you are ready to complete multi-trial analysis.

Open the video file of a single trial in Quintic (eg. Left_Fore_1). Open the “Digitisation” tab and “Load an Existing Trace”.

Click either the  (Linear Analysis) or the  (Angular Analysis) button and select the relevant Multi Video Analysis option.

All trials in the folder will load onto the graphs.

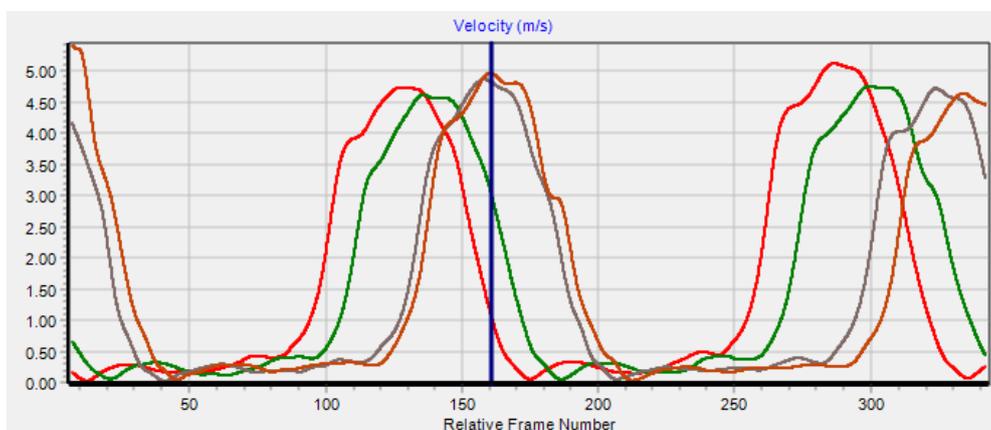
Now, select the trials you wish to display on the graphs by ticking the checkboxes on the right hand side next to the file name (Eg. Left_Fore_1, Left_Fore_2).

When using Linear Analysis, the marker (Eg. Fetlock) you wish to display on the graph can be selected from the “Marker Names” box on the right-hand side.

3. Setting Axes

Horizontal

To synchronise the videos to a common time each video must have an MRK file. This requires you to have placed a frame marker on a common time event during each video (eg. First fore foot contact).

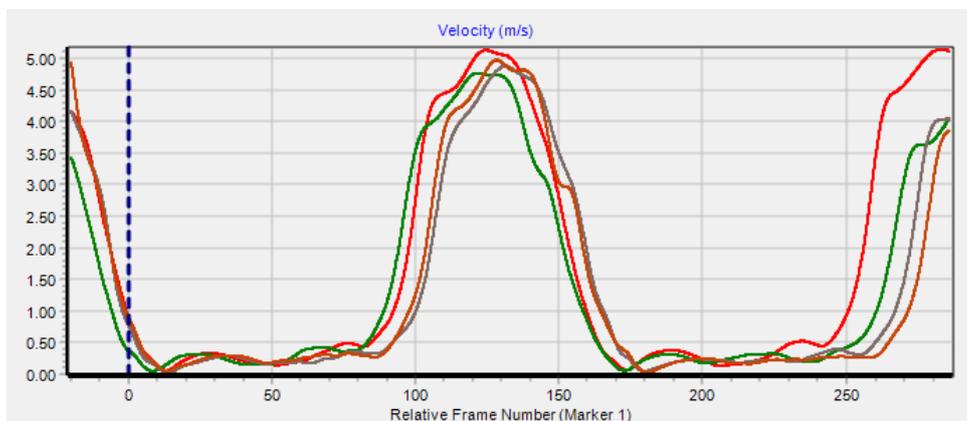


Example of Multi Trial Linear Analysis of a Fetlock marker displayed relative to the start of digitisation; the default setting.

Frame markers will appear as solid blue lines, corresponding to the frame number of the original video opened, on the horizontal axis of the graph.

Select display from the top left toolbar and click “Horizontal Axes”:

- **Relative Frame Number** – Displays the data relative to the start of digitisation trace. The data for each digitisation trace start at frame 1, regardless of length of the trace or time event in the video. The end of the traces are subsequently cut to the shortest trace, to be displayed on the graph.
- **Relative Time** – Displays the data relative to the digitisation trace. The data for each digitisation trace start at time 0. The end of the traces are subsequently cut to the shortest trace, to be displayed on the graph.
- **Relative Frame Number (Marker)** – Displays the data relative to the frame marker selected from the drop down list. Graph data series are aligned to eg. Frame marker 1 (eg. first for leg contact) and trimmed to the shortest digitisation trace. The x axes displays the common marker as 0. Both ends of the traces are trimmed to the shortest trace, to be displayed on the graph.
- **Relative Time (Marker)** - Displays the data relative to the frame marker selected from the drop down list. The x axes is displayed as time relative to the marker (0). Both ends of the traces are trimmed to the shortest trace, to be displayed on the graph.



Example of Multi Trial Linear Analysis of a Fetlock marker displayed relative to the frame marker displayed as a broken blue line.

Once the data has been displayed relative to a frame marker, the selected marker is displayed as a dotted blue line and the x axes shifted so 0 coincides with the line.

Vertical

Click “Display” from the toolbar and select “Vertical Axes”. A window will appear titled “Vertical Axes Settings” with minimum and maximum values for each of the three graphs; “Displacement”, “Velocity” and “Acceleration”.

Parameter	Automatically Scale Vertical Axis	Minimum	Maximum
Linear Displacement	<input checked="" type="checkbox"/>	0.01	35.12
Linear Velocity	<input checked="" type="checkbox"/>	0.07	3.54
Linear Acceleration	<input checked="" type="checkbox"/>	-32.95	44.98

“Automatically Scale Vertical Axis” is ticked as default. If you wish to rescale the graphs, untick the box and enter minimum and maximum values for the y axis.

4. Averages

Display an average of all the data on the graph by selecting the “Show averages” tick box in the top right of the window.

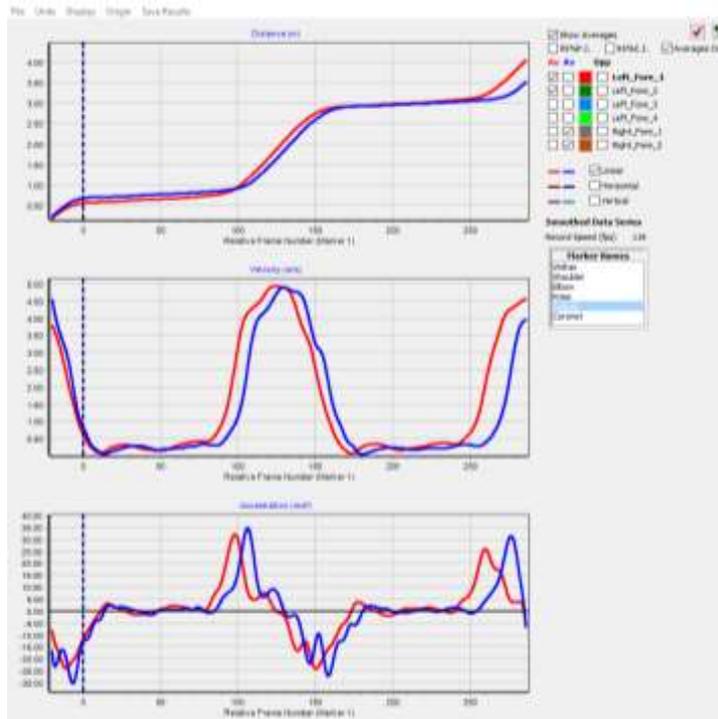
Now, if you wish to display a second average, select “Display” and click “Allow Second Average”. This will add a blue average column next to the red average column for each trial.

Av	Av	Opp
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Left_Fore_1
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Left_Fore_2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Left_Fore_3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Left_Fore_4
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Right_Fore_1
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Right_Fore_2

Select the trials you wish to display as an average for each condition. Here, we have selected Left_Fore_1 and Left_Fore_2 as the red average and Right_Fore_1 and Right_Fore_2 as the blue average to enable us to compare the contralateral gait of the horse.

Re-select “Show Averages” and “Averages Only” to display the average of each fore leg during the first contact.

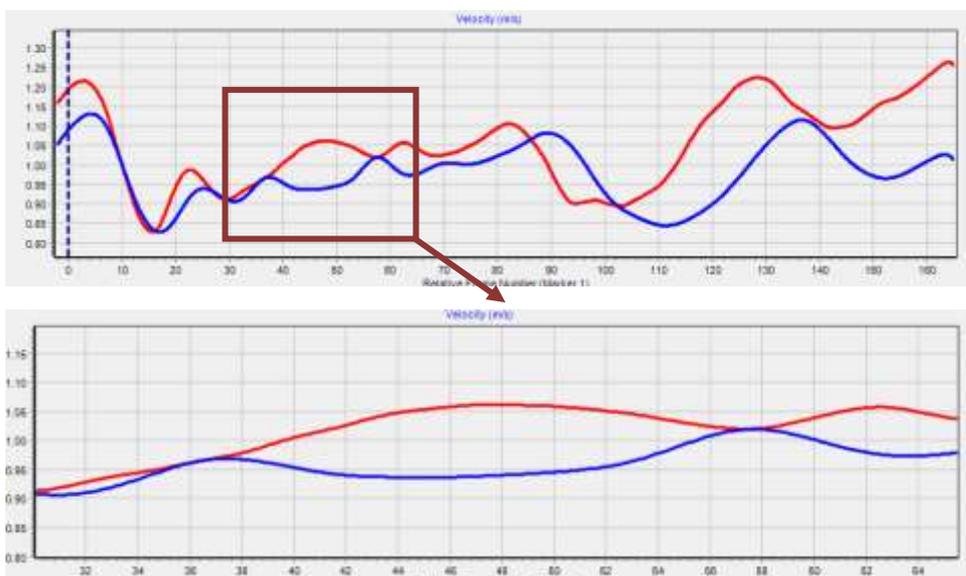
All trials can be either selected or deselected at once using the “Select All”  button, or the “Deselect All”  button.



Alongside “Averages Only”, there are 2 tick box options; “95% P.I.” and “95% C.I.”. Selecting either one of these allows you to display the Prediction Intervals (P.I.) **OR** Confidence Intervals (C.I.) at 95% certainty.

Each graph can be expanded to the size of the analysis window by double clicking on the relevant pane.

Alternatively, to zoom in on a specific area of the graph drag the cursor over the area you wish to zoom in on. The graph will resize and rescale in order to fill the graph area.

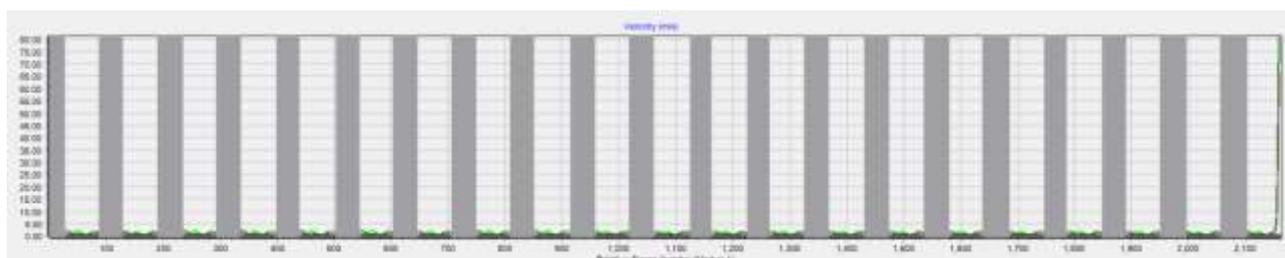


5. Interpolated regions

From Quintic v29 onwards, intelligent digitisation allows markers to be automatically interpolated and re-found once a marker becomes lost or obscured. This means that single markers or whole templates can be lost and then re-located without losing any of the data associated with that period and without manual intervention.

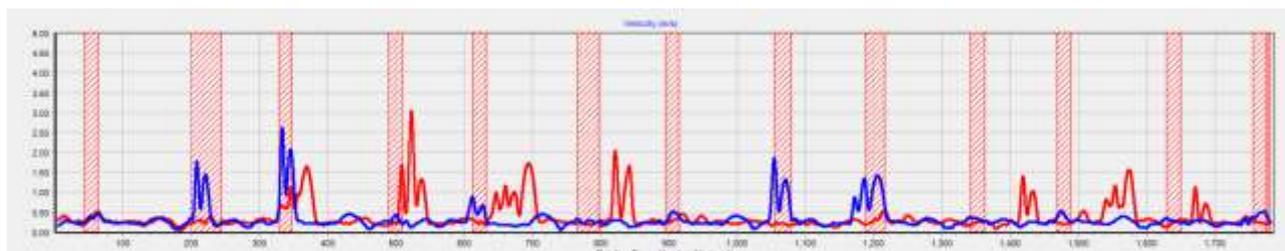
When analysing trial data in Quintic, the regions where interpolation has occurred are shown using different colours of box and hatching:

Solid Grey Box – This occurs when the whole reference template has been lost from the Area of Interest (AOI). The solid grey box appears on the graph between the frame where the template was completely lost and the frame where the whole template was re-found. The data series in this region is obscured from view.



Coloured Hatching – Covers the region of the graph where a single marker has been lost. The colour of the box is dependent on the colour of the marker selected when creating the reference model. E.g. the graph below compares two averages of hip marker velocity during a walking gait analysis.

The hip marker was selected as red during the creation of the reference model (default intelligent tracking “Gait –Side View Template”), therefore, the hatchings are red in the regions where the hip marker is obscured from view (Eg. by the hand). The marker can be selected from the menu on the right side of the window (Multi Linear Analysis).



When using Multi Angular Analysis hatching will only be displayed when the selected angle includes the marker that has been interpolated. E.g. When analysing the knee angular velocity during a gait analysis regions where the hip marker has been interpolated, the hatchings will be displayed.

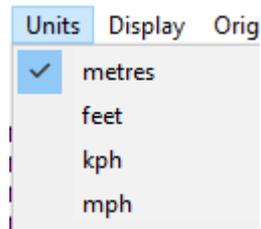
To turn the interpolated regions function on/off click “Display” and select “Show Interpolated Regions (Intelligent)”.

However, in order to show interpolated regions, all videos must be digitised using the Intelligent Digitisation function in Quintic Coaching or Biomechanics v29.

6. Toolbar

File – Allows you to print or save the graph as a JPEG displayed as it is seen on-screen. This is affected by the size of the Analysis window, therefore expanding a graph by double clicking on the graph area and increasing the window size, you can create a large scale image.

Units – Allows you to select relevant units. Both Metric and Imperial units are available.

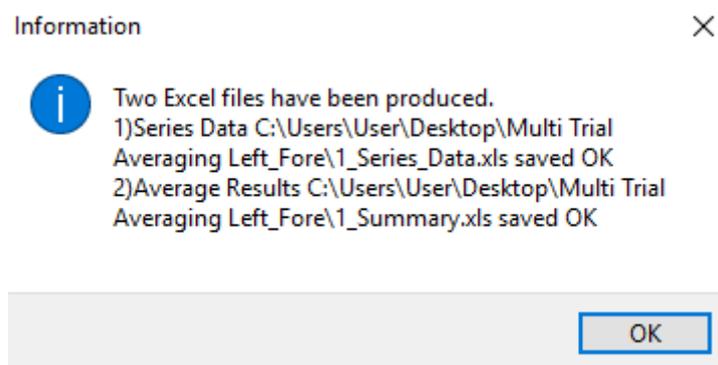


Display – Allows you to edit the markers displayed on the graph.

- *Show Series Values* – When the cursor is held over a position of the trace, the values are displayed for that data point.
- *Show Frame Position* – A solid black vertical line indicates the current frame of the video being displayed in the main Quintic window.
- *Show Interpolation Markers* – A solid red vertical line indicates the frame at which an interpolation marker was placed in the video.
- *Show Frame Markers* – A solid blue vertical line indicates frame at which a frame marker was placed in the video.
- *Show Interpolated Regions (Intelligent only)* – Hatched areas on the graph represent the time at which markers were lost and the data interpolated
- *Allow Second Average* – Allows a second average to be displayed on the graph.

Origin – Select the relevant origin for you; Relative or Absolute.

Save Results – All co-ordinates of the graphs can be saved as an excel file.



A pop-up will appear stating that two excel files have been created. One of these is the entire dataset for marker/angle that is selected and the other is the averages for all of the data.

The Excel file will represent the axes and origins currently shown on the graphs. Before saving ensure that the axes are correct and the origin is absolute.