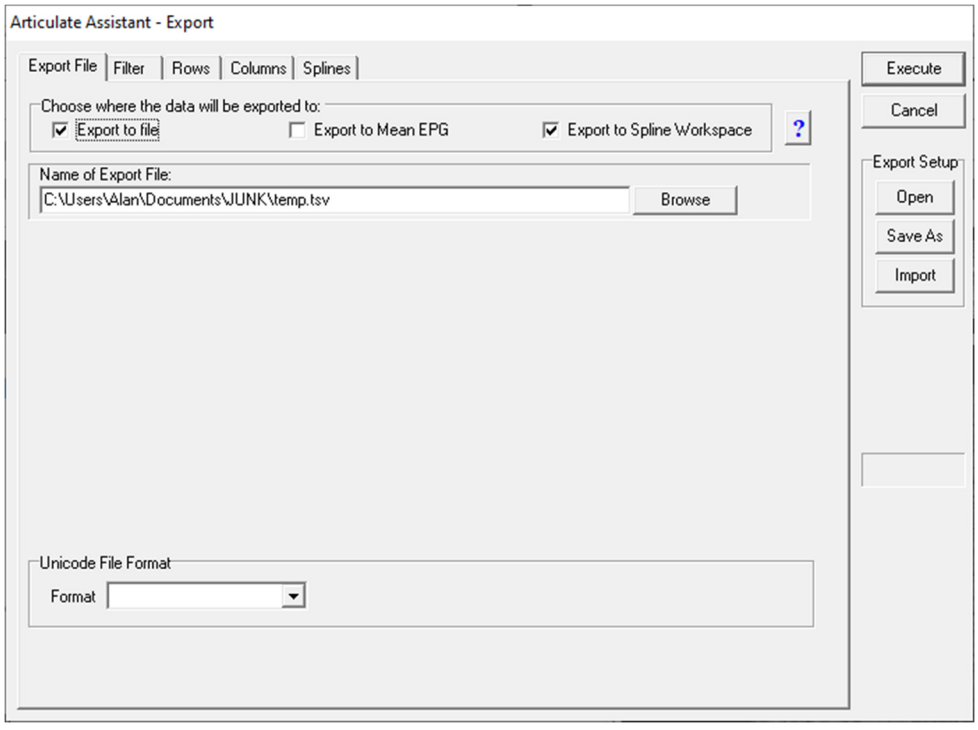
Spline Workspace

Contents

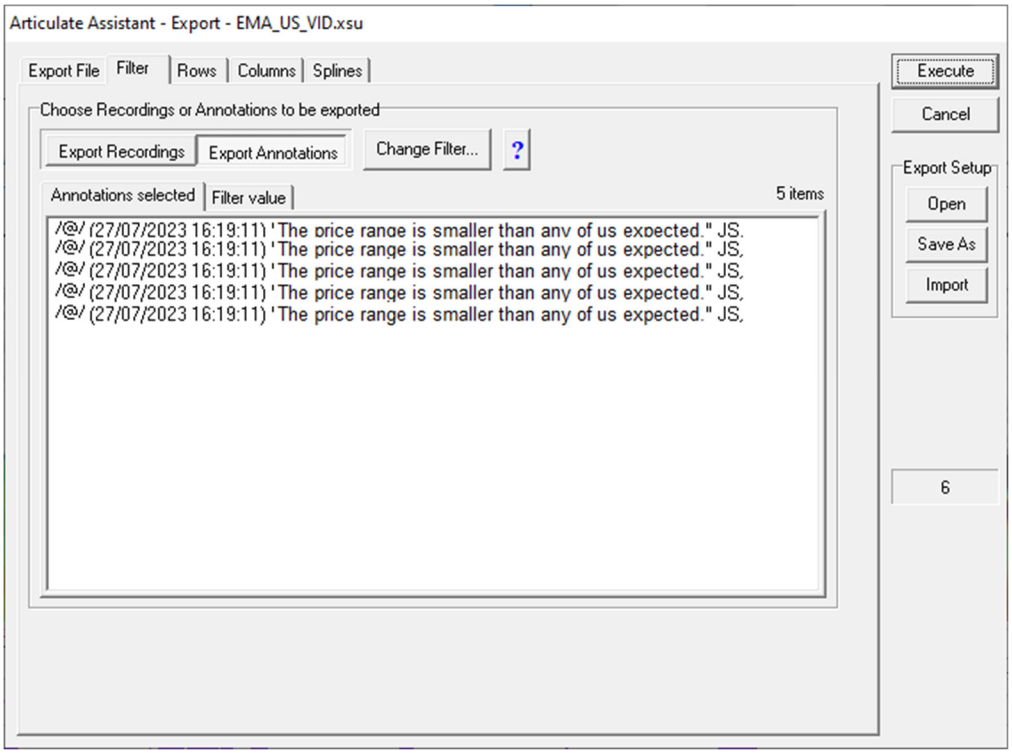
Adding splines to the workspace

Data Export Dialog

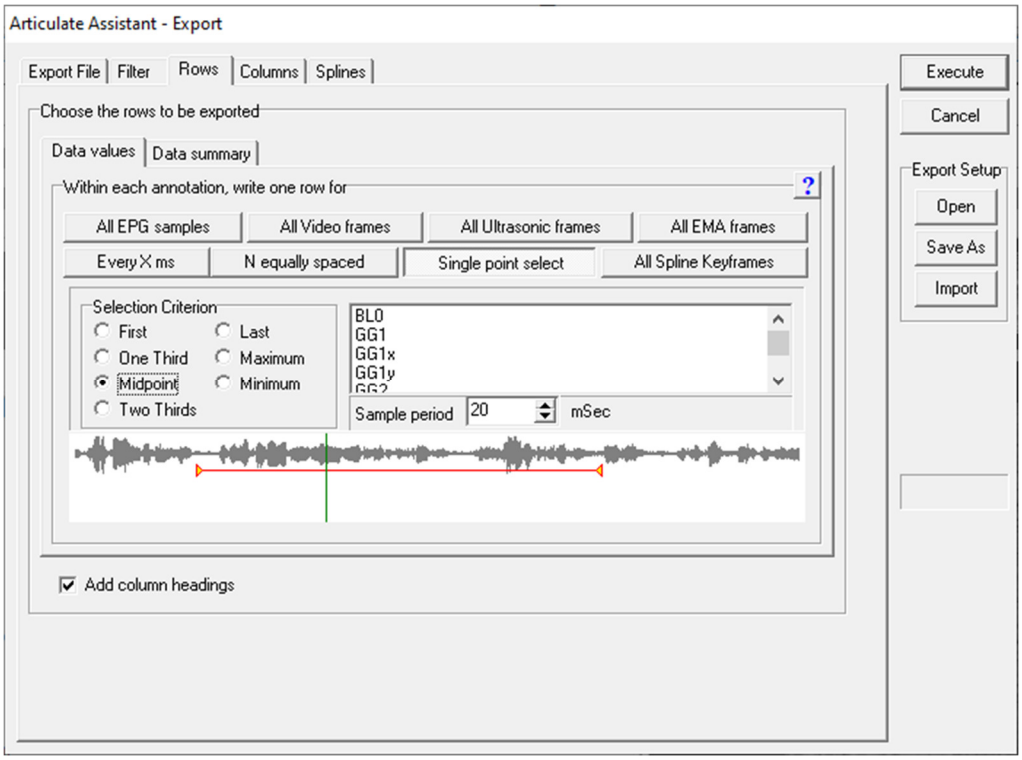
The most useful way is to use Export Data and select groups of splines that you wish to compare.



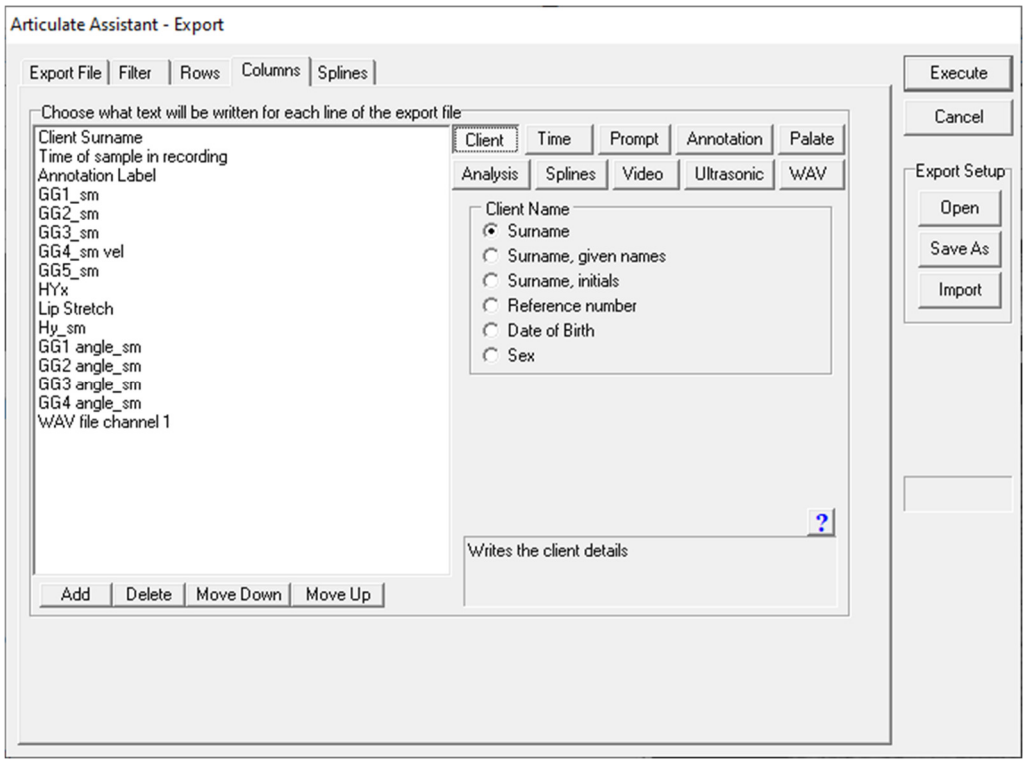
Below is an example where all the schwas /@/ have been Filtered



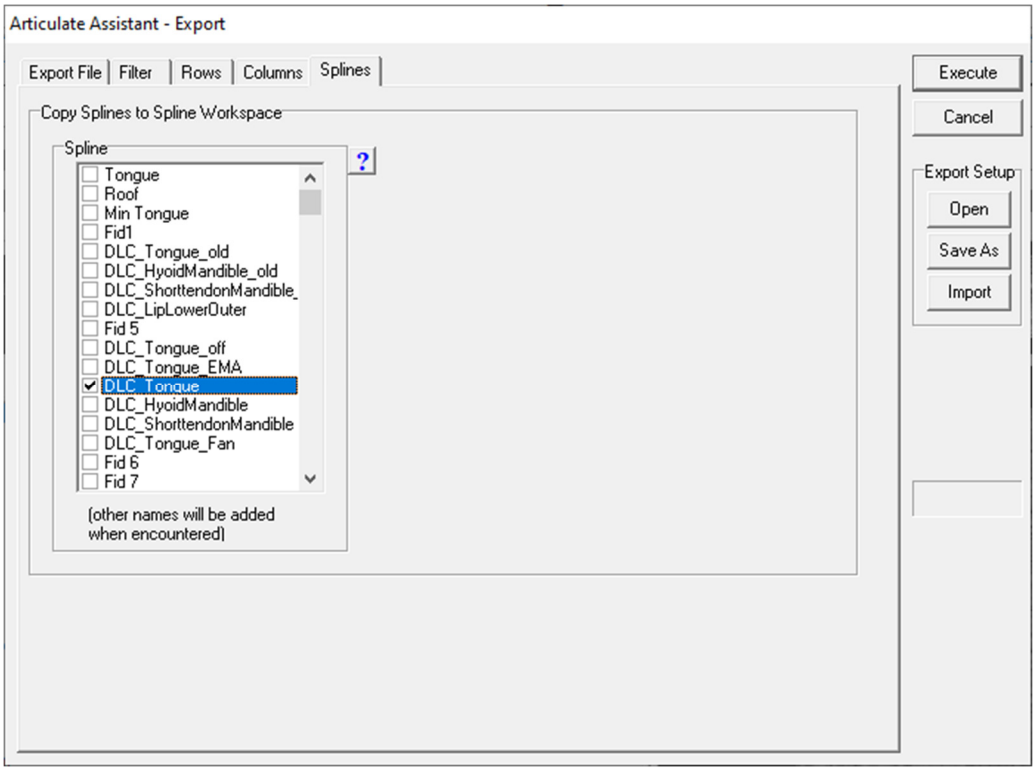
In the Rows tab a single time point has been selected for each annotation so in the example there will be 5 splines and 5 rows in the exported file.



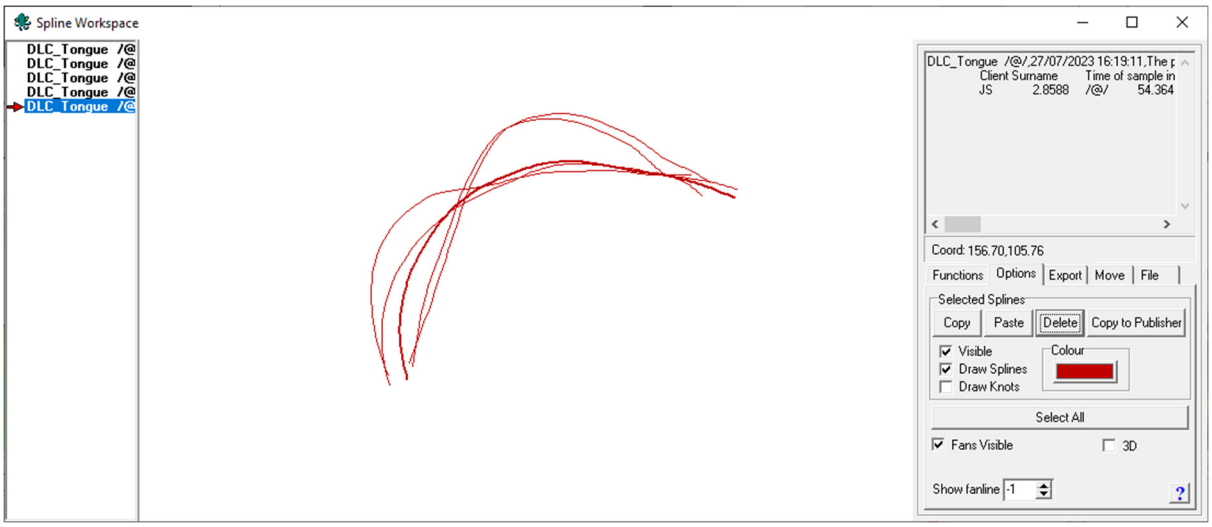
Any column values will be copied to the Spline workspace to help identify the source of the spline.



In the Spline tab, select the spline that you want to copy to the Workspace (usually DLC_Tongue)

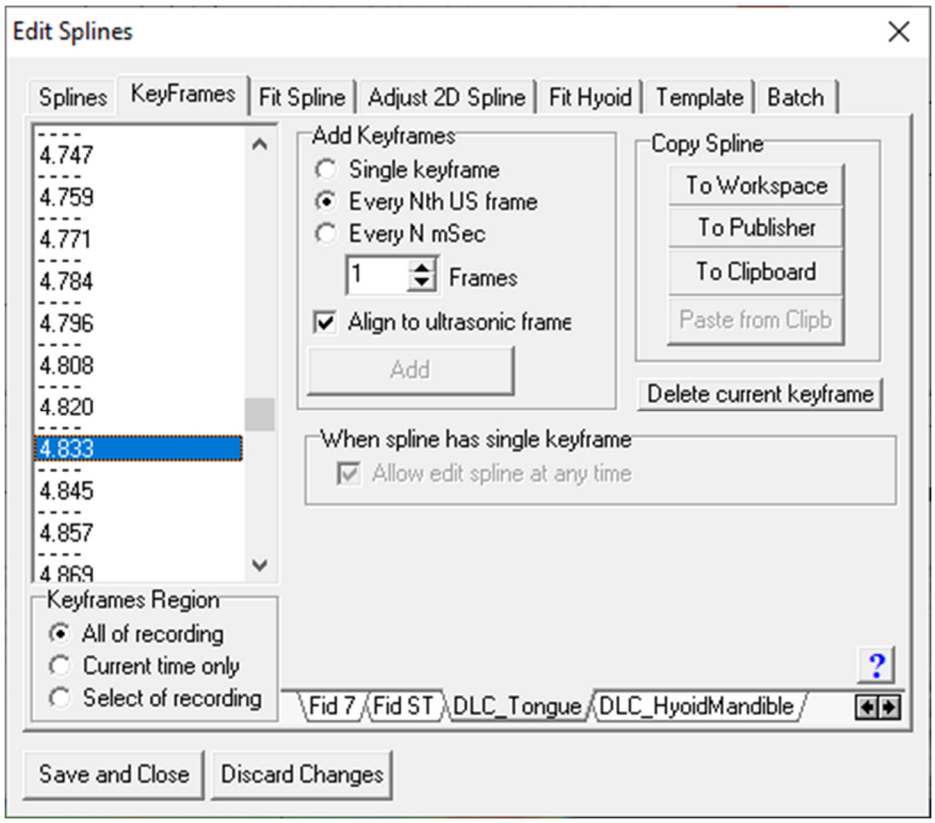


Click Execute. After the file has been generated and you confirm the export is complete, the Spline workspace dialog will appear.

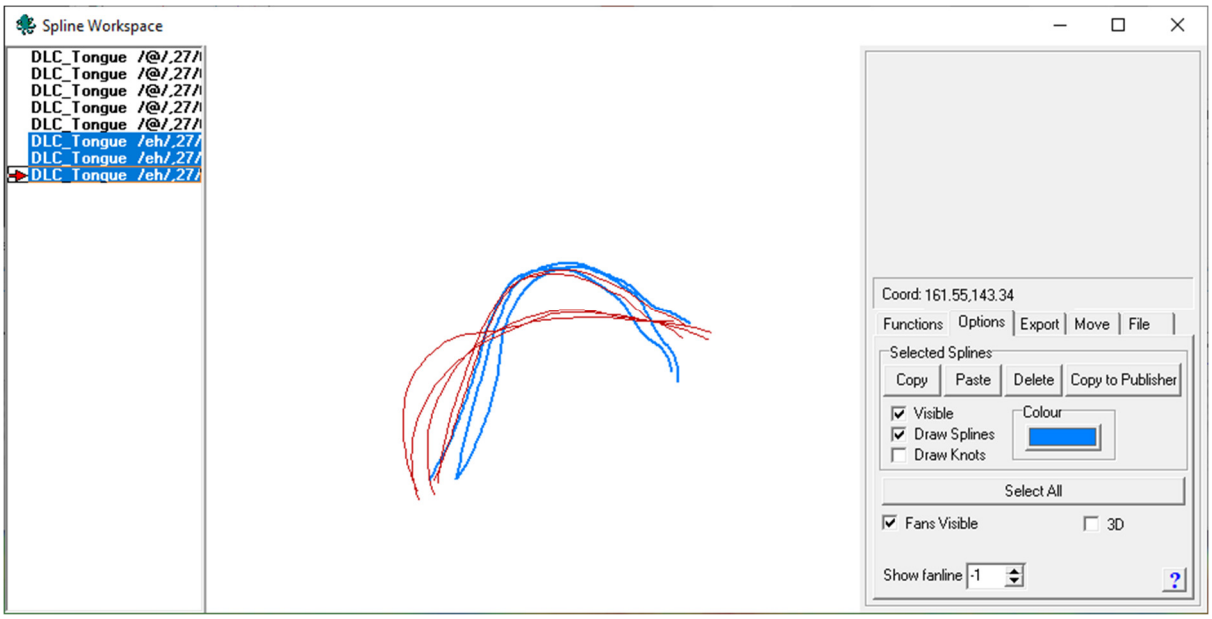


Edit Splines Dialog

1. Open the edit Splines dialog.
2. Click the Keyframes tab
3. Select the Spline you want to export to the workspace from the set of tabs at the bottom of the dialog
4. Click the **To Workspace** button



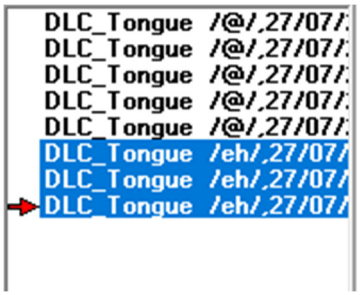
Comparing groups of splines in the workspace



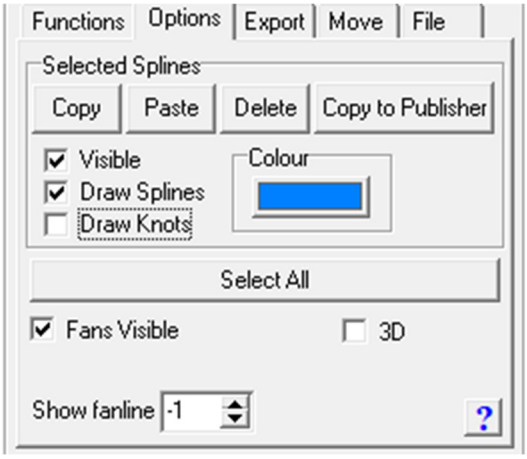
The Spline list

Each exported spline is listed on the left. If the Label is exported as the first column from Export Data then groups of splines with the same label can be identified.

Click and drag on the list to select a group of splines. Options and functions can be selectively applied.



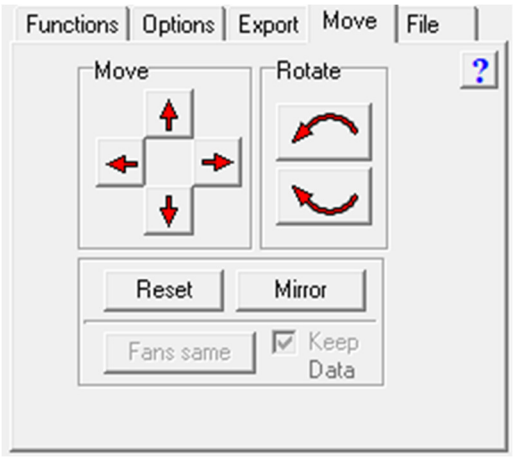
The Options tab



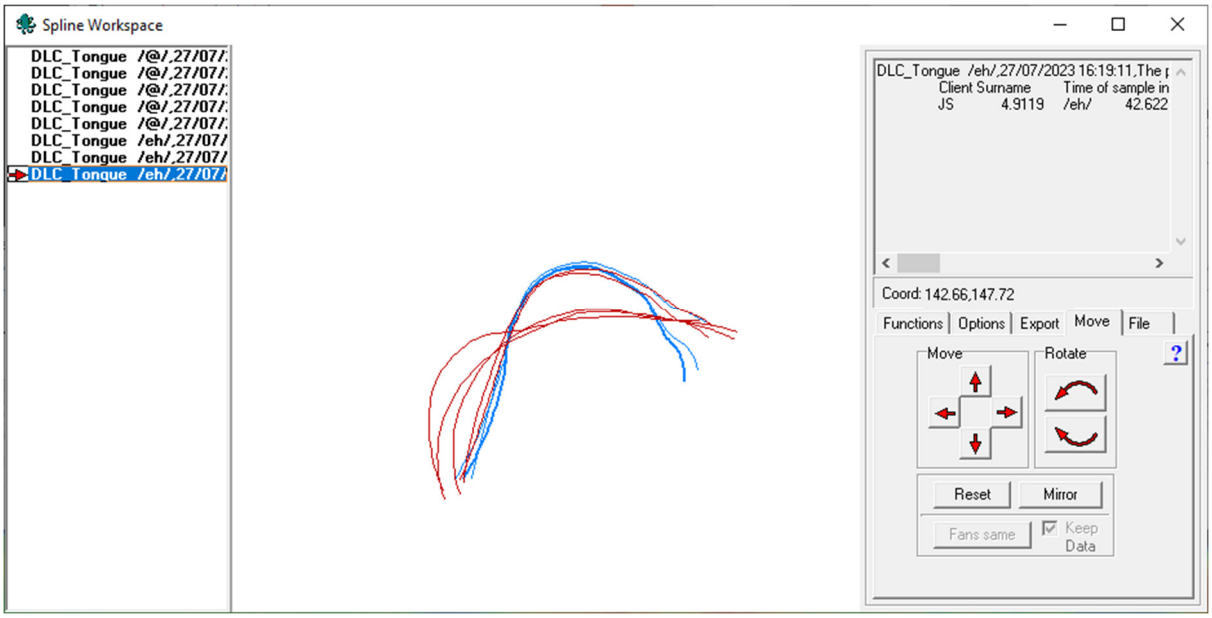
The Options tab allows the selected group of splines to:

- Be made invisible or visible
- To draw the splines or not, leaving the option to Draw the knots alone or with the Spline
- Change the colour to make the groups visibly distinguishable
- Delete the group of splines
- Copy the splines to the clipboard or paste them from the clipboard (This option is not used)

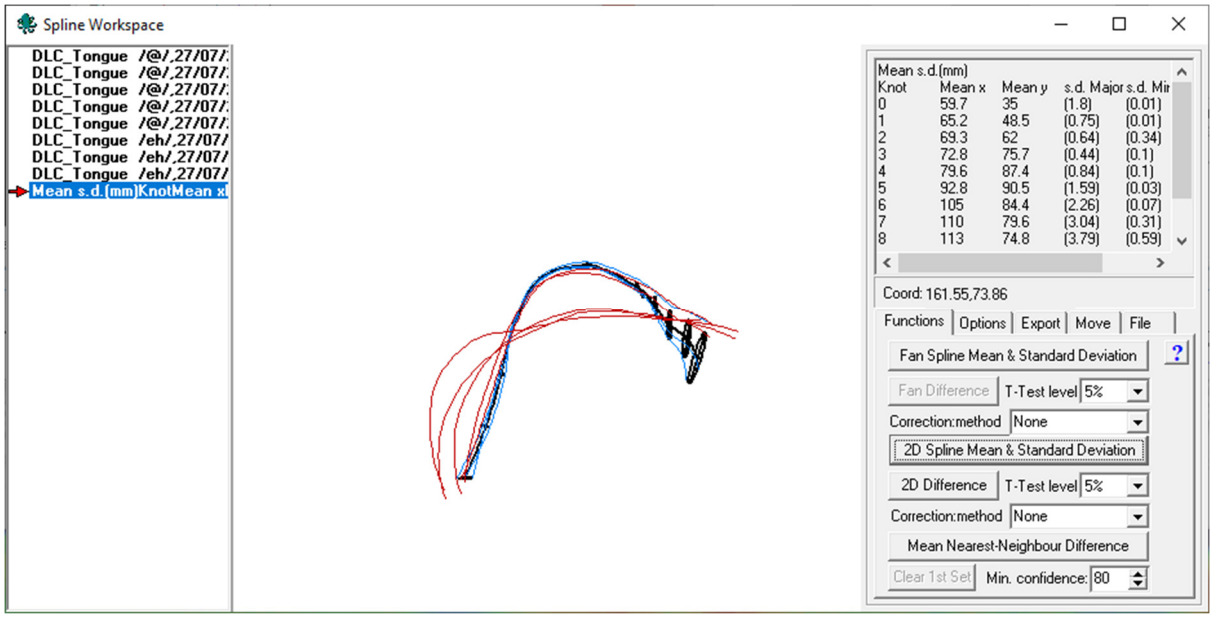
The Move tab



Individual or groups of splines can be translated or rotated in the workspace. This chanes the co-ordinates for any processing that is carried out like averaging.



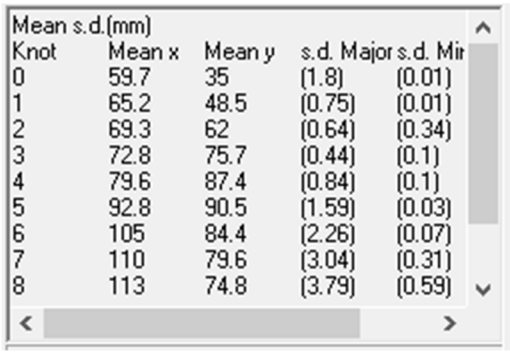
The Functions tab



Mean and standard deviation

To get an average DLC_Spline for a group, select the group from the list and click

The average is shown as a spline. The mean and standard deviations for each knot are shown in table at the top right.



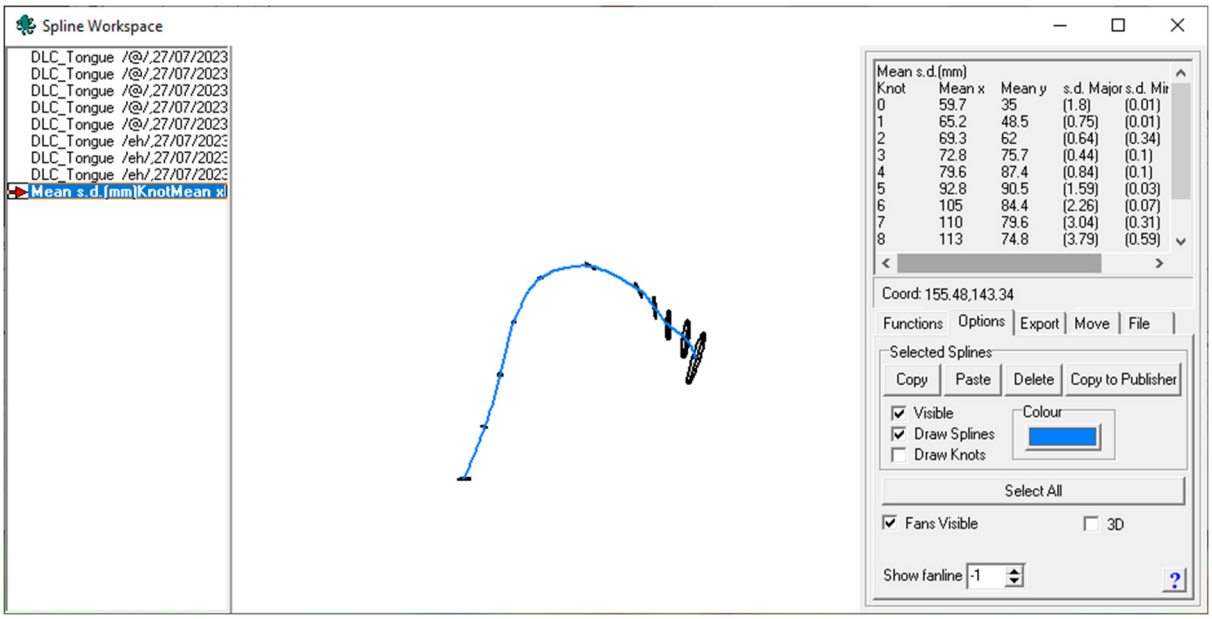
Mean s.d.(mm)

Knot	Mean x	Mean y	s.d. Major	s.d. Mir
0	59.7	35	(1.8)	(0.01)
1	65.2	48.5	(0.75)	(0.01)
2	69.3	62	(0.64)	(0.34)
3	72.8	75.7	(0.44)	(0.1)
4	79.6	87.4	(0.84)	(0.1)
5	92.8	90.5	(1.59)	(0.03)
6	105	84.4	(2.26)	(0.07)
7	110	79.6	(3.04)	(0.31)
8	113	74.8	(3.79)	(0.59)

Thie table can be copied as text

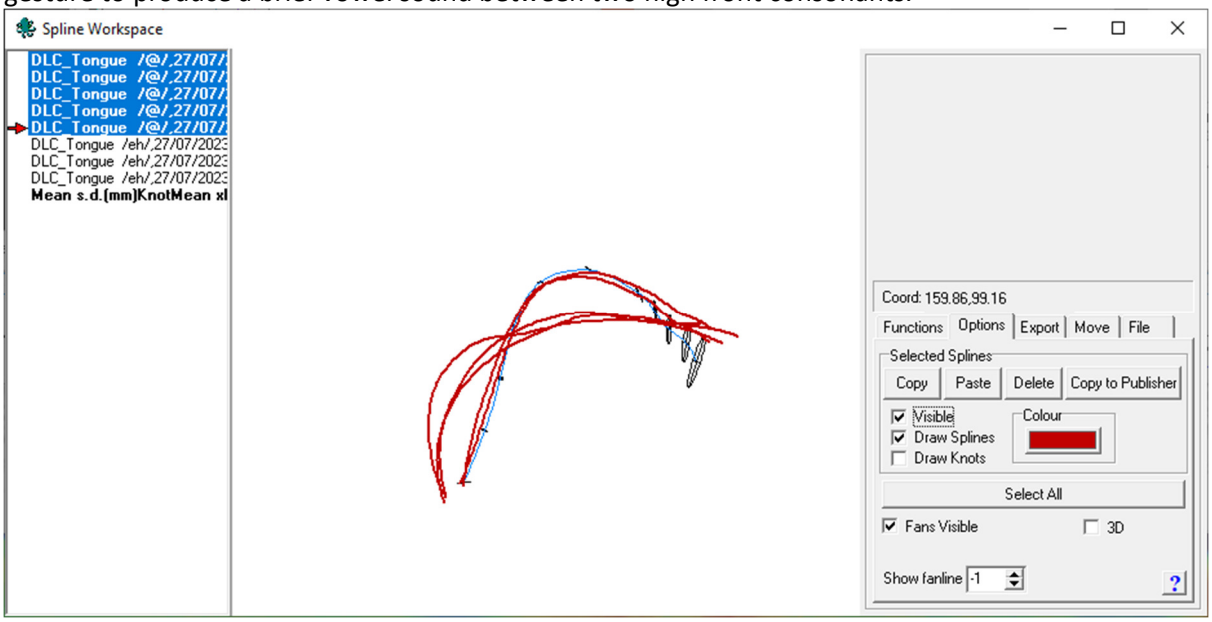
```
Mean s.d.(mm)

Knot  Mean x     Mean y     s.d. Major s.d. Minor Conf %.
0     59.7  35    (1.8) (0.01)
1     65.2  48.5  (0.75)      (0.01)
2     69.3  62    (0.64)      (0.34)
3     72.8  75.7  (0.44)      (0.1)
4     79.6  87.4  (0.84)      (0.1)
5     92.8  90.5  (1.59)      (0.03)
6     105   84.4  (2.26)      (0.07)
7     110   79.6  (3.04)      (0.31)
8     113   74.8  (3.79)      (0.59)
9     118   71.3  (4.96)      (0.83)
10    120   66.4  (6.88)      (1.02)
```

To see the mean spline better, make the group of splines it was based on invisible.

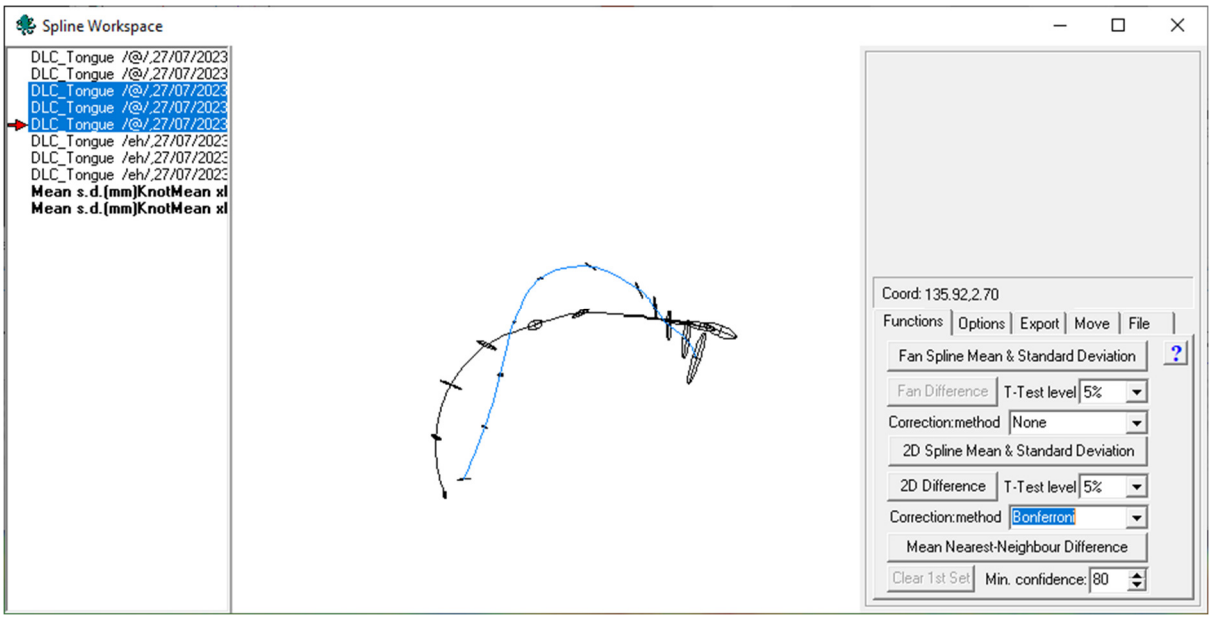


In the above example the group of /eh/ phones are very consistent in shape.

The Schwas /@/ seem to fall into two groups. One is very similar to the /eh/. The other is more neutral in shape. The ones similar to an/e/ may be mislabelled or they are simply transitional voicing gesture to produce a brief vowel sound between two high front consonants.

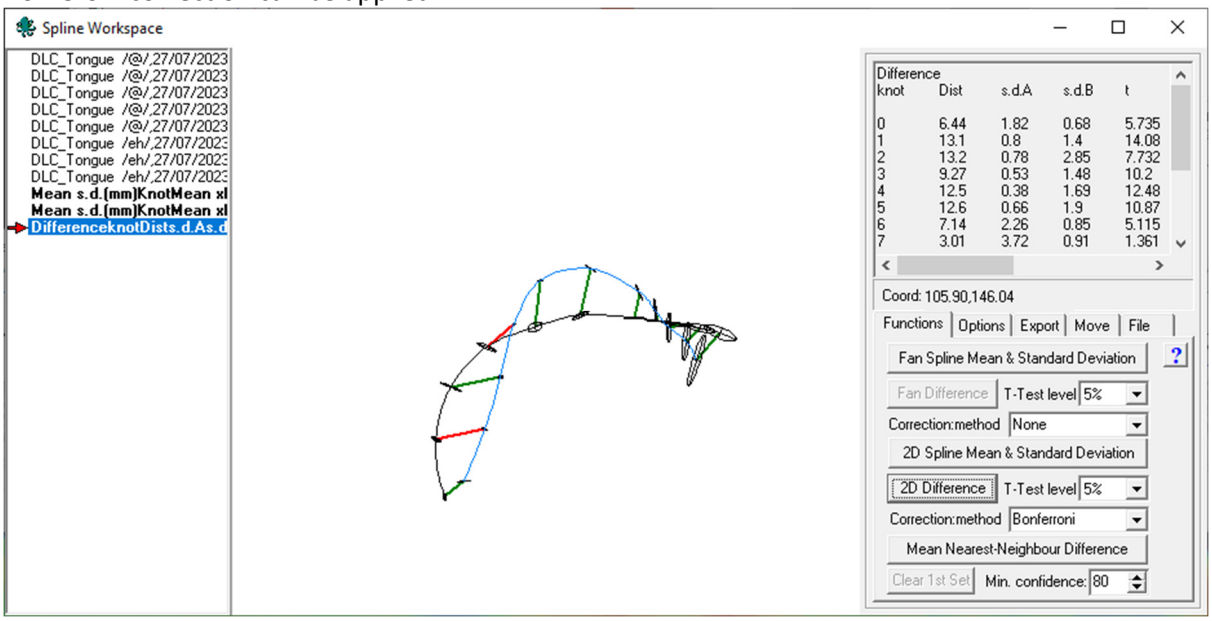


A subgroup of Schwas can be selected and a mean calculated.



2D Difference

A T-test can be calculated between the two mean splines based on the knot means and standard deviations by selecting the two mean entries in the spline list and clicking the 2D Difference button. Bonferoni correction can be applied.



The results are shown at the top right and can be selected and copied and pasted.

```
Difference
knot  Dist  s.d.A s.d.B t     dof   2-tail p   alpha bonferroni
significant
                                                level      corrected
0     6.44  1.82  0.68  5.735 3     0.01053    0.05  0.00455
1     13.1  0.8   1.4   14.08 3     0.00078    0.05  0.00455          *
2     13.2  0.78  2.85  7.732 2     0.01632    0.05  0.00455
3     9.27  0.53  1.48  10.2  3     0.00201    0.05  0.00455          *
4     12.5  0.38  1.69  12.48 2     0.00636    0.05  0.00455
5     12.6  0.66  1.9   10.87 2     0.00836    0.05  0.00455
6     7.14  2.26  0.85  5.115 3     0.01446    0.05  0.00455
```

```
7     3.01  3.72  0.91  1.361 2     0.30652     0.05  0.00455
8     2.86  1.63  4.06  1.133 3     0.33962     0.05  0.00455
9     5.01  4.68  2.91  1.574 3     0.21359     0.05  0.00455
10    9.41  7.73  2.38  2.013 2     0.18172     0.05  0.00455
Dist and s.d. in mm units
RMS distance  = 9.383 mm
Red vector joining means shows distance is significant and
corresponds to * in list above.
Group A is the first mean/s.d. appearing in the list on the left
that is selected and Group B is the second.
```

Mean Nearest neighbour

Select the first group of splines to be compared and click the 

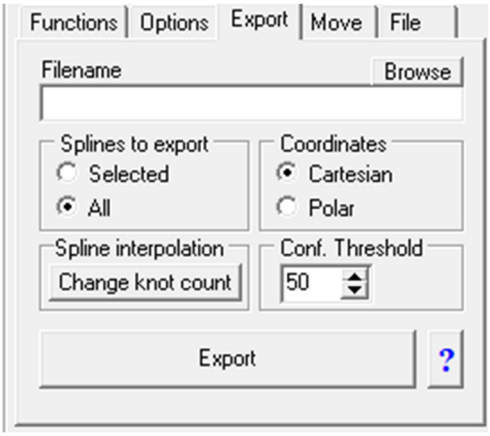
button.

Then select the second group of splines and click 

again.

```
MNND (Mean Nearest-Neighbour Difference)
Mean of all MSDs:
7.36311864852905
Standard Deviation of all MSDs:
0.72868150472641

A file has been created in your AAA folder
called MSDs.txt which contains every MSD.
You can copy-paste them into other software.
(eg. a spreadsheet or a statistics program)
```

The Export tab



- Leave the Filename blank to copy to clipboard.
- **Splines to export = All** then all visible items in the spline list are exported
- **Splines to export = Selected** then only the selected visible items are exported.

Polar coordinates can only be exported for Fan Splines.
Each item in the list selected for export will have the following form:

```
DLC_Tongue  /@/,27/07/2023 16:19:11,The price range is smaller than
any of us expected.

     Client Surname  Time of sample in recordingAnnotation Label
     GG1_sm     GG2_sm     GG3_sm     GG4_sm vel GG5_sm     HYx
     Lip Stretch     Hy_sm GG1 angle_sm     GG2 angle_sm     GG3
angle_sm   GG4 angle_sm     WAV file channel 1
```

JS 5.5746 /@/ 50.9114 50.7519 55.5762 98.1577
41.8142 64.7943 19.8717 49.1582 3.0594 2.6591
2.2873 1.9664
C:\Users\Alan\Documents\JUNK\JS__270723161911_553764_Ch1.wav

59.6399 34.0731

62.3662 48.8676

66.7958 62.2801

72.1810 75.9829

79.9556 86.4624

93.1738 88.4195

106.0015 83.5684

110.5955 80.3374

114.5686 76.9012

119.5295 74.6312

123.6920 71.4662