

Jacob's Ladder 12.1 © Documentation

Benjamin Elbirt
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I **Jacob's Ladder 12.1 Product Specification**

I **Product Overview**

JL 12.1© is the next generation of visualization and intonation software in the Jacob's Ladder© series. Unlike past editions that used VRML 97 technologies, JL 12.1© uses OpenGL and Java technologies.

II **Software Installation**

JL 12.1© requires the installation of the latest Java environment which is available at <http://www.java.com/en/download/index.jsp>.

The JL 12.1© software installation file unzips to the directory

c:\Program Files\ElbirtSoftware\

You *must* use this directory as there are other files placed within the directory that are needed by the software (OpenGL DLL files, Sound Files, etc.).

III **Memory Expansion**

JL 12.1© uses as much memory as made available through the Java environment and the command line execution. To increase the memory, use:

```
java -Djava.library.path="C:\program files\ElbirtSoftware" -Xms1M -Xmx2M -jar jacobs ladder.jar
```

where *1M* is the amount of memory to use for the initial heap size and *2M* is the amount of memory to use for the maximum heap size. The *M* is used to represent megabytes.

```
java -Djava.library.path="C:\program files\ElbirtSoftware" -Xms1000M -Xmx2000M -jar jacobs ladder.jar
```

will launch the application with an initial heap of 1 GB and a maximum heap of 2 GB.

IV **Using the Included Short-Cut/BAT File**

The provided JL-12 bat file contains the Memory Expansion java call for running JL™ and can be used instead of a command line execution. Further, a shortcut can be created for the JL application with this bat file.

V. **Bug Collection & Reporting**

Use the “java -jar jacobs ladder.jar” command from a prompt (DOS) to obtain error messages from the executable. Please report any bugs / problems to the author, Benjamin Elbirt, at sarq_6669@yahoo.com.

V Updates Version 12.1

1. Force Object Type Display Remote Control
2. Hide/Show Reflexive Edges Display Remote Control
3. Animations for different size/content matrixes.
4. Force Instrument Animation Remote Control
5. Memory Usage Reduction
6. Force Note Animation Remote Control
7. Force Equal Edge Strength Display Remote Control
8. JL-12.bat / icon file for launching through windows.
9. Use of default MIDI sound-bank if the JL sound-bank file is not found.
10. Edge Labeled with Strength Values.
11. Spherical Axis
12. In/Out Edge Display Remote Controls with Simultaneous display.
13. Spatial Contraction / Expansion (Spread) functionality.
14. Separate Frames per Time Period and Object Resolution (Slicing).
15. Usage of Table displays for Information and Viewpoint Remotes.
16. On/Off Animation Controls for size, spin, coordinates and colors.
17. Intonation velocity now a node element vs. an animation control.
18. Surface Plots for Animations
19. Cylinder, Torus and Pyramid Size Alpha Input
20. Coordinate Disable Display Remote Controls
21. Intonation Channel Controls and XML Data Inputs
22. Edge Color Forcing with Display and Animation Remote Controls

VI Future Enhancements

1. Additional Display Windows / Window Stacking
2. Hide/Show Matrix/Node controls based on display pane
3. Object Spin Animation
4. XML Format Standardization Implementation
5. XML I/O Operations Improvements
6. Shadow display with motion controls.
7. Hide Disconnected Nodes (Isolates) (Still and Animated)
8. Clique / Cluster macro stepping controls and animations.
9. Mac / Linux Compatibility
10. 3D Glove/Goggle technology usage features and controls.
11. Improved Lighting
12. Play button for music in still displays.
13. Matrix/Node level music on/off controls.
14. Font Rotation for “Always Face First/Upright” display
15. Graphical Skins for Objects.
16. Curved Edges
17. Object Grab and Highlight (Animation & Still), Move (Still)
18. 3D Spherical Axis
19. Surface Plots with Edges
20. Still Surface Plots

II Running Jacob's Ladder 12©

Unlike past versions, Jacob's Ladder 12© has its own display interface and does not use a browser. With this display methodology there are more options including the use of multiple displays for simultaneous view perspectives.

The JL12© files are installed (unzipped) into the c:\program files\ElbirtSoftware\ folder and JL12© can be started using the *jacobs ladder.jar* java file. The command line execution of the application should be done with:

```
java -Djava.library.path="C:\program files\ElbirtSoftware" -jar jacobs ladder.jar
```

JL12© will not work without the properly library path specification.

I. Initialization Options

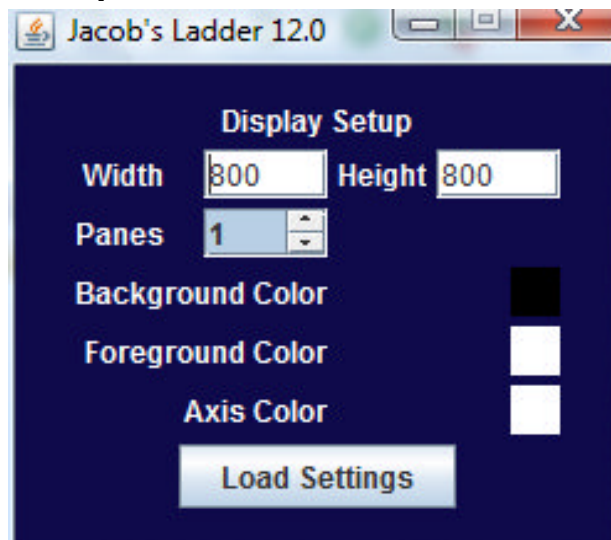


Diagram 1 – Initial JL12© Display Setup

At this time Jacob's Ladder 12.1© allows for up to 4 simultaneous display windows (panes); however they are displayed horizontally and cannot be stacked. The height and width specified represent the TOTAL height and width of the display; not for each pane in the display. Thus, if you were to specify 1600 wide by 800 tall with 2 panes you would get 2 800x800 panes within a 1600 pixel control window.

It is HIGHLY recommended that all panes created are of equal height and width to prevent display distortion that occurs from rectangular pane dimensions.

Background Color, Foreground Color and Axis Color are used for the initial display and can be changed later through the Display Remote. Click on the color cube to receive the color selection window.

Once configured, click the Load Settings button to activate the primary Jacob's Ladder display window.

II. *Jacob's Ladder 12 Display – The OpenGL Interface*

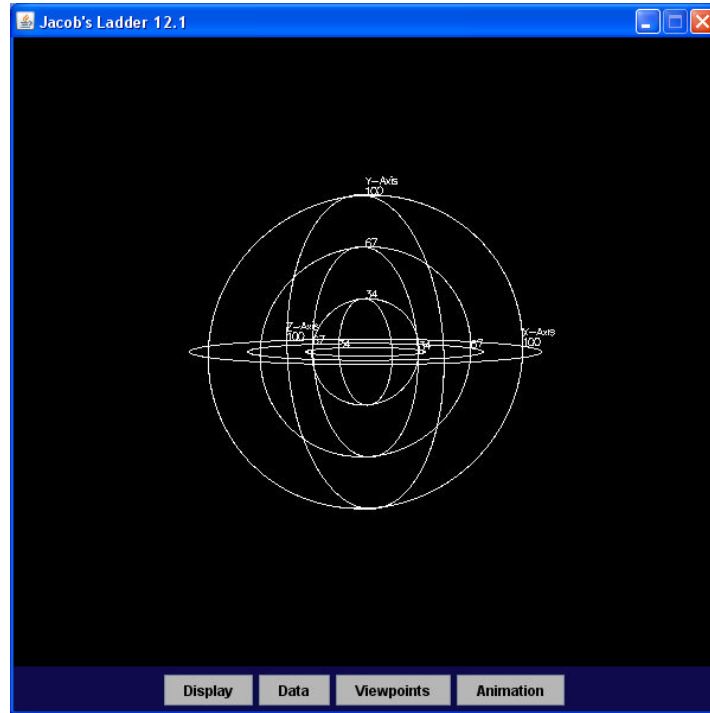


Diagram 2 – Single JL12© Display Interface – Spherical Axis

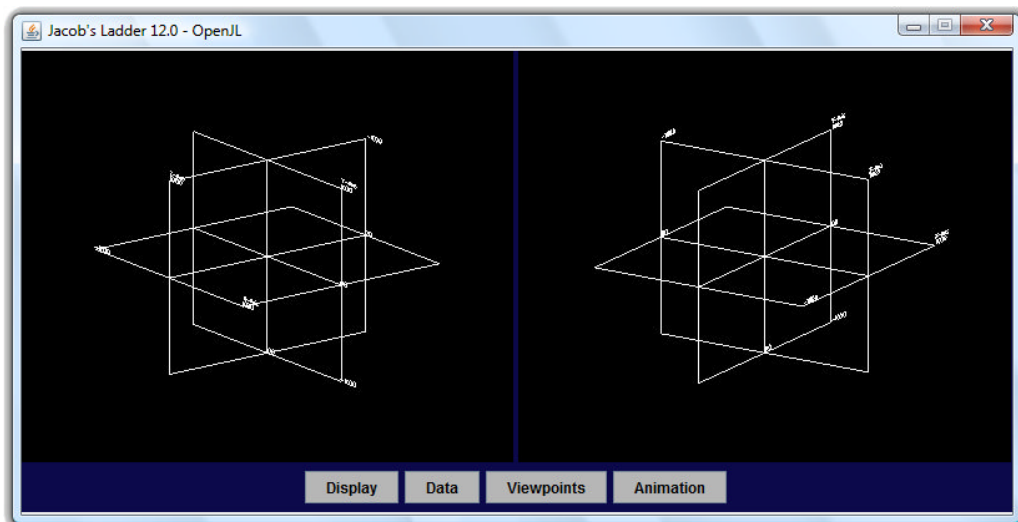


Diagram 3 – Multiple JL12© Display Interface – Standard Axis

Diagrams 2 and 3 illustrate the single and multiple pane display window interfaces JL12© provides. Notice in both displays that there are a series of buttons on a blue background. These buttons are the “remote controls” used to interface with the windows and provide color, display, animation and other important features.

III. Keyboard Controls

The following are the keyboard controls available for display modification. You must click on the pane the keyboard action is to be applied to for the action to occur in said plane.

- **Escape** – This key will exit the application.
- **Backspace** – This key will reset the display to the default orientation and zoom.
- **U** – This key will move the screen UP.
- **D** – This key will move the screen DOWN.
- **L** – This key will move the screen LEFT.
- **R** – This key will move the screen RIGHT.
- **Z** – This key will ZOOM the screen.
- **A** – This key will ZOOM AWAY the screen.
- **S** – This key will SLOW the rate of change for motion (up/down/left/right/zoom/rotate and mouse motion).
- **F** – This key will INCREASE the rate of change for motion.
- **Left Arrow** – This will rotate the screen LEFT.
- **Right Arrow** – This will rotate the screen RIGHT.
- **Up Arrow** – This will rotate the screen UP.
- **Down Arrow** – This will rotate the screen DOWN.
- **C** – This key will center the display.

IV. Mouse Controls

The mouse can also control the display much like the keyboard controls. Use the left mouse button to control rotation (arrow keys), the right mouse button to control directional movement (u, d, l and r keys) and the scroll wheel to zoom in and out (z and a keys). The rate of motion can be altered using the **S** and **F** keys or the [Display Remote](#) slider control for [warp factor](#).

V. *Display Remote*

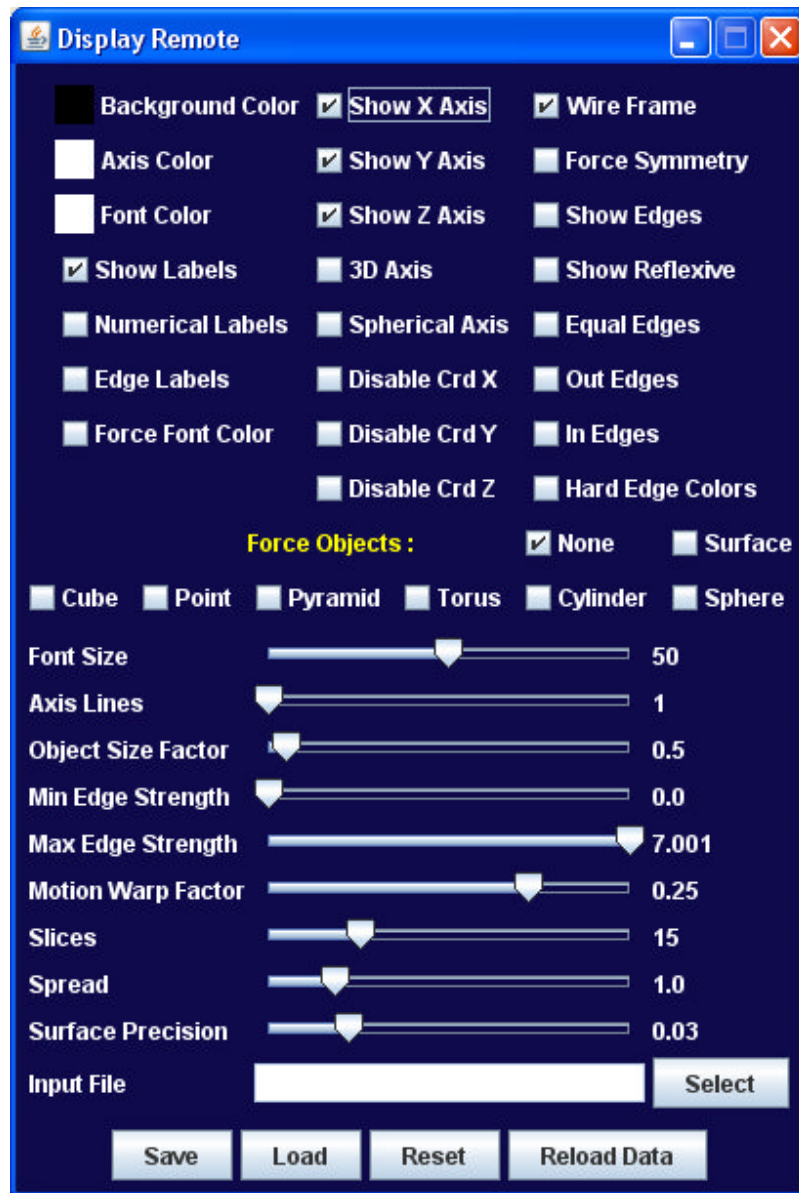


Diagram 4 – Display Remote

The display remote is used to control global display options. The following outline each of the control options and their function:

3D Axis

This option creates a 3D cube of the axis system and is mainly present for use with 3D display rooms/equipment. This feature does not apply to Spherical axis at this time.

Axis Lines

This slider controls the amount of axis lines in the display.

Background, Axis, Font Color

The background, font (foreground) and Axis colors can be modified by clicking on the color cube provided. A color chooser interface will be provided to choose an alternate color.

Disable Crd X, Crd Y, Crd Z

This option enables/disables the application of the provided coordinate values. Any coordinate disabled will be re-assigned the display coordinate 0.0 for the given dimension (X, Y, Z). Please note this option is only applicable to non-[surface plot](#) displays.

Edge Labels

This option enables/disables the edge strength value display. Edge labels are not shown unless the edge is show.

Equal Edges

This option will force all edges to have the same strength value (1.0).

Font Size

This slider allows for the reduction / increase in font size in the display.

Force Font Color

The [font color](#) specified in the display remote is for the axis only unless this option is used. Forcing the font color will change all node labels to the axis font color.

Force Objects

This option allows for the object type to be forced to one of the acceptable types in **JL 12.1©**.

Surface plots are available as of **JL 12.1©**. This plot is generated on a different scale ($-1.0 \leq X \leq 1.0$) and is scaled to fit within the display after generation. Memory and CPU usage are greatly reduced although some data precision is lost by the normalization range.

Force Symmetry

This option will make the matrix symmetrical and display all edges as single (non-directed).

Hard Edge Colors

This option will change the colors used for edges to be based on the specified “hard edges” vs. the colors of the objects connected by the edge. **NOTE:** Hard Edge colors do not animate between time matrixes. Rather they change as each new matrix is shown and last through all slices.

In Edges

This option will activate the display of in-directed edges.

Input File

This option allows for the specification of the input XML file by using the “Select” button. The file will be loaded and immediately displayed unless a problem occurs. Problems will result in warning messages. Please see the sections on [Input Files](#) for more information about the input data format and creation.

Min / Max Edge Strength

These sliders control the visible edge strengths when [show edges](#) are enabled. The combination of both sliders can be used to show mid range.

Motion Warp Factor

This slider controls the motion speeds for rotation, shifting and zooming of the display. Slower speeds are often necessary for micro movements on zoomed viewings.

Numerical Labels

This option forces the use of numerical labels (node id) in place of textual labels.

Object Size Factor

This slider allows for the shrinking/enlarging of object sizes (relative to each other) for improved display characteristics.

Out Edges

This option will activate the display of out-directed edges.

Show Edges

This option allows for the hiding / showing of all edges in the display. Show Edges is off by default due to the memory necessity of edges.

Show Labels

This option allows for the hiding / showing of labels in the display.

Show Reflexive

This option will show/hide the reflexive edges.

Show X, Y, Z Axis

This option shows/hides the various axis lines related to the dimension specified.

Slices

This slider determines how many slices are used when displaying complex geometric objects like the torus, sphere and cylinder. Larger values have smoother objects; however they require more CPU / Memory and can slow the response time of the JL12© panes.

Spherical Axis

This option will change the axis to a spherical model vs. a square one. The 3D Axis option is not available for this axis type at this time.

Spread

This slider will spread the data out in the display (or condense) using the spread value as a multiplier for visualization.

Surface Precision

This slider determines the precision used when generating the Surface forced object type. Smaller precision (0.01) yields more precise results; however the CPU/Memory load is greater. This option should be used to regulate the CPU/Memory load on Surface displays.

Symmetric Edge Colors

Edges are displayed such that the color of the edge at the node will be the color of the sender. If the edge is symmetrical both colors will appear, one at each end. Edges with zero value symmetry will only be the color of the node with the non-zero value.

Wire Frame

This option allows for the specification of wire frame vs. solid object display. Wireframe displays are useful for viewing nodes within nodes where the solid objects will hide nodes that are contained within other nodes.

VI. Viewpoint Remote

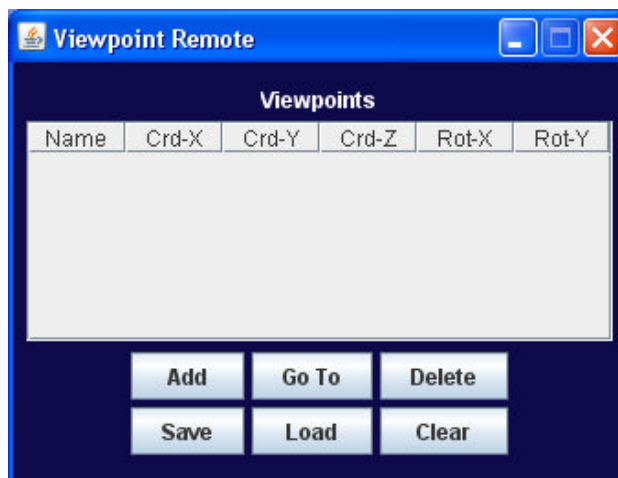


Diagram 5 – Viewpoint Remote

The viewpoint remote is an extension of the Jacob's Ladder 11© viewpoint concept that provided specific points of view for display selection. Unlike the previous version, **JL12.1©** allows the user to specify viewpoints on the fly and load these viewpoints into any of the display panes setup for the display.

Add

This button initiates the add sequence. The viewpoint name and source pane will be required to create the viewpoint; no pane specification is necessary if only one pane is used for the display.

Go To

This button will go to the selected Viewpoint from the viewpoint list and apply the viewpoint to the pane specified if there are more than one panes in use.

Delete

This option will delete the selected viewpoints from the viewpoint list pane.

Save

This option will save the current viewpoint definitions to the specified file.

Load

This option will load the viewpoint definitions for use. An error message will be provided if there is a problem with the definitions.

Clear

This option will clear all viewpoints from memory.

VII. Data Remote

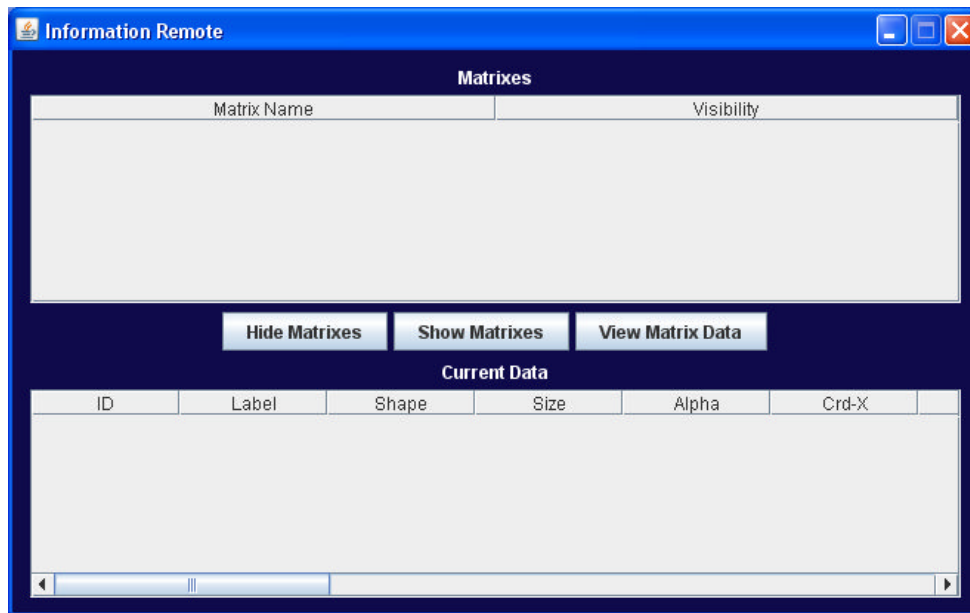


Diagram 6 – Data Remote

The data remote provides a series of options both for display of the data and review. The remote consists of a matrix list pane, hide/show/view matrix buttons and a data window for the current matrix node data to be displayed.

Hide Matrixes

This option will hide from display all of the matrixes specified.

Show Matrixes

This option will show any of the selected matrixes that have been hidden.

View Matrix Data

This option will perform differently based on the type of display being shown. For still display it will show the node data for the selected matrix. Animations will show, by default (at all times), the matrix data for the time point currently displayed. This information will update simultaneously as the animation runs.

VIII. Animation Remote

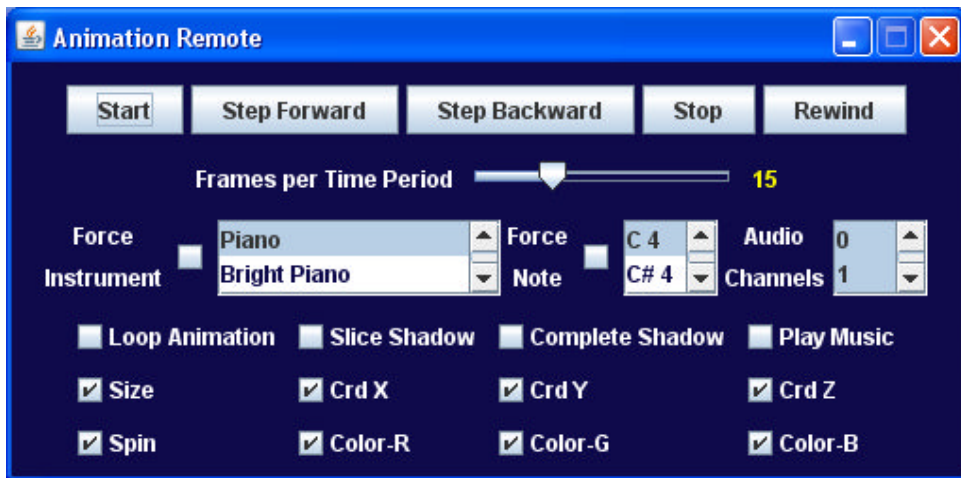


Diagram 7 – Animation Remote

This remote is for controlling the animation sequence display. Buttons control the flow of the animation, sliders control the intensity/speed and checkboxes enable/disable special features.

Start

This button will start the animation from the current time point.

Step Forward

This button will step the animation sequence forward one matrix in the time series up to the final position (it will not cycle forward to the first matrix). The animation will remain on this time point so long as it has been “Stopped” with the stop button.

Step Backward

This button will step the animation sequence backward one matrix in the time series up to the initial position (it will not cycle backward to the last matrix). The animation will remain on this time point so long as it has been “Stopped” with the stop button.

Stop

This button will stop the animation sequence at the current time period and leave the display as is until started. The time point displayed will be the last matrix shown should the animation be in the midst of a [slice display](#).

Rewind

This button will rewind the animation sequence to the first matrix in the time series.

Frames per Time Period

This option specifies the number of “slices” to generate for a [slice display](#).

Force Instrument

This option will force the audio output for all nodes/channels to use the instrument selected.

Force Note

This option will force the audio output for all nodes/channels to use the note selected.

Audio Channels

This option controls which audio channels to intonate and can do up to all available channels simultaneously.

Loop Animation

This option specifies that the animation should loop from the last time point to the first running continuously (forever) until the stop button is selected.

Slice Shadow

This is a new feature in JL12 that has not completely been debugged/cleaned. At this time the feature works to generate the display; however when attempting to rotate/zoom/shift the display it fails to only generate the results and instead generates multiple duplicates of everything – a colossal mess.

The display will retain each [animation slice](#) shown between matrix time points when using this feature and NOT attempting to rotate/zoom/shift the display. This provides a historical view of the motion between matrix points in time.

Once the point in time moves to the next (finishes the slicing) it will reset the display and start the shadow sequence for the next two points in time.

The display will automatically fix itself when this option is unchecked during an animation sequence.

Complete Shadow

This feature is the same as the slice feature, including the bugs, however it shows the entire animation in a shadow sequence rather than the slices between time points.

The display will automatically fix itself when this option is unchecked during an animation sequence.

Play Music

This option will turn the music outputs on/off. Music can be enabled/disabled at any time during an animation. There are no features to review music data in still displays.

Size

This option will enabled/disable the animation of size changes including alpha size.

Crd X, Y, Z

This option will enabled/disable the animation of coordinate changes.

Spin

This option will enabled/disable the animation of spin changes.

Color R, G, B

This option will enabled/disable the animation of color changes.

III Display Characteristics

I. JL-12 Object Visualizations

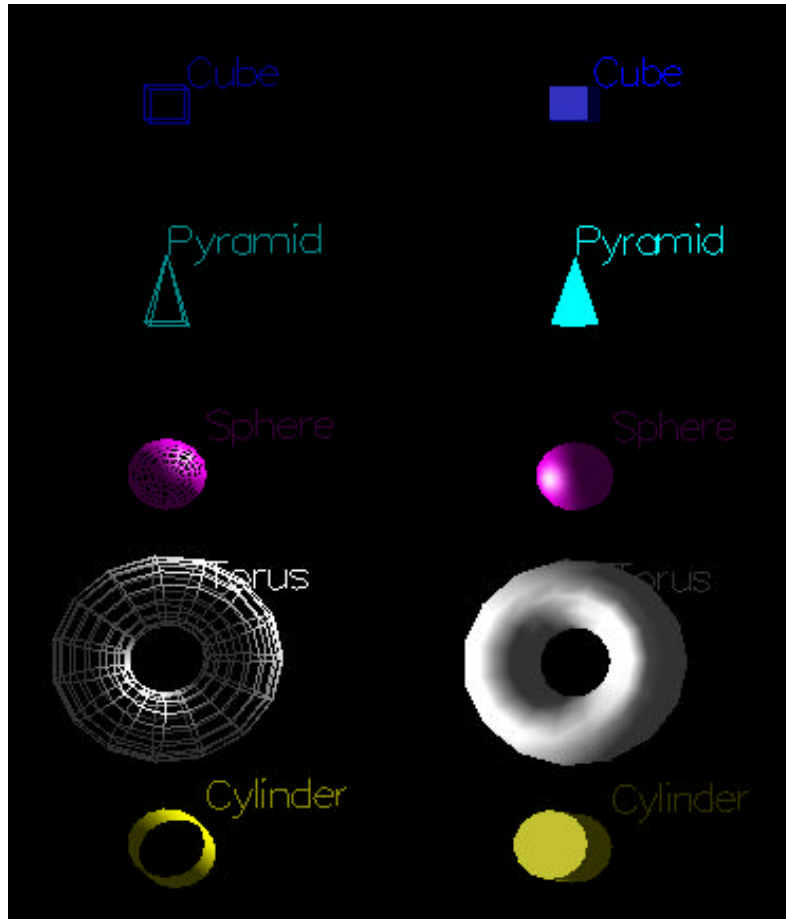


Diagram 8 – Example Object Visualizations

Cube

Cubes are defined as Size X Size X Size and are colored complete.

Cylinder

Cylinders are defined as Size X Alpha where the size is width of the cylinder and the Alpha is the length of the cylinder. Cylinders are colored complete and the Alpha size is defaulted to the Cylinder size if not specified.

Point

Points are single pixels and are colored complete.

Pyramid

Pyramids are defined as Size X Size X Alpha where Size is the width/depth (base) and the Alpha is the height. Pyramids are colored complete and the Alpha size is defaulted to the Pyramid Size if not specified.

Sphere

Spheres are defined as Size in radius and are colored complete.

Surface

Surface coordinates are used to determine where on the surface (X and Y Coordinates) to place the “pinch” and the size of the pinch is determined by the Z coordinate.

Surface plots do not include edges and cannot be used with still displays at this time.

Torus

The Torus is defined as Size X Alpha where Size is the total size of the torus and Alpha is the size of the hole within the torus. The object is colored complete and the default Alpha (when not specified) is two times the Torus size (Size*2).

II. Still Displays

Still displays will show those matrixes not hidden through the [Data Remote](#). All matrixes contained within the XML input file will be shown overlaid. Music is not available through the still display feature at this time.

All data loaded as still display is hidden by default to reduce display processing/memory requirements.

III. Animation Displays

Animation displays will show the matrix at the given time point only and will not overlay other matrixes unless the [slice shadow](#) or [complete shadow](#) options are used. Musical characteristics will be applied if the [play music](#) option is selected.

Animation Slicing

The animation sequencer is smoother as more points in time are provided for display. Often, the available data does not provide enough information for the animation to run smooth enough for pattern recognition.

Slicing is a process that determines the rate of change between two points in time and uses that rate to create sub-matrixes which represent the gradual change. Should 30 slices be used, 30 divisions of the data will be created between points in time making a smooth linear transition based on 1/30th of the slope of change between those two points in time. This transition sequence is the simplest and fastest means of creating smooth linear motion where this is none.

Slicing is the only means currently of slowing the animation. The more slices used the slower the animation sequence.

WARNING: The slices are linear in nature and do not approximate the actual motion of the objects. It should NOT be construed as actual data representation; rather it is a means of smoothing the transition for easier interpretation by the eye.

IV. Animation Intonation

JL12© uses the MIDI intonation sequencing similar to the Jacob's Ladder 11© software; however there is a difference in the application. JL11© used frequencies and instruments; JL12© uses notes, velocities and instruments.

The MIDI sequencer will utilize as many channels available on the computer running the software to minimize sound distortions through overlapping notes.

IV Jacob's Ladder 12© Input Files/Data

Jacob's Ladder 12.1© uses an XML file standard generated by the sister software **NetXML©**. This XML is customized for the **JL12.1©**; however future version will adopt a networks XML standard (yet to be determined).

Please refer to the **NetXML©** documentation for generation of the input files.

V Included Examples

I. US Cities

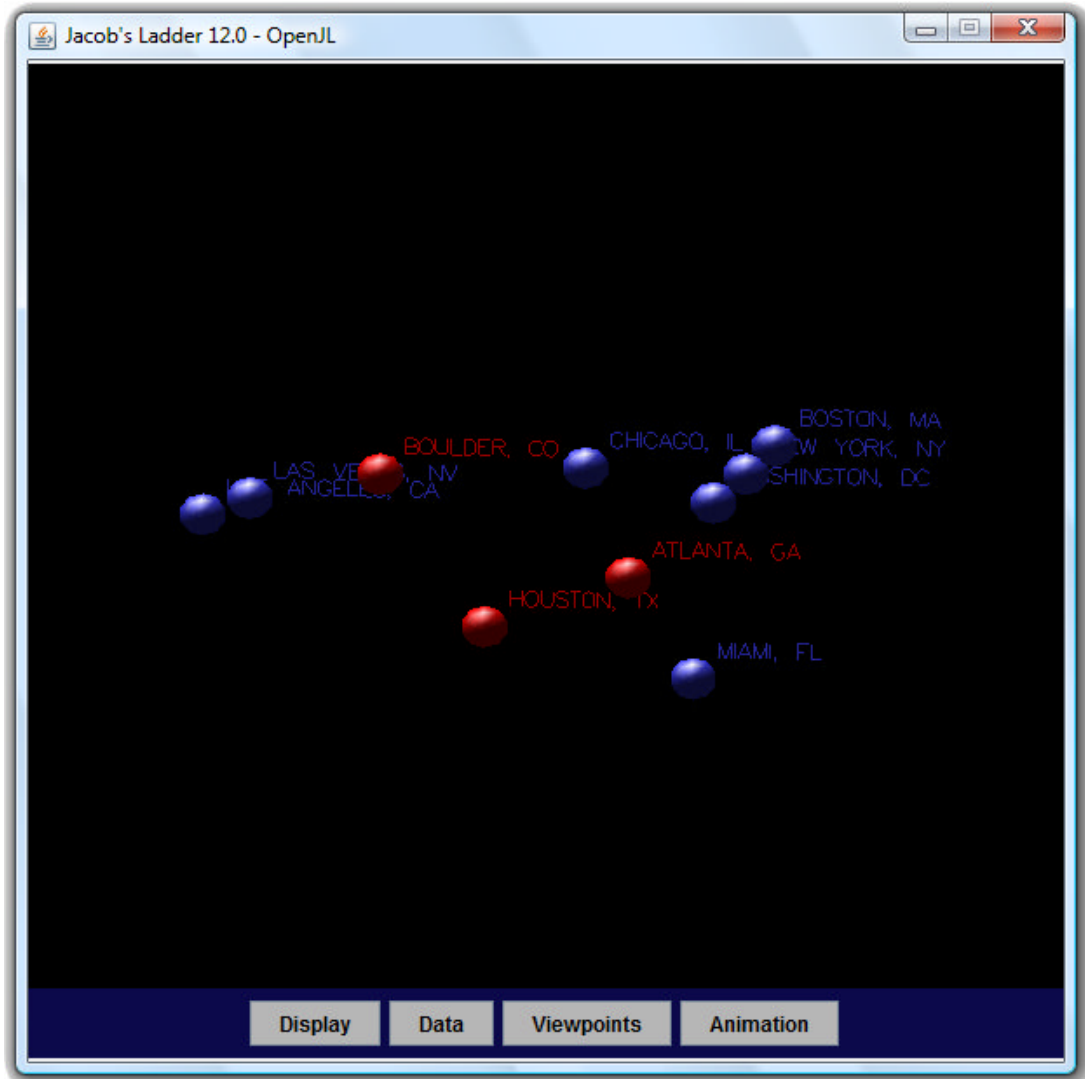


Diagram 8 – US Cities

This example uses the file *us_cities.jl12.xml* located in the *c:\program files\ElbirtSoftware\examples\jl12* folder. The colors used indicate the party voting for that state in the 2008 US Presidential Election. Blue represent the democrats; red represent the republicans.

II. Semantic Analysis of Genesis in English

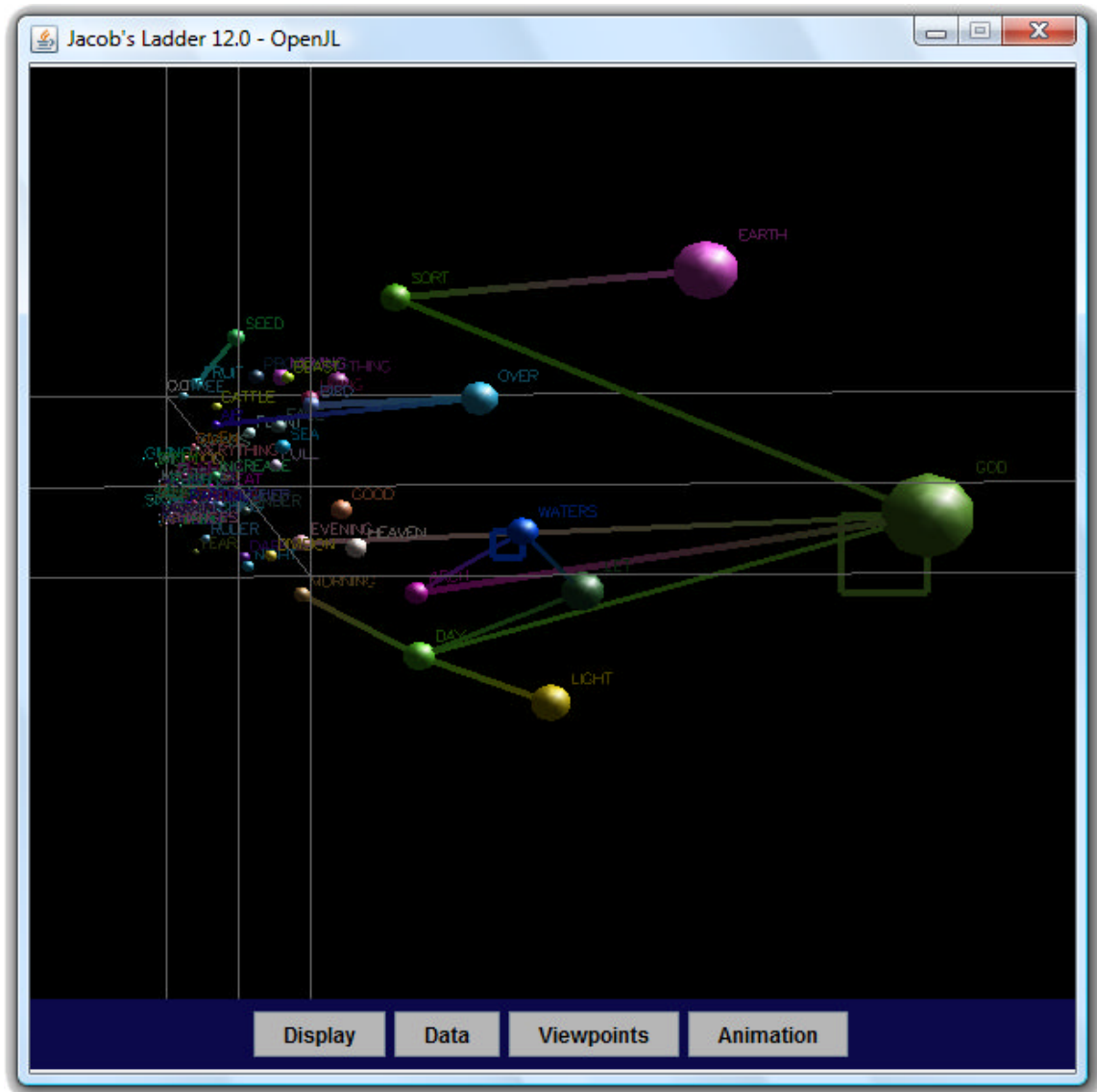


Diagram 9 - Semantic Analysis of Genesis in English

This example uses the file *english_gensis.xml* located in the *c:\program files\ElbirtSoftware\examples\jl12* folder. The colors used have no relevance to the graph data. The size of the word represents the frequency and the proximity of each word to another represents the semantic relationship. Edges displayed are those with strengths between 3.0 and 4.0 (all strengths are normalized to between 0.0 and 7.0) with directionality based on color and size of the line representing the strength. Notice self reflexive edges and both non and symmetrical edge colorings.

III. Canadian Migration Patterns – Still

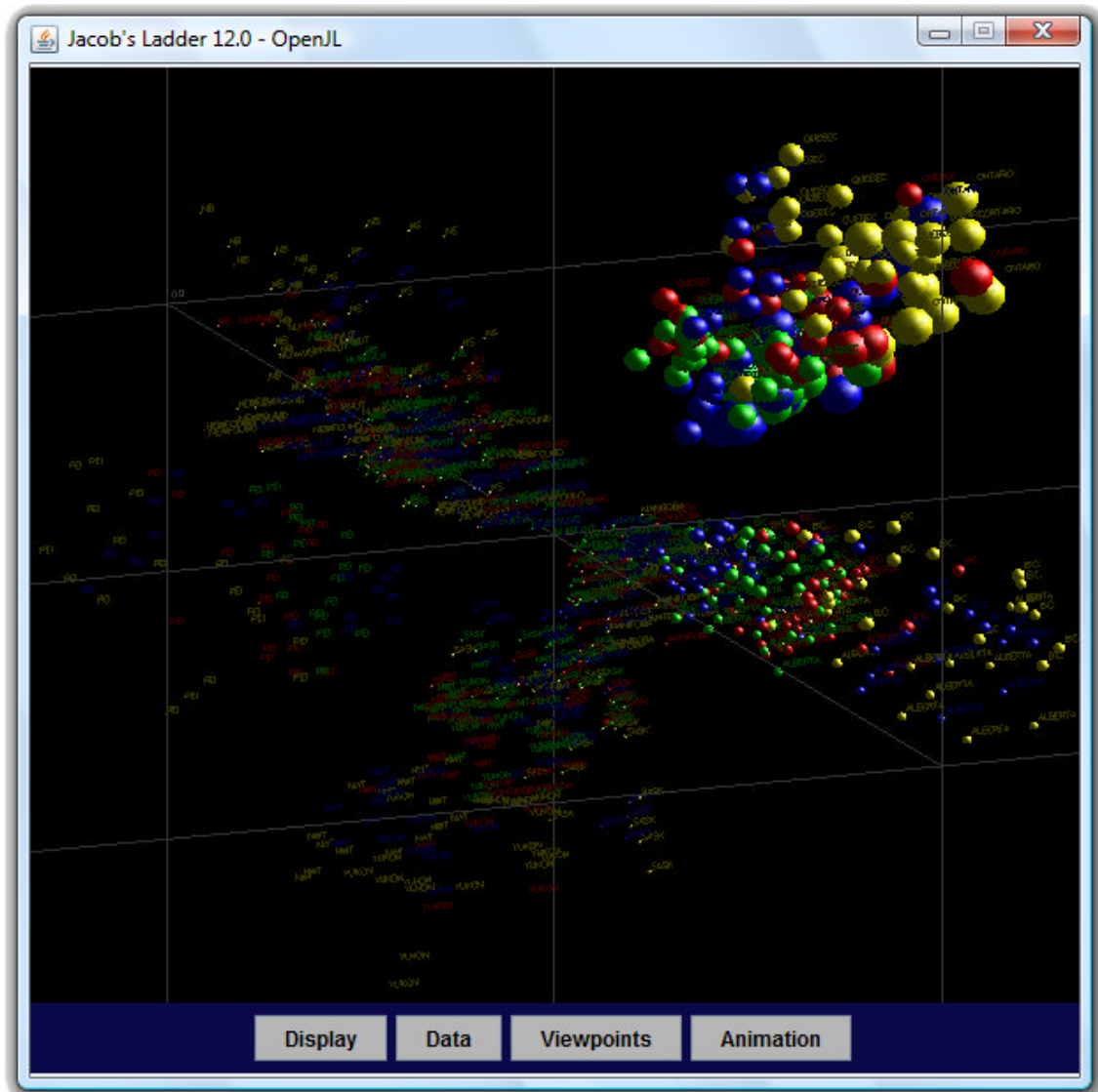


Diagram 10 - Canadian Migration Patterns – Still # 1

This example uses the file *canadian_migration_still.xml* located in the *c:\program files\ElbirtSoftware\examples\jl12* folder. The colors used are representative of the season (winter=blue, spring=green, summer=red, fall=yellow). Eighty plus points in time are represented in a single space with 15 nodes per matrix. Node size represents population.

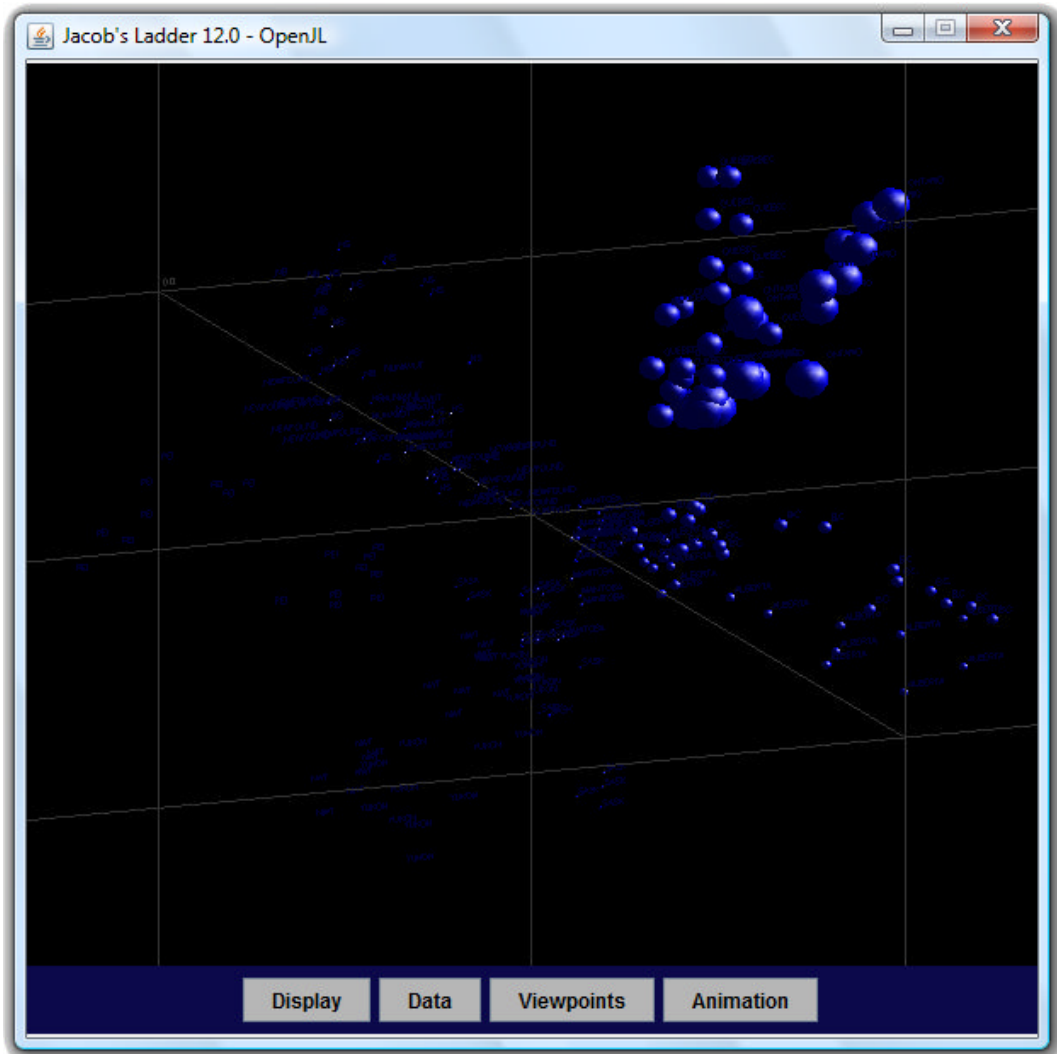


Diagram 11 - Canadian Migration Patterns – Still – Winter Matrixes Only

This example uses the same information as the previous example; however it only displays the winter (blue) periods. This was achieved by using the [Data Remote](#) to hide all matrixes but those of the winter specification.

IV. Canadian Migration Patterns – Animation / Intonation

This example uses the file *canadian_migration_animation.xml* located in the *c:\program files\ElbirtSoftware\examples\jl12* folder. The data is representative of the same in the previous example, however each point in time is being animated rather than simultaneously displayed.

No visualization of animation is possible here graphically; however the experience of both the time series and data frequencies show the sound and visual possibilities with this application.

V. James Fowler Congressional Data – Surface Plot

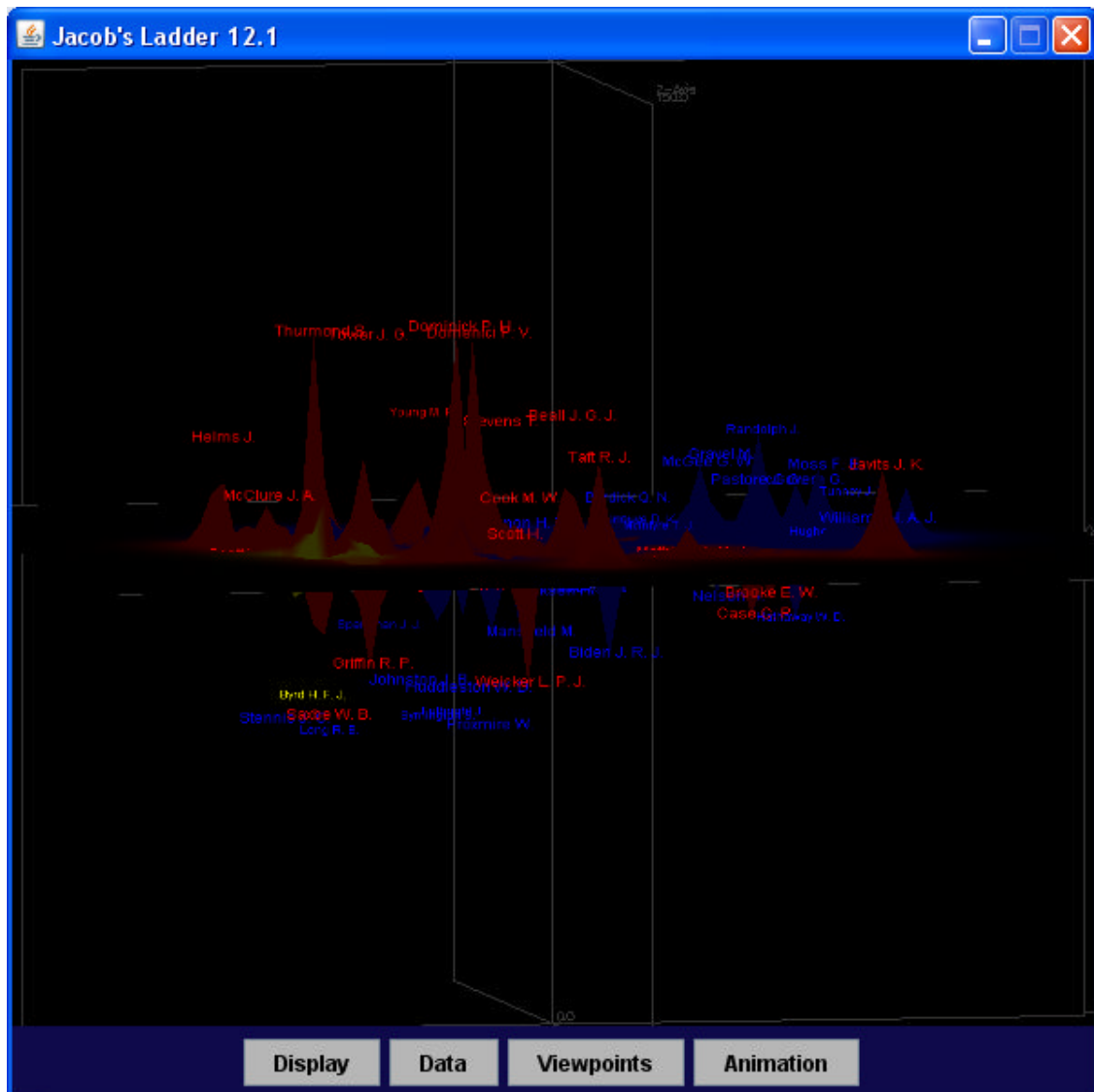


Diagram 12 – James Fowler Congressional Data - Animation – Coordinate Surface Plot

This example uses the file *fowler_animation.xml* located in the *c:\program files\ElbirtSoftware\examples\jl12* folder. The data represents the co-sponsorship of bills among congressional senators from the 93rd to the 109th US Congress. Diagram 12 represents the surface plot, using the MDS X, Y and Z coordinates for the data, for the 93rd Congress. Democrats are colored blue, republicans red and independents yellow.

No visualization of animation is possible here graphically; however the provided example file will animate the surface plot for each time point, with slicing and colors