AFNI! Interactive Tips and Tricks
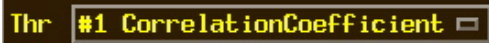
1) On most systems, the X11 cursor used in AFNI is an orange arrow pointing at about "10:30" on the clock face. However, the arrow becomes yellow and points to about "11:00" on the clock face, when it is over a location that has a hidden Right-Click popup menu (usually).

    normal cursor shape

    hidden menu cursor shape

    a) The Right-Click popup menu for the blank square to the right of the AFNI **done** button lets you see a cartoon of Brodmann area locations, and some text describing each area.

    b) The Right-Click popup menu attached to the intensity bar (just to the right of the image) lets you plot coordinate label overlays and tic marks on top of each image.

    c) Right-Click on the **Save** button in an image viewer, and you'll get a window that lets you choose between the different image save formats: `Sav1.jpg`

    d) Right-Click on the label left of a drop-down "option menu", and you'll get a window with all the menu options (*e.g.*, right-click on "**Thr**"): `Thr  #1 CorrelationCoefficient`

    e) Left-Clicking in the button that opened an image or graph viewer will bring the viewer window to the front. Right-Clicking in that button will bring the viewer window from wherever it is hiding back to that location – this is useful if the window somehow got shifted off screen (*e.g.*, when a laptop's second monitor is disconnected).

    f) In the **Render [new]** plugin, Right-Clicking in the **Accumulate** control lets you enter a label string that can be overlaid on future renderings; Shift-Right-Click lets you alter the label string for already-rendered images. Display of labels is controlled from the Right-Click popup menu attached to the renderer's image viewer intensity bar.

2) Overlay thresholds and color bars can be locked together between AFNI controller windows, using the **Edit Environment** controls (*cf*. the **Define Datamode→Misc** menu).

    a) Also see the **README.environment** file for lots more information.

3) In an image viewer window, if you press-and-hold-down mouse button #1 and then drag the cursor around vertically and horizontally, the contrast and brightness of the underlay changes as you move.

    a) If environment variable **AFNI_STROKE_AUTOPLOT** is set to **YES**, then the histogram of image values is popped up as you alter the image value→grayscale conversion curve.

4) Many of AFNI's interactive operations can be controlled by scripted commands, sent to it from an external program, read in from a file, or given to AFNI directly on its command line. See the file **README.driver** for a list of all the commands that can be used to control the AFNI GUI from outside.

5) Environment variable **AFNI_AUTO_RESCAN** can be used to have AFNI automatically rescan the open directories for new datasets every 15 seconds. (By default, AFNI will also rescan the current directory when you press **Underlay** or **Overlay** to change datasets.)

6) The **Dataset #N** plugin, combined with the **Double Plot** feature, can be used to overlay multiple datasets' time series in the graph viewers; *e.g.*, the **3dDeconvolve −fitts** output.

7) The **Disp** menu in an image viewer lets you transform the underlay image in various ways (*e.g.*, 2D median and sharpening filters), and graph it as a wire mesh surface (**SurfGraph**).

8) Pressing the **v** key in an image viewer will cause AFNI to "video" through all the slices; **v** in a graph viewer causes video progression through all time points. When image viewers are also open, time video is an easy way to view an animation of the slices from an FMRI imaging session. The inter-frame video delay is set using environment variable **AFNI_VIDEO_DELAY** (units of ms). Pressing the **space** bar turns video mode off.
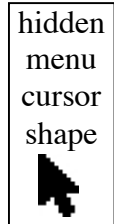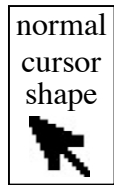
a) Other image shortcuts: **V r/R z/Z i/I m a s D M q <> p c l [] S # u/o**

b) Other graph shortcuts: **V r/R < > [ ] 1 l L - + a A m/M b S t w i/I**

c) **PageUp**, **PageDown**, and **arrow** (←→↑↓) key shortcuts can be used to move quickly around in the image and graph viewers, and also to change values in the threshold slider.

d) If an image is cropped, the crop window can be adjusted in size by holding down **Control**+**arrow** ; it can be adjusted in position by holding down **Shift**+**arrow** .

e) If an image is zoomed, pressing **Home** will move the panning region to be centered.

f) Pressing **F1** in an image or graph viewer pops up a help window. (This is actually a feature of X11/Motif, not just AFNI.)

9) The popup hint for the image intensity bar shows the bottom-to-top range of numerical values in the image file that are being mapped from the bottom color/grayscale to the top color.

10) In various places (*e.g.*, the graph viewer), where the menu item lets you save an image to **PNM** format, if you end the filename with "**.jpg**", the file will instead be saved in JPEG format.

11) Menu item **Define Datamode→Read Web** lets you load a dataset from a Web server.

12) The **1DChain** and **2DChain** functions are defined using the **Define Datamode→Misc** menu, and let you create a sequence of operations to be applied to a dataset before graphing (**1DChain**) or image display (**2DChain**).

a) The **Expr 0D** plugin lets you define a simple nonlinear voxel-wise transformation function to be applied to datasets for graphing or image viewing.

b) The right-click popup menu on the **Define Overlay→Inten** label lets you apply various transformation functions to the overlay image before it is colorized. (The **Disp** control panel in the image viewer lets you apply these transformation functions to the underlay image.)

  i. Other items on this popup menu let you alter the color scale range, and save an image of the current color scale window.

c) The **InstaCalc** facility lets you create a volume by voxel-wise calculations from one or more other datasets for image viewing (e.g., interactively view the ratio of two datasets) — the volume so defined appears as the Overlay.

13) You can add text notes to a dataset's header with the **Dataset Notes** plugin or with the **3dNotes** command line program. These will be display by **3dinfo**.

14) You can graph a multi-brick dataset with boxes rather than as a line graph, using the **Opt→Colors→Data** options in the graph viewer. This can be useful for seeing the distribution of β values from a **-stim_times_IM** regression, for example:
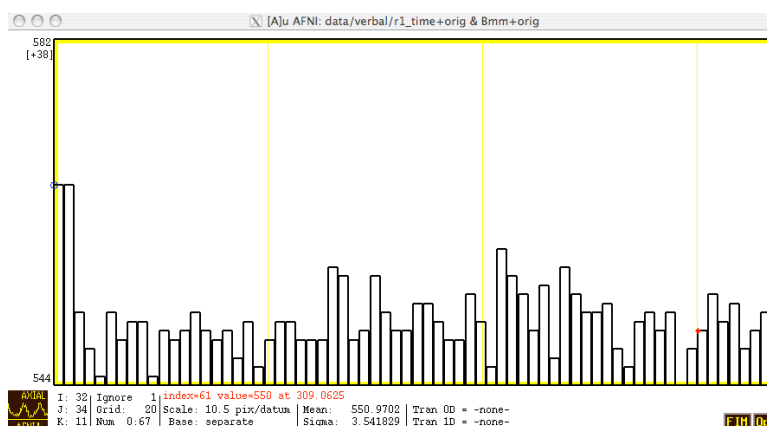
Test Your AFNI! Expertise! [these are difficult questions]

1) Explain the difference between **Min-to-Max** and **2%-to-98%** in the AFNI image viewer. Why is **2%-to-98%** the default?

2) What does the **R** key do when typed into an AFNI image viewer window? What about in a graph viewer window? What about the lower case '**r**'?

3) On some computer systems, it is possible to drag an image viewer window so that its aspect ratio (height/width) is not preserved; in this situation, the image becomes distorted. Describe at least 2 ways to bring the image viewer quickly back into the correct aspect ratio.

4) What does the **Project** menu button do in the AFNI image viewer **Disp** control panel?

5) When you have 2 (or more) AFNI controllers open, how can you lock their threshold sliders so that they move together?

6) In an AFNI graph viewer window, how can you get a display of the time series that is the average of all the sub-graphs currently being shown?

7) Suppose you are showing a time series graph of a very long 3D+time dataset, and want to only see the points between time indexes 200..400 displayed in the graphs. How can you do this?

8) Explain the 3 different baseline modes available in an AFNI graph viewer.

9) Given a list of (*x,y,z*) coordinates, describe how to create an AFNI dataset that equals 1 at each voxel inside a radius=5 mm sphere about each coordinate in the list, and is 0 at all other voxels.

10) Why it is better to use the **3dcopy** program to make a copy of an AFNI dataset (**.HEAD** and **.BRIK** files) rather than use the Unix **cp** command twice?

11) How do you get AFNI **3d** programs to treat a **.1D** file with a single column of numbers as a 1-voxel 3D+time dataset? As a multi-voxel dataset with 1 value at each voxel?

12) How do you get AFNI to automatically compress output **.BRIK** files with **gzip**?

13) What does the command below do?

```
afni -dset "v1+orig<`3dClipLevel 'v1+orig[4]'`..10000>"
```

Explain the use of the 3 different kinds of quotes. (What kind of person thought of this, anyway?)

14) Suppose you have two 1-brick datasets **aaa+orig** and **bbb+orig**, and want to extract from a 3D+time dataset **xxx+orig** the average time series over all voxels where *both* **aaa+orig** and **bbb+orig** are bigger than 3 (*i.e.*, perform a conjunction test). Explain how to do this in a *single* command.

15) The **Rota** arrow buttons on the **Define Overlay** control panel rotate the color bar. How can you save a movie (animated GIF or MPEG-1) of the changes that happen in an AFNI image viewer as the color overlay changes while you interactively press a **Rota** button?

16) In an AFNI image viewer, you can both crop and zoom an image. What happens when you **Save** such an image to disk (*e.g.*, in a JPEG file)? Is it cropped, zoomed, both, or neither?

17) In an AFNI graph viewer, you can filter the time series in each voxel using the **Tran 1D** transformation functions. One of these pre-programmed filters is a "Median-of-3" filter. How can you do a "Median-of-7" filter instead? (Interactively: *i.e.*, without writing new C code.)

18) How can you make the color overlay be computed from the square root of an *F*-statistic sub-brick, rather than the *F*-statistic value itself? (Interactively; *i.e.*, without using **3dcalc**.)

19) Describe how to input a short **.1D** file directly on the command line, rather than via an actual file stored on disk.

Scoring: 0-1 = Recovering SPM/FSL User; 2-4 = AFNI Catechumen;
5-9 = AFNI Practical Expert; 10-14 = AFNI Certified Expert; 15-19 = AFNI Initiated Master