Today is about “Linked Views” — a New Project that adds Chris Beaumont, Michelle Borkin & Hanspeter Pfister
We’ve seen **Linked Views** at least twice at ADASS 2010...

**Aladin (Thomas Boch’s demo)**

**ASCOT (Andy Connolly’s talk)**

[Aladin screenshot]


And options are many, re:SAMP...
(see Boch & Cambrésy IVOA Victoria 2010)
J OHN TUKEY’S LEGACY

PRIM-9 → DataDesk* → XGobi → GGobi → RGGobi


PRIM-H

John Tukey's Legacy

XGobi

GGobi

RGGobi

Spotfire

Polaris

Tableau Software
DataDesk (est. 1986)
Tukey’s “Four Essentials” (c.1972)

Picturing  Rotation  Isolation  Masking  Selection

and these “need to work together” in a “dynamic display”

Brushing  Linking

Results...
1. for immediate insight
2. as visual source of ideas for statistical algorithms (...relation to SVM)

Warning
“details of control can make or break such a system”

Watch the PRIM-9 video at: http://stat-graphics.org/movies/prim9.html
TOPCAT
first “DataDesk” of Astronomy

Learn more on YouTube “Online Astronomy” channel

www.youtube.com/user/astronomy999
SAMP + VO offers Linked Views

Simple Application Messaging Protocol

www.ivoa.net/Documents/latest/SAMP.html

Also SAMP-enabled...
Great, but what about >2D?

(AG “AstroMed” @ ADASS 2007; cf. Borkin ADASS 2006,7)
The “arraytional” future...

“Complex analytics will be simplified with SciDB because arrays and vectors are first-class objects with built-in optimized operations. Spatial operators and time-series analysis will be easy to express. Interfaces to common scientific tools like R and eventually MATLAB and IDL, as well as programming languages like C++ and Python, will be provided.”

Thanks to Tim Clark for coining the phrase “arraytional” during early discussions of the SciDB concept at IIC with Mike Stonebraker.
This is a “spectral energy distribution”
**GENERALLY**

1D: Columns = “Spectra”, “SEDs” or “Time Series”

2D: Faces or Slices = “Images”

3D: Volumes = “3D Renderings”

4D: Time Series of Volumes = “3D Movies”
Perseus

- mm peak (Enoch et al. 2006)
- sub-mm peak (Hatchell et al. 2005, Kirk et al. 2006)
- $^{13}$CO (Ridge et al. 2006)
- mid-IR IRAC composite from c2d data (Foster, Laakso, Ridge, et al.)
- Optical image (Barnard 1927)
“Astronomical Medicine”

“KEITH”

“PERSEUS”

“z” is depth into head

“z” is line-of-sight velocity

http://am.iic.harvard.edu/
Perseus

3D Viz made with VolView

Astronomical Medicine @ IIG

COMPLETE
Welcome to ASTROMED09

View full size

Download talks and photos here!

The final Scientific Program is now available.

The Conference Dinner is now fully booked!

Abstract submissions have now closed.

The Inaugural Sydney International Workshop on Synergies in Astronomy and Medicine

Sydney, Australia, 14-16 December 2009

Astronomy and Medicine share many similar demands for increasingly sophisticated and diverse imaging techniques as well as associated cutting-edge instrumentation technologies and advanced software tools for multi-dimensional data storage, manipulation and processing. This workshop will provide an international forum for exploring and consolidating these synergies, exchanging ideas and identifying opportunities for knowledge and technology transfer across the two research disciplines, and on to industry and academia.

...to be continued, I think!
**COMPLETE Data Available**

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<th>Show</th>
<th>Perseus</th>
<th>Ophiuchus</th>
<th>Serpens</th>
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The dream scenario...
Exemplar: Linked Dendrogram Views in IDL

Video & implementation: Christopher Beaumont, CfA/UHawaii; inspired by AstroMed work of Douglas Alan, Michelle Borkin, AG, Michael Halle, Erik Rosolowsky
Challenge #1: 3D Selection

What’s the 3D “magnetic lasso”? How do you use it with a mouse? How can a human “steer” computer-aided selection?

see Michelle Borkin, Harvard Ph.D. student!
Challenge #2: Too many windows...

see Exposé, and yesterday’s talk about ALMA monitoring GUI
Challenge #3: What does “Publication-Quality” Graphics Mean in an Interactive 3D World?

Figure 2: Comparison of the ‘dendrogram’ and ‘CLUMPFIND’ feature-identification algorithms as applied to $^{13}$CO emission from the L1448 region of Perseus. a, 3D visualization of the surfaces indicated by colours in the dendrogram shown in c. Purple7 indicates the smallest scale self-gravitating structures in the region corresponding to the leaves of the dendrogram; pink shows the smallest surfaces that contain distinct self-gravitating leaves within them, and green corresponds to the surface in the data cube containing all the significant emission. Dendrogram branches corresponding to self-gravitating objects have been highlighted in yellow over the range of $T_{mb}$ (measured temperature) test-level values for which the virial parameter is less than 2. The $x$-locations of the four ‘self-gravitating’ leaves (labelled with yellow tails) are the same as those shown in Fig. 1. The 3D visualizations show position–position–velocity ($p$–$p$–$v$) space. RA, right ascension; dec., declination. For comparison with the ability of dendrograms (c) to track hierarchical structure, d shows a pseudo-dendrogram of the CLUMPFIND segmentation (K), with the same four labels used in Fig. 1 and in a. At ‘clumps’ are not allowed to belong to larger structures, each pseudo-branch in d is simply a series of bins connecting the maximum emission value in each clump to the threshold value. A very large number of clumps appears in b because of the sensitivity of CLUMPFIND to noise and small-scale structure in the data. In the earlier PDF version, the 3D cubes (a and b) can be rotated by any orientation, and surfaces can be turned on and off (interactivity requires Adobe Acrobat version 7.0.8 or higher). In the printed version, the front face of each 3D cube (the ‘home’ view in the interactive online version) corresponds exactly to the patch of sky shown in Fig. 1, and velocity with respect to the Local Standard of Rest increases from front ($65$ km/s) to back ($80$ km/s).


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Will Astronomy lead or follow?
SAMP  Will Astronomy lead or follow?

Simple Application Messaging Protocol
Huh?

Seems familiar...

Everyone knows...
Huh?

Seems familiar...

Everyone knows...

my experiment

Taverna

zotero

Tripit

KAYAK

iGoogle

hulu

BOXEE

Microsoft Research WorldWide Telescope
What “views” astronomers can use now...

summaries being prepared for VAO SAC by Alyssa Goodman, Eric Feigelson & Gus Muench will be posted publicly
+ “windowing” GUI
+ 3D selection = “Dream Scenario?”
The Past and Future of Linked Views in Scientific Visualization

Alyssa A. Goodman
Harvard-Smithsonian Center for Astrophysics

Jan Vermeer. The Astronomer. (1668)