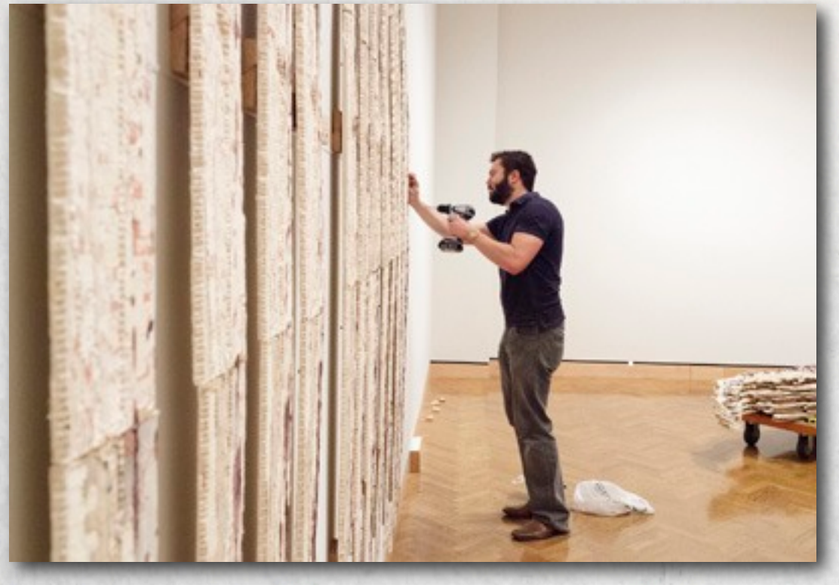
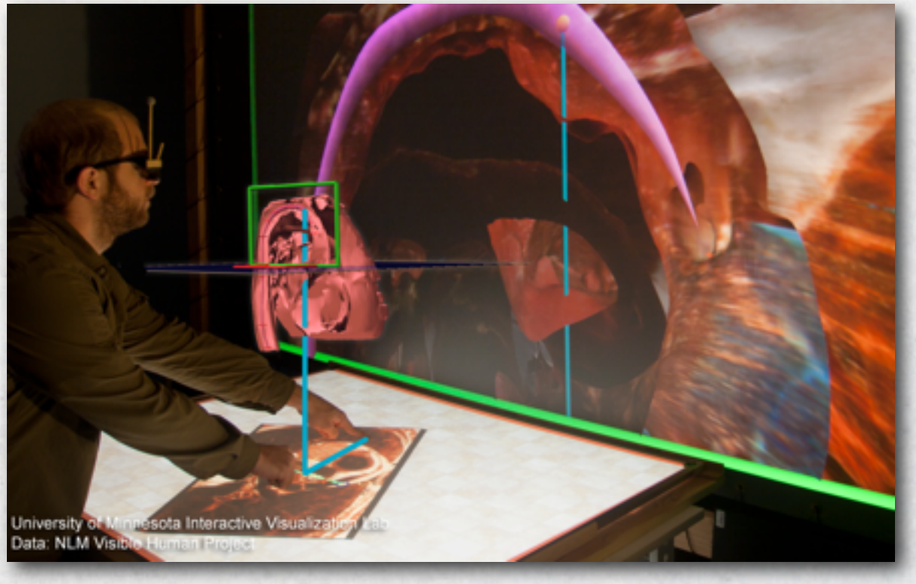
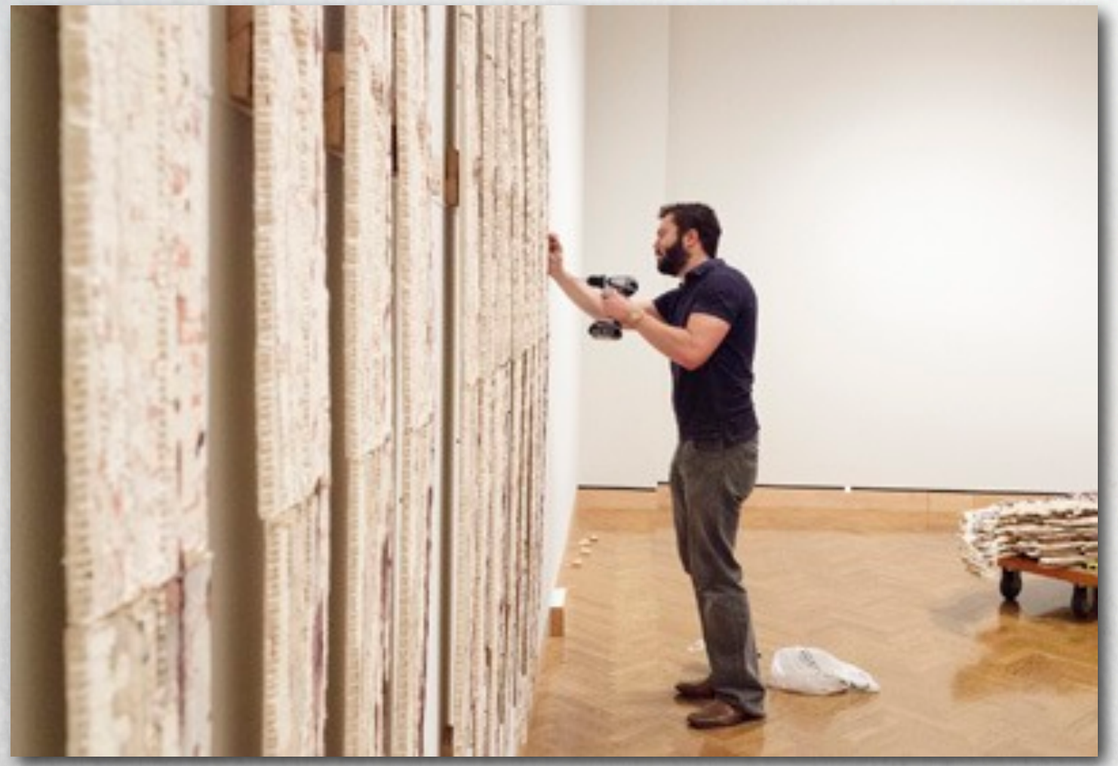
How Graphic Artists and Fine Artists Fit Into a Scientific Visualization Research Process



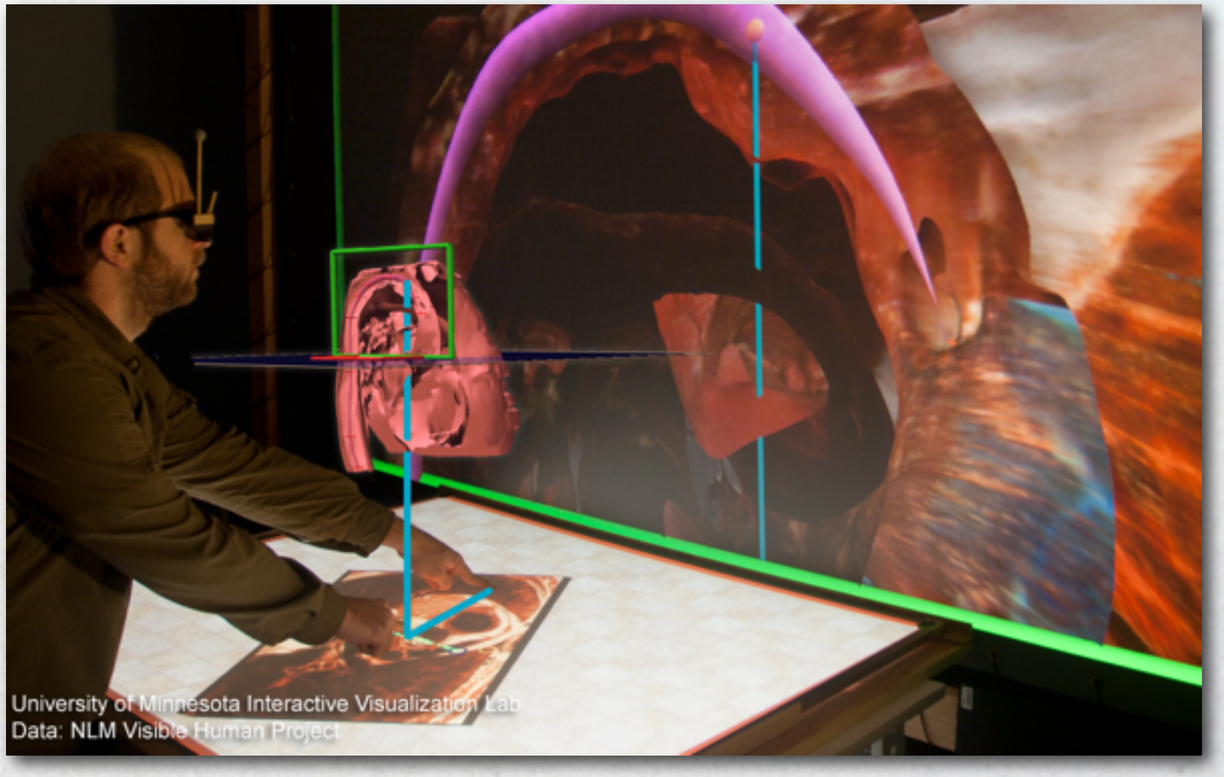


Daniel Keefe

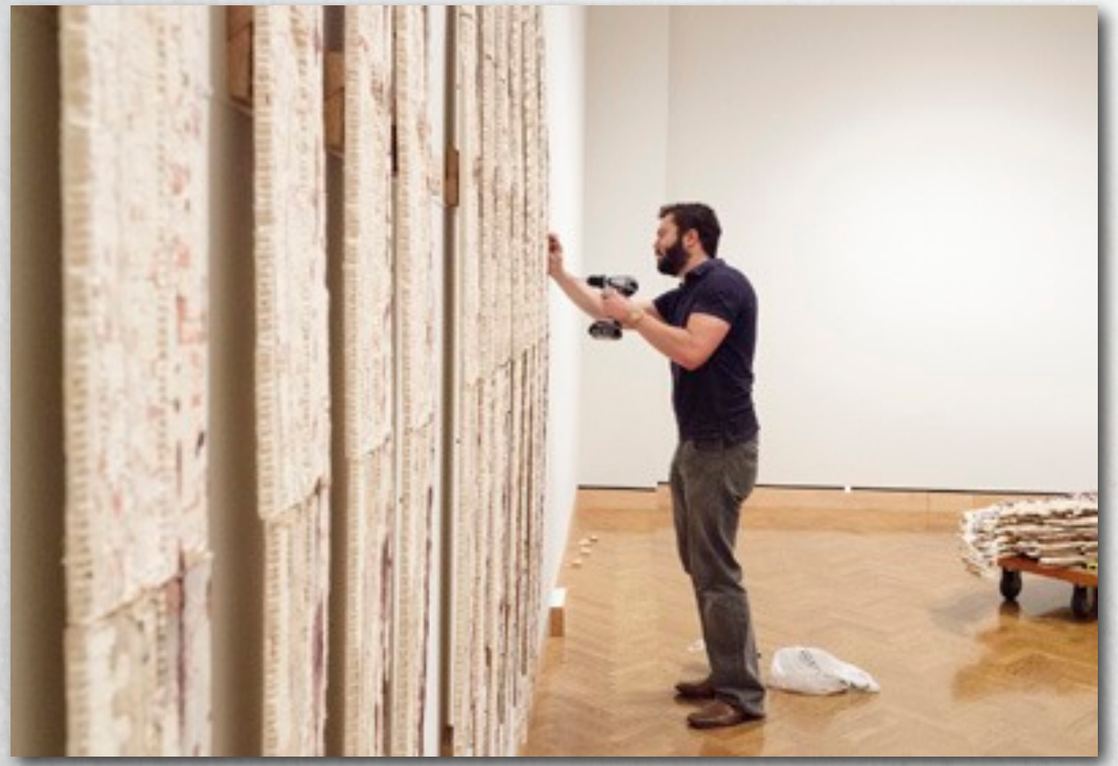
McKnight Land-Grant Assistant Professor
Department of Computer Science and Engineering
University of Minnesota



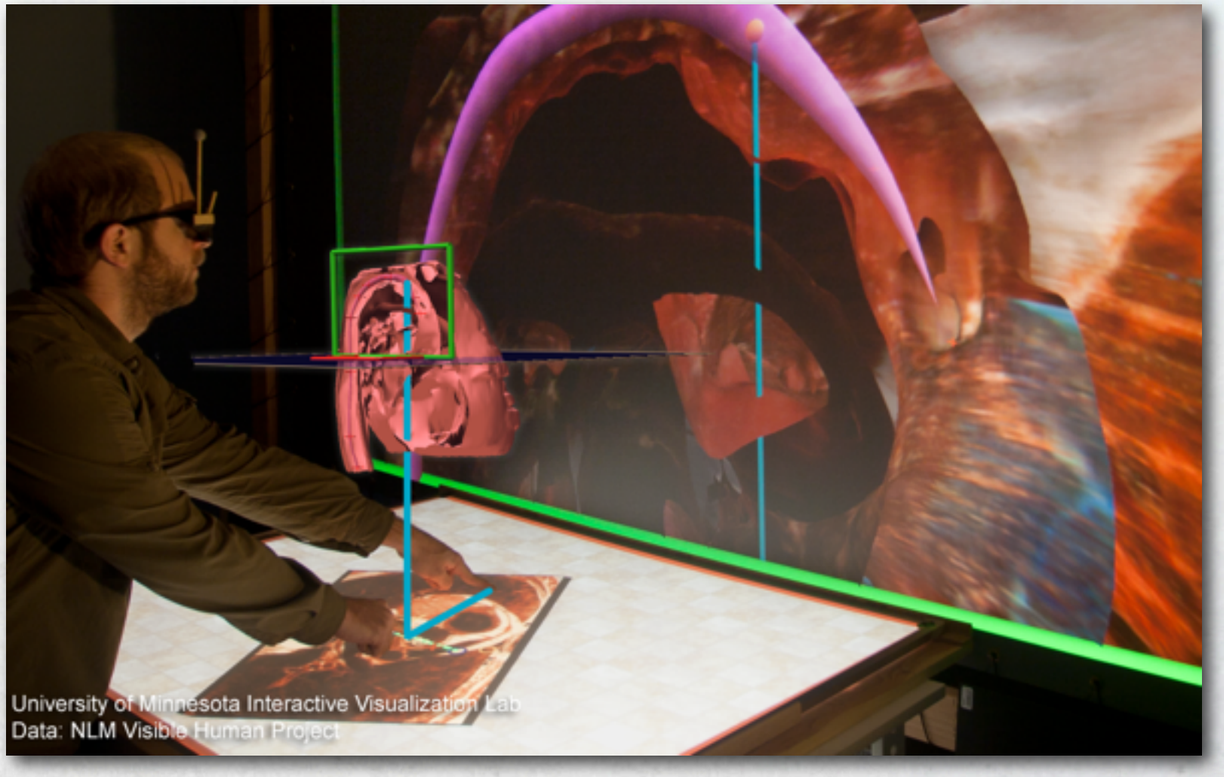
Artist Luke Aleckson installing his current show at the Minneapolis Institute of Arts



Coffey et al., Interactive SliceWIM: Navigating and Interrogating Volume Datasets Using a Multi-Surface, Multi-Touch VR interface. IEEE Transactions on Visualization and Computer Graphics, 2012.



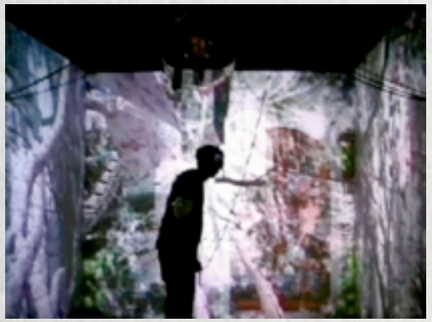
Artist Luke Aleckson installing his current show at the Minneapolis Institute of Arts

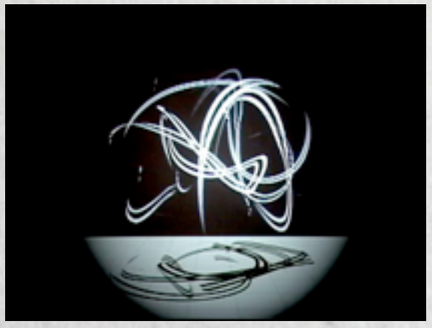


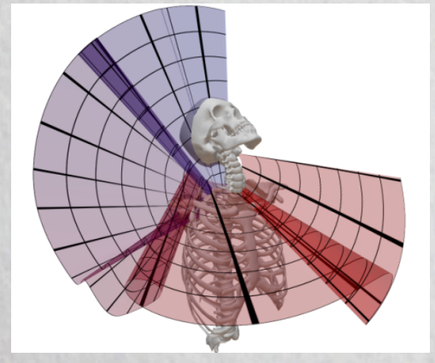
Coffey et al., Interactive SliceWIM: Navigating and Interrogating Volume Datasets Using a Multi-Surface, Multi-Touch VR interface. IEEE Transactions on Visualization and Computer Graphics, 2012.

1. Linking the Virtual and the Physical
2. 3D Vision, Useful Illusion, and Multiple Scales
3. Engagement, Aesthetics, and Conveying Information

Roadmap

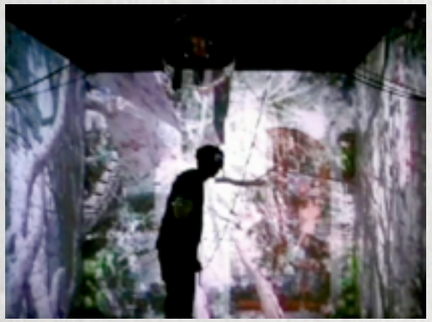


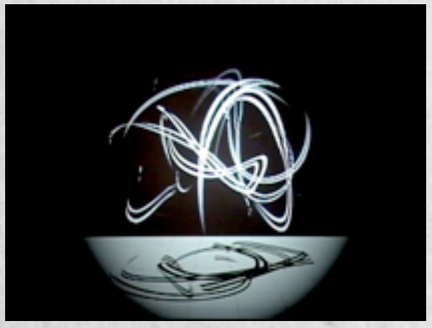


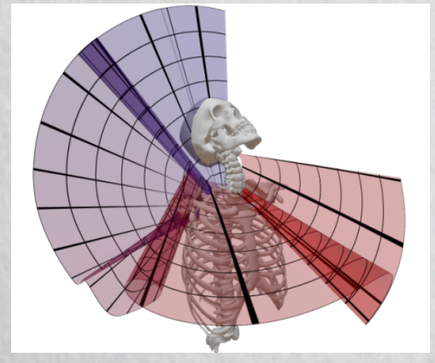


- Rethinking Visualization Environments: Creative use of physical space in a CAVE environment
- Deep Visual Investigations: 3D form, gesture, and “line”
- Ideation, Design, and Critique: “Renaissance teams” for visualization projects

Roadmap

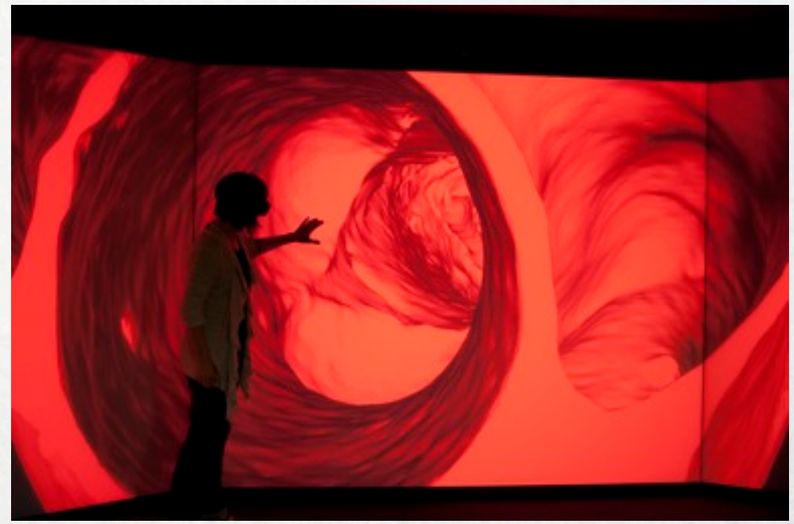






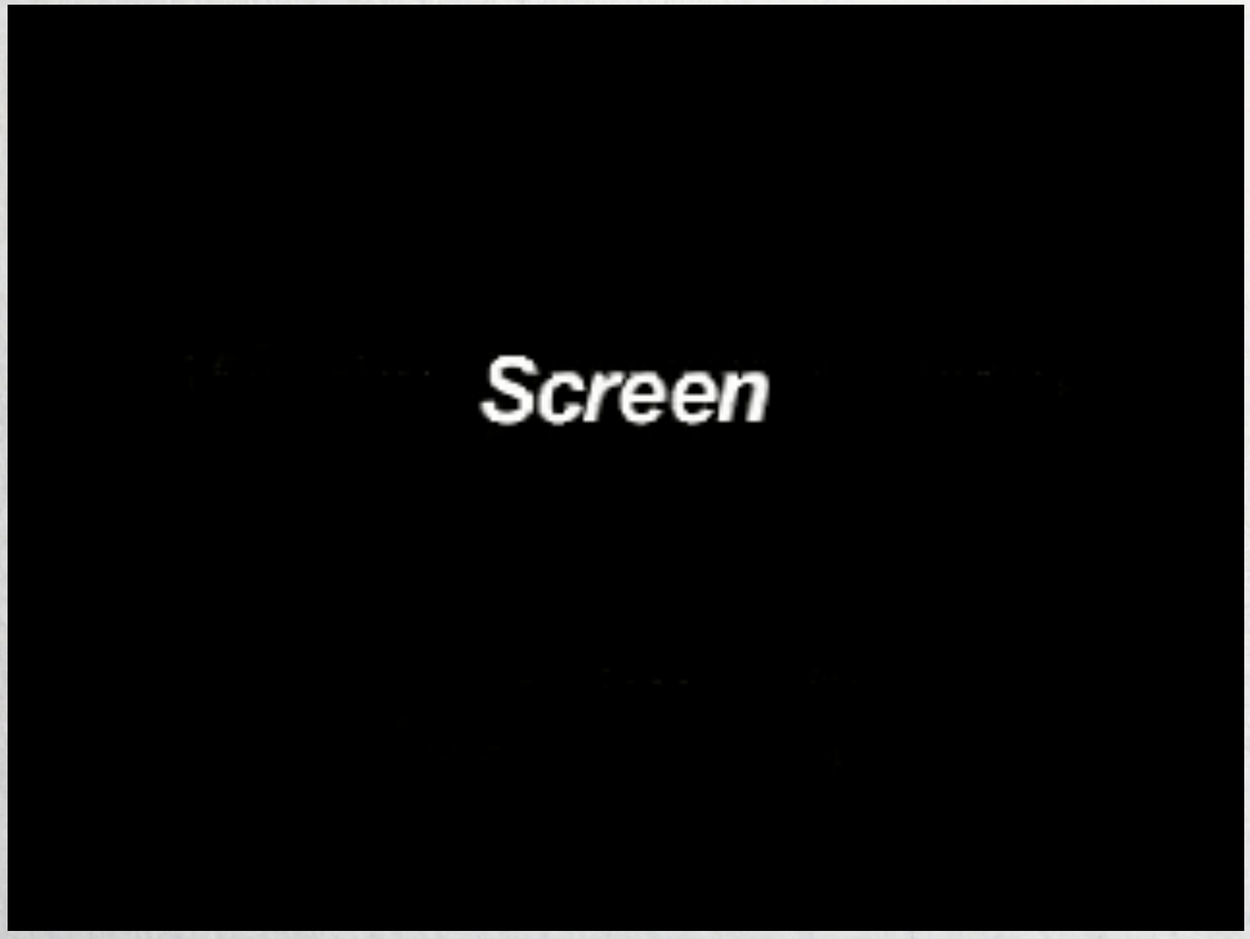
- Rethinking Visualization Environments: Creative use of physical space in a CAVE environment
- Deep Visual Investigations: 3D form, gesture, and “line”
- Ideation, Design, and Critique: “Renaissance teams” for visualization projects

CAVE Virtual Reality Environments for Science



Example virtual reality environments at Brown University and the University of Minnesota

Using Advanced Visualization Environments for Creative Writing



Video thanks to:

Writing with Digital Media (http://writingdigitalmedia.org)
Robert Coover, John Cayley, Brown University

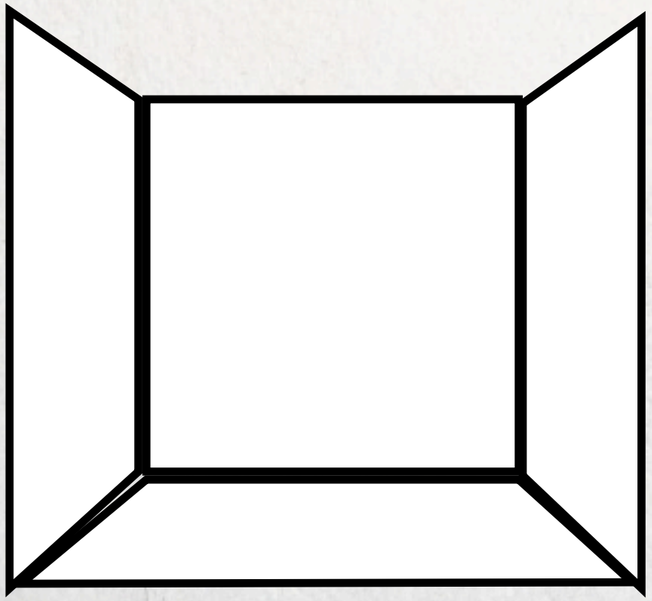
Screen, Noah Wardrip-Fruin, Andrew McClain, Shawn Greenlee, Joshua J. Carroll,

This is Just a Place, Poem by A. R. Ammons, interpreted in 3D by Vesper Stockwell, Bryant Choung, Dmitri Lemmerman, Edwin Chang, and Shawn Greenlee

Exhibited: Boston CyberArts Festival, Bell Gallery and Creative Arts Council at Brown University, Providence, RI, April 26 and May 3, 2003.

Hiding Spaces (Rubin & Keefe)

Combines 3D modeling in space with interactive layers of digital photography textured to the walls of the Cave.

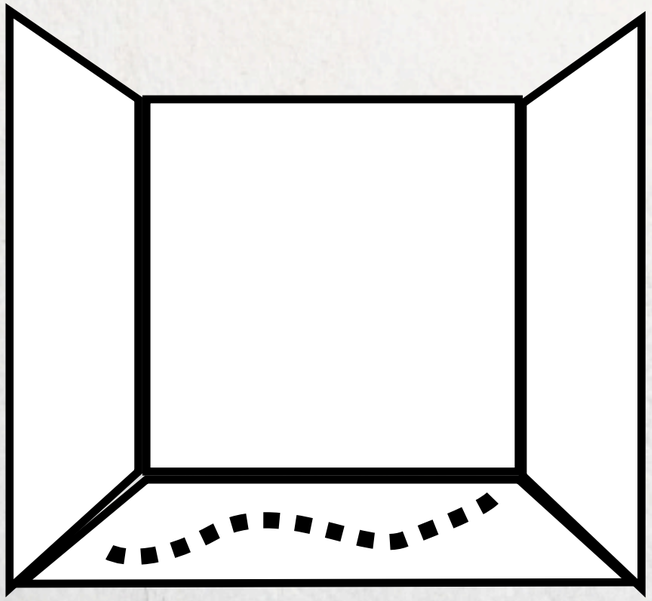


Viewer's path through the environment...

triggers shifts in imagery on the walls.

Hiding Spaces (Rubin & Keefe)

Combines 3D modeling in space with interactive layers of digital photography textured to the walls of the Cave.

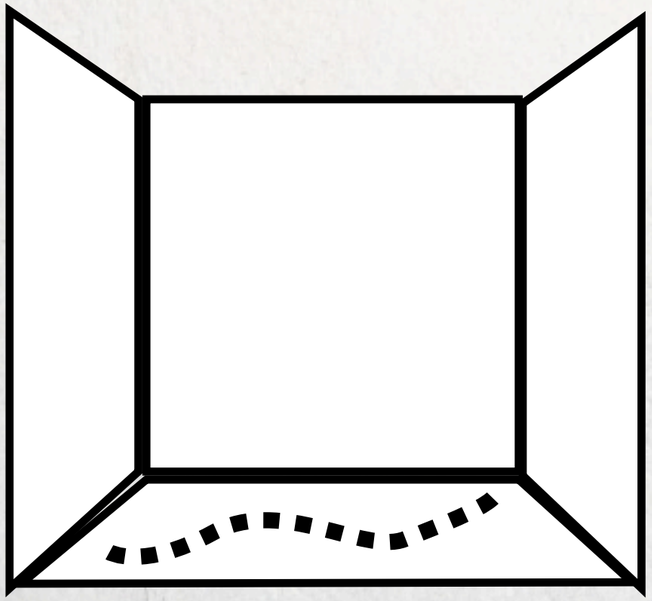


Viewer's path through the environment...

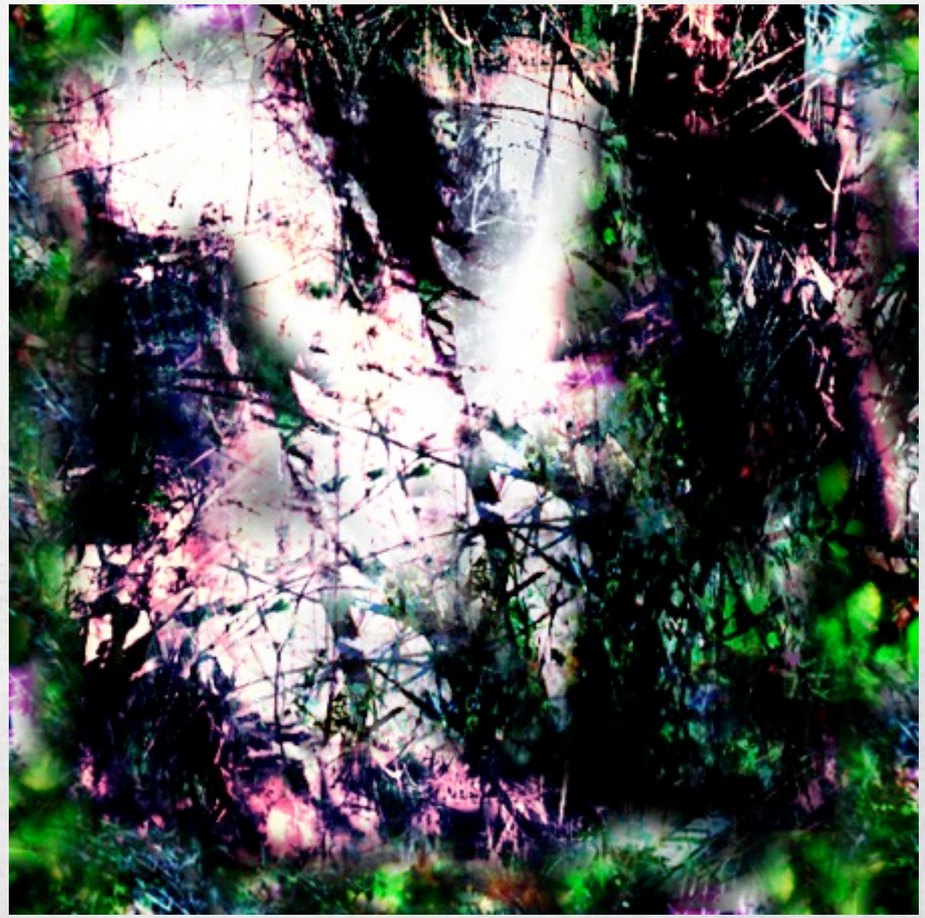
triggers shifts in imagery on the walls.

Hiding Spaces (Rubin & Keefe)

Combines 3D modeling in space with interactive layers of digital photography textured to the walls of the Cave.



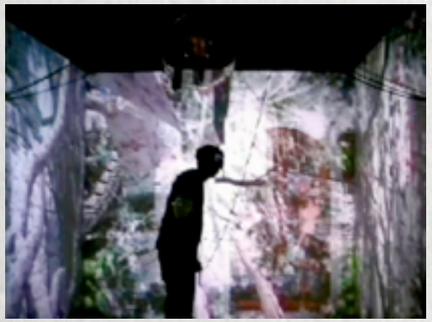
Viewer's path through the environment...

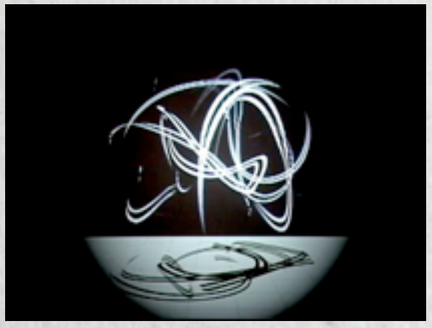


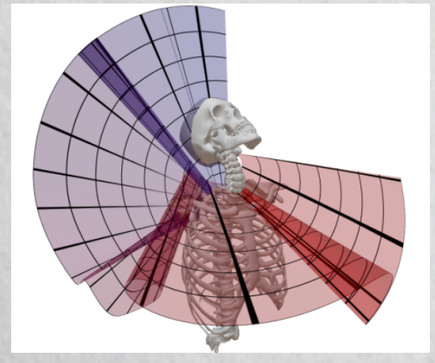
triggers shifts in imagery on the walls.

SIGGRAPH 2002, International Symposium on Electronic Art 2002

Roadmap

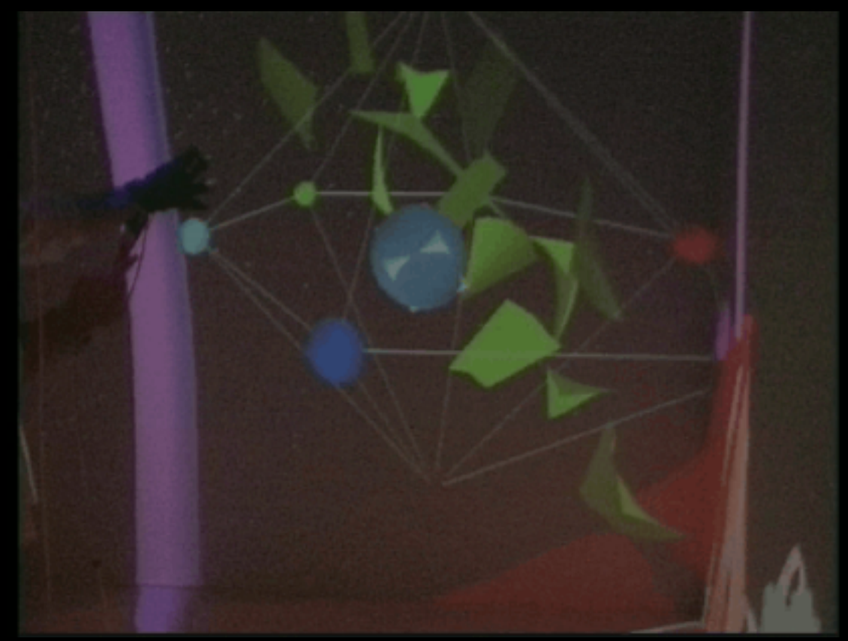






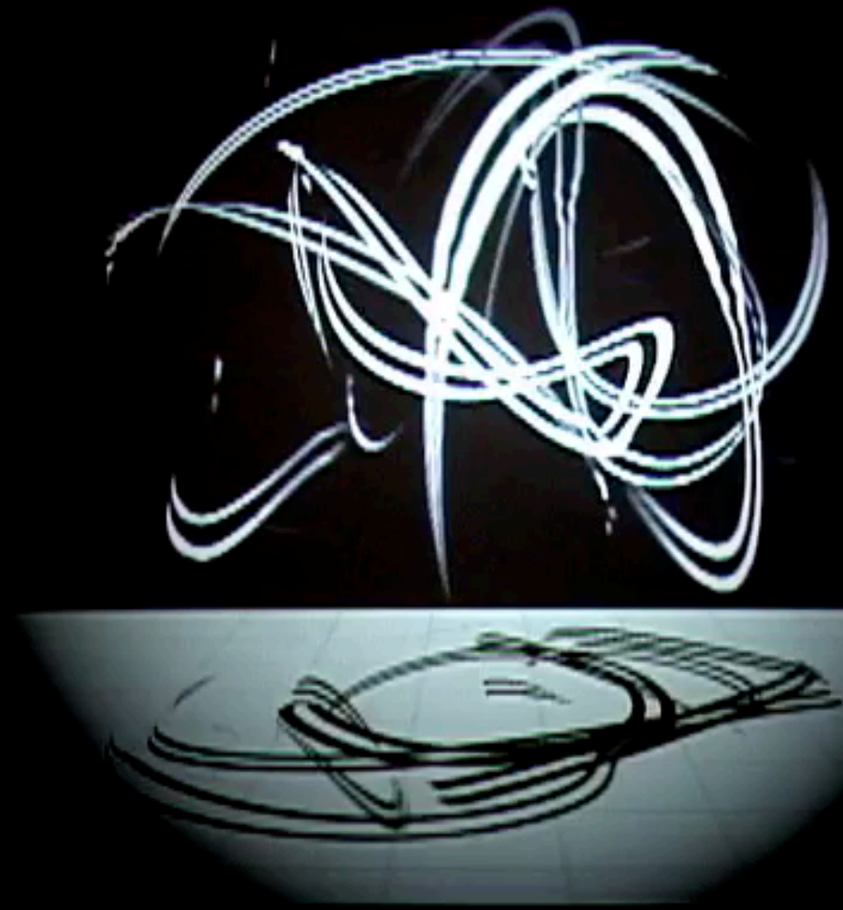
- Rethinking Visualization Environments: Creative use of physical space in a CAVE environment
- Deep Visual Investigations: 3D form, gesture, and “line”
- Ideation, Design, and Critique: “Renaissance teams” for visualization projects

CavePainting



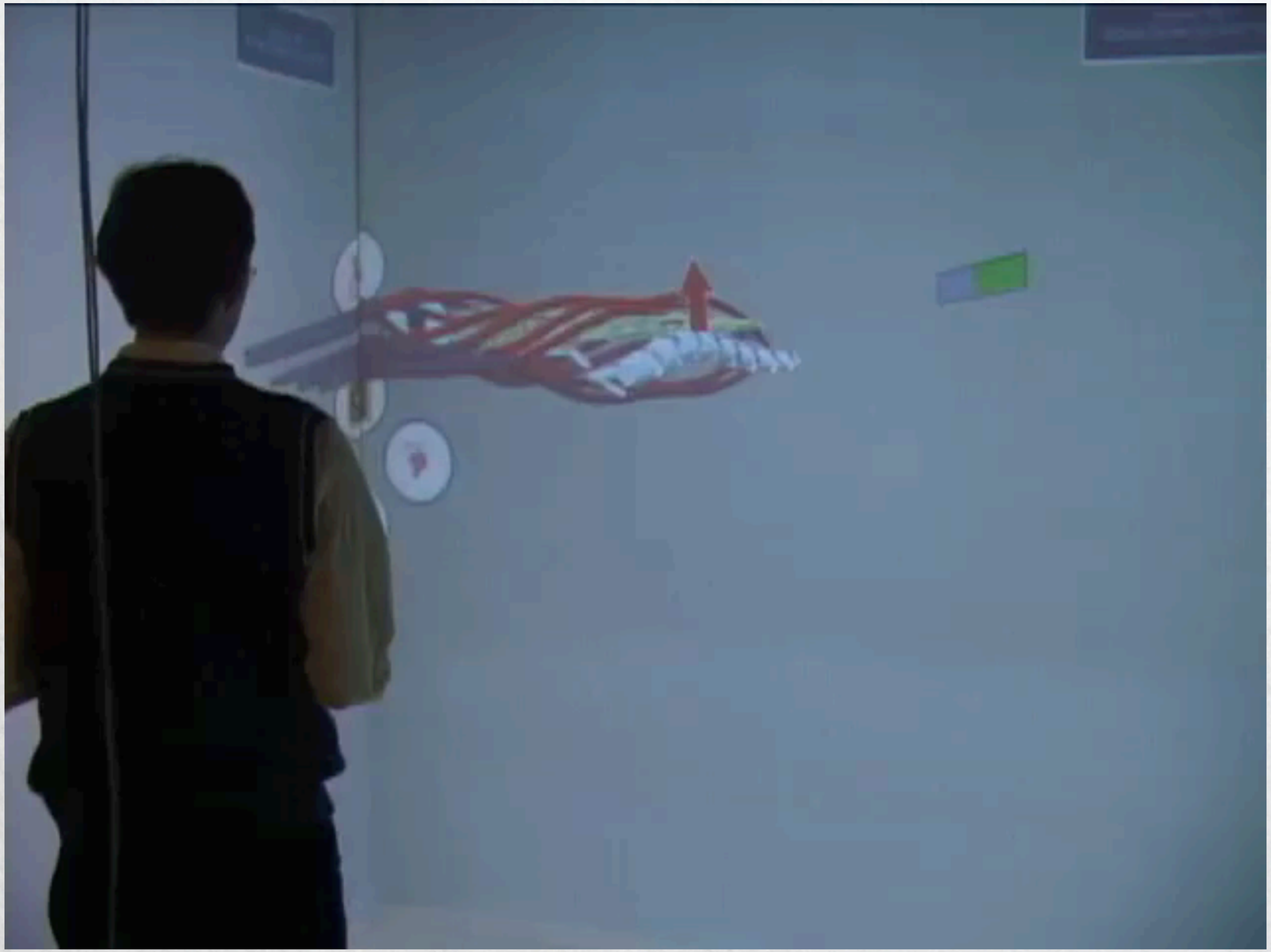
Daniel F. Keefe, Daniel Acevedo Feliz, Tomer Moscovich, David H. Laidlaw, and Joseph J. LaViola Jr. CavePainting: A fully immersive 3D artistic medium and interactive experience. In Proceedings of I3D 2001, pages 85–93, 2001.

Daniel F. Keefe. The making of La Guitarrista Gitana. In SIGGRAPH 2002 Art Gallery, 2002.



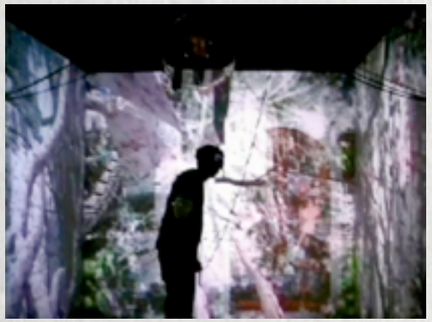
Artist Harrison Love

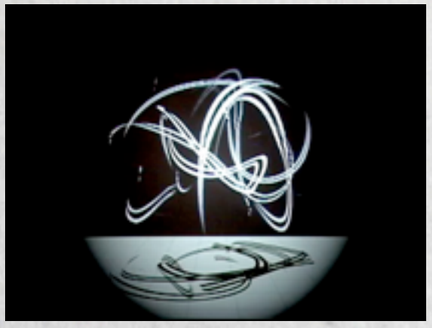
Daniel F. Keefe, Robert C. Zeleznik, and David H. Laidlaw. Drawing on air: Input techniques for controlled 3D line illustration. IEEE Transactions on Visualization and Computer Graphics, 13(5):1067–1081, 2007.

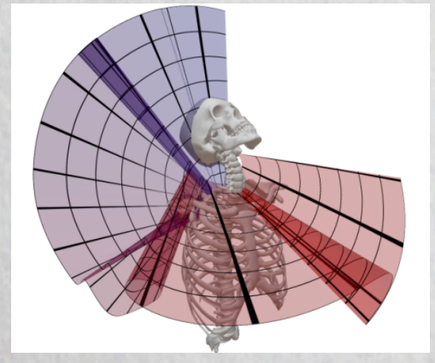


Daniel F. Keefe, Daniel Acevedo, Jadrian Miles, Fritz Drury, Sharon M. Swartz, and David H. Laidlaw. Scientific sketching for collaborative VR visualization design. IEEE Transactions on Visualization and Computer Graphics, 14(4):835–847, 2008.

Roadmap

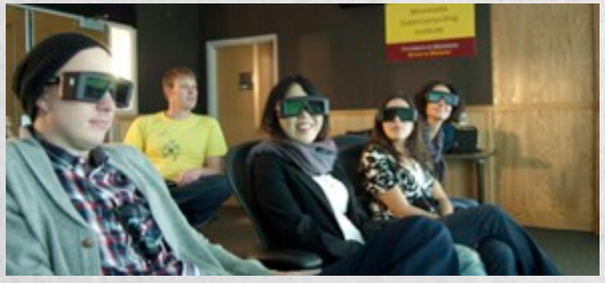




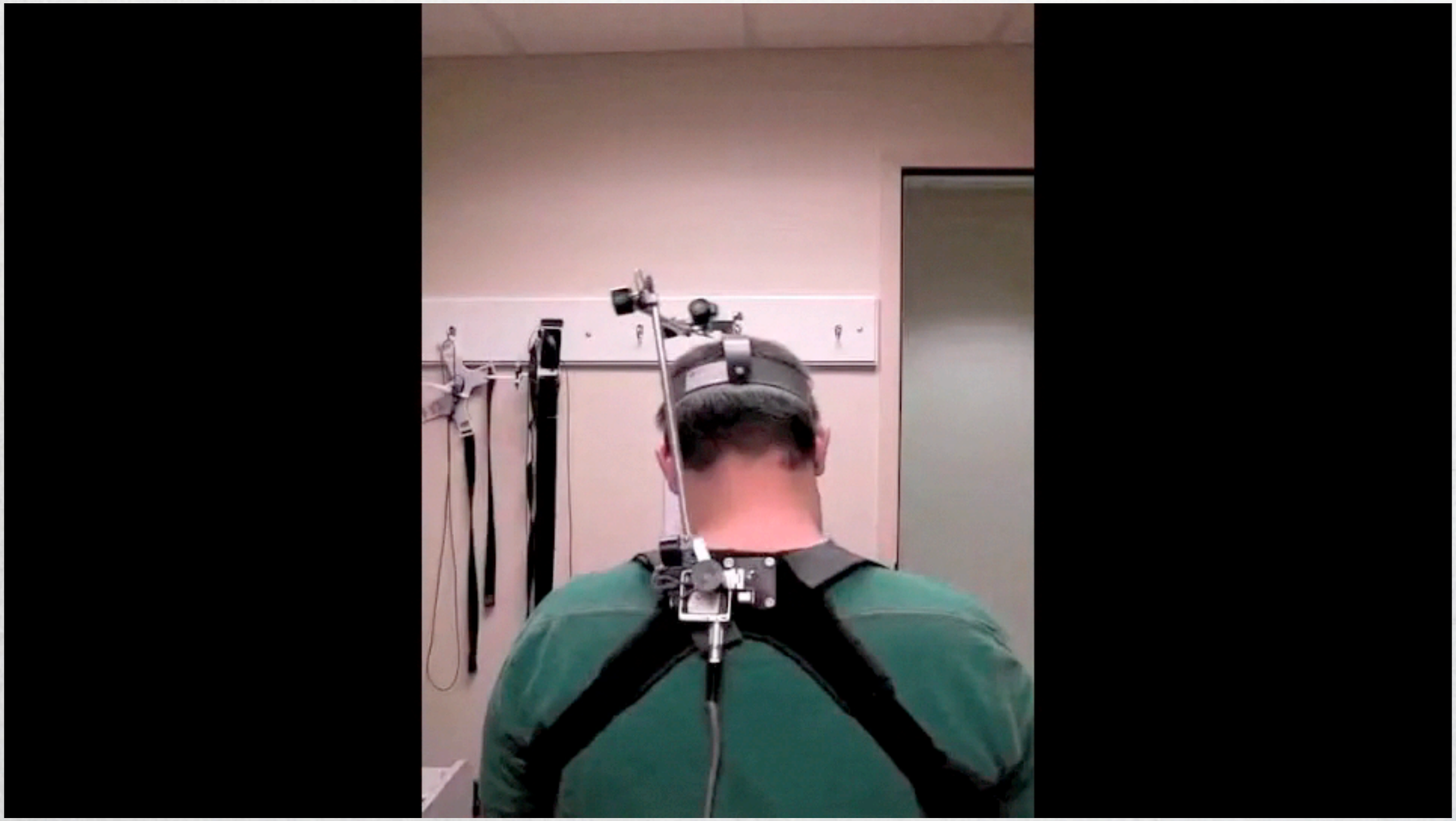


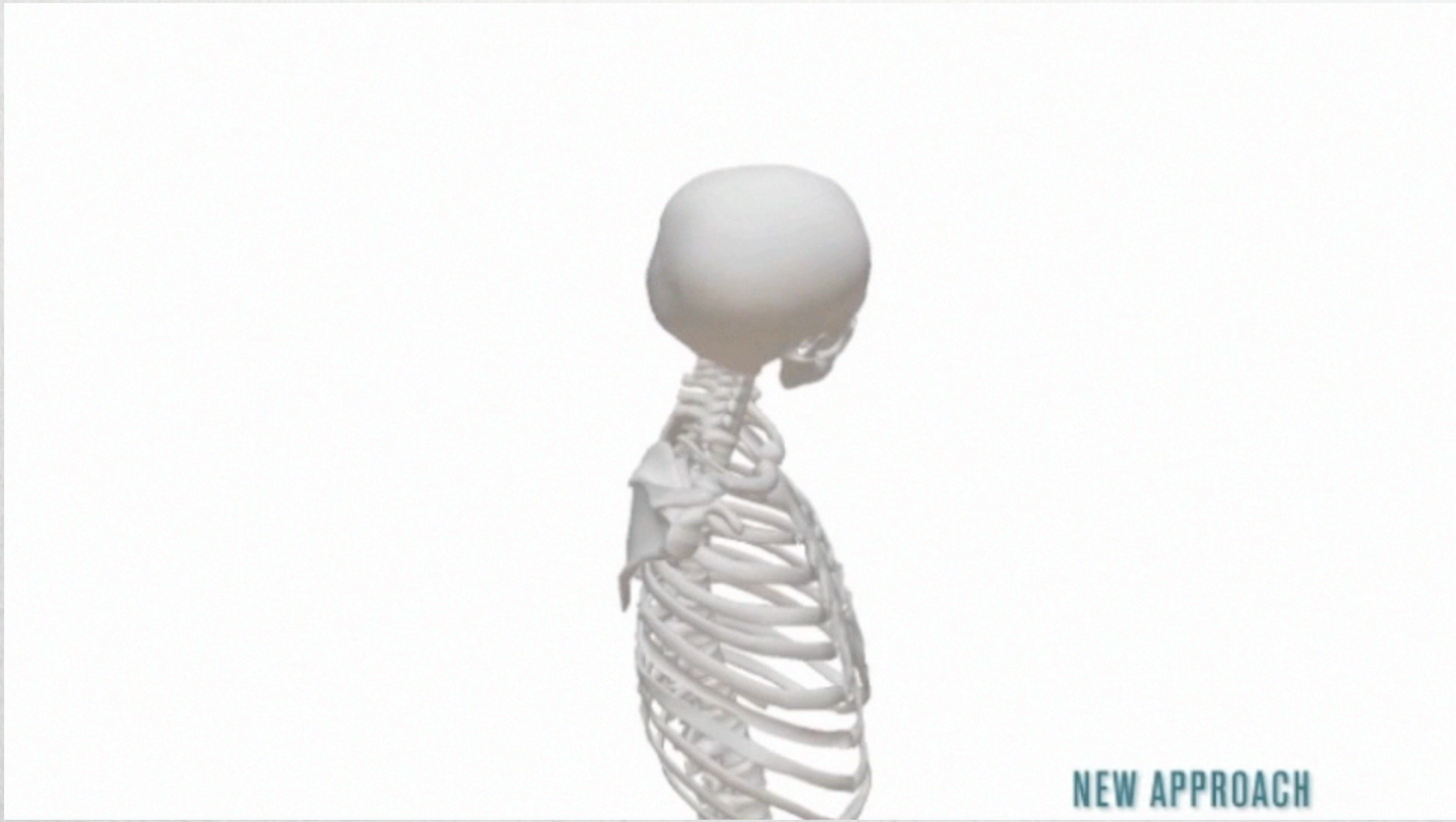
- Rethinking Visualization Environments: Creative use of physical space in a CAVE environment
- Deep Visual Investigations: 3D form, gesture, and “line”
- Ideation, Design, and Critique: “Renaissance teams” for visualization projects

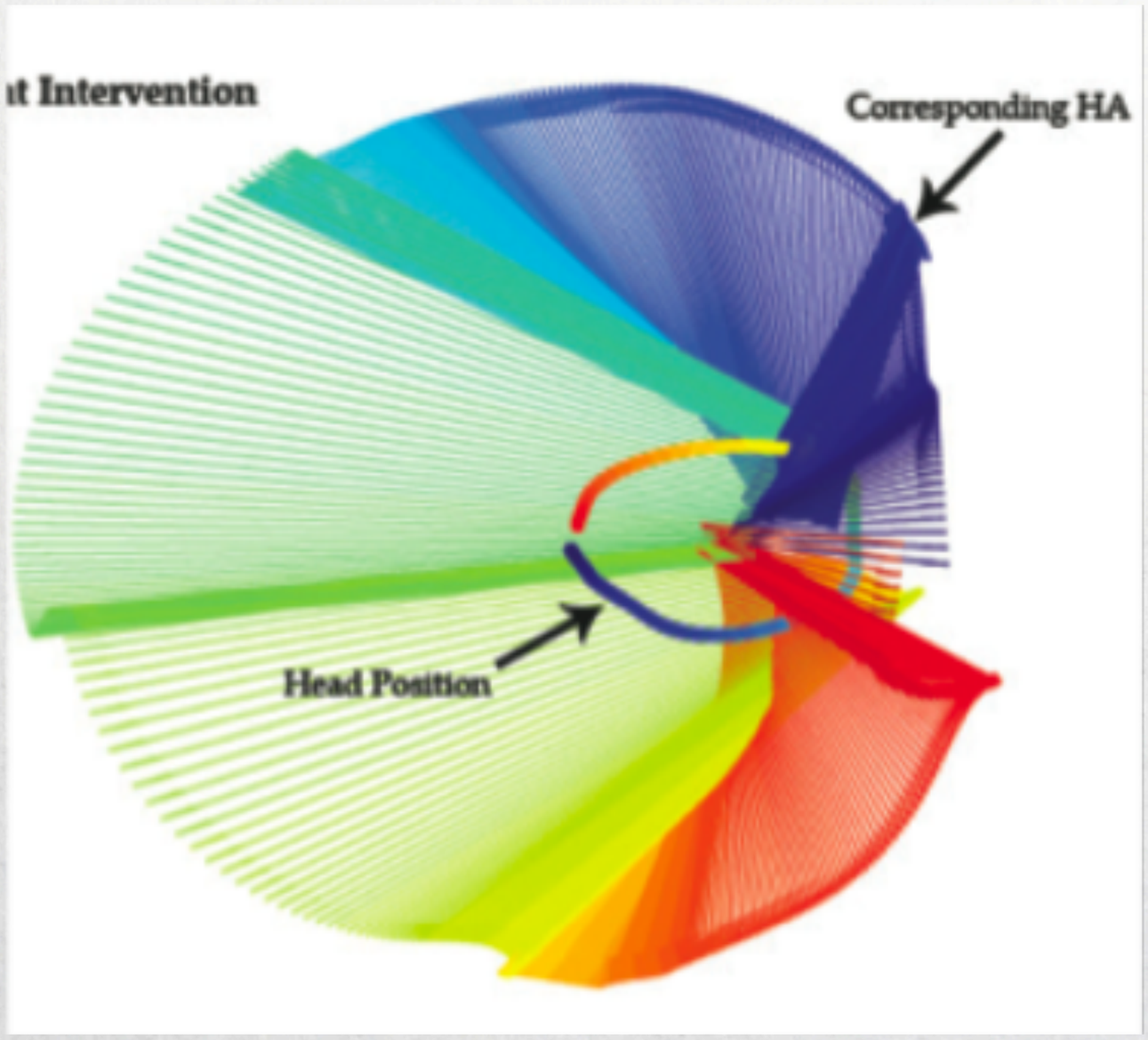
Renaissance Teams for Visualization

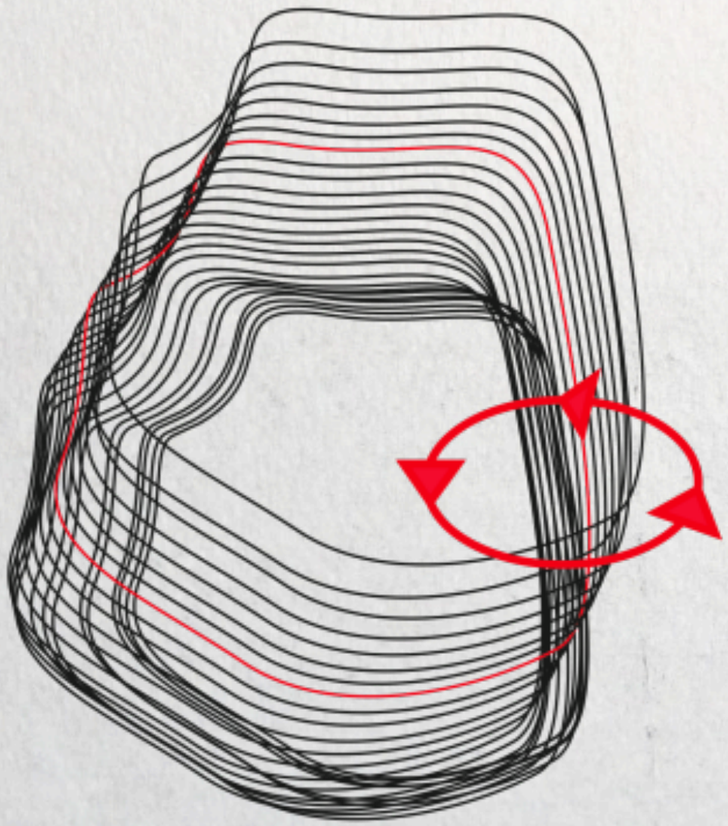


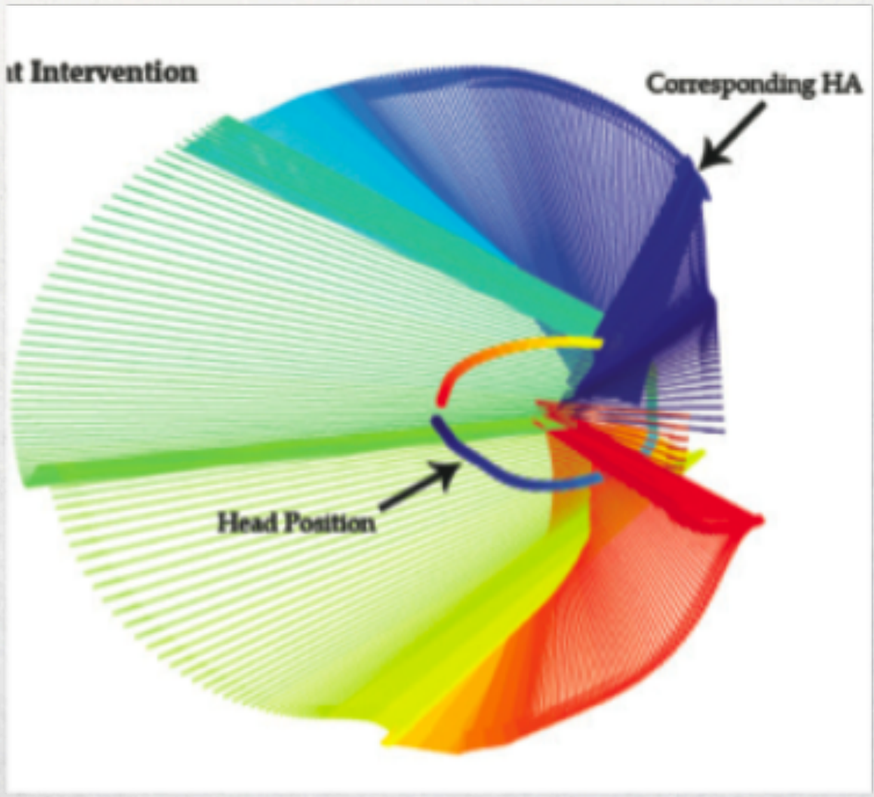
Collaborations with the Minneapolis College of Art and Design



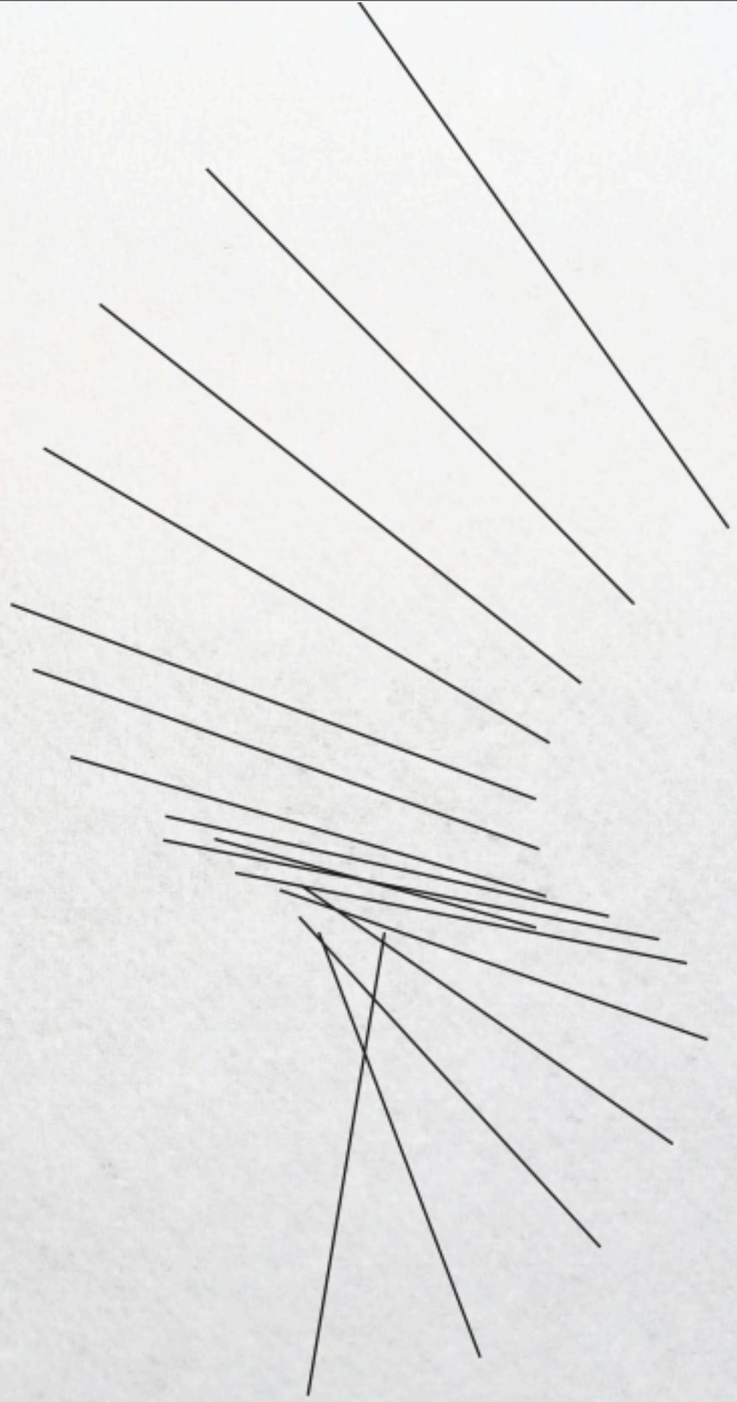

NEW APPROACH


ıt Intervention
Corresponding HA
Head Position

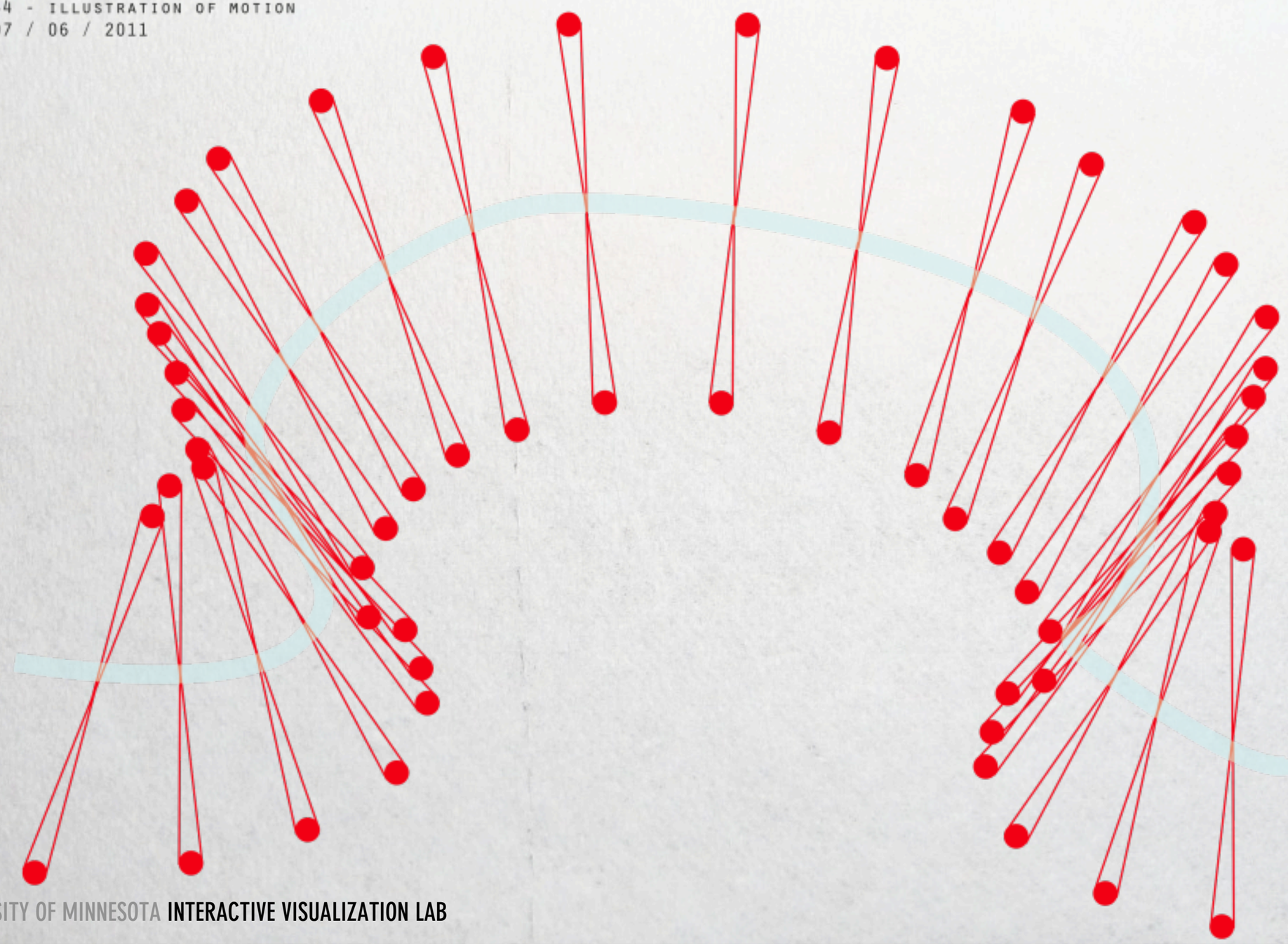



t Intervention
Corresponding HA
Head Position

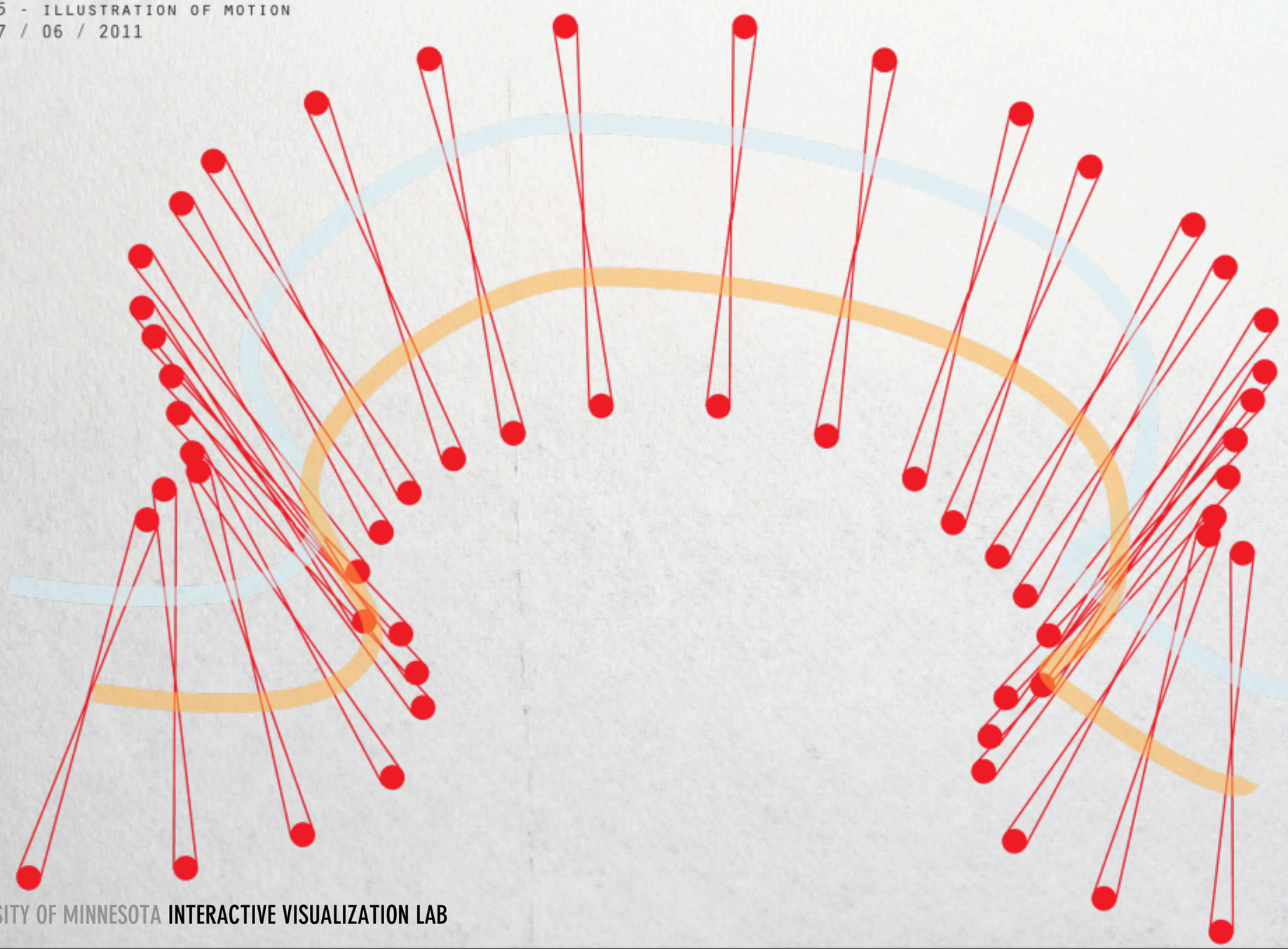
51 - ILLUSTRATION OF MOTION
07 / 06 / 2011



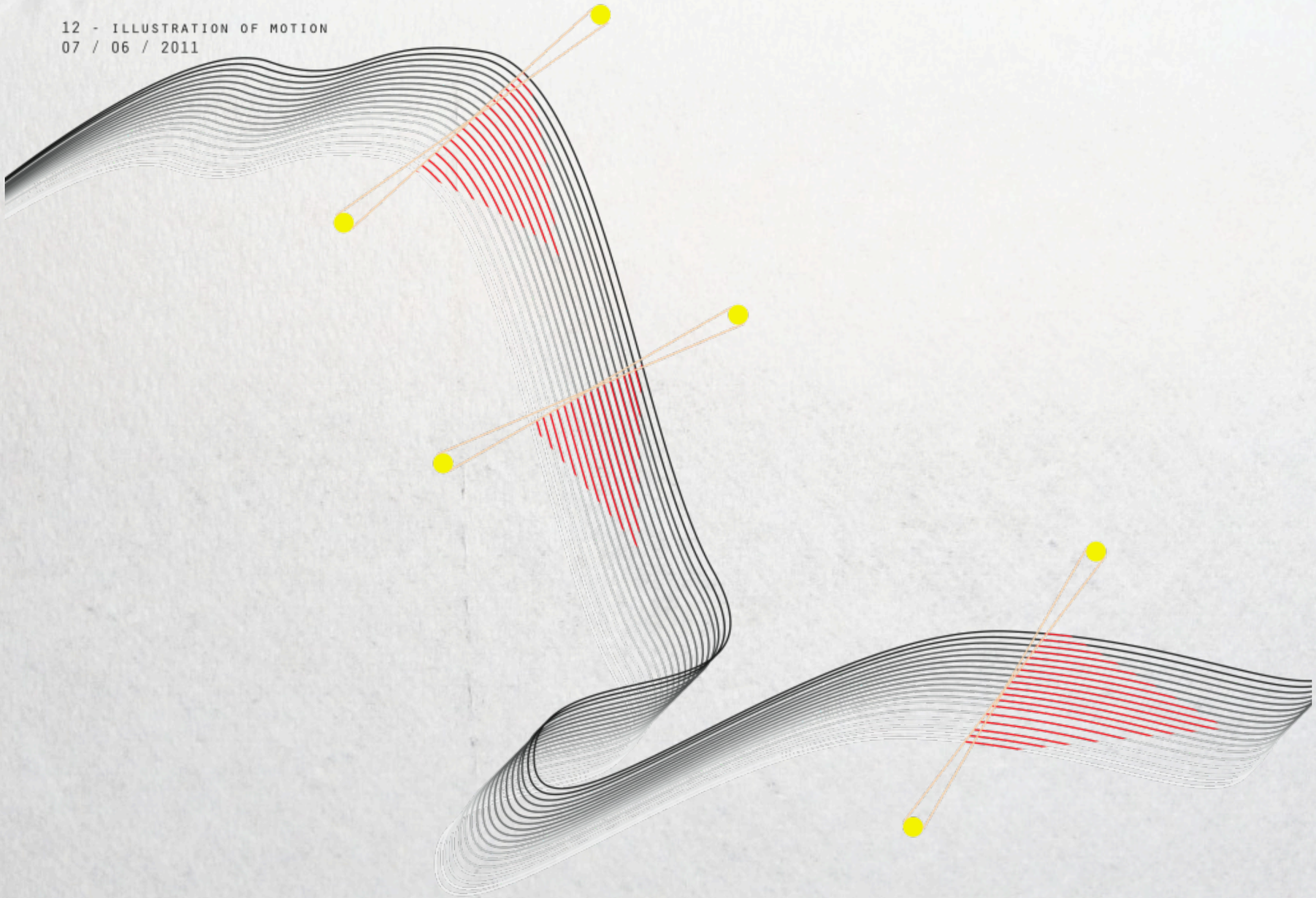
44 - ILLUSTRATION OF MOTION
07 / 06 / 2011



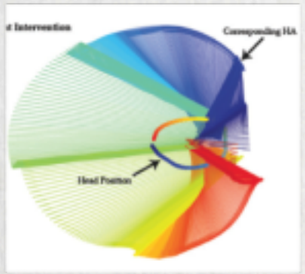
45 - ILLUSTRATION OF MOTION
07 / 06 / 2011



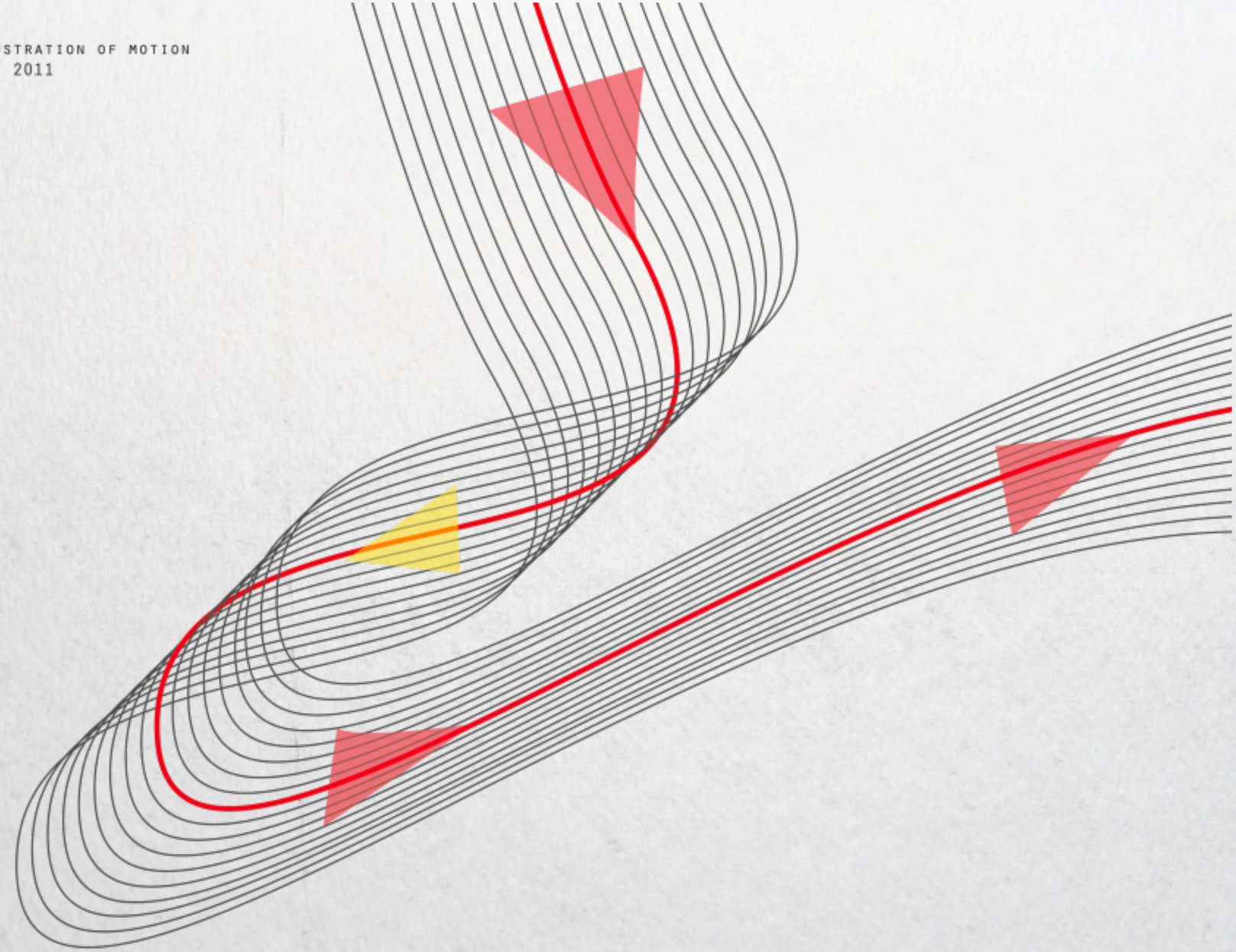
12 - ILLUSTRATION OF MOTION
07 / 06 / 2011



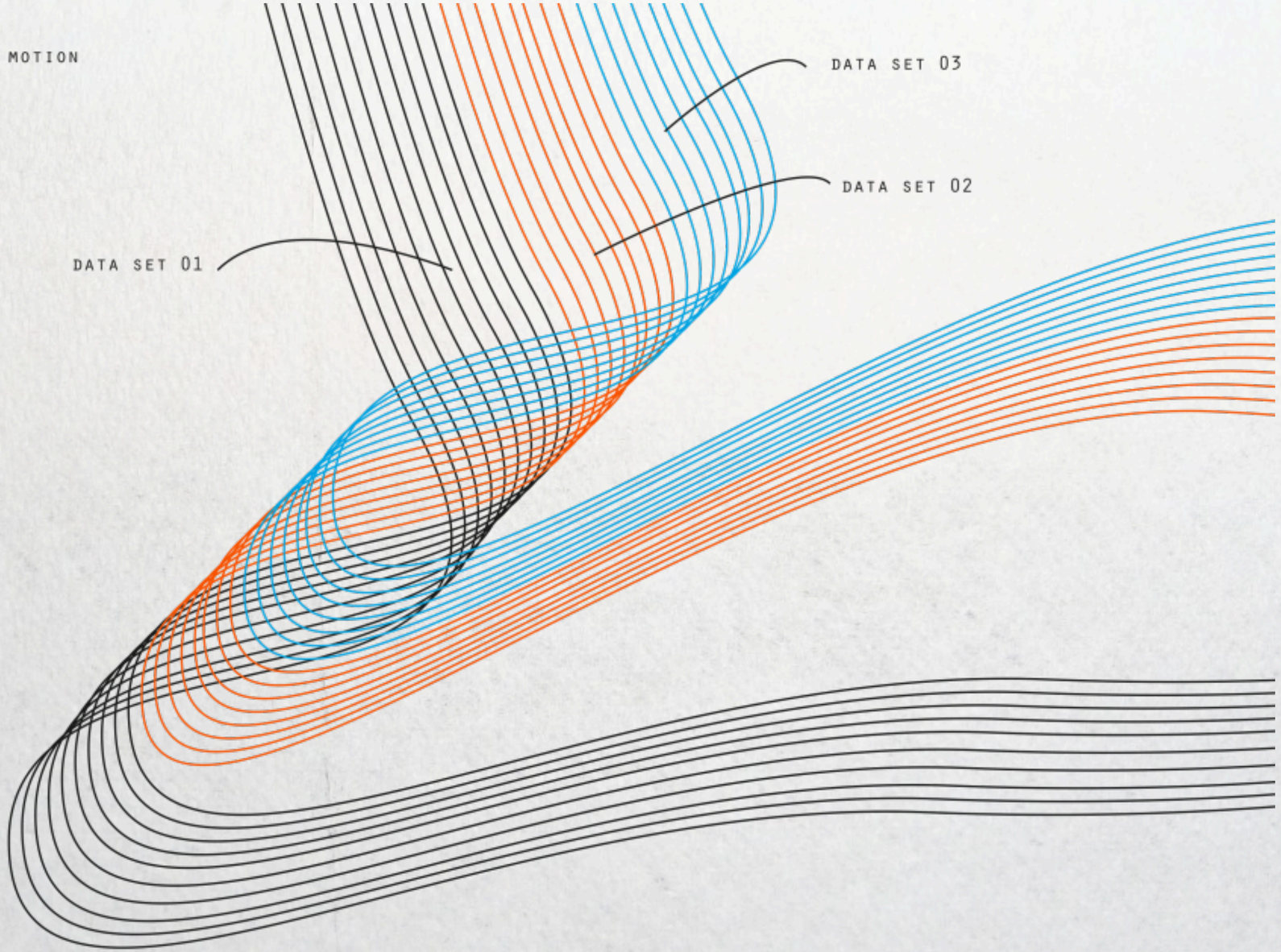
59 - ILLUSTRATION OF MOTION
07 / 12 / 2011



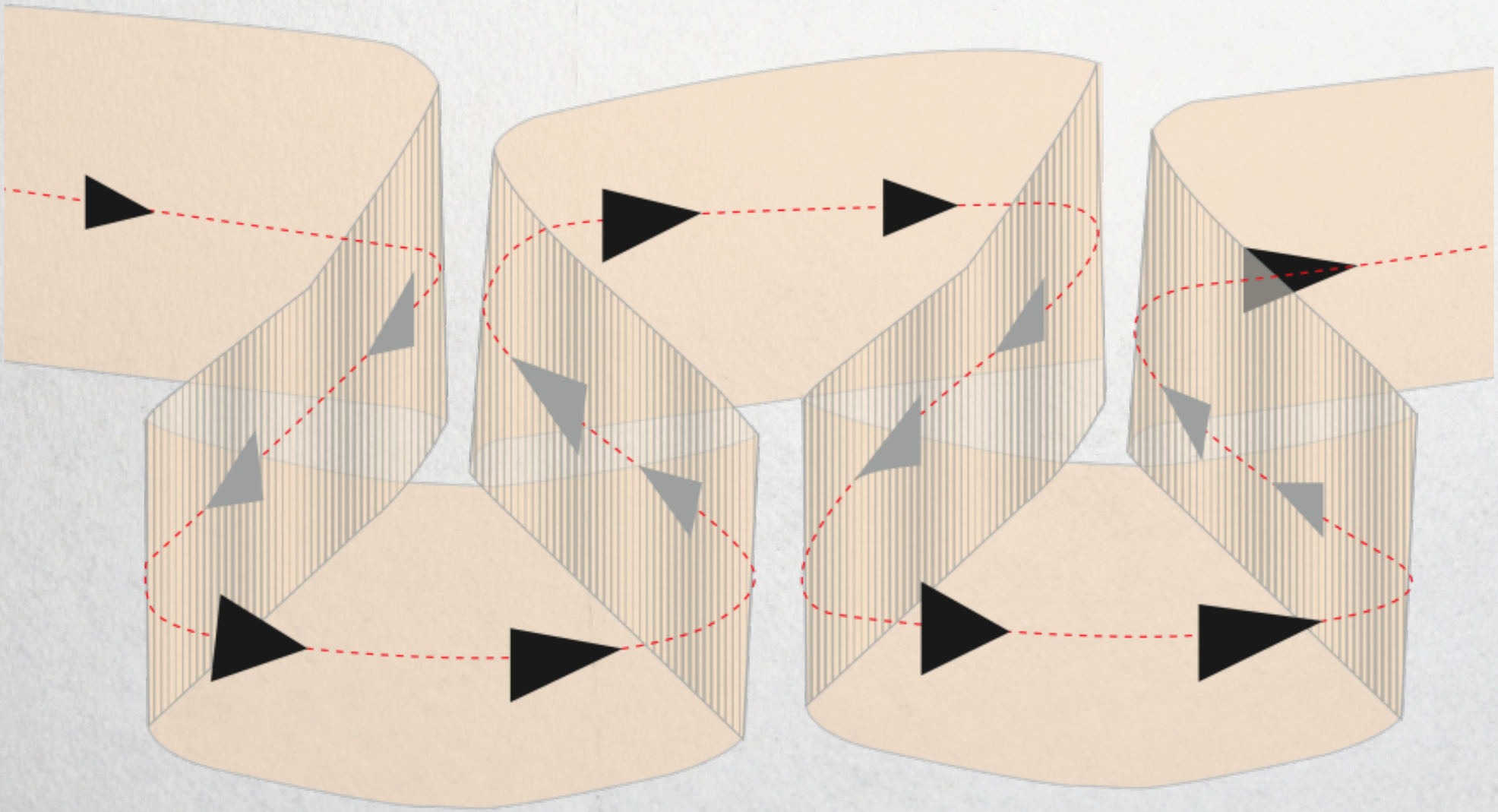
17 - ILLUSTRATION OF MOTION
07 / 06 / 2011



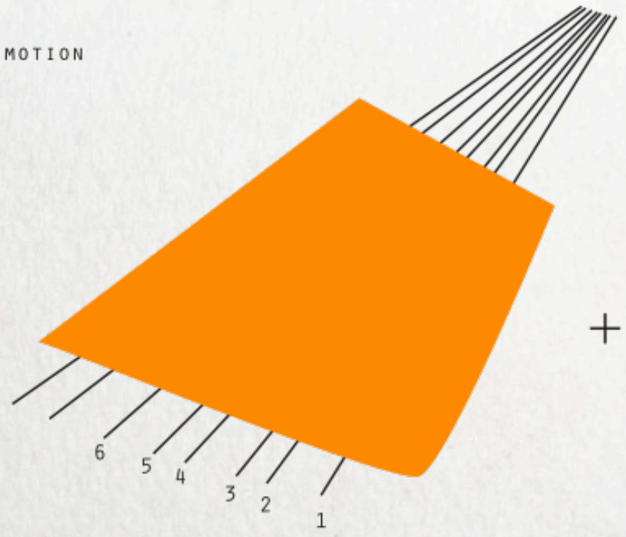
25 - ILLUSTRATION OF MOTION
07 / 06 / 2011



41 - ILLUSTRATION OF MOTION
07 / 06 / 2011

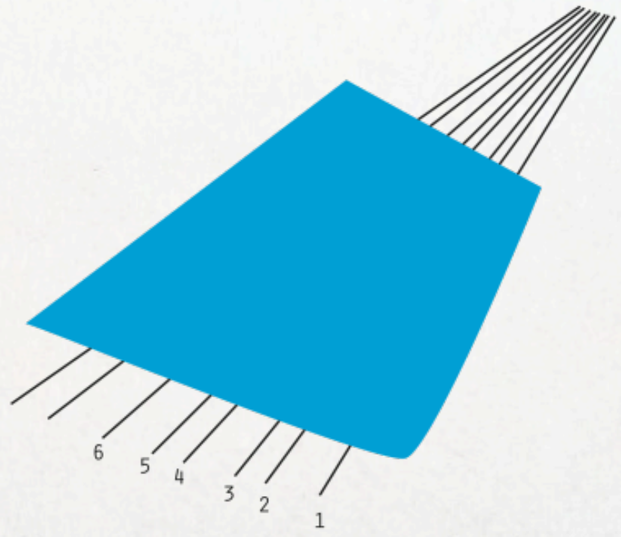


14- COMPARITIVE MOTION
10 / 12/ 2011

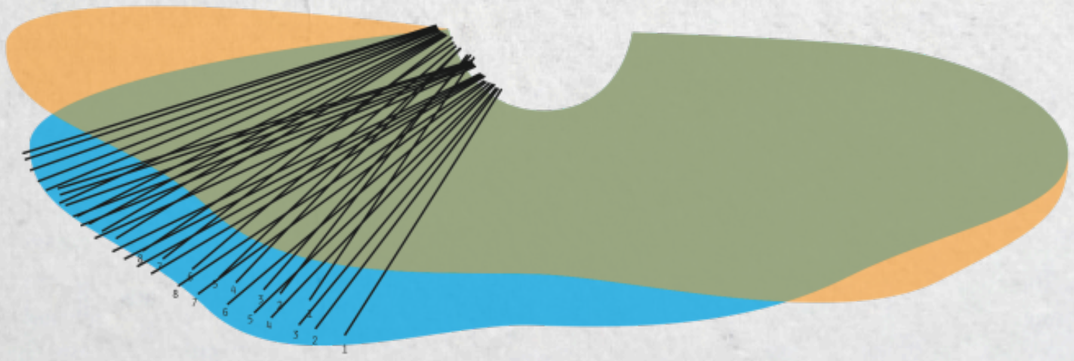


BEFORE

+

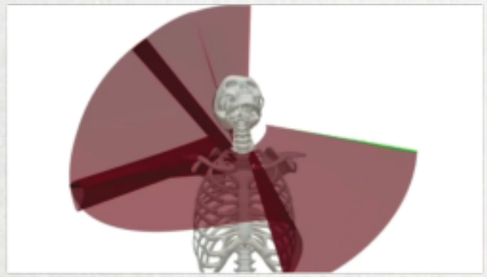


AFTER

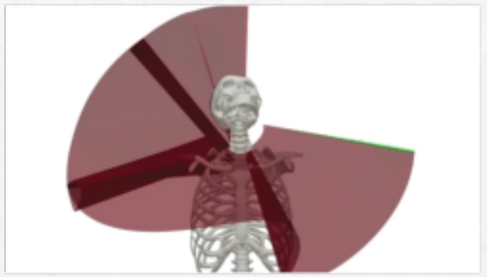


EXAMPLE OF COMBINATION

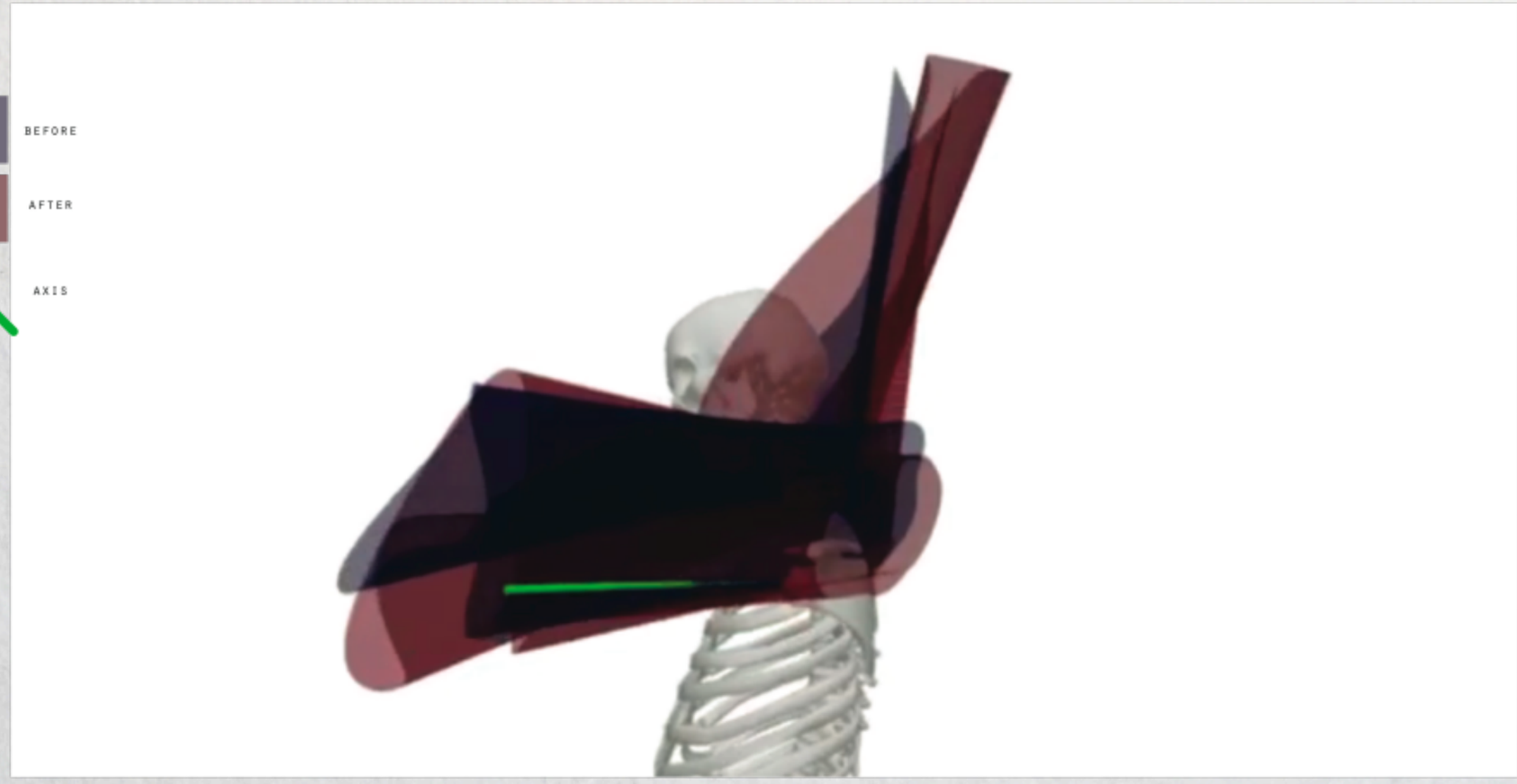
18- COMPARITIVE MOTION
10 / 12/ 2011

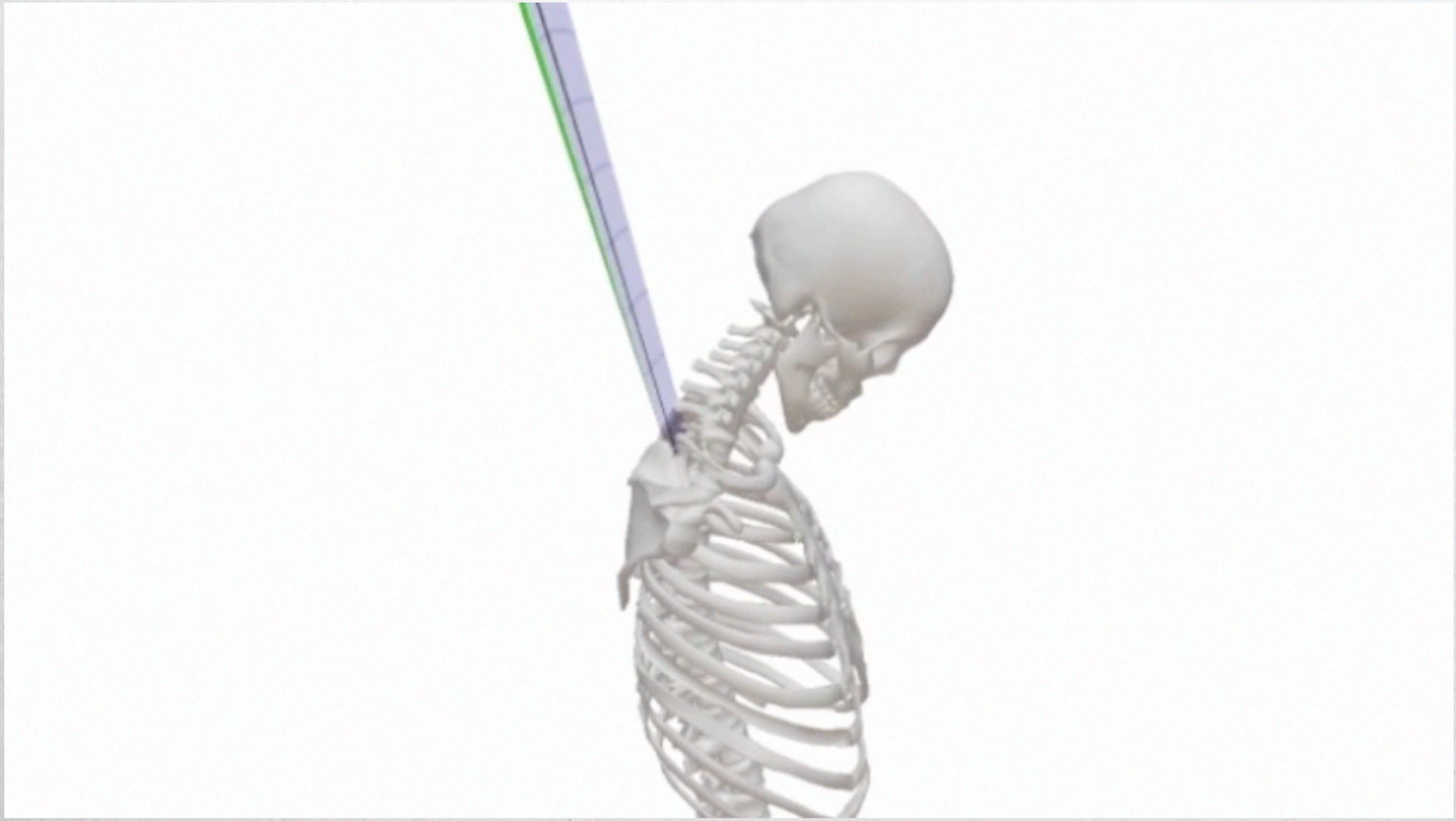


BEFORE

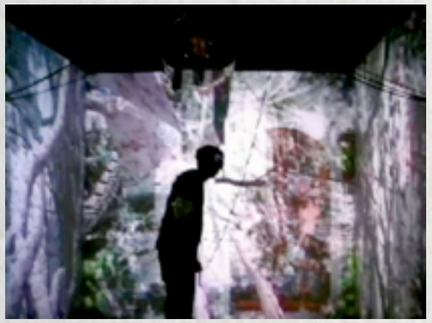


AFTER

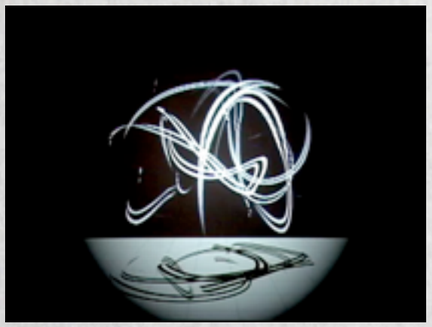




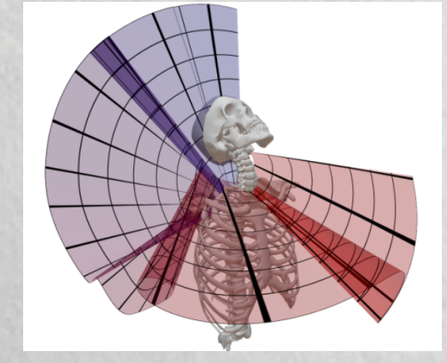
How Graphic Artists and Fine Artists Fit Into a Scientific Visualization Research Process: 3 Specific Examples



- ***Rethinking Visualization Environments*** to create new modes of interacting with computers.



- ***Deep Visual Investigations*** to discover new visual strategies and encodings for data.



- ***Ideation, Design, and Critique in "Renaissance Teams"*** to address specific real-world data visualization challenges.

Thanks to

Students at the University of Minnesota and Minneapolis College of Art and Design: Dane Coffey, Joseph Downing, Bret Jackson, Fedor Korsakov, David Schroeder, Heesung Sohn, Lauren Thorson.

Co-Authors and Collaborators: Daniel Acevedo, Fritz Drury, Arin Ellingson, David Laidlaw, Joe LaViola, Harrison Love, Jadrian Miles, Tomer Moscovich, David Nuckley, Cynthia Beth Rubin, Sharon Swartz, Bob Zeleznik, Brown Cave Writing team, Brown and RISD students in our courses.

National Science Foundation (CAREER #1054783 and #1218058)