

Analytic Drawing of 3D Scaffolds - Questionnaire Responses

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SIGGRAPH ASIA 2009

Below are the responses to post-experiment e-mail questionnaires conducted with our pilot session subjects. The text has not been cut-and-pasted verbatim, and not altered except to preserve anonymity. Note that subject D1 answered a slightly different set of questions, and Subjects A1 and G1 were not surveyed.

Architect 2 (Subject D2)

Background:

- M.Arch.
- 6 years of experience with 3d modeling
- 5 years of experience as a programmer / logic theory (before enrolling in Architecture)
- 4 years Furniture-design / construction (desing-build projects for various clients)
- I always use paper/pen sketches to start any design process, even digital design projects
- Knowledge of engineering principles (3 years aerospace engineering)

Questionnaire:

1) What did you like about the drawing interface?

- It was simple.
- Differences between drawing a line and drawing a guide were quite clear (drawing to green area vs drawing within frame)
- the formula that found the best non-complex curve to fit worked well in most cases.
- not too long to learn the basic operation
- Very natural way of drawing
- Really enjoyable experience - good for prototyping conceptual sketches
- I would use this tool for my first design incursions where I would normally be sketching on paper
- the grid on the floor was very helpful to anchor our ability to judge distances in the 3d space
- horizon guide lines are an excellent scaffolding to build a drawing.
- I got the sense I was "building" a drawing rather than just drawing. The lines almost gained a material quality.
- a very exploratory process, not a lot of time fiddling around with thousands of options and menus and features.

2) What didn't you like?

- I experienced some confusion about the undo and erase tools
- multiple horizon lines occurred without warning (had I known as I was drawing a line that it differed from my initially defined horizon points, I may have erased the line and tried again)
- rotate and move tool had a defines area to click in. Personally, I prefer being able to use a keyboard button (like the 'alt' key in maya) to hold down while moving the stylus to rotate or pan or zoom. Or perhaps include the click funtion in the stylus (holding down the stylus button activated rotate/pan/zoom)...

3) What was easy or enjoyable?

- The best function was the ability to define a plane and have it place red points on all lines intersecting that plane
- enjoyable to experience sketching in 3d - ability to quickly get a perspectival sketch that I could 'walk around'
- I can see how easy it would be to get someone to understand an architectural building sketch. As it is, I would have to explain a sketch in elevation, plan and perspective, but this way I can keep working on a single sketch and build up an understanding in the observer/client.
- A very natural way of drawing, very easy to understand, not too many tools.
- entirely dependent on hand drawing.
- very easy to begin to view the sketch in 3d, very easy to get into that mental "instant 3d" mode rather than the traditional plan/section/elevation mode I have to think in for paper sketches. With this software I can start visualizing my drawing immediately in 3d space.

4) What was difficult or frustrating?

- Definitely the most difficult part was getting the hang of the undo tool, which only undid drawn lines and not guides
- having to constantly rotate the model to see if my lines were where I wanted them to be. (perhaps not frustrating or difficult, but a bit tedious)
- getting a curve to go through the required points was sometimes difficult.

5) What would you change?

- Option for undo to include guides
- Option to delete horizon points that were not needed to make horizon lines clearer
- Option to define and draw on an arbitrary plane
- perhaps 2 types of lines - solid lines and 'sketch lines' that could be used to build scaffolding. As it is, scaffolding for defining distant points has to be real lines, which need to be erased after building the scaffold. If there were sketch lines (very thin grey or blue lines) that could be left in place as scaffolding, that would make the drawing process easier, perhaps.
- Perhaps add the ability to superimpose previous save points onto the sketch so that we can begin to see how a sketch from a long session has evolved... Often times, I will make a first sketch on tracing paper, then place a tracing paper over the first sketch and sketch again using the first sketch as a guide, and keep going until I have 15 or 20 sheets of tracing paper overlaid, with the final sketch a result of that process... If this process could be made available in your software, that would be awesome.
- Perhaps a function that would auto-rotate the model so that a set of selected points could be used to define a drawing plane, to allow more accurate line drawing through those points

6) What features of other 3D tools did you wish you had available?

- Ability to edit lines and tangents once they were drawn
- circle feature
- ability to move polygonal faces, rotate, stretch, skew polygons and lines
- ability to change the color or display thickness of some lines
- ability to copy or array lines
- ability to align lines to guides
- Ability to define viewports so that we don't need to rotate the model to see if a line is going where we want to
- ability to save a series of viewing angles so that we can return to them quickly and not have to keep rotating the model to find a good view I had used before

Graphics Researcher 2 (Subject G2)

Background:

A long time user of animation (3D Studio MAX, Maya) packages with some CAD experience (Rhino 3D). Mostly used for personal projects, but also professionally for architectural visualization in a medium-size studio. Educational background is in computer science rather than art.

Questionnaire:

1) What did you like about the drawing interface?

3) What was easy or enjoyable?

1/3) - the interface for drawing blocky shapes was really intuitive. It was actually possible in practice to draw 3D objects without having to rotate the view. This could be especially useful when constructing 3D objects from tracing over a single view reference image. You could be confident that the drawn lines are correct without having to check them from another viewpoint (because of orthogonality guarantees or making of distances).

- it was just as easy to draw rotated objects as those in the standard coordinate system. No assumptions seemed to be made about the coordinate system you're drawing in. This allowed drawing of parts in their actual final poses, rather than the typical workflow of modeling each part in standard coordinates separately and posing them together afterward.

2) What didn't you like?

4) What was difficult or frustrating?

2/4) - curve drawing was sometimes difficult. Drawing from the "front" view of the curve (i.e. looking the the plane in which the curve roughly lies) made it easiest to get the correct shape for roughly planar curves, but often resulted in ambiguities in depth (either creating entire curve at incorrect depth, or snapping some of the control points to incorrect depth). Drawing from "three quarters" view of the curve made it mentally difficult to draw the correct curve in 2D. It seemed necessary to create several guide lines before attempting to draw the curve to constrain its shape. However, the tangent lengths still seemed to be guided by the drawn stroke (and not by guide lines) and suffered from my incorrectly-drawn strokes.

- not being able to get perfect arcs or circles was somewhat unsatisfying.

- as drawings got more complex, the number of suggested perspective lines [is this the right term? Correct me if I'm wrong] and snap points became large. This sometimes resulted in snapping to the wrong points or difficulty in choosing the correct perspective line.

5) What would you change?

- while it would probably discourage spontaneous drawing, it would be nice if the 3D curve shape could be completely specified by the guide lines and independent of the drawn 2D stroke shape (the stroke would only specify what control points / tangents snap to). As mentioned before, you could have confidence about correctness of lines, but it still seemed necessary to sometimes change the viewpoint to check the correctness of curves. It would be satisfying to have the confidence of drawn lines apply to curves.

6) What features of other 3D tools did you wish you had available?

- by the end of the session, I was wishing for some tools to manage the complexity of

the scene. Ability of hide parts of the scene so it would not interfere visually or create extra perspective lines / snap points would have helped.

Hmm, this seemed to come out overly negative. I'm not sure what I can do to highlight that the awesome parts are really, really awesome.

Designer 1 (Subject D1)

Background:

- Industrial Designer/Self taught artist.
- Specializing in Alias/Showcase/SketchBook/Inventor
- Company name is (*redacted*)

Questionnaire:

1) What did you like about the interface?

-Everything could be done with the stylus and there was very little clutter. Grid was nice and subtle, visually.

2) What didn't you like?

-The tumble icon was very close to the start menu (on Vista) and work flow was interrupted by dragging out of the window. Would have like to have been able to lock onto grid points.

3) What was difficult? Compared to other 3D creation tools?

-Basic operations like laying out a circle were difficult. Copy/Past operations could have been really helpful. Symmetry would make this an amazing tool. Finding the centre point of an existing line could have been easier. (I never figured that out, other than creating a box and drawing diags and then a line to the line in question).

4) What was easy? Compared to other 3D creation tools?

-Setting up perspectives was amazing. I could see that dominating the 2D sketching game. Setting up boxes and lines based on the initial guidelines was well done. Clearing guidelines was nice, but the option to lock certain guidelines would be really sweet.

5) Do you think this interface would be useful?

-Very useful. Not sure where the software is going in terms of additional tools, but this seems like it could benefit from the same praise that sketchbook gets for uncluttered workspace and great ease-of use.

6) Any other thoughts?

-The software should be (and is) very intuitive, but i've been trained so much to think differently in 3D, that I had a hard time letting loose and planning what didnt really need to be planned. I struggled at the start a lot, and didn't think I would ever figure it out. But it came around, and I'm looking forward to seeing what happens later down the line with this tool.

Designer 2 (Subject D2)

Background:

I'm A mechanical engineering student. However o have a background in technical communication and fine arts from a specialize program in highscool. I'm familiar with a wide range of 3d packages ranging in polymodeling to parametric modeling to nurbs. Even hve experience in BIM. I aquired Most of this knowledge within the past 5 years or so. I've been with autodesk as am intern for almost 2 years.

Questionnaire:

1) What did you like about the drawing interface?

I like the perspective drawing interface it sports. It's a niceway to get people who aren't 3D savvy into creating 3D objects. It doesn't need much instructions for something to be made.

2) What didn't you like?

I didn't like how it created new perspectives for ambiguous lines. The more lines that were not following th vanish points created new ones that cluter the canvas.

3) What was easy or enjoyable?

It was an easy and enjoyable session. Although there were some frusturating times. Overall it's a system that I like.

4) What was difficult or frustrating?

As I mentioned before, one of the frusturating things is the new vanishing points it makes. Another thing was creating planar lines wasn't that intuitive.

5) What would you change?

I would want the feature of deleting vanishing points wihour deleting the lines following it.

6) What features of other 3D tools did you wish you had available?

The 3d took that I wish was avaloa le was the ability to manipulate points. The conbination of feeeform and precision is a nice combo.