

Tool Time at Pixar

By Ellen Wolff

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Sketching The Incredibles

If you were in the Pixar screening room where director Brad Bird regularly reviewed images for *The Incredibles*, you would have seen a cool, new tool in action — the Review Sketch tool. This tool literally allowed Bird to draw on top of a projected image using a digitizing pen. The drawings were then accessible online by other members of his team.

“It’s a classic animation thing to want to put a clear sheet over an image and draw on top of it,” says Dr. Michael Johnson of the Studio Tools group and a software lead on *The Incredibles*. “People here have even used dry-erase markers on their CRTs. We’ve always talked about wanting to sketch on top of stuff, but for a variety of technical reasons it’s been hard to do.”

That changed when *The Incredibles* — Brad Bird’s 3D-CG feature debut — was underway. Bird was familiar with the CG techniques used in his largely traditionally animated *Iron Giant*, but the first instinct of this acclaimed 2D animator is to communicate by sketching.

“Brad’s always giving a pen to someone and saying, ‘Well, draw it,’” says Johnson.

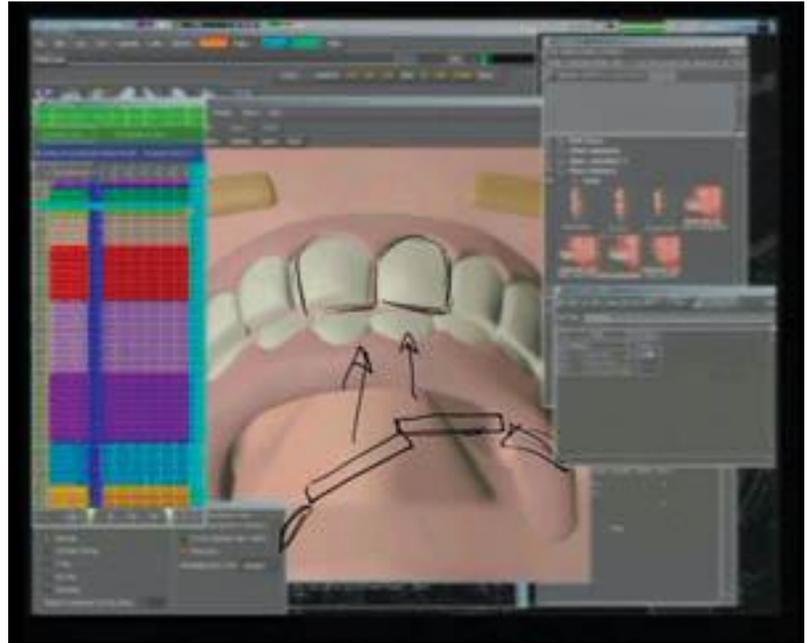
Karon Weber, Pixar’s user interface designer, soon noticed Bird’s preference. “Karon observed that what Brad was doing in reviews was to have somebody put an image on a monitor that was, in turn, projected onto a white board. Brad would draw on top of the projection on the white board, and then someone would take a digital picture of that drawing to capture it,” says Johnson. This cumbersome process led Weber to propose creating a digital sketch tool for Bird: one that would leverage the capabilities of Wacom’s Cintiq digitizing tablet and pen.

Bird was open to the idea, according to Johnson. “For people like Brad who are purely on the creative side, a lot of the technology we have available at Pixar can seem pretty astonishing,” says Johnson. “If you come from more traditional animation, you don’t think of people being able to go out and invent a new kind of pencil, or give you a new kind of acetate that lets you erase underneath it.”



Pixar’s proprietary vector-based Sketch Review tool, developed during production of *The Incredibles*, allowed director Brad Bird to draw animation corrections on top of a projected image using a digitizing pen. *The Incredibles* marks Pixar’s first feature with a “human” cast.

Pixar's technical gurus tackled the challenge using the Cintiq as a hardware gateway. Weber and fellow designers Brendan Donohoe and Max Drukman developed the user interface, and Johnson provided sketching code that he'd been writing for use on the Macintosh OS X platform. Weber also volunteered the services of her summer intern Antoine McNamara, who was aided by Johnson's intern Josh Anon. After a summer of brainstorming, McNamara put together the completed application.

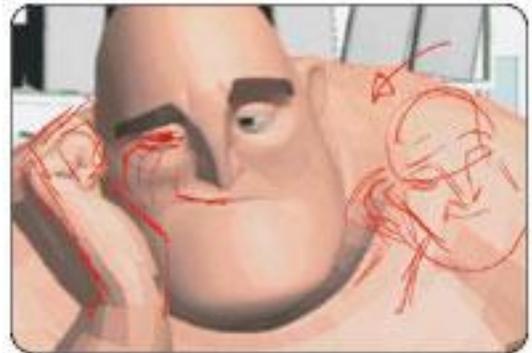


The Review Sketch tool, which resides on all the Macs at Pixar, contains features that addressed Bird's style of working. The director could draw on an image, and then play it back with the image moving underneath his drawing. A slider let him choose the width of the anti-aliased line.

"Most people dial it way down and have a very fine line," notes Johnson. "Brad would use a two- or three-pixel line as his hard line."



When Bird put the pen down, the system would automatically record a "snapshot" of what he had drawn. "We also added ghosting so that you could do multiple drawings and see the other drawings as well, though I don't think that got used as much as we would have liked," says Johnson.

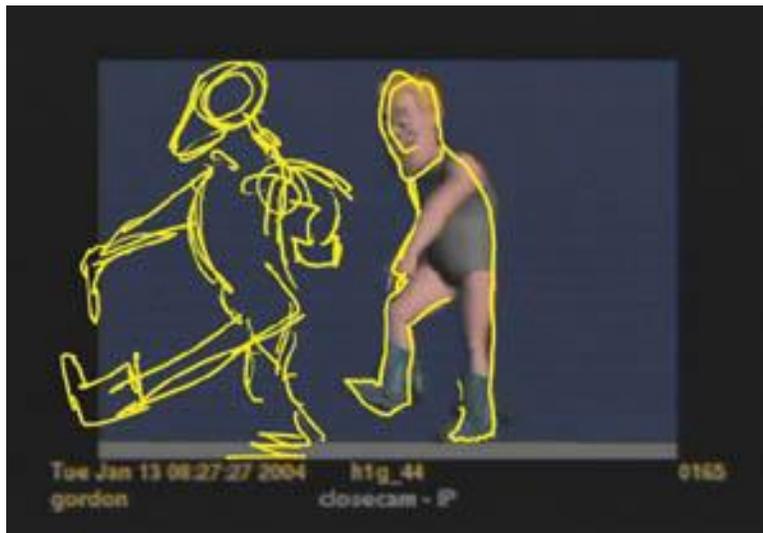


A key feature of the tool is its eraser. "This is a vector-based tool with a raster erase," says Johnson. "You can scale an image up or down, and when you want to erase, you turn the pen over and it erases. It feels very natural. Whenever I give a demo of this tool to artists and show them that feature, they immediately say 'I want one.' It is super simple to remove something easily, but really hard to remove the whole drawing by mistake. You'd have to erase the whole thing. It's a big, fat, 30-pixel eraser because we found that people want a fat eraser no matter how fine their lines are. They tend to erase whole big chunks. The underlying software knows when you put each stroke down. Erasures are actually saved as strokes, so we have the entire drawing history.



Even though the system reduced images to DV resolution, they didn't lose much information. "People might have something up in Maya or [Pixar's] Menv that they wanted to be able to draw on top of," says Johnson. "Things look softer when they're turned into DV, but at the stage they were using it, color and lighting weren't issues. The artist could sit with the director and the Cintiq, and when the director said 'Can you zoom in on that?' they could. Then they could draw on it."

Perhaps most useful — from the artist's perspective — was that the end product of the session wasn't just a digital snapshot of a corrected image on a whiteboard. Because files of review sessions resided on Pixar's web server, artists could go the studio's intranet and access what they needed in order to proceed.



Using Pixar's Review Sketch tool, an animator can draw on an image, and then play the scene with the image moving underneath the drawing. Other features of the tool include a slider for choosing the width of the anti-aliased line, ghosting, and a raster eraser. The tool's drawings are stored on Pixar's intranet, which allows for immediate accessibility.

"It's organized along three axes: what kind of review was it; what review room it happened in; and when it happened," says Johnson. "We have the background image, the foreground image, and the composited image. Then we have the drawing made at a standard camera size and the RGBA drawing of it. The artist can bring up a frame that's in our 3D system, then bring up the director's drawing and layer it right on top. It's not a terribly complicated program that puts heavy demands on a computer. Anybody's Mac — even a little iBook — is perfectly fine for running this."

Although this tool was designed to address Brad Bird's penchant for drawing, word of its development traveled fast. The people working on Finding Nemo, which was quite far along at the time, wanted a system installed in their screening room. Nemo's production designer Ralph Eggleston pushed especially hard for this. He'd grown weary of using a laser pointer to indicate the changes he wanted made in the film's many undersea simulation shots, and then having to wait while assistants wrote copious notes. With this new tool in hand, Eggleston could view an image filled with schools of fish and simply cross out the fish he wanted to delete.

"Only at Pixar would you be allowed to be that anal retentive," says Johnson. "And I mean that in a good sense!"

The studio's artists have become believers. When Eggleston signed on to The Incredibles, he asked for yet another Review Sketch tool to be installed in what Pixar call "the layout lounge."

Eggleston may not have actually referred to it by its proper name, however, because some people call it the Madden tool after NFL TV analyst John Madden.

"There's actually a tool at ILM called the Madden tool, which is why we have the more generic name," says Johnson.

Early on, Karon Weber proposed naming the tool after a pioneering interactive-TV show called Winky Dink and You. The mid-1950s CBS show encouraged children to buy a clear-plastic screen that fit over their TV screens on which they could draw lines that would augment the animated action. Millions of kits were sold, and kids dutifully drew the bridges, ropes, and ladders through which Winky Dink escaped peril.

Johnson had a strong reaction to Weber's suggestion. "I said 'I am not supporting a tool called Winky Dink!'" he says. By any name, the tool has permitted the artist's hand to influence the computer animation process in an interesting, gestural way. Artists like Brad Bird can add touches that promise to stretch 3D-CG beyond its tendency to be photorealistic. Given that *The Incredibles* is Pixar's first film with a human cast — in very comic poses — it isn't surprising that this project inspired the development of a sketch tool.

Because Pixar's Review Sketch tool is process software that operates in the background, its influences can only be inferred. But all of these interim sketches still remain on Pixar's intranet. It will be interesting to see if any ever make their way into books or as an extra on the DVD.

"All those drawings are still sitting there on the same website," says Johnson. "It's fun to spelunk through it. Occasionally, you'll even see a hangman game!

"It's a scalpel, not a Swiss Army Knife," says Johnson. "But it has a really sharp blade with a really good handle on it. At the end of the day, it's a very simple thing, but it's executed very well."

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