Hiroaki Inoue on Computers and Japanese Animation

Talk at MIT, 13 May 2003; Hiroyoshi Iwashima Translating for Mr. Inoue

Article by Eri Izawa

Note: I have tried to be as factual and accurate as possible in reporting what was covered at this talk, although errors are of course possible. In the interest of writing a coherent article, I have taken the liberty of rearranging what Mr. Inoue said into thematic sections, rather than keeping it strictly chronological.

What Was the Talk About, Really?

The introductory email (by Sean Leonard?) went as follows: "Japanese animation (anime) has gained increasing acceptance worldwide. Mr. Hiroaki Inoue, producer at Anime International Corporation [AIC], explains how anime is made in an era of digital technologies, from concept to production to market. He will also address the future of the medium. Mr. Inoue has been in the industry since 1978 producing such famous anime as Tenchi Muyo!, Ah! My Goddess, Perfect Blue, Moldiver, Arimitage III, Now and Then, Here and There, and the Daicon III/IV openings. This marks the first visit of an anime industry member to an American university."

I was fortunate enough to be able to attend the talk, and had a great time hearing about the industry directly from a well-known and accomplished producer.

Mr. Inoue is a cheerful, round-faced man with curly black hair, a mustache and beard, and an easy-going, friendly manner. He listed off some of the projects he has worked on in his 24 years in the anime industry: Starting with "Hinotori 2772" (1980), he has worked on "Astroboy," "Lensman," "Wings of Honneamise," "Top o Nerae," "Tenchi Muyou," "Perfect Blue," "Bubblegum Crisis," "Ah! My Goddess," and many others. Most recently his work has been on "GXP" and on the third and final "Tenchi Muyou" videos.

We started off watching some excerpts of "Mahou Yuugi" (called "Magical Witchland" in the US), which features extensive use of computer graphics, as well as a few behind-the-scenes glimpses of the computer work behind the scenes. Although no motion capture is used for the series, the characters are modeled in 3D and animated in 3D, and the sets are built with extensive 3D components.

However, "Mahou Yuugi" turns out to be an exception in modern anime production in terms of its extensive use of 3D computer graphics. So, where is the industry, really?

History of Computers in Producing Anime

The history of computerized anime extends back to the early 1980's. Mr. Kaneko, then a student at South Carolina, heard of the use of digital effects in films, and excitedly went to the New York Institute of Technology to make enquiries. As a result, an attempt was made to use computer graphics in "Kojika no Monogatari" (*The Yearling*). They tried to have the computers do the compositing work of combining foreground cels with background cels. The projected efficiency was a factor of four.

However, out of 52 episodes of "Kojika," only one wound up using computer animation. Each of the other 30 episodes took two and a half months to animate, but the single CG episode took a year.

Other projects attempted to use CG; the "Lensman" movie used 3D polygons, but of its roughly 100 minutes of final footage, only 5 minutes of CG were included (half of which were produced in New York). Likewise, a company called Film Link attempted to put CG into "Golgo 13," but only 3 minutes went into the final movie. In both cases, computers were hardly necessary; they counted more as a selling point.

Things started to change when Toei, the largest animation house in Japan, began serious development of computer aided animation. After ten years of development, they brought it to mainstream TV in approximately the 92-93 season.

Computers and Animation Today

Many companies followed Toei's lead. These days, roughly 80 thirty-minute episodes of anime are produced for weekly viewing on Japanese TV, for a total of about 4000 episodes a year; on top of this, roughly 15 animated theater-bound movies are made per year, and about 100 thirty-minute OVAs (Original Video Animation). Of all these animated productions, only about 5% no longer use computers. Perhaps the most famous of these old-fashioned shows is "Sazae-san," an anime that has been running for over 30 years, whose staff is getting older and is perhaps no longer so up-to-date on modern technology. Another recent project still using old-fashioned non-computerized cel technology is the new "Astroboy," but this is apparently because the animators in Beijing do not have the necessary equipment. However, most of the rest of the industry uses computers; the recent Studio Ghibli "Sen to Chihiro no Kamikakushi" ("Spirited Away"), for example, was fully digitized (although most everything was first drawn by hand). That said, full polygonal, rendered 3D animation is still not very common, although its use is increasing.

Generally, computers these days are used to create and combine the "cels" – no longer are actual physical transparent cels made (he notes that "if you have bought a cel supposedly from an anime made in the past 4 or 5 years, it's probably fake!"). The approximate process goes as follows, once the storyboard and designs have been finalized: A cartoon character for a particular key frame is hand-drawn on white paper. The animation director makes any changes on a separate sheet of pink paper. The material, along with the outline schedule, is generally sent overseas for creating the in-between shots that transition from key frame to key frame. The final images are drawn on white paper, scanned into a computer, and then colored and edited or given any necessary special effects on the computer. Any separately moving parts of a character are drawn separately and scanned in separately, as are any moving objects in the background, as well as the background itself. A program called Lettuce (used by most animation houses these days) combines all the elements – each of which is like a Photoshop layer – to create the final composite scenes, which may then be burned onto film. Gone are the days of taking millions of photographs of layers of clear plastic cels placed over a background. For general frame work, computers have improved efficiency by about a factor of five; in terms of compositing a scene, the efficiency improvement is ten fold. Without this efficiency, the creation of 80 episodes a week would be nearly impossible.

(Although a computer may allow millions of color possibilities, industrial efficiency demands standardized colors, since work is frequently done overseas or by someone far away from the production office. Hence, regulation color palettes are still used, and those millions of possible colors are largely wasted. A paper keyframe layout sheet is still used to note how many seconds a particular "cel" is to be displayed in the final animation. All this traditional standardization remains in place so that anyone can pick up, work on, and finish a project. However, as computers become more and more commonplace, Mr. Inoue predicts that such things as color gradients may become standard, and gone will be the days of only having a few color tones on a particular character.)

Full 3D modeling and rendering (such as Pixar's), where an object is modeled out of polygons, given bones to facilitate movement, and is then rendered frame-by-frame, is currently used only in certain circumstances. Mr. Inoue predicts there will be more and more crosses between hand-drawn animation and full CG effects, and he thinks that as this becomes more common, old-fashioned hand-drawn images may start looking strange to viewers. Films like "Akira," he noted, may look better in full polygonal animation.

Not many studios can afford to do full rendering; to do fully 3D work, a company may have to outsource the work to a studio that has the technology to do so. (Since this is such a big and expensive decision, these issues are handled at the Producer level.)

There are two main reasons that full 3D rendering is not that common yet. Firstly, of the 80 episodes airing each week, only a few series will run for a full year. Many last only 13 episodes (a single cycle of episodes, or a "Cool"), so there is no economic incentive to invest in full 3D modeling and rendering. Secondly, the costs of Japanese TV animation are still about a quarter the cost of producing American TV animation. A third reason that Mr. Inoue later mentioned is that 2D art has certain strengths over 3D art.

However, some things are very commonly modeled in 3D and rendered, such as robots, spaceships, and other mechanical designs. These models can then be used in commercials, providing good economic reasons to take the time and energy to make them. Furthermore, mechanical objects are extremely time consuming to draw and animate by hand. For example, a particular "Uchuusenkan Yamato" ("Starblazers") scene that featured maybe 20 seconds of the spaceship flying toward the camera and then away took about two months for a top-notch animator to create by hand. Another example is a scene in "Tonari no Totoro" ("My Neighbor Totoro"), where the main

character pokes at a tadpole. Animating the roughly 30 independently-moving tadpoles in that 10 second scene took Studio Ghibli's elite animation staff two months.

With Disney animation, recent movie scenes featuring many horses or other animals are made possible by computerized animation. However, too often in Japan, there is not the manpower nor resources to do these extensive scenes. Unfortunately, this results in such scenes being avoided completely. For the sake of story-telling and remaining true to a story, computer graphics are necessary for Japan's animation industry.

Animation Industry Staffing

Mr. Inoue was asked how many people it takes to create a show. He explained that a typical 30 minute TV anime show takes roughly 120 people: perhaps 2-5 character, mechanical, and background designers; 4-6 scenario writers, 40 in the animation team, 30 people to do finishing/touch ups, background, and compositing/combining; and 20-30 people to do voice acting and sound tech. A film such as "Sent to Chihiro" ("Spirited Away") requires about 500 people. Studio Ghibli itself, although comprised mostly of animators, only has about 100 people; they rely on nearly 500 or so people outside the company for contracted work, sounds, and other support. In addition, 2/3 of the animation jobs are overseas, contracted out to animation companies in Korea, China, Taiwan, and the Philippines. These days, he noted, 80 episodes a week would require tens of thousands of animators, but Japan simply doesn't have the numbers of people required for that much work. Mr. Inoue later explained that currently in Japan, there are about 10 large animation houses, 30 medium sized ones, perhaps 2000 tiny companies (sometimes with as few as 3-4 people). In the larger company, of the 300 or so workers, only 20% are actual employees with benefits; the rest are basically contractors. Hence (he noted) there is no job security, and he "can't recommend the industry" unless a person is particularly good.

Moreover, the work is long and hard. Of his own day at work, he said that he starts off the day around 10am with a meeting at the company, which is comprised of about 70 animators, digital staff, and production staff. He remains at work (generally in meetings) through the day til 9 or 10pm. Four or five times a month, the meetings continue until 2 or 3am. A few times a month he also goes into the other studios - the voice/dubbing studio or the finishing studio - and stays there until 2 or 3am. "I think [the animation industry] is bad for one's health," he noted wryly.

Manga, Games, and Anime

Another audience member asked about the connection between the anime and manga industries. According to Mr. Inoue, up to about 20 years ago, there was a much clearer division between the two industries. Previously, although popular manga did become anime, it was a way for the manga writers to show their ideas to the world. These days, many mangaka actively want to do anime, so they do such things as drawing their manga in ways to make it easier to turn into anime, or otherwise inquiring about turning their manga into anime.

As for anime and games, Mr. Inoue noted that, although games were initially mostly about the programming more than the graphics, these days Japanese games have become focused on RPGs and adventures. This has lured many animators into the gaming industry. The "Final Fantasy" games in particular are set up to show off animation, for example; and there is also a trend of creating bishoujou ("pretty girl") games utilizing bishoujou anime. Likewise, because of the need for animation, game company Sega even has an animation studio called Tokyo Movies.

A lot of merchandizing is determined at the very beginning of a series. Toy makers may decide on what new toys they want and choose what to turn into products. However, extremely popular series may result in products such as stationery and fan goods being developed later.

Why Anime Can Push the Envelope

Mr. Inoue also spoke with me privately at length about why it is that Japanese animation has been able to produce so many shows of good caliber (he believes 20% of most anime is actually good quality, as opposed to our usual saying that "99% of everything is crap"). Part of this is because, he suggests, once a director has established himself as a successful money maker, the studio become tolerant of his desires to make experimental or visionary productions. So, although Spielburg may have had to use the proceeds off the popular "Jurassic Park" to fund his personal project "Schindler's List," Japanese studios seem to be willing to make deals with their directors - allowing them to make small market or niche films so long as they do not exceed a certain budget (as examples, he said a dream film budget may be set to 2 hundred million yen, while a studio money-making film may have a full budget of five hundred million yen - which is fine as it may bring in three billion yen in revenue). Mamoru Oshii, who

directed the popular anime "Patlabor," took advantage of this allowance to make a live action film. Also, he noted, a successful director can often push the envelope – such as happened with Gundam, one of the earliest series to portray the death and destruction of war in such a realistic way. Aspects such as these, Mr. Inoue believes, has allowed the Japanese animation industry, despite being a commercial enterprise that must make a profit to survive, unusually blessed in its ability to create works of profoundness and insight.

Mr. Inoue mentioned another factor in the diversity of anime. He said that "ever since Evangelion, there is no anime [series] that is watched by everyone." In other words, modern anime is no longer is tied to the mass market, and it may be freer to seek out niche markets and smaller audiences.

The Power of 2D Animation

When asked about the advantage of animation over traditional film, Mr. Inoue said that its number one strength was the ability to create characters. With animation, it is possible to put a unique soul into a 2D character, whether Mickey Mouse, Bugs Bunny, Astroy Boy, or Totoro. The cuteness and liveliness is based on and distilled into the 2D. Fully digital, 3D modeled and rendered movies currently can't have the same emotional nuances as 2D art. Also, some series just wouldn't look right live action: he suggested that an example of something that would look strange as traditional film would be "Sailor Moon."

When asked why anime still has the characteristic "look" (e.g., large eyes, small mouths) that Tezuka helped develop decades ago, Mr. Inoue said he believes that it has become a style of art, one that particularly allows emotional expressiveness and the distillation of cuteness and liveliness. He points out that children do not find anime facial features to look strange (and neither did anyone present in the room at the time). Also, modern anime incorporates many styles, ranging from the traditional large-eyed characters, to very realistic art. Anime, he pointed out, can still make the audience laugh or cry. It has done so for forty years, and will continue to do so in the future.

Thanks to Hiroyoshi Iwashima for corrections!

The talk by Hiroaki Inoue was sponsored by SP.270 (Japanese animation course) and the MIT Japan Program.

Some relevant links:

Interview with Mr. Atsushi Okui, Director of Cinematography at Studio Ghibli at Imagica.com

Anime production process – feature film as of 1999 – even talks about genga (key frames) and douga (in-between frames)

Keys' Little Anime Cel and Animation Art FAQ

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