

COURSE NOTES: ART 103, TECHNICAL DRAWING

YOUR PROFESSORS ARE DUSTY RHOADES, BARON ENGEL, AND DAVE BRYANT

REINVENTING THE WHEEL: PHILOSOPHY OF DESIGN

REALISM VERSUS EFFECT There's a continuous spectrum from one to the other. For the sake of convenience, though, it's possible to break this spectrum down into four rough categories.

"Type I" technology is most realistic, with little or no artistic license. This stuff really has to work, or at least look like it works, without any apparent compromises.

"Type II" technology looks plausible if you squint a little. It seems realistic at first glance, but may have subtle inconsistencies for the sake of effect.

"Type III" technology looks *cool!* Style is everything and plausibility is secondary. Suspension of disbelief is very important here.

"Type IV" technology is straight out of the cartoons. It's pure effect; style and plausibility are discarded at will for the sake of the art.

IT'S A PRODUCT, NOT A PROP Whatever the item is, somebody designed it, somebody tested it, somebody marketed it, and somebody bought it. If you as the artist think of the item as a movie prop, the viewer may well see it that way too: fake and flimsy. It's like the difference between a stage costume and a hall costume at a convention. The first can be as fancy or frilly as you want, because it's up on stage. The latter, though, has to be able to survive the abuse of brushing through crowds.

Industrial and human-interface designers make good money: they have to make sure a product will work as intended and is safe and easy or at least feasible to use. The science of making a device easy to use is called *ergonomics*. It may be simple, as in a knife or car-door handle, or complex, as in a vehicle or desktop computer. Either way, it's important for the artist to consider. Of course, even in the real world, people don't always get it right. History is filled with failed devices and concepts that didn't measure up.

Technology doesn't exist in a vacuum. Any important device or technique will influence other areas, sometimes in surprising ways. Failure to account for this can lead to odd "spikes" in the level of technology — for instance, a world that looks not much more advanced than, say, the 1970s, but with fusion power, artificial intelligence, and faster-than-light travel.

Pick the right technology for the situation. Who's using it? How, where, why, and when is it being used? If the art is intended to be humorous, you might use absurdity. This works best with "type III" or "type IV" technology.

TALK TO THE EXPERTS If you can, consult someone who actually uses it, whatever "it" may be. Even better, if it is possible and safe, use or at least handle it yourself.

LEARN FROM OTHERS Look at how other artists do it. What's "right" and what's "wrong" about it? What do you like or dislike about an artist's sense of design (or a real object, for that matter)?

GETTING IT ON PAPER: CREATING THE ART

MEDIA AND TOOLS First of all, it's not cheating to use drafting equipment—a writer, after all, uses a spell-checker or a thesaurus in his work. Neither is it cheating to use a computer if it's used well, just as with any other medium.

Pencils and erasers: if you have a light hand, try a soft lead like HB or 2B. Softer leads are very prone to smudging. For a heavier hand, use a harder lead like F or 2H. Colored pencils are a different matter. They can achieve a paint-like effect, but this requires using them ruthlessly and thoroughly; a large piece can "burn" through entire pencils. The best erasers are kneaded erasers and the white nylon erasers, which come as small blocks and as cylinders that fit in plastic pen-shaped holders.

Pens and markers: find permanent inks that won't fade quickly. This isn't difficult for inking pens, but is effectively impossible for markers, which are about the most "fugitive" medium out there.

Paints: the most popular are acrylic, watercolors, and oils. Acrylics are water-based polymer paints that come in liquid, tube, or jar form. They dry quickly and permanently and can be used on special paper or illustration board, but are intended for canvas or masonite. Watercolor paints come in tubes and cakes or pans and are intended for watercolor paper or illustration board. They are known for glowing colors and quick drying times, and their transparency and the fact they are not waterproof can be challenging. Oil paints, based on linseed oil, come only in tubes and are used on canvas or masonite. They are known for rich vibrant colors, easy blending, and taking days to dry.

SUBSTRATES Whatever you use, make sure the image you want to create will fit the available space. If necessary plan it out and use thumbnail sketches.

Sketchbooks: make sure to get acid-free, archival-quality books. Spiral-bound books are easier to handle, but smudge more easily than perfect-bound books.

Bristol board: again, look for acid-free archival-quality board. Hot press has a heavier "tooth" or texture while cold press is smoother. The former works better with pencils, while the latter is more suited to inks. Artists often tend to feel fierce loyalties to one or the other.

Illustration board: what goes for Bristol board goes double for illustration board, which is thick and stiff like cardboard rather than flexible like heavy paper.

Canvas: there are stretched canvases, canvases glued to board backings, and "canvas paper". Stretched canvases are traditional, but board canvases are durable and easier to handle and canvas paper is cheaper.

Watercolor paper: this can be used for sketching and the like, but (needless to say) it is best suited for watercolor paints. Be sure to dampen and stretch the paper before painting, or it may wrinkle when water is applied.

Masonite: this surface provides a smooth, durable, heavy surface for paints, but it is not cheap.

REFERENCE There's more to this than scrounging up a photo. Text sources can provide information like dimensions or descriptions that can clarify smudgy pictures or diagrams. Toys and models, if rendered accurately, provide a perspective unmatched by any flat picture.

Aside from general and specialty bookstores, books and magazines often can be found at libraries. Public libraries often are sufficient for common subjects; for more esoteric things, university libraries tend to be better.

Manufacturers and retailers may be able to provide brochures and catalogs chock-full of lovingly detailed photos or line drawings and technical specifications. Many of them have Web sites, too, and of course there are always third-party sites that may contain other useful material.

If you have the space and patience, you can create a *morque file*. Cut out or copy handy photos and text passages and file them by category, however seems most organized and accessible to you. Having thirty photos of a given item doesn't help if you can't find them!

Be sure to include the mundane and everyday, too. There's more of it out there than there is of the sexy and cool stuff, and you might be surprised at what details you might miss otherwise. Also, grab as many different sources as you can. One source might contain errors; multiple sources allows you to cross-check them. Besides, not every source gets hold of good-quality pictures.

Oh, and remember, it's a guide; don't be a slave to it.

PREPARATION First of all, don't be afraid of that blank paper. It's better to make mistakes from which you can learn than it is not to do anything at all. In fact, it's been said that one learns *more* from error than from success.

When you design an item, first focus on what makes it distinctive. If it's a firearm, for instance, figure out not only what makes it look like a firearm but what makes it look *different* from other, similar firearms.

For a real or previously depicted item, make sure all its parts are proportioned properly to each other and to everything else. Even big-name artists can get caught by this one, especially if they haven't found good references.

Real-world technology, especially mechanical technology, tends to be clean-lined and hard-looking, with a no-nonsense air. Rarely is it soft and squishy-looking. Generally, that sort of look tends to be associated with biological or other very exotic technologies.

EXECUTION Take your time, and don't rush it. If the deadline is too tight, either simplify the artwork's composition or choose another subject. It's better to do that, even if it's a little disappointing, than to try something too ambitious and end up with a mess.

Block the shapes loosely and lightly at first, just as you might with a figure. Don't get too tight too quickly; you may have to erase and redraw part or all of the item.

Objects have *mass* (and energy), including the character. These masses and energies will interact: a character sitting on a motorcycle will compress the suspension, a two-handed sword is heavy enough to cause noticeable muscular flexing and careful balancing in the wielder.

Whether for black-and-white or color work, both surface and internal textures are important. They will affect color, light, and shadow, sometimes in unusual ways, which is why many professionals use models and sets.

Last but not least, pay attention to the work. It is always possible to improve and to learn something new and enjoyable from any given work.

CURRICULA VITAE: PANELIST CREDENTIALS

DUSTY RHOADES Bio-Hazard Comics, professional in the motorcycle industry. E-mail: dustykat@earthlink.net.

Bio-Hazard comics started out in late 1989 as a small mini-comic company for producing my own title, *The Hyway Man*. It made its first appearance at Confurence 3 and ran three issues, appearing at each successive Confurence through 6. I also have had pages printed in *Furrrough*, *Genus*, and *Hit the Beach*. I was a regular in the mini-comics scene until 1994, when I attended Motorcycle Mechanics Institute. After graduating number two in my class, I quickly moved into my new career, working in two Harley Davidson dealerships in the next four years.

After moving to the Bay Area in the fall of 1999, I quickly gained employment with Custom Chrome (a Harley Davidson after-market parts catalog) in the research and development department. There, I am responsible for frames, exhaust systems, suspension components, and sheet-metal components that are made domestically and overseas, in Mexico, Taiwan, and Korea. I have owned and ridden motorcycles all of my life and presently ride a 2000 Buell X-1 StreetFighter.

BARON ENGEL P. O. Box 734, Cupertino CA 95015. On the Web: <http://www.backbreaker.com/>.

I have a diverse range of experiences and training that give me the ability to draw or paint a wide range of technologies, and to advise others on how best to improve their own potential. From the early days of designing flying models and competing with them to designing starships for online gaming, I have developed spacecraft, ground vehicles, robots and a plethora of small personal equipment for television and film proposals.

Hellfighter Online Game (1995–96): Contracted to develop a wide variety of spacecraft designs for the online game. Craft designs had to fit into the pre-existing design of the universe and had to be easy to recognize on the screen during game play.

Vision Entertainment (1998): BackBreaker Studios was contracted to do conceptual design and consultation for the television series proposal *Earth Force*. The following goals were met by the deadlines and budget set by the employer.

1. Developed major spacecraft designs for the various races that would appear in the proposed television series.
2. Provided to the animation teams detailed explanations of how the proposed spacecraft technology was to operate, thereby allowing the animators and story writers to maintain a feeling of consistency in the world they were creating.

3. Proposed ideas on designs for remotely piloted vehicles (RPVs) to be used in the series, and helped develop procedures for the operation of these vehicles under a variety of conditions.

4. Researched and completed designs for communication equipment and personal electronics (e. g., wearable computers and VR headsets) that were consistent with the rest of the universe, and would help give the series its own distinctive and exciting feel.

Pure Hubris (1998–present): Have been helping Pure Hubris with tech design and world-building for a to-be-announced film project. The following goals for the project have been met.

1. Proposed designs for all the major characters of the film and their personal technology and costuming.

2. Provided designs for all the major spacecraft, vehicles, and weapons that maintain a feel consistent with the rest of the universe and enable the animators to draw them from any angle with confidence.

3. Design all the architecture and urban environments described in the script. These designs will be used by the animation team to create the background settings used in the film.

Education: *Art Center College of Design, Pasadena, CA* (1981–1983). Art Center is one of the most renowned schools in the world for automotive and product design and for graphic design and illustration. While attending as part of a high school scholarship program, I was able to meet and study with many of the students and instructors in the automotive and consumer design programs. I was able to see first-hand how an idea grows from a sketch on a piece of paper to a manufactured product.

West Valley/Mission College, Saratoga, CA (1984–1987). Entered and completed my certificate program for illustration,

but also studied heavily in the subjects of history, astronomy, and fine arts. Also helped the theater program on campus design and manufacture stage designs and props, which had to be constructed within budget and to be durable and safe to use.

Hobbies: History, military and civil aviation, art, astronomy, cooking, auto racing, shooting, reading, animé, archaeology, paleontology, fishing, raising stupid goldfish.

DAVE BRYANT E-mail: dave@catspawdtp.com. On the Web: <http://www.arclight.net/~pdb/>. Dusty and Baron graciously invited me to join them on this panel as an additional perspective to complement their considerable skills and knowledge regarding technology and the depiction thereof. A lifelong fascination with science, technology, and history—especially military history—has given me a fine appreciation of the importance of industrial design and its influence on realism in the arts. Moreover, long-time study, operation, and maintenance of firearms has proven to be the best way of learning how to handle and depict a class of mechanical device that is so popular in science fiction art, not to mention instilling a strong understanding of and respect for mechanical design and processes. A professional career in print and electronic publishing has also acquainted me with both large, heavy mechanical equipment and smaller professional and consumer computers—and the regulations that apply to such workplaces, arising from their unique characteristics and hazards. As well, I have been an avid SF fan much of my life and a fan of anthropomorphic characters for more than twenty years. All this background has been reinforced and used over the years not only in my own art but in an advisory capacity on a number of professional and semiprofessional endeavors up to the present and, I hope, well into the future.

BIBLIOGRAPHY OF SAMPLE SOURCE MATERIAL

Magazine Title	Topic	Publisher
<i>Car and Driver</i>	Autos: current and classic	Hachette Filipacchi
<i>Import Sport</i>	Autos: contemporary Euro & Japanese sports cars	Primedia Inc.
<i>Popular Hot Rodding</i>	Autos: 1960s–1970s US muscle cars	Primedia Inc.
<i>Road and Track</i>	Autos: current and classic	Hachette Filipacchi
<i>Street Rodder</i>	Autos: classic hot rods, as from <i>American Graffiti</i>	Primedia Inc.
<i>Trucking</i>	Autos: contemporary and classic sport pickup trucks	Primedia Inc.
<i>Cycle World</i>	Motorcycles: sport-bike current events	Hachette Filipacchi
<i>Dirt Bike</i>	Motorcycles: off-road motorcycle and ATV current events	Primedia Inc.
<i>Easy Rider</i>	Motorcycles: chopper-style Harley Davidson bikes	Paisano Publications
<i>Essential Superbike</i>	Motorcycles: high-end sport bikes	Bright Star
<i>V-Twin</i>	Motorcycles: high-end custom Harley Davidson show bikes	Paisano Publications
<i>Air and Space</i>	Aerospace: current events	Smithsonian
<i>Aviation Week</i>	Aerospace: current events	The Mc-Graw Hill Companies
<i>World Air Power Journal*</i>	Aerospace: post-Second World War military aircraft	Aerospace Publishing Ltd.
<i>Combat*</i>	Firearms: Japanese soft-air replicas	(Not known at press time)
<i>Guns</i>	Firearms: defense and military small arms	Primedia Inc.
<i>Guns and Ammo</i>	Firearms: civilian and military small arms	Petersen Publications
<i>Architectural Digest</i>	Architecture: upscale private homes	Conde Nast Publications Inc.
<i>Popular Mechanics</i>	General: new or upcoming technology	Hearst Magazines
<i>Popular Science</i>	General: new or upcoming technology	Time4Media

Book Series Title	Topic	Publisher
Men at Arms	Arms and armor throughout history	Osprey Books
Elite	Arms and armor throughout history	Osprey Books
Vanguard	Military vehicles of the twentieth century	Osprey Books
Jane's	Vehicles of the twentieth century	Mallard Press
In Action	Vehicles of the twentieth century	Squadron/Signal Publications
How to Draw Manga*	Broad range of subjects	Nippan IPS Co., Ltd.
Eyewitness Books	Broad range of subjects	Alfred A. Knopf, Inc.

Individual Book Title	ISBN	Author/Editor	Publisher
<i>Homes for Creative Living</i>	0-87701-314-4	Jeremy Jones	Chronicle Books
<i>Homes in the Earth</i>	0-87701-212-1	Larry Chalmers, Jeremy Jones	Chronicle Books
<i>How to Draw Cars Like a Pro</i>	0-7603-0010-0	Thom Taylor, Lisa Hallett	Motorbooks International
<i>Intron Depot*</i>	4-87892-011-4	Masamune Shirow	Seishinsha Co., Ltd.
<i>Sentinel II</i>	4-06-202322-9	Syd Mead	Kodansha
<i>The Star Wars Sketchbook</i>	0-345-27380-X	Joe Johnston	Ballantine
<i>World Military Power</i>	0-517-49597-X	Chris Bishop, David Donald	The Military Press

* Not stocked by most bookstores or magazine stands; more often found in hobby shops or other specialty stores

Some publications listed above are out of print and may be difficult to find.

Most major manufacturers maintain marketing and technical documents for their products. The former is often freely available on request; the latter may or may not be available depending on security or intellectual property concerns.

Web Site	URL	Comment
Welcome to Army Technology	www.army-technology.com	Good contemporary reference
Air Force Links Photos	www.afs.mil/photos/aircraft.html	Official USAF photo archive
DefenseLINK	www.defenselink.mil	Links to most major arms makers worldwide
JED Military Equipment Directory	www.jed.simonides.org/jed1/	Another source for hardware in olive drab
HazeGray&Underway-Naval History	www.hazegray.org	Great visual library of naval history
Classic and Vintage Motorcycles links	www.dropbear.com/bikeslinks/classic.html	
Motorcycle Online	www.motorcycle.com	Current bike reviews with detailed photos
AuHo? The Automobile Homepage	www.auho.com	Images of current production cars worldwide
Library of Congress	www.loc.gov/homepage/lchp.html	
Google	www.google.com	Excellent and thorough search engine
AltaVista Search	www.altavista.com	Very good and more technical search engine
PARaseek.com	www.paraseek.com	And now for something completely different

Most major manufacturers maintain their own Web sites. Many other organizations and individuals maintain independent sites, sometimes containing information not present on manufacturer sites.