

Ergonomics in the Studio

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Ergonomics, also known as *human engineering*, is the field of engineering concerned with the interaction of technology and its users. More simply, its goal is to make sure that equipment is safe and easy to use. While much of the burden for this falls on the designer and manufacturer, it is up to the user to select products he or she can use properly—and then to do so, *consistently*.

In the case of the artist outfitting a studio, that means choosing good tools and furnishings, arranging them efficiently and effectively, and making safe and correct use of them. The reward for this is an artistic career unmarred by chronic medical problems like tendonitis or repetitive stress injury.

Furniture

The basic advice here is simple: don't scrimp. Buying inadequate furniture to save a few bucks now easily can result in expensive medical bills later. Moreover, over the last couple of decades, office and studio furniture prices have declined slowly while quality has improved gradually. It is now possible to obtain a complete set—chair, drawing surface or easel, and computer desk—of acceptable quality for about five hundred dollars US, or even less, if good merchandise is found on sale.

Take the time to shop around, both for price and for suitability. Every human body is different, and what seems perfect for one person may be dreadful for another. Be aware it may take practice and experience to determine what works best for oneself, and don't be afraid to ask advice. (Equally, don't be afraid to reject advice that seems ill-suited.) If possible, try out the furniture in person. Ordering items through the mail or Web may be less expensive, but there's no guarantee they will fit properly.

Office supply chain stores discontinue old models in favor of new ones fairly steadily; it's often possible to find good clearance deals. Other stores specialize in used equipment, whether repossessed or sold voluntarily. In any case, comfort, ergonomic correctness, and durability should trump price. Spending \$150 on a good chair that will last twenty years is better than spending \$50 on a mediocre chair that lasts only five years.

It also pays to consider the room into which the furniture must fit and plan ahead. Obviously, details must wait until specific items are selected, but it's possible to examine the room in advance and evolve some general guidelines. Where are the windows and the door(s)? Are there closets or other furniture, including light sources, around which one must arrange? How are electrical, phone, or network connections placed? If cables must run across the floor, get proper safety devices to cover them.

The physical environment isn't the only thing that demands thoughtful consideration. The artist should spend time observing just how he or she does things, much as in a time-and-motion study. Such studies examine the movements required to execute a task, with an eye to adjusting the work processes and environment to facilitate or even improve both productivity and comfort. For instance, be sure to place tool storage where it can be reached without twisting or stretching.

Seating

There is probably more material available on correct seating—and sitting—than on any other ergonomic topic. Correct sitting posture requires that both feet be flat on the floor or a foot support, that the thighs and forearms be parallel to the floor, that the upper arms be more or less perpendicular to the floor, and that the back be straight (not hunched). Improper posture can lead to serious medical difficulties that are both expensive and excruciating.

Seats and seat cushions are the most important and idiosyncratic elements of work chairs. The only way to be sure a chair is suitable is to sit in it, but remember that sitting for a few moments on a chair displayed in a store is not the same thing as using a chair hours at a time, day after day, for months on end.

Modern seat cushions are padded with various types of foam and, in most Western jurisdictions, must be treated with fire retardants. All else being equal, thicker foam is better . . . but all else is not equal. Cheaper foams tend to break down and flatten out more quickly. The unpleasant result after a few months is a hard, uncomfortable seat studded with bolts.

The most common materials used to upholster these seat cushions (and seat backs) are fabric of various sorts, leather, or artificial substances simulating leather. Leather is the most expensive and is considered the most prestigious, but it does have its drawbacks. Unlike fabric, it and its imitators are nonporous, so sweat, skin oils, and other fluids won't soak into them, impregnating them with stains and odors. They're easier to clean, but they also feel cold in cool weather and sticky in warm weather.

Possible allergic reactions to materials in the cushions or upholstery are another consideration. A possible solution for that and for easy clean-up is to use some sort of slipcover, even something as informal as a T-shirt stretched over the chair-back (assuming the chair-back is large enough).

Seat-backs come in three general sizes. The smallest tends to be roughly elliptical and is placed to support only the lumbar region (the lower back). Mid-size backs are roughly shoulder high and may have adjustable lumbar support. High backs frequently incorporate head-rests as well as lumbar support. Generally, the more expensive the chair, the higher and fancier the back. However, as long as one makes a habit of sitting straight and the chair isn't of substandard quality, the only real differences are cushiness and luxury.

As tempting as armrests may be, it's probably best to dispense with them. They can interfere with getting into or out of the chair or with placing the chair close enough to a work surface. Moreover, they can lure the user into leaning on them even when it's bad ergonomic practice to do so—when using a keyboard or mouse, for instance.

Obviously, the rules are slightly different for so-called “knee chairs”. These have no backs; instead, one sits on a tilted seat and kneels on a padded knee rest, with the feet under the chair. Proponents claim it naturally puts the sitter in an ergonomically correct position, with a straight back. Detractors claim the sitter trades a sore upper back and shoulders for sore knees and lower back, and that the upper back gets tired and slumps after a while.

Work surface

Whether they are intended for drawing or painting, most of the work surfaces available are angled, with the edge nearest the artist lower than the far edge. The purpose of this angle is to minimize, as far as practical, the amount of hunching over the artist must do. Since every artist is built differently and has different work habits or preferences, many such surfaces are adjustable, both in height above the floor (or ground) and angle of surface.

Drawing tables or portable drawing boards often have shallow angles, though a draftsman's desk may be quite steep (and heavy) to accommodate the huge sheets often used in that trade. The surface should be low enough that, when the user is sitting correctly, the elbow should just clear the edge as the arm reaches.

Easels tend to be almost vertical, and many painters work while standing, with the painting held at chest level. This minimizes the stooping and stretching necessary to reach the edges of the painting. Because easels, especially portable ones, may be relatively light in weight and the force exerted by the artist's tools may be well above the easel's center of gravity, they may tip easily. In such a case, it's best to anchor the easel somehow, perhaps by putting weights such as sandbags on the easel's pedestal.

Watercolor easels differ from other drawing or painting surfaces in that they *do* tend to be horizontal—otherwise the paints would drip or run down the paper and ruin the artwork. To compensate, many watercolorists work in a standing position, with the easel holding the artwork at or slightly below waist level. Some versions are gimballed or otherwise adjustable, so that the work surface can be angled selectively, allowing the colors to run in a controlled fashion in order to achieve a desired effect.

Computer desk

The cheap pressboard computer desks of yore, little more than modified writing desks with hutches, are giving way to similarly priced but sturdier and more attractive desks designed specifically for this task. Fancier and pricier models may be more adjustable, provide room for peripherals, or offer other features or options, useful or frivolous. In the end, though, the basic purpose of a computer desk is to hold the monitor, keyboard, and pointing device in positions that make them accessible to the user.

The top edge of the monitor's display area should be more or less level with the user's eye level—if it is significantly higher, and the user tends to crane the neck; significantly lower, and the user tends to hunch over. Authorities disagree on the minimum distance that should separate the monitor from the viewer's eyes, but a foot and a half to three feet seems to be the usual rule of thumb. To prevent glare, make sure no light sources shine directly on the display area or directly in the user's eyes.

The keyboard should be at the near edge of the desk or keyboard shelf, with mouse or trackball immediately to one side. There should be no pads or rests to encourage leaning on by the hand or arm. The height of the desktop or keyboard shelf should allow the upper arms to be more or less vertical and the forearms to be more or less horizontal, with the wrists held straight.

Some people prefer to place keyboard and mouse a long distance away across a desk; some claim it is more comfortable, while others want to leave a clear space for writing or other purposes. *Don't do it.* It forces the user to hunch over, stretch the arms, and lean on the elbows, all of which promote muscle aches, pinched nerves, and, worse, tendonitis or repetitive stress injury.

Light

Indirect sunlight is the best possible light source. It is diffuse, without visual “hot spots” to cause glare, which is why some artists like skylights and north-facing windows. If the sunlight doesn't reflect off colored surfaces, colors will appear true, which is why the walls and ceilings of many studios are white.

Unfortunately, getting indirect sunlight to shine brightly on a work surface without exposure to *direct* sunlight—which *isn't* good—is hard, and there's no sunlight of any kind at night. Artificial lights came about to make up this lack, and in the modern world fall into two categories: incandescent and fluorescent.

The best artificial light sources are incandescent bulbs designed to approximate sunlight, called “5000 Kelvin” lights for the temperature of the tungsten filament emitting the light. Unfortunately, these are sold only through specialized suppliers, mostly in the fields of graphic arts and photography, and tend to be expensive. Moreover, many models are designed to be used only in light boxes or viewing hoods, not in normal light fixtures.

Household incandescent lights—including halogen lights—glow at the much cooler temperature of 2900 K, and thus tend to be yellower. Fluorescent lights, which glow from chemical reactions rather than heat, tend to show a bluer cast. Recently, however, improvements in bulb design have made it possible to tailor output spectrum to some extent, leading to a plethora of choices such as “warm fluorescents” and “white incandescents”.

Even so, incandescent light still tends to be better than fluorescent light, overall; it is easier on the eye and doesn't affect color perception as much. Some models of task light pair an incandescent bulb with a fluorescent bulb; turning both bulbs on is supposed to provide bright, reasonably color-balanced light.

Fluorescent tubes used in office ceiling fixtures are cheap to buy and operate . . . but they are the very worst sort of light available on the market and should be avoided entirely. The harsh bluish light promotes eyestrain and noticeably distorts the appearance of colors, and includes a significant element of ultraviolet that can, in the long term, cause artwork to fade.

A last note: don't become obsessive about making sure the art looks “right” in sunlight because that's what artists are supposed to use as the “correct” light. After all, most framed art is not displayed in sunlight—it is usually displayed in a room lit by household incandescent fixtures. A collector or museum with sufficient financial resources might pony up for gallery lighting, but even this tends to be something of a compromise between household-style 2900-K and specialized 5000-K lighting.

Arranging the light

Lighting a studio involves two basic concerns—ambient light and task lighting. The former is simply the general level of light in the room, while the latter is light that falls specifically on the work surface. Both are important.

Ambient light should be bright enough for clear vision, but low enough to be soothing and undistracting. It may be tempting to reduce ambient light to a minimum, working in a room dark except for the immediate work area, but keep in mind that such a sharp contrast between the two can tire the eyes and that anything outside the bright area will be hard to see.

Minimize glare to the extent practical. Arrange furniture to place light sources where they will not shine directly in the eyes or computer monitor—or onto reflective surfaces. Use shades or

blinds to diffuse lights, softening them and reducing their tendency to create visual “hot spots”. Torchiere lights can particularly good for this, since the shades of well-designed torchieres direct most of the light upward, toward the ceiling.

Task lighting should be bright enough to see the work clearly, but without dazzling. Avoiding glare is harder, since most task lights have no shrouds or diffusers covering their bulbs, but as long as the light is positioned above one’s head, it’s only a problem if one looks up into it.

Sound

A studio should be kept moderately quiet, the better to bolster concentration and to remain aware of sounds in the environment such as telephones and doorbells—not to mention avoiding permanent hearing damage. Background music, if any, should play at a lower volume than one would set for normal listening. Within these limits, an artist has wide discretion; anything that motivates and sustains effort is good. Many artists choose music based on the mood of the moment or of the artwork in progress.

The louder a sound is, the more “processing power” it demands from the brain, making it harder to concentrate on other things. Instrumental music tends to be less distracting than vocals, because the human ear is attuned to voices, especially those speaking or singing in a language the listener understands. Also, studies have shown that people tend to work more vigorously, at a slight cost in error rate, when listening to rock music, and by contrast to work less energetically but with greater precision when listening to classical music.

Some artists prefer television to music, but this is not recommended. Moving visual images are intensely distracting: the human brain and eye evolved in a threatening environment, where any movement might be a carnivore sneaking up to grab a snack. A television screen—and the accompanying soundtrack—can cut an artist’s ability to concentrate in half, or worse. Human beings by nature are not good multi-taskers.

The body

The artist’s most important tool is his or her own body. It should be maintained in good condition, not only out of concern for quality of life but to continue working throughout one’s life. To a significant extent, the body “records” what happens to it, and what happens to it now will have ramifications in years to come, whether one is nineteen or ninety.

Eyes are critically important to anyone working in the visual arts. Get them checked regularly and corrected properly with eyeglasses or contact lenses. Ears, while not quite as critical, should also be checked occasionally, especially if one spends much time in noisy surroundings. Don’t be shy about using earplugs to block potentially harmful sounds. If budget permits, get the volume-discriminating earplugs often sold to shooters. These cut out loud noises while still permitting the wearer to hear quiet sounds.

Dispatch Magazine is a monthly Webzine for dispatchers, primarily in emergency services. A page containing a large index of links to sites dealing with workplace ergonomics can be found at <http://www.911dispatch.com/ergonomics/ergonomics.html>. The Web site of the United States Navy’s Naval Postgraduate School contains a page devoted to the ergonomics of computer workstations and drawing tables at http://www.nps.navy.mil/safety/Regulatory_compliance/Ergo/Ergo/sit_proced_chair_ergo.htm. The Oregon Occupational Health and Safety Administration has, among other things, a page for schoolteachers on ergonomics for elementary schoolchildren at <http://www.orosha.org/cergos/>.

It may seem elementary to mention the necessity of taking breaks, but their importance is hard to exaggerate. Remember to stop for solid, balanced meals, and don’t overeat. Working at a drawing board or computer doesn’t burn many calories. Stay hydrated; survival experts say the overwhelming majority of people don’t drink enough water, even during a normal day.

Resting is not simply stopping for a moment to rub the eyes or work the shoulders—get up and stand or walk around, focus on other things, perhaps stretch or go through some calisthenics. People sitting in front of computer monitors don’t blink as often, which is why their eyes get dry and scratchy. People sitting and working don’t move around enough, which is why their muscles ache. Most authorities recommend such “active” resting for ten or fifteen minutes out of every hour.

Know when to quit working. If doing a task in a particular way hurts or twinges, stop and don’t continue until the problem is addressed. Pain is a warning, and one ignores it at the peril of later permanent medical problems like repetitive stress injury. Long hours should be avoided, unless an imminent deadline is looming; overwork does not improve the quality of one’s efforts.

One of the things that can hurt is holding one’s tools too tightly. That tires the muscles and can cause tendonitis in the long run. Moreover, holding tools loosely—just firmly enough to keep them from falling out of one’s grip—actually *improves* one’s fine motor control over them, because one’s fingers, hand, and arm are better able to make small, precise movements. If necessary, try out different tools to find ones that don’t require pressing down or holding in a death grip to work properly.

We live in a chronically sleep-deprived society. It’s tempting, especially if one has a full-time job to which one commutes, to sacrifice sleeping time in favor of one’s art, and it’s hard to argue against that. At the very least, experiment by sticking to a firm sleep schedule, getting enough every night, for a week or a month and see how much better and less run-down one feels.

Don’t procrastinate. Some people claim they “work better under pressure”, but this is an illusion. Scientific examination has proven that nobody actually does better work when pressured—in fact, the quality of work invariably goes down.

Lastly, remember that bodies change over the years. This may make it necessary as time goes by to change one’s tools or working area to adjust and to continue working comfortably and efficiently. Pay attention to small signals like squinting, stiffness, or creeping aches and take steps to accommodate these changes.

Other sources

There are plenty of books, magazine articles, and Web sites devoted to safe and proper use of studio equipment. Such organizations as OSHA (Occupational Safety and Health Administration), part of the US federal government, and Cal-OSHA, the state of California’s equivalent, are excellent sources of information. Those who have personal physicians can ask them for advice. A handful of useful Web pages are listed below as a start.