Hands on a Keyboard

Sample Chapters

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Hands on a Keyboard

A Guide for Musicians and Computer Users

New York – Vilnius

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A Guide for Musicians and Computer Users

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Disclaimer: The reader should consult his or her medical/health professional before adopting any of the suggestions in this book or drawing inferences from them.

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We have spent many years helping professional musicians who developed hand problems and today we are able to use that experience to aid those whose hands have been compromised by overuse of their computers.

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Shmuel Tatz
Vladimir Mayoroff

Contents

For computer users

To the reader:

You decided to buy a computer for your work and pleasure. But you must remember that the computer is not a toy. Today the computer is a necessity and in order for it to help you rather than hurt you it should be dealt with skillfully.

Millions of people in offices and homes sit in front of their computers for many hours each day. Computers are an integral part of our lives. When they are broken they can be repaired. However, it is not as easy to repair the person sitting in front of the computer. Every person can only endure a certain amount of physical and psychological stress.

Medical researchers have revealed various ways in which computers impact our health. Namely, people working on computers often suffer more headaches; static posture while sitting at the computer can cause neck, back, shoulder and hand pain; and, one's eyes become tired, especially if wearing glasses.

We shouldn't be afraid of using our computers but we should learn how to protect ourselves.

A wise working and resting regimen, as well as certain physical exercises can help both your physical heath and mental acuity. Good habits help you stay alert, healthy and happy.

In this book we will explain how to properly organize your work place in order to keep yourself physically and mentally at the top of your game.

It is not an accident that we decided to describe problems related to both working with computers and playing musical instruments - the causes and the treatments of these work related problems are quite similar.

People working in front of their computers and musicians working with their instruments generally work non-stop for hours on end, thus becoming very tired. Fortunately, musicians have the benefit of altering their posture - they do not remain in a static position. Muscular and mental activity stimulates blood circulation, brain activity and hearing.

There has been a lot written about the impact of computers on human health. However, the literature on this subject is often very complicated. Researchers offer such a wide variety of advice and diagrams that readers remain confused and end up doing nothing.

You know there have been many books and articles written on this subject. And, I bet you even have some books on your shelf that you opened only once! Most books on this topic offer useful information but the problem is that we don't have time to use it.

In this book we will try to explain general requirements and give you the minimal amount of exercise that is necessary for increasing your productivity and improving your general health.

You don't have to do all the exercises in a row and they won't take a lot of time. Please don't expect instant miracles. However, if you do start exercising promptly you will quickly understand

that these exercises are really necessary and useful -- they will help you a lot!

You want your room and your work place to be comfortable so that you spend your work time in a pleasant and fruitful manner.

I. Your room

Walk into a room that has one or more computers and you feel a palpable energy. That's because electrical equipment emits an electric current. It's important to use the equipment properly so you can minimize the negative effects that can arise from being exposed to the electrical current.

First of all, the room shouldn't be too small. Ideally, it should be no less than 100-110 square feet. If the room has a very low ceiling, more space is required. However, sometimes the only room you have for your computer may be a small one. In that case, ventilation is a key. Two fans in the room will help circulate the air (figure 1).

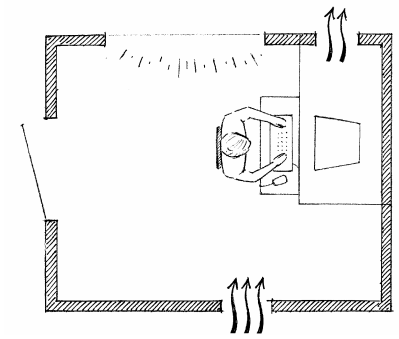
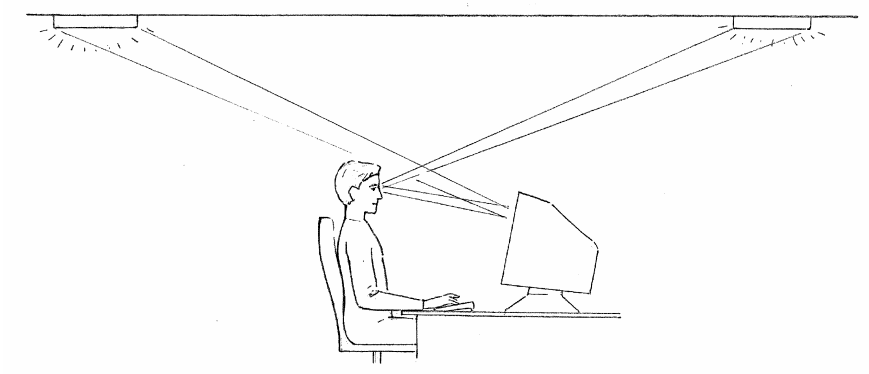


Figure 1

Since you look at more than the computer screen while you're working, the environment of the room is important, too. The walls and ceiling should be painted soft, light colors to avoid overtaxing or irritating the eyes. The other smaller surfaces (table, shelves, closets, etc.) should be darker in color but definitely not too bright.



Light reflecting from windows, lamps, small table lamps, etc. can fall on the computer screen and wash out the image of the screen. This glare can cause eye fatigue and irritation. One way to help minimize this is to paint the walls of the room with flat colors so that they will absorb the light rather than reflect it.

We've already mentioned that electrical equipment has an impact on the environment. Computers in particular generate ionization radiation at the screen and create an electrostatic field. To minimize the impact of this field, carpet the floor with an antistatic carpet.

Now, the room is nearly ready for you to start working. There's one final detail to take of: temperature.

If the room in which you're working is too hot - which makes you feel sleepy - or too cold - which may make you shiver - you'll be uncomfortable and less productive. Research and experience have shown that the optimal temperature for a work environment is between 64-72 F (18-22ºC).

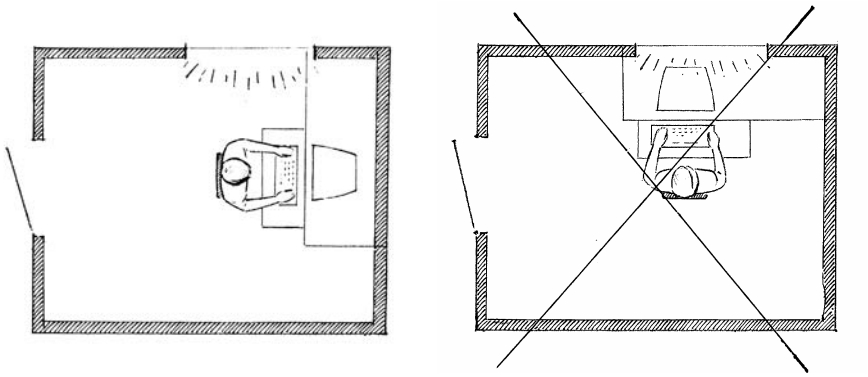


Figure 2

Work comfort also depends on light. Natural light is best, but most of us have to make do with artificial light.

Keep in mind that the human pupil is an optical apparatus. In bright light, the pupil constricts and decreases the light beam to the retina. Imagine that you have a window in front of your eyes, in the back of your computer. The window's light is brighter than the computer screen's. Your pupils constrict and react to the window's light. On other hand, pupils have to adapt to the window to see the image on the computer screen sharply. This is not a favorable work situation, because your eyes will fatigue quickly. If you have a window in your room and the only place to put the computer is in front of the window, cover the window with a shade (figure 2).

It's important that lamps be positioned on the side of the computer for easiest viewing of the computer screen. The screen and keyboard should receive the same amount of light - you shouldn't have blind patches on the screen and keyboard due to glaring light from the lamp.

If street noise is an issue, cover the walls with soundproof material and/or install a false ceiling.

We understand that it's not always possible to create an optimal work environment. That's why it's important to have good air circulation in the room and to take frequent, short breaks while working.

Summary:

1. The size of your computer room should be about 110 square feet.
2. Make sure the room is well ventilated (two fans, in and out).
3. Walls should be painted in soft, light, matte colors.
4. If the computer is near a window, the window should be on the side of the computer, not behind it.
5. Light should be white.
6. Cover the floor with an antistatic rug to minimize the effects of the electrostatic field created by the computer.

For Musicians

"*The scrutiny of the truth is difficult on one hand and easy on the other hand."*

Aristotle

Noteworthy information

If you ask a mountaineer what is most important on the journey to the top of the mountain, his answer will most likely be something along the lines of, "You have to know how to take care of yourself."

The journey to the top of a career in art is similar to mountaineering. It takes training, dedication, and an awareness of the dangers and pitfalls that can stall, or even end, a career.

Studying to be a musician takes a minimum of fifteen years, and training starts early, usually in pre-school. While their friends are playing outside and going to the movies, future musicians are practicing, playing their instruments again and again, sometimes at the expense of other childhood activities.

Musicians, like athletes, should always be in good shape in order to be in peak playing condition. This means not only taking care of themselves physically, but also studying their craft steadily, without taking time off. Studying consistently is especially important in their early years of training, when regular practice helps their fingers learn speed and endurance. This is why it's

essential for aspiring musicians to cultivate the habit of practicing on a regular basis, every day if possible.

People who dedicate their lives to music know all too well how much time and energy it takes to learn how to play an instrument. To go to the next level and become a professional musician takes even more drive and dedication, and the physical demands are equally rigorous. All that time spent playing and practicing can overstrain the hands and cause injuries. While it is sometimes be difficult to determine the exact cause of these injuries, one thing is certain: nothing comes out of nothing, of its own volition.

One reason an injury may occur is that every body has its own so-called "weak" spot. Musicians - pianists, violinists, viola-players, cellists, bassists, whose hands work unceasingly for many hours at a time, should acquaint themselves with the anatomy of hands in order to better understand how the muscles, ligaments, and tendons work.

When we work with musicians, our goal is to help them understand how to keep their hands healthy. We give them practical information about anatomy, training, etc., so that they can design their own integrated program of practice, physical exercises, and relaxation.

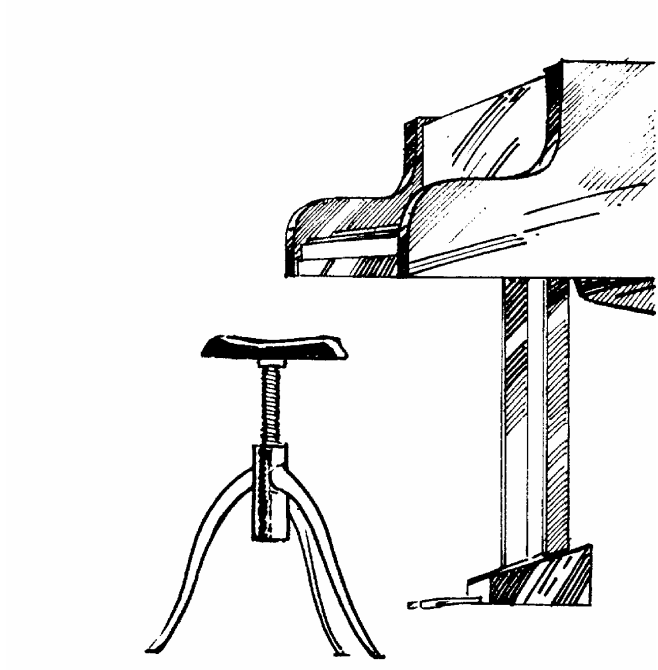
In this book, you will find an overview of the anatomy and physiology of the hands. We cover the most common hand injuries, discuss treatment, and talk about the importance of rest. We also present a method of self-massage that can help treat, and possibly prevent, injury.

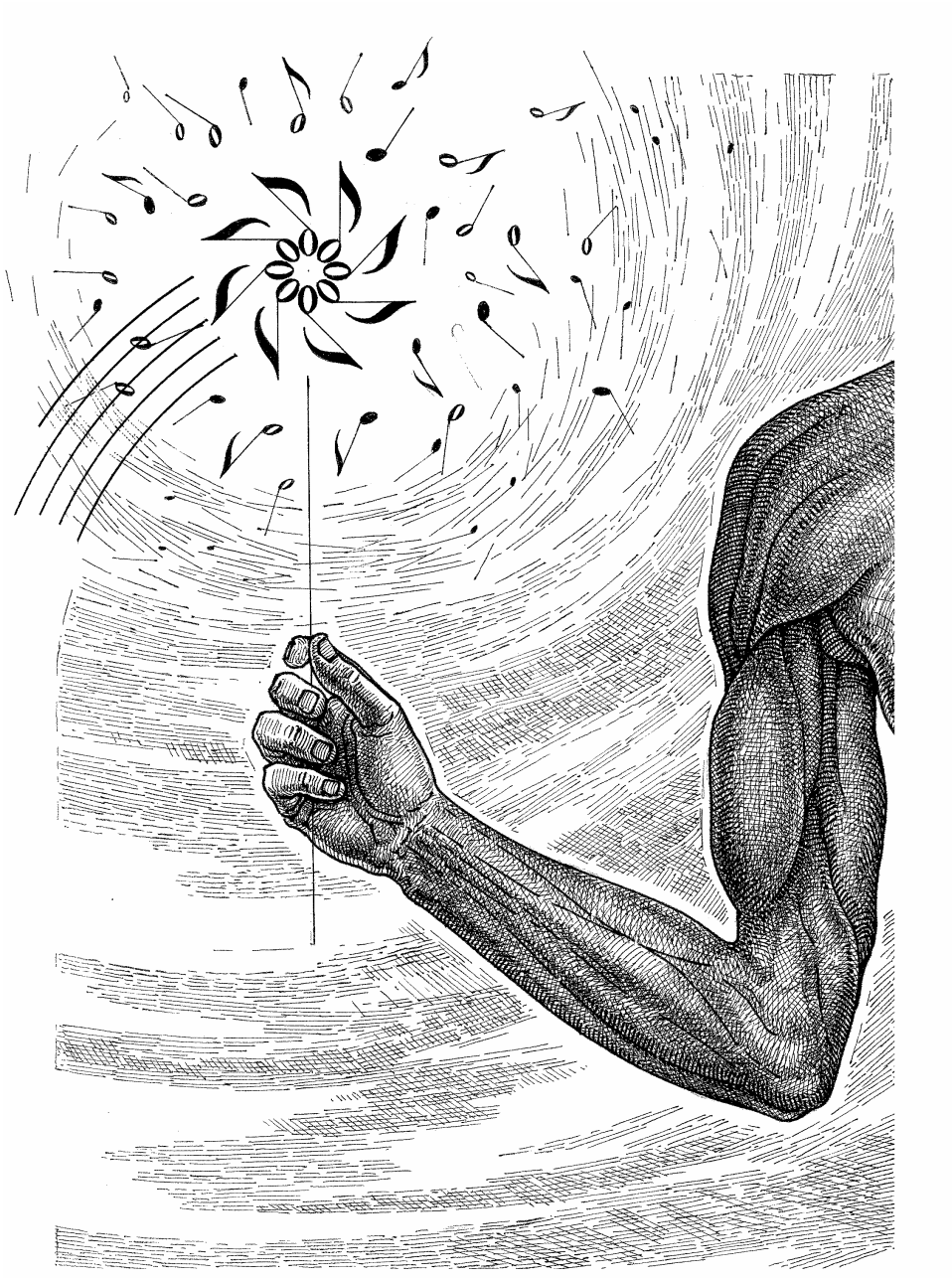
If it is necessary to resort to other methods of treatment - surgery, acupuncture etc. - musicians will have an excellent foundation for getting the most out of those treatments, so that they can possibly prevent recurrent or chronic injuries.

Some of the chapters that follow feature detailed hand anatomy, and are geared toward musicians and music teachers. Other chapters are more general, and will be interesting to all readers.

We hope this information will help you keep your hands healthy and injury-free. And we wish that musicians' hands everywhere be quick, lithe, and strong as they move beautifully on the violin's neck and on the black-and-white keyboard of the piano, creating music for all of us to enjoy.

I. How Muscles and Tendons Work





Musicians' hands perform a range of movements while playing their instruments. Sometimes these movements are sharp and active, requiring strength and endurance. Other movements may be subtle, soft and gentle - a barely noticeable shift of the fingers. Both types of movements require tendons, muscles, and joints to work in tandem.

Six muscle groups are responsible for our hand movements:

1. Flexors (mm. flexores)
2. Extensors (mm. extensors)
3. Pronators (inward rotators, mm. pronatores)
4. Supinators (outward rotators, mm. supinatores)
5. Adductors (mm.adductores)
6. Abductors (mm. abductors)

The anatomy of the arm is quite complex. In our opinion, it's necessary for musicians to understand arm anatomy in order to master the principles for playing freely and comfortably.

Start by observing the arm structure, from the shoulder joint to the tips of the fingers. You'll notice that the muscles become smaller and tendons become narrower near the wrist and hand - these weaker muscles and tendons are the ones most sensitive to overload.

The muscles consist of numerous muscle fibers, which come together to form bunches - secondary and tertiary bunches and so on, until the muscle is totally formed. The muscle is covered on the outside by dense connective tissue membrane called "fascia." Muscles are connected by tendons, which are strong strips of tissue on either end of the muscle. Tendons connect to the bones.

Muscles also have receptors, and sensitive motor nerves. Nerve impulses, which run through the nerve fiber along the central nervous system (CNS), force the muscle to contract and change the posture of a finger or hand.

Blood vessels are the life support of muscles. They deliver oxygen and nutrition, and remove the by-products of metabolism, which are produced when the muscle contracts.

Most of the small vessels (capillaries) do not function during muscle relaxation, but circulation increases 30 times or more while muscles are working. The muscles have to adapt to the demands placed upon them.

As we already discussed, the muscle has sensitive nerves, on the ends of which are highly sensitive receptors. Let's try to imagine how human muscles work.

Let's assume that we have to lift a certain weight. At the beginning, the muscle tenses, and the tendons extend. The nerve impulse runs from the receptors to the CNS, where the weight is analyzed (figure 1). As a result, the CNS sends impulses to the muscle using different nerve fibers, forcing the muscle to contract with the force necessary to lift this item.

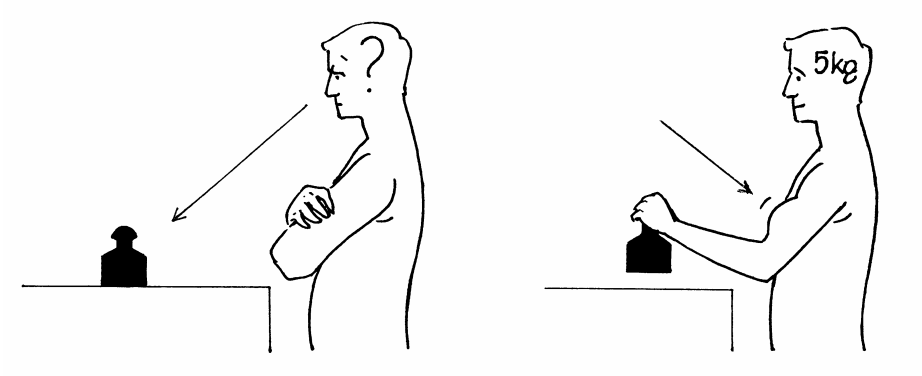


Figure 1

Of course, the process is much more complex, but it's the complexity - and evolutionary adaptation - that allows humans to perform precise movements. In order for the muscles to move the fingers, hands, or other parts of the body, we need a transfer mechanism. The tendons play this role.

Tendons are the dense part of the muscle - that highly elastic tissue that connects muscles to bones, fascia, and inter-muscular partitions. During the tension phase of a muscle contraction, the tendon fibers soften the movement.

Tendons get nutrition from small arteries, which originate in the muscle.

Tendons are covered with a tissue called "synovium," which allows them to move freely with the help of synovial fluid. The body naturally regulates the flow of synovial fluid, so that the tendon remains smooth and elastic, and can tolerate prolonged work (figure 2).

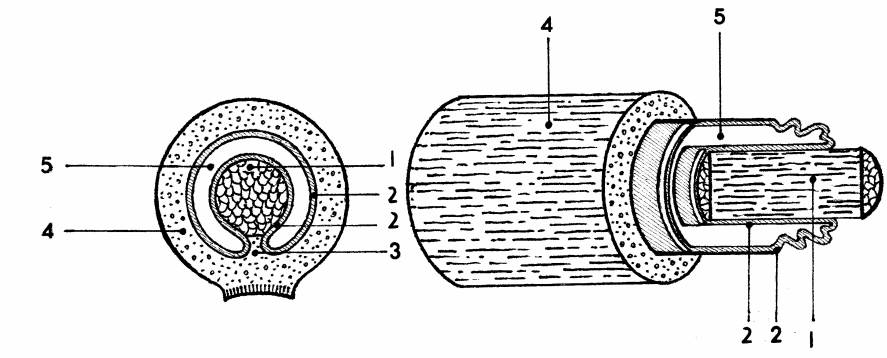


Figure 2. Structural scheme of the joint

1. Tendon
2. Inner and outer leaves of the synovium
3. Tendon mesentery
4. Fibrous cover
5. Synovial cavity.