STEADICAM POSTURE

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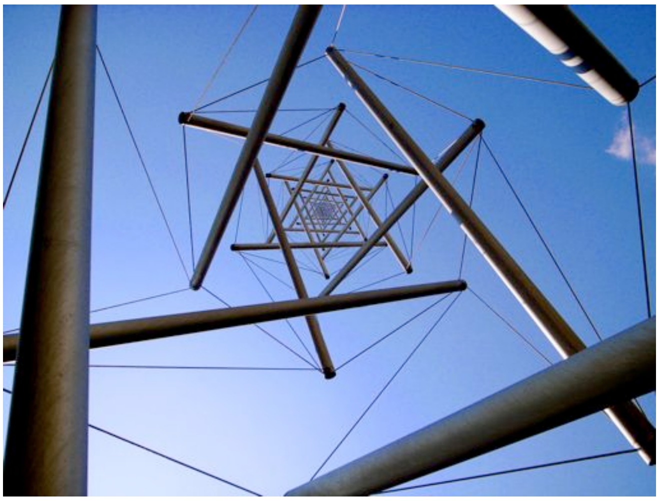
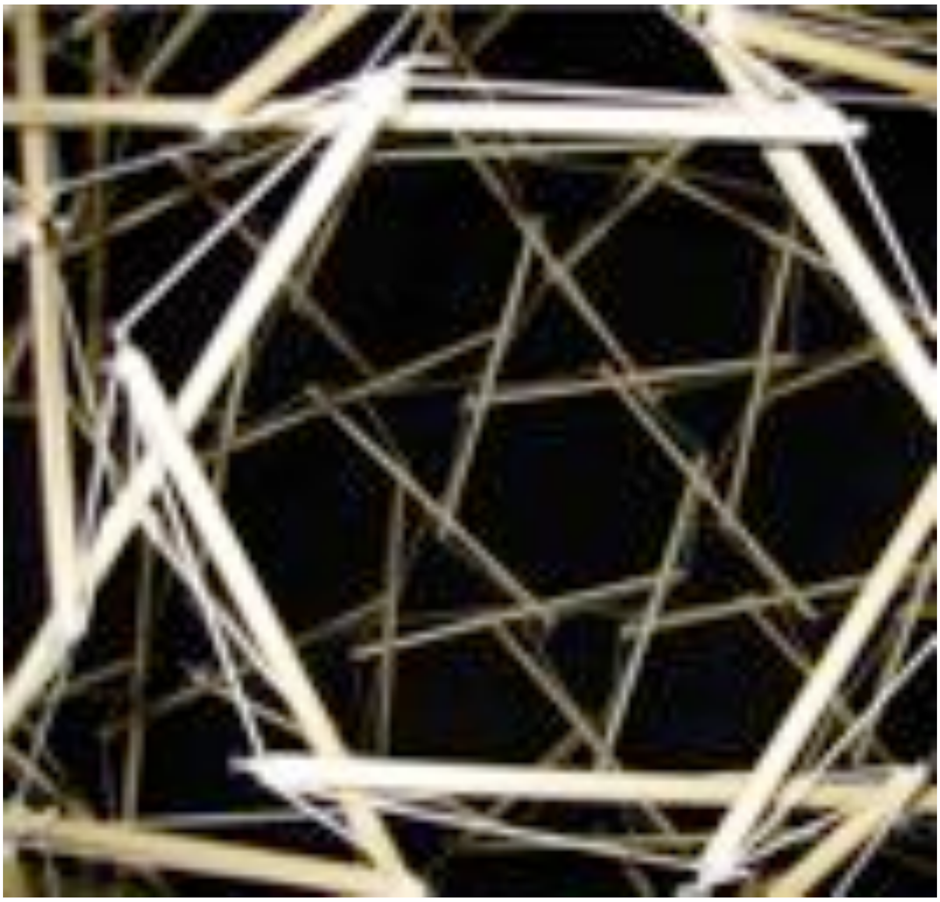


INTRODUCTION

In modelling the physical structures involved in maintaining ourselves with respect to gravity, we are used to relying on concepts of engineering that date back to the Ancient Greeks. Classical anatomical studies of posture view the skeleton as a load-bearing structure with series of muscles exerting leverage through tendons. This implies that a fixed perfect posture may be achieved, but the concept itself is misleading. Posture is a dynamic response to our environment.



In this article, we'll look at a 20th century engineering principle, tensegrity—*a structural-relationship principle in which structural shape is guaranteed by the finitely closed, comprehensively continuous, tensional behaviors of the system and not by the discontinuous and exclusively local compression member behaviors* [Buckminster Fuller]—and how it relates to the human body. We'll cover some basic principles of our postural systems—with a digression into how they got to be the way they are—and their relevance to Steadicam support. Then we'll look at common postural errors, before going on to examine how we might better use ourselves in everyday operating. Many thanks to Jerry Holway, Frank Rush, Garrett Brown, Stephan van Dijk, Virginia Garcia Ramos, and many other professionals, for advice, suggestions, and support.

TENSEGRITY

There is a popular appreciation of the spine as representing nothing more than a tower created by stacking blocks one upon the other. [Oschman]

This is a model which is commonly clinically applied: the tower is misaligned, 'blocks' are out of place and, working in a biomechanical manner, an attempt can be made to 'put back in place what is out'…A different perspective is offered by Buckminster Fuller and his tensegrity principle. [Myoskeletal Manual]

In ***Tensegrity****,* (a contraction of tensional integrity) R. Buckminster Fuller states: *Engineers told me, before my full-scale demonstrations of Geodesic structures, that Geodesics would not work*. Yet today, geodesics are in common use in everything from garden tents to radar domes. Why the initial scepticism? The Oxford English Dictionary defines tensegrity as: *A stable three-dimensional structure consisting of members under tension that are contiguous and members under compression that are not*. Before ***Tensegrity****,* it was not generally appreciated that gravity-resisting structures might be built wherein the compression elements did not touch.

A tensegrity structure can have one point of support coming from any direction, and still maintain its structural integrity. There are no moments at the joints because the structure is fully triangulated. This contrasts with a multi-segmented, articulated column model that is inherently unstable, and has high energy requirements. Tensegrity structures are low-energy-requiring structures and, as such, are favored by natural selection…(Tensegrity) *structures are omni directional and are stable in any direction and independent of gravity*. [Levin]

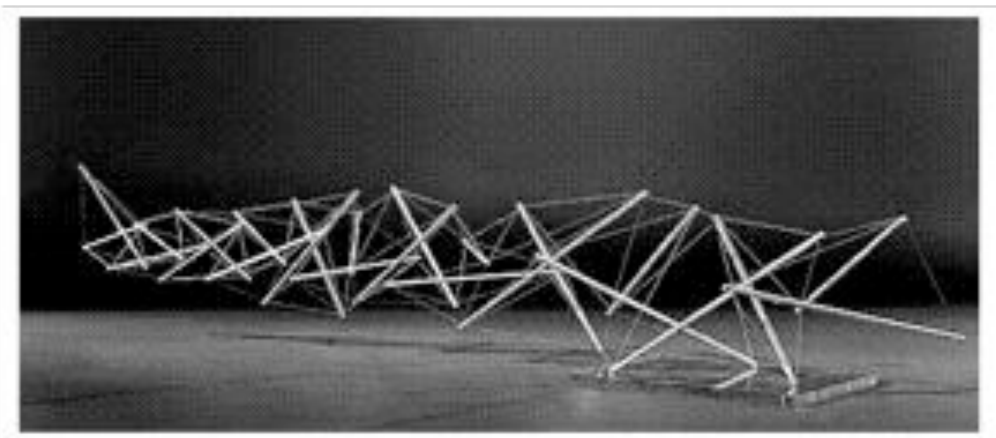
The principles of tensegrity apply at essentially every detectable size scale in the human body. At the macroscopic level, the 206 bones that constitute our skeleton are pulled up against the force of gravity and stabilized in a vertical form by the pull of tensile muscles, tendons and ligaments. [Ingber]

ANATOMY

It’s been wondered how the skeleton can withstand both sudden impacts, such as the heel striking the ground, and lifetime usage, such as the hip joint rotating in its capsule. We’ve known that shock-absorbing systems are in use, but the nature of these systems is only now becoming understood.

The laws of leverage act differently when applied within the tensegrity system such that forces generated are dissipated and may actually strengthen the structure much as pre-stressed concrete or a wire under tension. External forces applied to the system are dissipated throughout it so that the ‘weak link’ is protected. The forces generated at heelstrike as a 200 pound linebacker runs down the field, for example (an impact corresponding to up to three times body weight), *could not be absorbed solely by the os calcis* (heel bone) *but have to be distributed—shock absorber like—throughout the body*. [Levin]

Joints last a lifetime of reasonable use (though cartilage lining is avascular—not equipped with a blood supply to speed repair). Why? If the joint is well supported, it doesn’t carry all the load. Joints are stabilised by webs of interconnecting tissue that dissipate loading throughout the body: *Axial loads were applied to joints in live subjects under anesthesia during surgical intervention for a variety of conditions. Joint studies included the knee, ankle, elbow and metatarsal-phalangal* (foot) *joints. In our studies at no time could the* ***articular surfaces*** *of these joints be forced into contact with one another as long as the ligaments remained intact*. [Levin]



In this tensegrity mast, none of the compression members is in contact with any other, yet the structure is so resilient it can be picked up and turned on its side. Any loading on such a structure is distributed evenly throughout the entire system.

Since the spine is a mechanical structure, investigators have used mechanical models to attempt to study spinal kinematics and kinetics. Until now, all models, mathematical or actual, have been based on the axial-loaded compression support system. The problem of such a construct is that they are unidirectional, so that, like a 'stack of blocks,' or the Great Pyramid, they would be pulled apart by the very forces that were conscripted to hold them together if tilted out of plumb. The mechanical laws of leverage that operate in the compressional system would create forces that far outstrip any strength of biologic materials. We could not use such a system to walk on our two legs, crawl on all fours, walk on our hands or stand on our heads without the addition of tensional forces to hold us together. Such a system is only as strong as its weakest link. [Levin]

When applied to the human body, (the tensegrity) *model is characterized by: a continuous tensional network (tendons), connected by a discontinuous set of compressive elements (struts, i.e. bones), forming a stable yet dynamic system that interacts efficiently and resiliently with the forces acting upon it.* [Oschman]

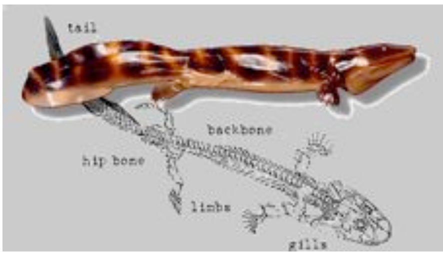
In relation to the spine, the tensegrity principle suggests that when the soft tissues around the spine are under appropriate tension, they can 'lift' each vertebra off the one below it. This viewpoint sees the spine as a tensegrity mast, rather than a stack of blocks. [Robbie]

The support system of the spine, and indeed the remainder of the body as well, is a function of continuous tension, discontinuous compression, so that the skeleton, rather than being a frame of support to which the muscles and ligaments and tendons attach, has to be considered as compression components suspended within a continuous tension network. Only in failure does the spinal column function as a 'stack of blocks.' [Levin]

Tensegrity provides the ability to yield increasingly without ultimately breaking or coming asunder. [Buckminster Fuller]

EVOLUTION

Bear in mind that our skeletal structure differs little from our first ancestors to leave the sea 375 million years ago. Since then, the skeleton has modified amazingly without radically altering. All land animals use pretty much the same structures to earn a living.



Some of these (animals) *even came up off their forelegs to become bipeds though their bodies were still angled forwards with long tails balancing them behind. This tendency to raise up parts of the body over other parts, higher and higher above the ground, led eventually to the primates and us with our long straight legs, our opened-out hips and erect upper body*. [Gorman]

Gazelles power their sprints by contracting the same muscle complexes that we use to erect our spines. Giraffes reach the high leaves with a neck containing the same seven vertebrae that we use to support our heads.

(Tensegrity) *structures are omni directional and are stable in any direction and independent of gravity. When applied to animated beings the structural system is maintained whether functioning as a biped or quadruped; prone, supine or standing upside down; on the ground, under water or in a spaceship*. [Levin]

To achieve better awareness of how to use ourselves well, we must abandon the notion of the spine as a load-bearing column, and now view it as a tensegrity system pre-stressed into a set of curves that maximise resilience and flexibility.

The curves are important to give strength to the spine and resistance to deformation; they provide a springiness and a shock absorbing effect simply not possible were the spine straight. [Gorman]

(Normal posture implies) *there is essentially minimal or no muscular activity needed to support the head. The intervertebral discs maintained in proper alignment experience no excessive* (disc) *compression…The* (spinal facet) *joints are properly aligned and do not bear excessive weight upon the body assuming the erect posture… and the nerve roots emerge with adequate space*. [Cailliet]

That means, given good use, the spine auto-erects, and is dynamically supported by postural muscle complexes innervated by gravity, position, and movement reflexes.

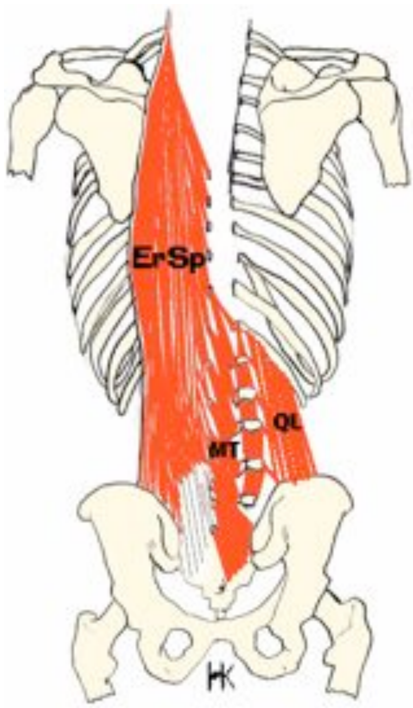
POSTURE

Since the body is not a stack of blocks, it can adapt to novel situations such as hefting a fully-loaded Steadicam. There is great redundancy built into our articulation systems, but if they are not used right, they eventually fail. Though we all know of someone that slipped a disc 'just stepping off the sidewalk,' we tend to ignore the 20 years of bad use that led up to it. We are designed to develop an effective posture in response to our environment, but the modern world, in which we spend 14 of our formative years sitting in chairs, is not the hunter-gatherer one to which we are evolved to respond—*Aborigines in Australia suffer very little from back pain…African tribes also reveal a very low incidence of slipped disc*. [Southern Health Board]—Correspondingly, we can't step into a Steadicam, and expect automatically to develop an appropriate response without invoking a certain amount of conscious control. Let's now consider some aspects of posture relevant to Steadicam.

All of our muscles are composed of Type 1 and Type 2 muscle fibers. Type 1 muscle fibers are often referred to as slow twitch, while Type 2 muscle fibers are often termed fast twitch. Type 1 fibers are characterized by smaller size, less force capacity and more endurance capacity They are the dominant muscle fibers in ***endurance*** *activities…Type 2 fibers are characterized by larger size, more force capacity and less endurance capacity. They are the dominant muscle fibers in* ***power*** *activities.* [Westcott]

Systems of muscles that are designed to support the body against gravity, the postural muscles, are built primarily of Type 1 muscle fibre, which can fire all day when dealing with an accustomed load. If we are to keep our **articular surfaces** supported, we must use ourselves in such a way that the postural muscle groups support the load, as they are designed to do—and leave our skeletons free to articulate, as they are designed to do.

The paraspinal muscles, shown in cutaway opposite, whose functions are to *extend the spine as well as to provide support for it* [Global Spine], consist of global muscles, like the erector spinae (with polysegmental innervation), and local muscles like the multifidus (with unisegmental innervation), that are dominated by Type 1 fibres. *Global muscles act like guy wires, while local muscles attach directly to the spine and provide segmental stability*. [Knudsen]



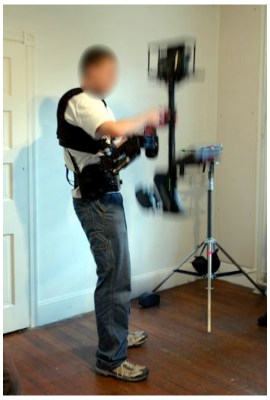
They are also known collectively as the *antigravity muscles* [Kornberg], but for our purposes, we can refer to them, like Garrett Brown does, as **that** muscle.

AVOIDANCES

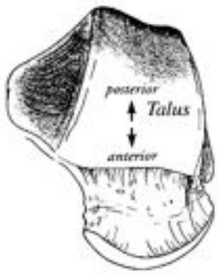
The carrying capacity of the postural muscles must be built up gradually, in the way that a woman builds up her capacity to carry a full-term pregnancy. For the back to be properly supported in a standing position, **that** muscle must work continuously—and when subjected to an unaccustomed load out front, such as a heavy rig, it will hurt. We can adopt a variety of avoidance postures in an attempt to shift the load, but the point of this discussion is to argue against them. Let's examine three of the most common. (I apologise for using people's images. Operators may have been caught off step, and the posture indicated may not reflect their normal operating position; but rather than mock up examples, I wanted to draw from real life. Anyone that wants his or her image replaced, please email me directly.)

#1 THE TOWER OF PISA

Often, the first reaction to 'weighing' a Steadicam is simply to fall away from it to counterbalance the weight. Keeping the usual posture, and leaning backwards is a disorientating solution; but its main failing is to introduce unaccustomed forces into a body that is used to being vertical, especially in the way the load is delivered into the ankle joint.


As you see below, the two leg bones, tibia and fibula converge from either side on the *talus* of the foot, and grip it like a pincer. When the ankle joint is in plantar flexion (as in *Pisa), the posterior (narrower) part of the talus is in the 'pincer,' and the joint therefore less stable*. [Calais-Germain] As such, it requires **much** more support from the surrounding muscles and ligaments to hold it together. Transferring your bodyweight plus up to 50% through your ankles in this way is asking for trouble.



As most sprains occur when the ankle joint is in plantar flexion, Pisa is an unstable solution in more ways than one.

Right ankle joint from front

#2 THE GUITAR HERO

Once it becomes clear that Pisa renders normal locomotion difficult, operators usually straighten up, but in an effort to get in an extra few hours of practice early on, a ready relief from the pain in **that** muscle is to disable it by throwing the body backwards from the hip. Because this moves your centre of gravity forward, you have to throw head and shoulders quite a way to achieve counterbalance, but the paraspinal complex can relax because the weight of the head, torso, plus a good deal of the Steadicam is being driven down the spine into the sacrum—bone and gristle all the way. Now the spine **is** working like a stack of blocks, though don't expect it to stand as long as the Parthenon. Your shock-absorbing webs of muscle and tendon are substituted by delicate vertebral articular facets.

If the spine is to carry weight, it is the articular facets (or the inter-vertebral discs) that must do the work.

Spinal arthritis occurs when the cartilage in the joints is worn down as a result of wear and tear, ageing, injury or misuse. [Regan]

Arthritis of the spine, especially the lumbar spine, is primarily a result of misuse of the facets to bear weight that is best borne by other means.

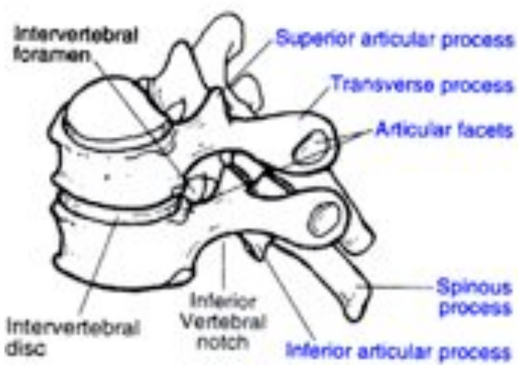


Illustration of 2 spinal vertebrae
The rear of the spine is to the right

Guitar Hero is a viable mode of operation only for someone with a young back.

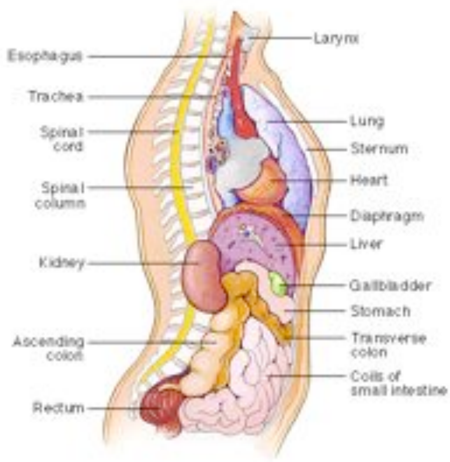
#3 The Whoopie Cushion

Whoopie is more of a bad habit than a complete avoidance. The operator, in tilting the head to view the monitor, allows the head and neck to fall forward, and the shoulders to follow. Instead of remaining upright, with the head inclined slightly down (and letting the paraspinal complex do all its work), the operator allows the back to stretch out, and the spine to curl forward, thus transferring weight out of back and into muscle systems in the front of the body that are not designed for postural support. Being composed largely of **power** muscle, these systems are prone to fatigue.

Whoopie is problematic. The articular facet joints, as mentioned before, are situated to the rear of the spine, so when the back bends forward, weight comes onto the intervertebral discs. This leads to a chain reaction, in which the lungs work as airbags to transfer this weight through the diaphragm and into the abdomen, where networks of abdominal and pelvic muscles come into play.

Combined with a tight waist belt, increased pressure in the abdomen will reduce blood flow returning from the legs, and may result in their cramping. With the subsequent need to control breathing, such that it not effect the trim of the rig, an operator in this posture may also suffer shortness of breath.

The more tension you can keep out of your front, the better. As you can see below, there is enough going on in there already.



Whoopie is not recommended following a heavy meal.

TOWARDS A BALANCED OPERATING POSITION

It is tempting, at first, to stand facing the direction you are shooting, with the Steadicam out in front also facing forwards. This is a tiring position, because the weight you are cantilevering is so far away, but you can't bring the Steadicam closer to your body without also bringing it to your side. Many operators work like this, but it's a bad position for your back. If you stand now, without the rig, and place both hands at one hip, you will feel rotational stress in your back—and that's without any load. If you add the weight of a Steadicam, the stress in your back muscles will increase significantly.

The most common way to rupture an intervertebral disc is by a combination of lifting and rotating, so obviously, we must avoid that. The solution is to work at an angle of roughly 45 degrees to the rig. This has the advantage of bringing the centre of gravity of the rig much closer to the body, and of keeping our heads, necks, and backs in comfortable alignment. It also allows us to move freely, forwards and backwards without altering the position, and affords a useful degree of vision to the rear.

The operator shown above is planted to the spot fighting a huge cantilever. The one to the left is operating with the rig comfortably close to his body, with minimal rotational strain in his back. He is aware of his surroundings, and poised to move in any direction.

When one is lopsided, there is a tendency to fall. When there is double weightedness, there is a tendency towards clumsiness. [Tai Chi Master Wang] What applies to martial arts, including boxing, also applies to Steadicam. Don't fight the rig, work it close to your body. Don't get stuck with your weight equally on both feet. Remain compact, fluid, and agile at all times.

To counterbalance the Steadicam, weight must be cantilevered behind the feet. In Pisa, the entire body is canted, the higher regions contributing most to the counterbalance. In Guitar Hero, the shoulders and head do the work. In Whoopie, the thorax is offered. Ideally (given that our centres of gravity lie in our abdomens), if we could keep the body, neck, and head upright and move it all back, away from the legs, we shouldn't have to move it very far. Look at the experts:



In these three pictures, the operators maintain ordinary postures, yet compensate the load perfectly. All maintain their bodies close to the rig, and none looks remotely in difficulty. I have watched Laurie Hayball (above) strap on a Steadicam that was perhaps half her weight, without appreciably changing her posture. Before her, a dozen big guys had struggled with the same rig, grunting and sweating, bending themselves out of shape trying to adjust themselves to it.

When you feel the load coming on, a first reaction is to brace the front of the body. Don't. There is a temptation to regard wearing a Steadicam as something requiring great strength. This is only partly true, and leads to operators—especially big, strong operators—using the power muscle groups in the fronts of their bodies to support the load. Not only is this inefficient, exhausting, and possibly bad for your health, but it affects your shot. A relaxed operator, using postural support systems is stable and fluid, yet dynamically poised.

Find the muscles grouped in the front of your body that are holding on, and let them go. This might not be easy, so persevere. When you do find these groups, and succeed in relaxing them, you will feel your torso expanding, your belly softening, and your chest floating up; the front of your pelvis will rotate forward and down, allowing a long curve to fall into your lower back (and your butt to stick out). The entire front of your body will feel 'open,' and weight of the Steadicam will **transfer into, and carry through, the length and breadth of your back.** Ensure that your buttock muscles are as relaxed as possible. If you are wearing an unaccustomed Steadicam, you will now feel **that** muscle take the strain.

Now check yourself in a mirror. With the Steadicam floating alongside you in operating position, you should be leaning neither to left nor to the right. If you are, adjust your side-to-side threads until you are upright. Sideways on, your shoulders should be directly above your hips. If not, adjust your fore–aft threads until you are aligned with the Steadicam in balance. Finally: relax, it's supposed to be fun.

OTHER ISSUES

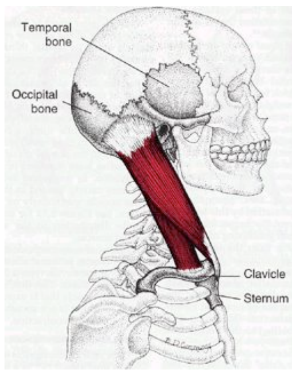
So far, we have considered the torso as if it were independent of the rest of the body. This should be addressed. The paraspinal muscles connect the 'sit bones' to the base of the skull, and the psoas muscles connect the lumbar back directly to the legs. For the body to work correctly, the entire system must operate as a coordinated unit.

#1 THE NECK

A common error, not just in Steadicam operation, is to break that coordination at the base of the neck. We must tilt our heads down in order to see the monitor, but in doing so, we should avoid allowing the neck to 'collapse.'

In this (collapsed neck) *pose the* (facet) *joints become maximally weight bearing and their cartilage is exposed to persistent recurrent trauma…In this increased cervical lordotic posture the intervertebral foramina are closed and the nerve roots are potentially compressed…With prolonged unremitting compression from the posture, the* (facet) *joint capsules can become constricted and even adherent, thus leading to gradual structural limitation…With cartilaginous structural changes, a degenerative arthritic condition of the facet joints occurs…If there is also superimposed muscular tension, the compression is increased and structural tissue changes are precipitated.* [Cailliet]

Otherwise known as a sore neck. The global 'guy wire' muscles, the Erector Spinae, are well named—they erect the spine; but their work does not stop at the collarbone. The 'collapsed' neck posture actually requires muscular effort on the part of the Sternocleidomastoideus (opposite), to counter the natural auto-erection of the cervical column.




C1 & C2 Vertebrae from rear

Throughout the spine, articulations between one vertebra and another define the range and type of movement possible between them. Head tilting is accommodated by the joint between the atlas (C1 vertebra), and the base of the skull (occipital bone). The two hollows cups shown opposite articulate with the head and facilitate its 'nodding' movement.

These articulating surfaces lie essentially on the outside of an imaginary sphere whose center in inside the skull… The shape of the (occipital–atlas) *joint surfaces…favors flexion/extension, and restricts other movements.* [Calais German]

Instead of allowing the neck to collapse in looking down at the monitor, the head should rotate about this joint, and allow the neck to float free beneath it.

C1 is palpable…between the mastoid process and lobe of the ear, where its transverse process can usually be located. [Myoskeletal Manual]

If you place your index fingers in the notch in the skull behind the earlobe, they will come in contact with a slightly deeper bone. Now nod your head, and you will feel that this bone does not move in relation to your skull. This is the top vertebra of your spine, and it is above this point that your head is designed to articulate in looking downwards.

Get used to the feeling, and remind yourself of it the next time you look down at the monitor. As well as reducing your neck's vulnerability, you will find your rear vision improved. If nothing else, it will make the grip's job easier.

We are inclined to pay more attention to our triax than to our necks, but the despite how marvellous the picture way down there on the monitor might be, the information traversing this connector is significantly more important. Keep it tension and kink-free at all times.

The most important cable in your kit

#2 THE ARMS

The entire support system of the upper extremity (arm) *is a tension system being supported by the musculature interweaving the spine, thorax and upper extremity into a tension support system. The scapula* (shoulder blade) *does not press on the thorax* (ribcage). *The clavicle* (collar bone) *has been traditionally recognized as acting more as a compression strut, as it would in a tensegrity model. In fact, in the cat family it is no more than a floating tensegrity strut. Although in humans the upper extremity is not weight-bearing, if we recognize that the same mechanism is used in bearing weight in all quadripeds, then we can readily see that the tension support system is utilized in vertebrates.* [Levin]

While holding your hands at the gimbal, don't support your arms from the shoulder muscles. Let the shoulder joints hang in a stable relationship with the trunk, and maximise the distance between the elbow and the shoulder in such a way as to maintain your upper chest open, and free to breathe. Resist rolling the shoulders forward and closing the chest; instead allow the arms to do the work of extension, leaving the shoulders behind.

#3 The Feet

That sensation of contact on the bottom of your feet…is your direct awareness of the earth pushing up underneath you and supporting you. It is your tangible appreciation of your relationship to the planet and to gravity. It is very direct and very reliable; it's there any time you wish to be sensitive to it. [Gorman]

Foot health is hugely important to us, and none will skimp on price when it comes to buying the best trainers, and yet *Expensive athletic shoes have been shown to account for 123% greater injury frequency than the cheapest ones.* [Robbins]

Worse, *Eighty-five percent of North Americans will see a medical professional for some type of foot-related pathology at some point in their lifetime, according to the U.S. Orthopedic Foot and Ankle Association. In staggering contrast, only three percent of habitually barefoot populations experience foot-related problems.* [Laskowski]

Since we are designed to walk barefoot, perhaps it should come as no surprise that shoes can interfere with our natural function.

The human foot has millions of nerves endings, especially on the sole, which sense the pounding and repetition of running, dancing, walking or other activity. Your brain and body work together to adapt to the stress of hitting the ground by adjusting the gait. This normal protective mechanism (which occurs constantly, and not just from the feet but also most parts of the body, including the joints) keeps us from being injured during activity. When we put a sneaker or shoe on the foot, we interfere with the body's normal adaptive mechanism. The mechanism works best when we walk or run barefoot because there is no interference with the nerves that sense our contacts with the ground. In other words, footwear can mask the sensations of activity, preventing the body from adjusting itself to perform better. The thicker and more overprotected the shoe, the worse it is for the body. [Maffetone]

Impact-moderating shoes have two adverse effects. First, they interfere with proprioception—the body's position-sensing system of intricate networks of feedback sensors embedded in muscles, joints, and tendons—by robbing the foot of information about the forces transmitted through it.

Mechanoreceptors in the joints along with the muscle spindles of the foot muscles are responsible for the positive support reflexes and a variety of automatic reflexive reactions. [Freeman] *These include the flexor/extensor reflex, which converts the lower limb into a firm, yet compliant pillar.* [Panzer].

Proprioceptive information generated when an unshod foot contacts the ground propagates through the body in a wave of preparatory muscle contraction that pre-stresses the tensegrity structures that protect the joints from impact injuries.

These muscle-firing sequences align the interlocking bones of the foot into the most structurally sound dome-like dynamic. The intrinsic musculature of the foot then fulfils its primary role, which is fine-tuning its balance during its interaction with the ground. This structural integrity and alignment is maintained up through the body through a wide range of three-dimensional movements. The structure, as a whole, is stronger and more energy efficient, with superior natural shock absorption, and is capable of superior performance with the lowest risk of injury. [Barefoot Science]

Second, the cushioning is a source of instability.

Current athletic footwear undoubtedly causes falls, since footwear with thick, yielding soles destabilizes humans by as much as 300% compared with hard-soled shoes. [Robbins]

Which causes us to plant our feet even harder onto the ground in order to feel stable.

Vertical impact and stability measures were also negatively related, with the strongest correlation obtained with the softest interface…Humans reduce impact-moderating behavior in direct relation to increased instability…The effect of cushioning during impulsive landing has also been examined in gymnasts landing from perches. Impact was always significantly higher when gymnasts landed on mats compared with hard surfaces. Impact amplitude was negatively correlated with impact-moderating behavior, such as hip and knee flexion. This demonstrates that when individuals land on soft foam materials, such as those found in the midsoles of modern athletic footwear, impact is greater because of less knee and hip flexion. [Robbins]

As we rely more on shoes, we rely more on foot support, to the point where many Westerners require custom orthotic insoles to shore up the natural arches of their feet. Try to spend as much time out of shoes as possible. Loaf around barefoot, in socks or slippers—perhaps try out some of the new ‘barefoot’ style shoes. Keep the support muscles of your feet active. Once you get used to orthotics, you’ll find it hard to get by without them.

We evolved to walk barefoot on savannah, not concrete, so shoes are a modern necessity. On buying your next pair, select something low and stable. They will take getting used to, but we know what getting used to unaccustomed muscle use is like. Meanwhile, try practising barefoot, bearing all we’ve discussed in mind. That extra feedback can help you to a better operating position.

Just do it.

Conclusion

Good Steadicam use is about consciously letting go and allowing your body to deal with the weight. A tensegrity structure works, not by jamming the compression struts together, but by allowing them to fall apart under gravity. You must allow gravity to fall through your body, and allow the postural support systems to work uninhibited.

Your body is now poised to move fluidly using the minimum of effort. In the three photos above, note how relaxed are the operators. To the right, Gary Spratling might be reading a newspaper. He compromises his body in no way other than to move the centre of gravity of his torso fractionally back.

When you wear a Steadicam, a balanced response to the weight is—keeping your front 'open'—to let your torso move back and up from the load. Allow your legs to 'fall' away from your torso, holding on at neither the groin, knees, nor ankles. Permit your back to **lengthen and widen** from your tail-bone all the way up through your neck to your skull, thus allowing the paraspinal muscles to transmit the load through the backs of your legs and into the ground. If there is any tension whatsoever in the buttock of your non-weight-carrying leg, you are still pulling your centre of gravity forwards. Worse, you are shortening your spine and decreasing the space between your vertebrae, thus needlessly loading your lumber disks. Relax. When **that** muscle hurts, rest, and try again. It will adjust eventually, without your having to resort to any other measure. All I'm saying is what Garrett Brown puts into three words: *Stand up straight!*

Fly safe.

NOTE #1 GOING GOOFY

In the '50s, Goofy got hip and went surfing. Humans had previously surfed left foot forward, but Goofy lead with his right. Human right-footed surfers were subsequently called Goofy Foot.

When some Steadicam operators switched the camera from the left to the right-hand side, they were labelled Goofy. Of course, 'orthodox' Steadicam operators lead with the right, so the label more correctly applies to them.

There are reasons for wanting to put a camera on your right-hand side. Its controls are operated mostly from the left, and if you come to Steadicam from hand-held operating, right will feel 'right,' but since you can't touch the camera without throwing the rig into a spin, this isn't much of an advantage. Another reason is that right-handed people feel that training their 'dexterous' hand to the sensitivities of the gimbal makes more sense—but most violin players are right handed, and this doesn't interfere with their learning the most intricate part of their playing, the fingering, with the left hand. New muscle memory can be programmed equally well for either hand, and training the less 'programmed' hand may even carry an advantage. *With handheld cameras on the right shoulder, we aim and work the camera in space with our right hands...so the translation to operating normally with the Steadicam on the left is no big deal.* [Brown] *I am used to grabbing things with my right hand, so I have better eye-hand coordination, better sense of my hand in space.* [Holway]

Another way to approach your decision might be to determine which is your dominant eye. Consider this discussion about Olympic-Style Archery: *I have seen children with good vision in both eyes, but still a profound left-eye dominance: they will never shoot a right-handed bow successfully.* [Milman] In this case at least, eye dominance is the deciding factor. A related factor is long-sightedness. The dominant eye is more prone to long-sightedness than is the non-dominant one, because the brain favours it for 'sighting.' Corrective treatments, such as lenses or laser surgery, usually complement this in that *the dominant eye is corrected for distance vision and the non-dominant eye is optimised for reading.* [Canberra Eye Hospital] Is perhaps your 'sighting' eye best focussed on the talent, and your 'reading' eye on the monitor? A final factor is body-side dominance. If you close your eyes, and try to feel your way about an unfamiliar space, you are inclined to lead with one side or the other. Since you walk diagonally when in a rig, your footwork might be more confident if you lead with your dominant hemisphere.

Operating side is a personal choice. The purpose of this section is to bring different criteria to your decision.

Note #2 EXERCISE

As opposed to exercise in general, many specific 'exercises' makes you good at doing that exercise, and little else. They can even have a negative affect on what you really want to achieve by selectively strengthening (and perhaps shortening) some muscle groups while ignoring others, leading to an unbalanced development that may interfere with proper use.

Exercises that attempt to flatten the belly (e.g., crunches) generally produce a set pattern in which the abdominal muscles merely overpower psoas and spinal extensor muscles that are already set at too high a level of tension. High abdominal muscle tone from abdominal crunches interferes with the ability to stand fully erect, as the contracted abdominal muscles drag the front of the ribs down. Numerous consequences follow: (1) breathing is impaired, (2) compression of abdominal contents results, impeding circulation, (3) deprived of the pumping effect of motion on fluid circulation, the lumbar plexus, which is embedded in the psoas, becomes less functional (slowed circulation slows tissue nutrition and removal of metabolic waste; nerve plexus metabolism slows; chronic constipation often results), (4) displacement of the centers of gravity of the body's segments from a vertical arrangement (standing or sitting) deprives them of support; gravity then drags them down and further in the direction of displacement; muscular involvement (at the back of the body) then becomes necessary to counteract what is, in effect, a movement toward collapse. This muscular effort (a) taxes the body's vital resources, (b) introduces strain in the involved musculature (e.g., the extensors of the back), and (c) sets the stage for back pain and back injury. [Gold] Though they might make you look good naked.

Conversely, a balanced exercise program—such as yoga or Pilates—or sport (especially symmetrical, locomotive sports such as running, walking, skiing, skating, etc., almost *ad infinitum)* will have a positive affect on your health and wellbeing that you can bring to Steadicam. The systems you use in dynamically supporting a Steadicam are best developed by operating one.

If you find operating exercise enough, look into the Alexander Technique. AT is not an exercise regime, but a form of physical re-education. Neither is it a therapy—you don't keep going back for the same treatment. You learn progressively how your body works, and you build upon that knowledge to apply it to whatever it is you do every day. Is it perhaps unique in that it doesn't overwrite your bad habits, but teaches you to inhibit them in such as way as to allow an appropriate response to your environment to emerge. It can't be learned from books, so take the time to find a teacher that suits you.

The Alexander Technique doesn't teach you something new to do. It teaches you how to bring more practical intelligence into what you are already doing; how to eliminate stereotyped responses; how to deal with habit and change. Frank Pierce Jones, Institute for Applied Experimental Psychology, Tufts University.

For more information, please visit http://alexandertechnique.com

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