

LESSON 3 STORYBOARDS FOR FILMS



When producing storyboards for live action film, you will be working on a project basis. A shooting board for a feature film generally involves over 1,000 frames, and you'll have on average two to three months to complete the job. Some boards can take much longer if the script is technically complicated and the budget permits. On a shooting board, you'll be working from your own studio but in close contact with the director. Films tend to pay less than advertising, but on the other hand, the projects are longer and often more artistically satisfying.

Considering that a film takes a long time to complete, and it's not unheard of for a production company to fold during the process, you should negotiate a 50% kill fee. This is an advance payment that the storyboard artist keeps even if a project is abandoned.

Many directors draw their own storyboards and, often, the work of the storyboard artist is to translate these notes into sketches that the crew can read. Some directors are highly skilled in drawing but, as producing a storyboard is generally a lengthy process, it is best to employ an artist. Hitchcock, for example, was a competent illustrator who often drew his own preparatory storyboard (or at any rate, the general design of the scenes). He then employed the best storyboard artists as, for him, this was the most important phase in a production.

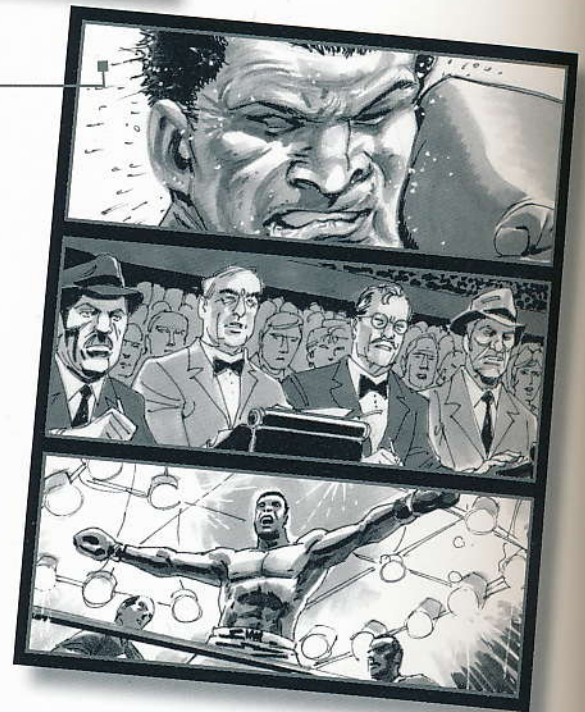


□ Cutting frames

The director Alexander Witt working on the storyboard for the film *Resident Evil: Apocalypse*.

□ Getting the details

Sometimes, for a feature film, the director will ask for a detailed storyboard, especially if the production is still looking for funding. Often the actors have not yet been cast but the director will already have some ideas about the characters that he or she will describe to the artist. He or she will also suggest some names and provide reference pictures to help the storyboard artist. These atmospheric frames were drawn by Tim Burgard for Columbia Pictures for the film *Ali*.



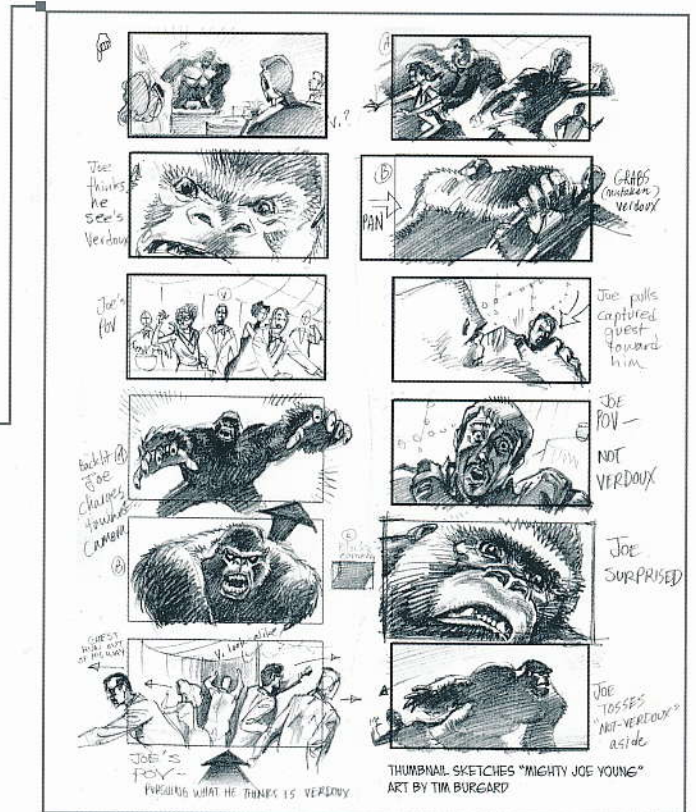
□ **Period pieces**

The director Patrice Chéreau requested storyboard sketches from Maxime Rebière in pencil for *La Reine Margot* in order to recreate the style of the sixteenth century, the setting of the film.



□ **Thumbnail sketches**

Initial sketches for the film *Mighty Joe Young* for Disney. Tim Burgard annotates the sketches with important information ready for the next stage.



□ **Working with the artist**

The director John Huston examines storyboard frames for the 1956 film *Moby Dick*.



○ Locations weren't decided at the time the initial meeting took place. The artist used reference material of jungles and small villages to give an authentic feel to the frames.

○ At the end of the drawing process, the storyboard looked a little too much like a comic rather than a storyboard. Depending on the requirements of the director, there are often scenes that need a lot of attention to detail, especially when there are crowd scenes involved or a lot of actors in the shot.



○ Note how, ultimately, the board doesn't contain any camera movement directions.

□ **Directing characters**

Arrows can be added to illustrate movement as in Tim Burgard's storyboard for *Garfield 2: A Tale of Two Kitties*, 20th Century Fox.

Client mood storyboard

Mood storyboards are often created from a work in progress script before location, cast, and props have been finalized. They can be used to secure more funding for the production.



□ **Action sequences**

The storyboard is an important way of planning out action sequences in movies. This sequence was drawn by Maxime Rebière for the film *Oliver Twist*, directed by Roman Polanski.

□ **Working in different media**

Maxime Rebière was asked by the director of the film *Wings of Courage*, Jean-Jacques Anaud, to work in colour for the client board in order to create a more realistic movie feel. The result was a gouache work on paper that captures the imagination.

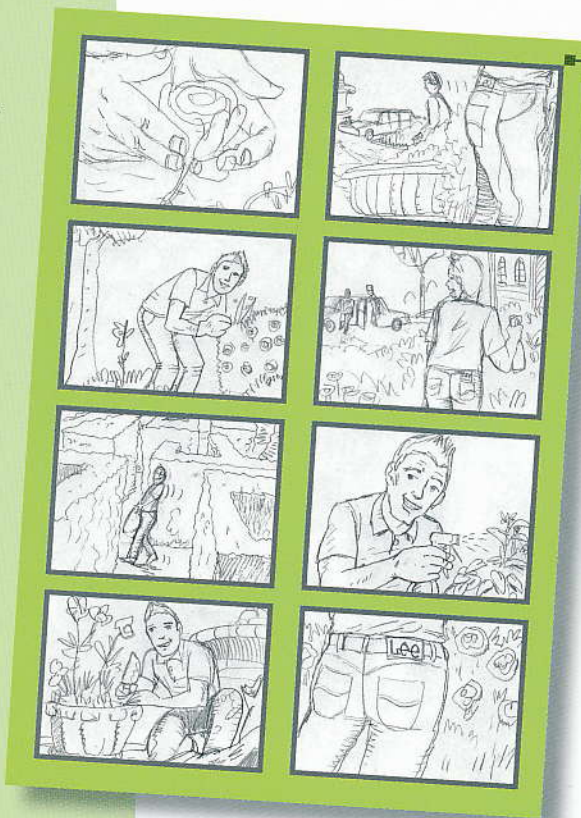


UNIT 2

WHAT SKILLS DO I NEED?

- films
- TV
- advertisements
- games
- animation

If you want to be a professional storyboard artist, you have to be able to draw with both speed and precision. This unit sets out some useful guidelines on how to set up your own studio and the kind of equipment you need. If you're a filmmaker interested in doing your own boards, however, then there are ways in which you can plan and communicate without having a great command of the pencil. Turn to page 74 for helpful tips for the artistically challenged.



Drawing ability

You need a good command of both anatomy and perspective. You need to be able to sketch from memory as well as from reference material. You need to be able to draw realistically for live-action storyboards, and to be able to reproduce established character and set design for animation.

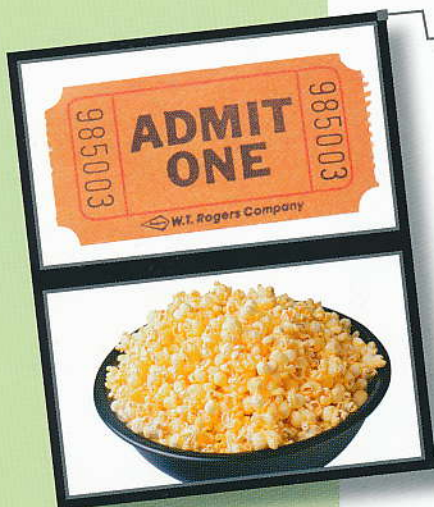
Speed

You don't just need to be good – you also need to be fast. You'll be working under stress and to tight deadlines, so speed is paramount. You need to be able to grasp and sketch ideas quickly in meetings, as well as work quickly in your studio.



Film knowledge

You need a broad knowledge of film history, as the people you work with will refer to films all the time in terms of style, tempo, colour and framing. You need to know what they're talking about. Watch films, live films, love films, and keep up to date. It's usually the classics and current hits that are most commonly referred to.



WHAT SKILLS DO I NEED?

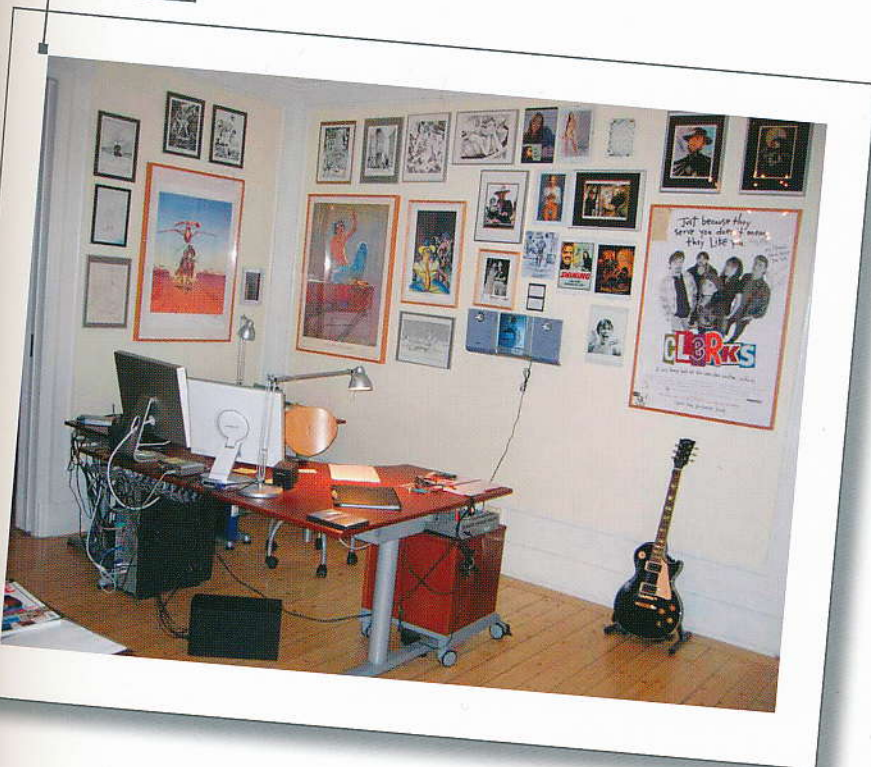
Technique □

You need to know the medium in which you're working – the language, the limitations, the possibilities and the different roles of the members of the production team. If you don't, you won't be able to communicate the director's needs or come up with solutions.



□ Organization

You need to be organized with your workspace, your time and your finances. Not only will you be working to tight deadlines, but you will probably also be working as a freelance artist. There will be no one but yourself to make sure you get the job done on time – or get the next job, for that matter. You'll probably be juggling several jobs at once, creatively and administratively – so be organized.



OVER TO YOU

If you want to increase your drawing skills and speed, then the only way is to practise. Try rapidly sketching frames from the television. You should also get into the habit of carrying a small notebook with you at all times, so that you can sketch wherever there are people and action – when you're sitting in a coffee shop or on the train, for example.



□ Ability to work as part of a team

A storyboard artist is literally a hired hand. The degree to which you'll be involved in creative decisions varies from one job to another, but for the most part you're hired to visualize someone else's ideas. From an egotistical standpoint, you need to be able to accept this and to respect deadlines. Teamwork is essential!



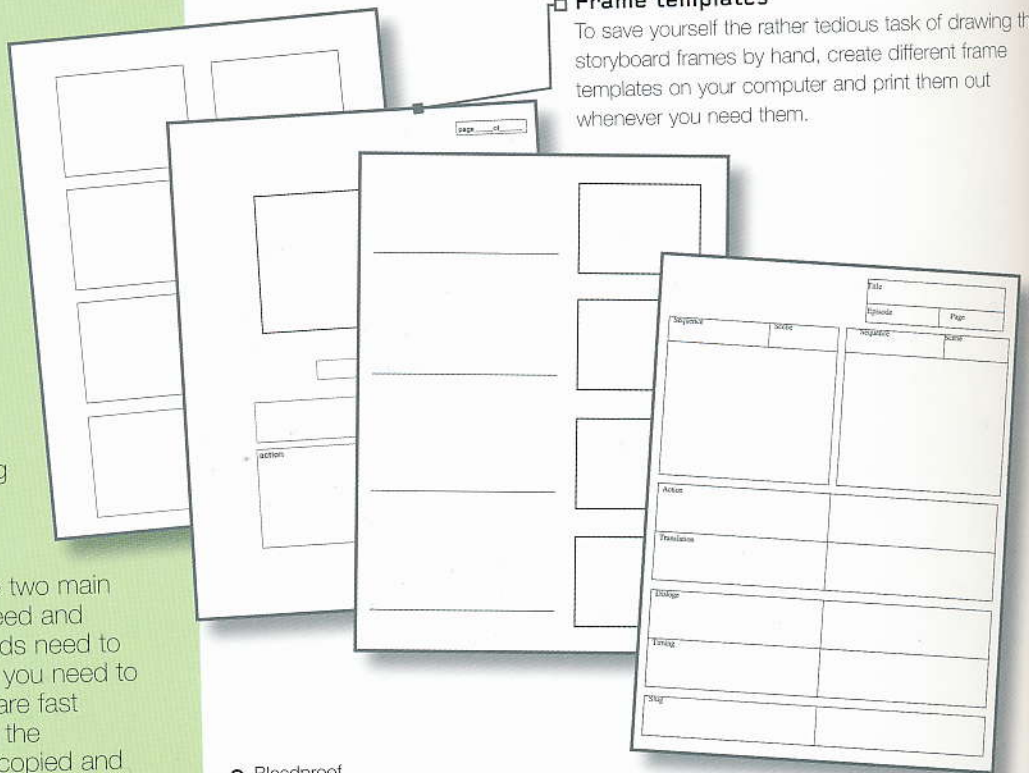
LESSON 9 DRAWING MATERIALS

-  films
-  TV
-  advertisements
-  games
-  animation

Storyboarding is one of the few jobs that, at its most basic level, still requires just a pencil and paper. In that sense, it's a job that gives you a lot of freedom. You can work on your storyboards in planes, on trains, and in the back of automobiles. If winter's getting you down, you can get out of town and take your work with you.

As far as other drawing materials are concerned, what you use is really a matter of personal preference, but there are two main factors to consider – speed and reproducibility. Storyboards need to be produced quickly, so you need to work with materials that are fast drying and efficient. And the storyboard will be photocopied and handed out to the production team, so it has to be done in a style that translates well when reproduced.

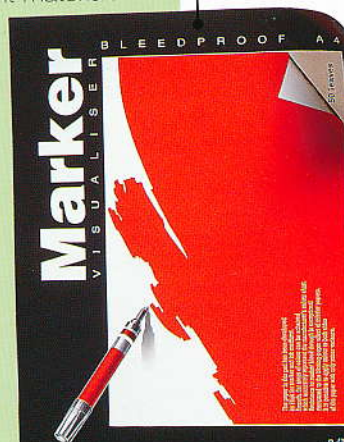
Play around with different materials and techniques, and find out what works for you.



□ Frame templates

To save yourself the rather tedious task of drawing the storyboard frames by hand, create different frame templates on your computer and print them out whenever you need them.

○ Bleedproof marker paper

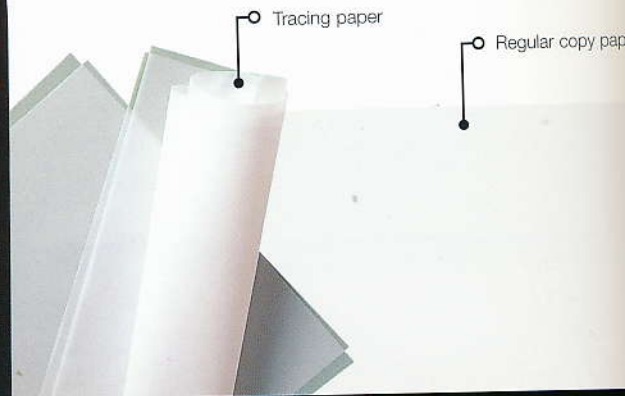


Paper

Use regular letter-size copy paper. It's inexpensive and available from any office supply shop, and it's easy to scan and send by fax. You can also use special paper available from art suppliers (such as Letraset comic layout paper, bleedproof marker paper or tracing paper), which is semi-transparent so that you can trace pictures, photos or your previous sketches.

○ Tracing paper

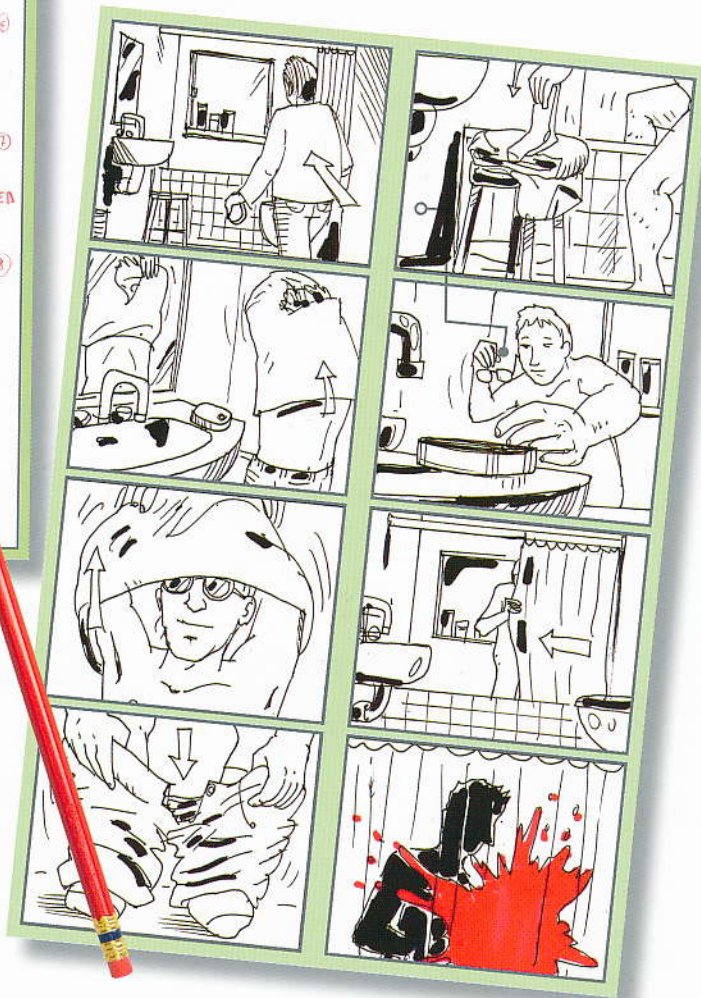
○ Regular copy paper





Work in red pencil

Make your original sketches in red pencil, so that you can easily clean them up with a regular pencil without having to use a light box. Red pencil doesn't show up when the work is photocopied, making it easier to do a clean-up of your work.



Pencils

Any 0.5 or 0.7 rechargeable pencils are practical.

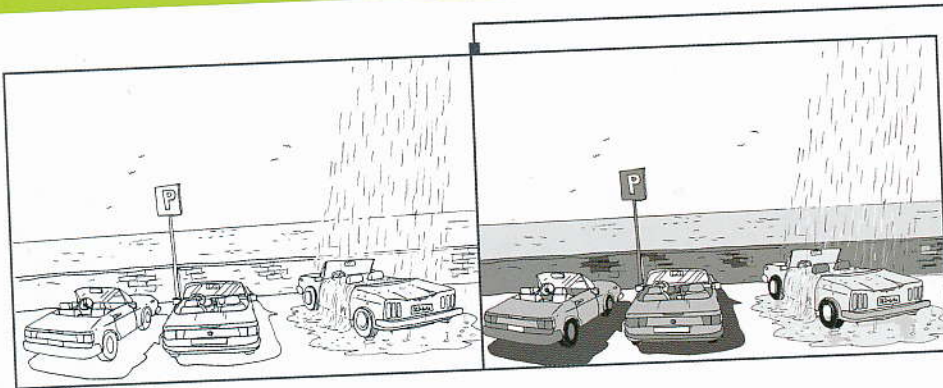
Rulers

Keep rulers handy. If they're stashed away in a drawer, you probably won't bother getting up to use them, and you'll end up with wobbly lines. Really small rulers that you can easily take with you or use when travelling are helpful.

TIP

Have extra markers, pens, printer ink and paper available, so that you don't suddenly run out of something in the middle of the night or on a weekend when you're working to a tight deadline.

UNIT 2 WHAT SKILLS DO I NEED?



□ **Grey markers**
Use a warm grey marker to add shadow and depth to black-and-white frames.



□ **Colour markers** □
Professional colour markers are easy to use and fast drying. Most brands offer sets that contain a good range of colours. Use a fine-pointed marker pen (0.3 or 0.5) and a wider (0.7 or 1.0) point for contours. To ink a large space in black, use a wider-tipped permanent marker pen.



□ **Refillable markers**
Markers are quite expensive, so buy a refillable variety and purchase extra refills of the colours that you use frequently.



TIP

To make corrections in a frame, instead of redrawing the whole thing, use a white pen or correction fluid, or even stick a white adhesive label over the top and draw on that.

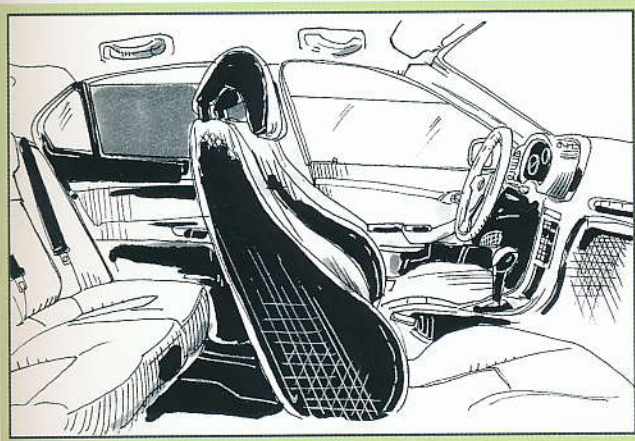


Light table or light box

A light box is useful for cleaning up sketches and for tracing photos – for instance, if you have to reproduce a particular vehicle or product. There are some good light boxes on the market that photographers use for viewing transparencies. The smaller sizes – roughly 21 x 30 cm (8 x 12 inches) or A4 size – are not very expensive. They don't get too hot if you leave them on for a long time, and they're reasonably thin (approx. 1 cm/½ inch), which makes them easy to use. Some light boxes can be quite bulky and cumbersome. In animation, it's common to work at a light table, although this can be awkward if you're not used to it.

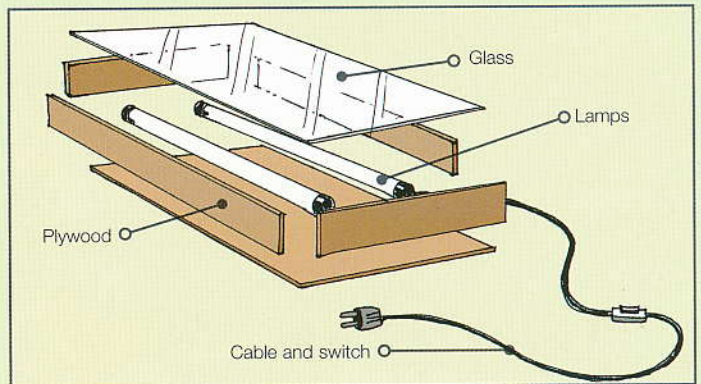
White pen

Use a white pen to quickly add highlights and details to a frame and enrich the image.



HOW TO MAKE YOUR OWN LIGHT BOX

Build a simple box out of plywood, as shown, to suit your particular requirements. For example, if you need to take it around with you, it needs to be just a little larger than an A4 sheet of paper. You can buy a sheet of glass for the top from glass suppliers or home improvement shops, or you can use Plexiglas or opaque white plastic. Add a couple of halogen lamps and a simple switch and there you have it!



LESSON 10 DIGITAL EQUIPMENT



films



TV



advertisements



games

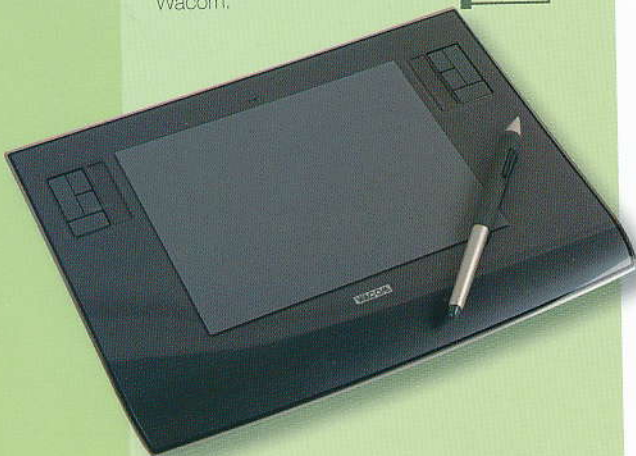


animation

In recent years, the computer has become increasingly important in the creative process of storyboarding. The kind of computer that you invest in depends on your budget and the type of work you intend to use it for.

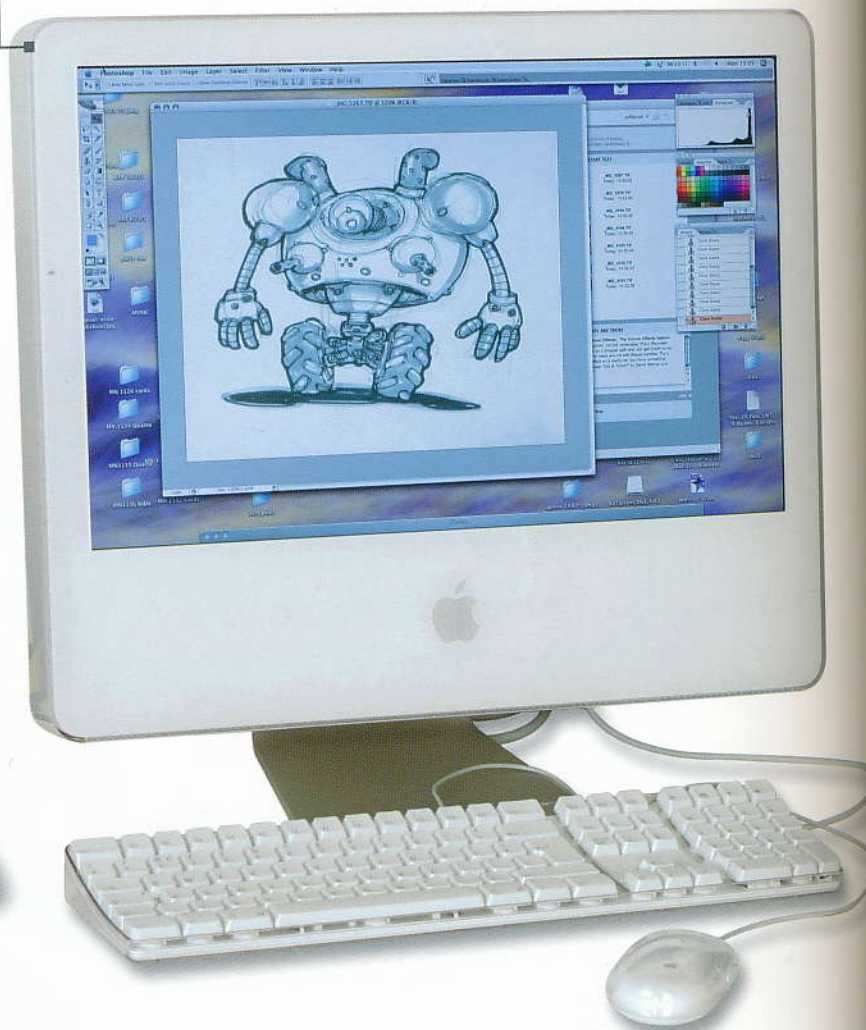
Drawing pad

If you're skilled on the computer, you might want to consider investing in a drawing pad such as Wacom.



Computer

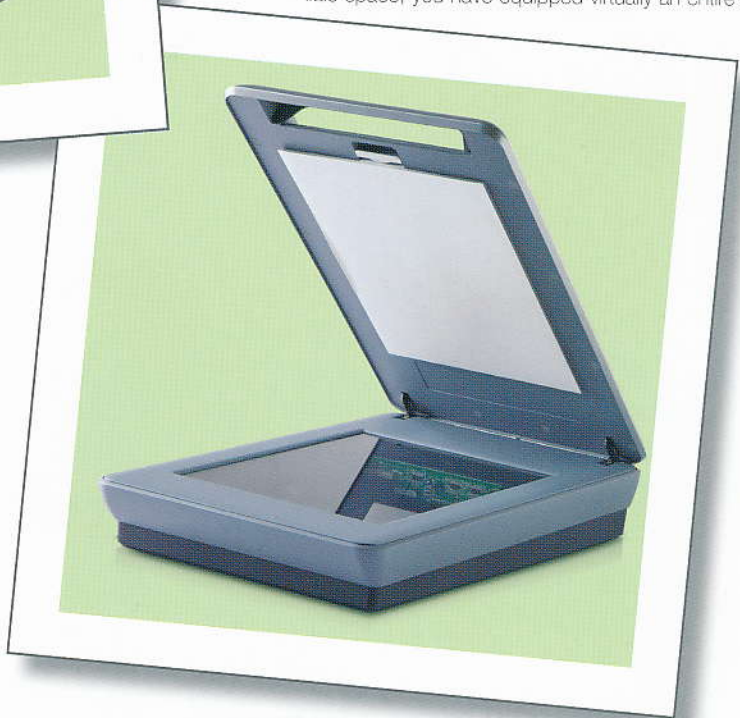
You don't necessarily need a computer to create your work, but you'll definitely need one to send and adjust scanned versions of your material to clients via email. The computer is also great for creating and printing out frame templates (see page 38). It really doesn't matter whether you use a Mac or a PC; it depends what you're comfortable with, because, for the most part, they support the same software. As for software, Adobe Photoshop is the program most commonly used.





□ **Printer and scanner**

You'll need both a printer and a scanner. There are some good all-in-one printers on the market today, which include a printer, scanner, copy machine, fax and smart card reader for downloading photos from digital cameras. They are a good solution: with just one USB cable and a little space, you have equipped virtually an entire office.



□ **USB key drive**

These portable external hard drives are about the size of a key and come in different capacities – 128MB, 256MB, and 512MB. They're great when you're travelling or have to go to a meeting and don't want to take a laptop computer. You can back up recent work on the key, and then plug it in and work on any computer.



□ **Digital camera**

The digital camera is another instrument that has become necessary to the storyboard artist. A huge number of models are on the market, and you can often find a bargain. Cameras with a large built-in display are the most useful, so you don't need a computer to go through your pictures. Clearly, the smaller the camera, the more practical it will be when you are drawing sketches on location.



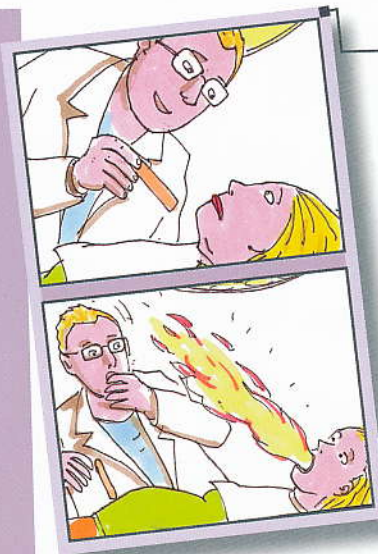
LESSON 11 DRAWING STYLES

-  films
-  TV
-  advertisements
-  games
-  animation

Nowadays, accessing storyboards created for big film productions is relatively simple: just look at the special features section in most DVDs. Be careful, though! You're looking at a feature film, and that type of job requires a different style than that used in advertising. However, this still gives you the chance to see the work of a substantial number of artists. Alternatively, make a note of the names of the artists listed in the film credits, and then look them up on the Internet. Most professionals have their own website, with examples of their most recent work.

The Internet is also the easiest way to find examples of advertising storyboards. It's really interesting to see the differences between boards created for feature films and boards created for ads. Researching artists in this way also means that you become aware of the styles that the different production houses prefer.

You can often find material lying around in the offices of advertising agencies, and their warehouses stock a number of old storyboards mounted on black card. This can all give you an idea of the type of work the agency is used to receiving from artists. Big agencies such as Saatchi & Saatchi, for example, nearly always prefer working with classic and traditional storyboards, the so-called "old school". This is because big companies have offices all over the world and very often collaborate with each other for international clients, so the style of the drawings needs to be acceptable to most cultures (see page 51).



Humorous style

A number of storyboard artists come from the world of comics, but advertising storyboards need to be as realistic as possible. Their purpose is to sell products and to convince a client to invest enormous sums of money in the production of an advertising spot, and so a humorous approach is generally not appropriate.

Different styles

As you can see, a frame can be created in a number of different ways.

Frame 1

This solution is too cartoonish and many agencies prefer not to adopt this style.



Frame 2

In this frame cross-hatching has been used ineffectively – there are too many lines which make the image look "dirty".



Frame 3

This frame offers quite a good solution. It is a little bit rough but it can be effective and it is the faster way to sketch if using a marker instead of a computer.



Frame 4

This image is the best choice – simple, clean and immediate to understand. The key is to always be "essential".



For animation, the question of an artist's individual style is not so relevant, as here you need to be able to reproduce the style of the show on which you are working. You need to be able to assimilate the creator's style and the design specific to the cartoon. This is not always easy, and it is mainly for this reason that animation studios have a system of selection tests, which can be quite hard to pass.

In the following examples, you can see how the approach varies depending on the purpose for which the storyboard is required. The difference in approach is due mainly to the time available for producing different types of board. For example, big advertising agencies usually allow more time to hand in a storyboard – unless there is a last-minute presentation to be done. In film production, you often have weeks to complete your work – but remember that the amount of work is huge compared to that required for advertising campaigns.

1 Black-and-white ink

Clean and simple black-and-white ink won't disappoint anyone. If unsure about the agency's preferences in storyboard styles this one could be your safest choice.

2 Coloured inks

For a client presentation a colour storyboard is the best choice. Unfortunately to achieve such a good-looking board you need to spend a lot of time on the colours. In the example the colours have been applied in Adobe Photoshop.

3 Grey tones

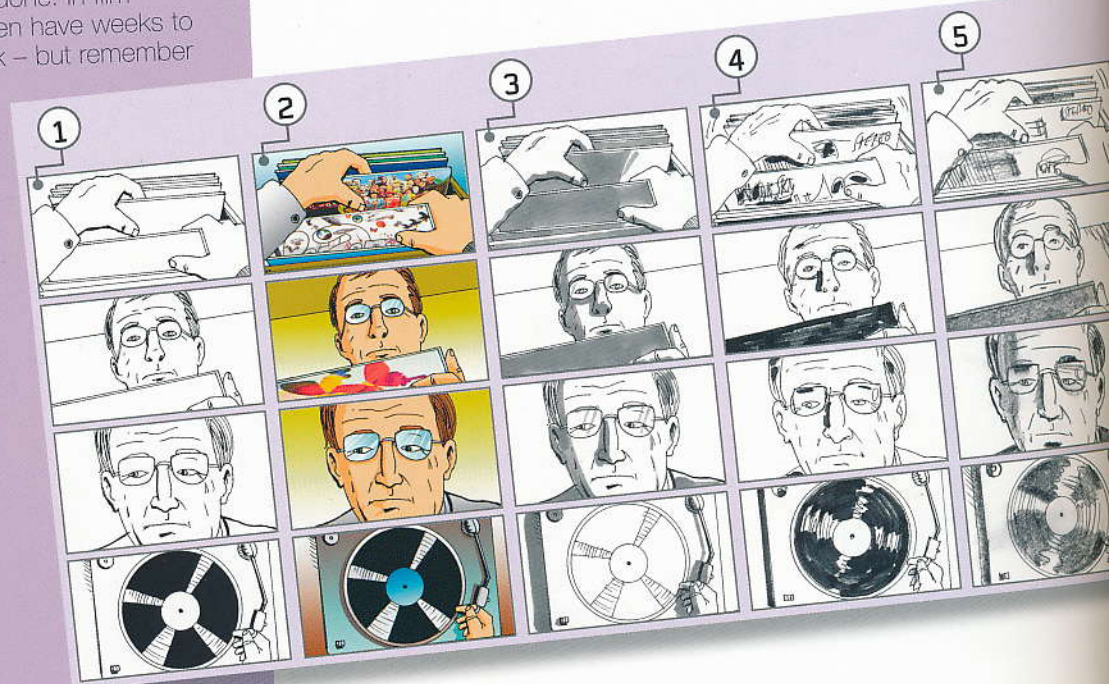
Grey tone falls between the previous two examples. It's good enough for most situations and can also be presented to a client. Sometimes it's preferable to show the client a board in grey scale to make them focus on the storyline rather than the details.

4 Different strokes

Another black-and-white inked example but this time using different thicknesses of pen. Compared to the first example this rendering is softer.

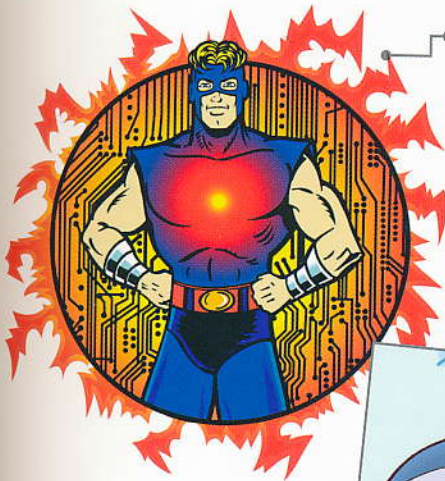
5 Mixed up

This is a mix of black-and-white ink and pencil. It is quick to execute and preferable when working on a film and producing over a thousand frames.



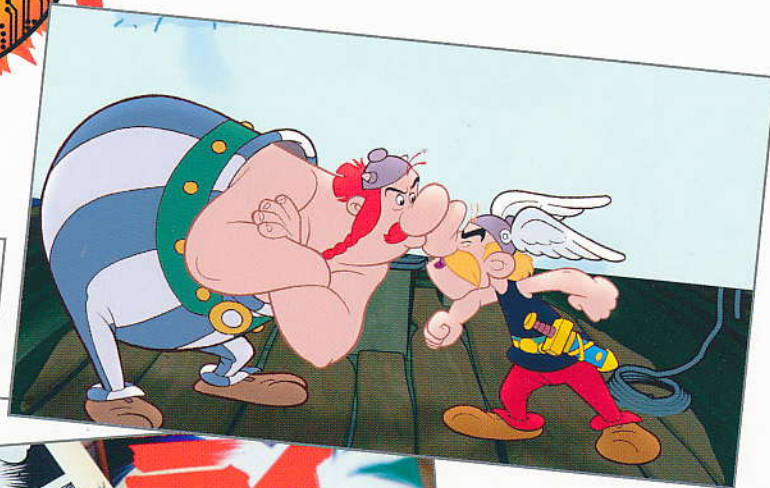
Different comic styles in different countries

The American market is dominated by the presence of superhero comics, which leads to a style that tends to exaggerate forms, muscles and action. In Europe, the predominant style has a more realistic element. There are also differences between the various European countries; Spain and France, for example, go for a more humorous approach. Italy has a number of publications in which the drawings are more realistic.



The stereotypical "muscle man" dominates the US comic market.

France is known for its use of humour in comic strips.



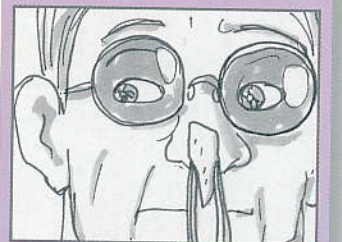
Comics produced in Asia – Japan, for example – have a different narrative tempo than Western comics. Japanese storyboards often have more frames and show an incredible attention to detail.

Simple black and white

Black-and-white ink is also one of the most practical styles as it can be faxed and photocopied easily.

Adding shades of grey

Adding shades of grey gives a more elegant style that allows you to give depth to the images.



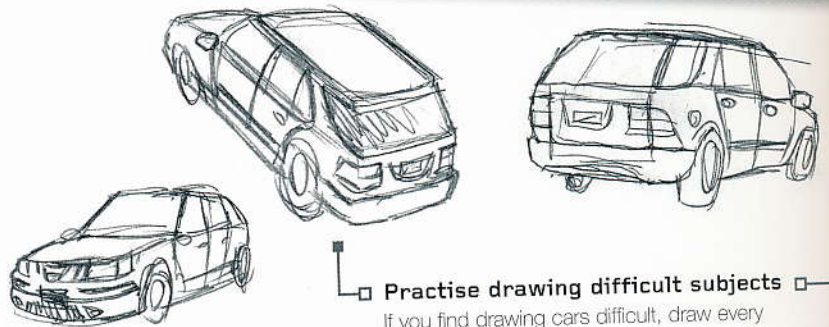
To develop your own skills and style, it's absolutely vital that you practise – and so you should get used to drawing even when you're not working. Have a sketch pad handy or a file into which you put all your work. If there is something you don't feel that you can achieve, then have the discipline to practise. For example, many artists find drawing cars quite difficult. Actually, drawing a car from memory is not that simple even if you see a particular model every day in the street. It's the details that escape you. These are all elements that generally appear in storyboards and so you need to be able to draw them.

Get into the habit of storing all those sketches and drawings that you do in your spare time. It can be really interesting to look back through your old sketches; you may find an illustration you never finished, or inspiration for some unrelated job.

Another suggestion is to gather reference material every time your hand goes to a magazine. You never know what will turn out to be useful in the future – for example, a photo of a beautiful galloping horse. Be honest – how easily could you draw one without reference material?

Comic shops

Comic shops have on their shelves a number of imports, or catalogues from which you can order the material you want. And you always have the Internet as a source for your research.



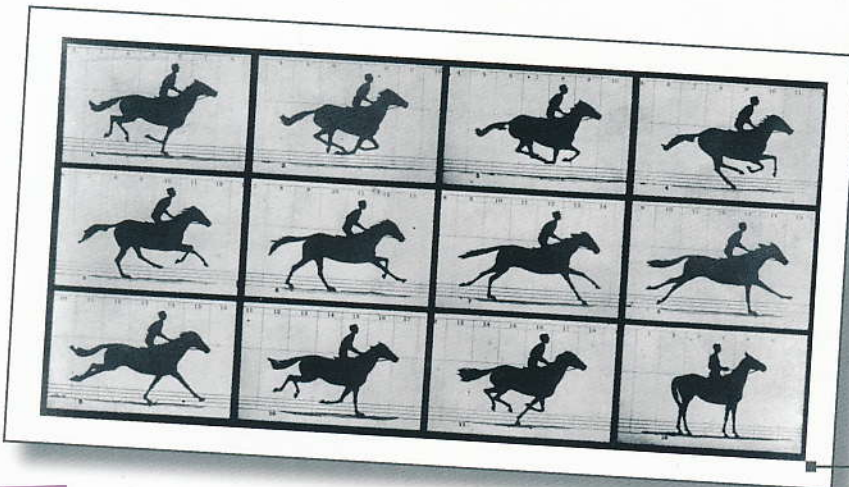
Practise drawing difficult subjects

If you find drawing cars difficult, draw every model that you can find, so you'll be able to recognize their basic shapes and details.



Collect reference material

Reference material showing movement or difficult poses is very helpful. Build up your own personal library of animals, people, vehicles, buildings – whatever might be useful.



Practise drawing from magazines □

To get used to drawing the human figure, copy images from magazines, drawing people in various positions and engaged in daily tasks. After a while, you will gain more confidence in your ability and develop your own style.



LESSON 12 SIMPLE FORMS

-  films
-  TV
-  advertisements
-  games
-  animation

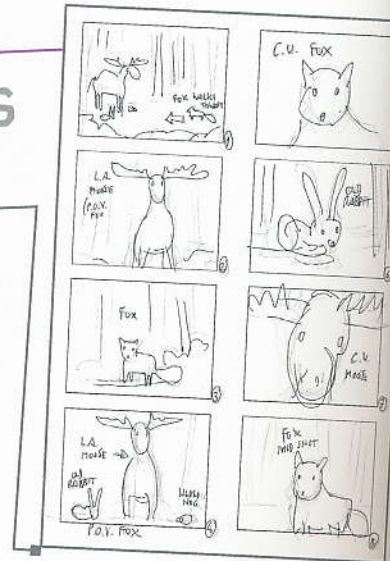
Learning to streamline drawings using simple shapes, as in the examples on these pages, is very useful when you are working with a director who is instructing you on the frames to produce. There's always very little time available and a lot of work to get through, so you need to reduce the time you spend in meetings to the minimum. Obviously, everyone has a different drawing style; the important thing is that your sketches will be clear to you once you get back to your studio. If necessary, write any important notes in the frames.

A lot of information in a storyboard remains vague in any case, even once you have finished the job. For example, it's possible that no specific location has been decided for a given scene; in this case, it's better to reduce all details to the bare minimum, as seen in the examples.

To get used to sketching with simplified shapes, use photographs (see page 57).

Annotate your rough sketches

Remember, directors are very busy people who can't be contacted easily, so it helps to add annotations with all the information you might need before you begin.



Simplified forms

In rough sketches the bodies of the characters can be suggested with circles for heads and a few lines for the bodies.



Filling in the details

Try working on the rough sketch on your way home from the initial meeting or if you have to wait for another meeting.





□ Rough sketch

The more you practise, the more secure your hand will feel. Your sketches will become clearer and closer to a finished board.

□ Order of frames

Very rough sketches can be made in any order and sequence, as long as you remember to annotate them with the correct numbering.



□ Finished storyboard sequence

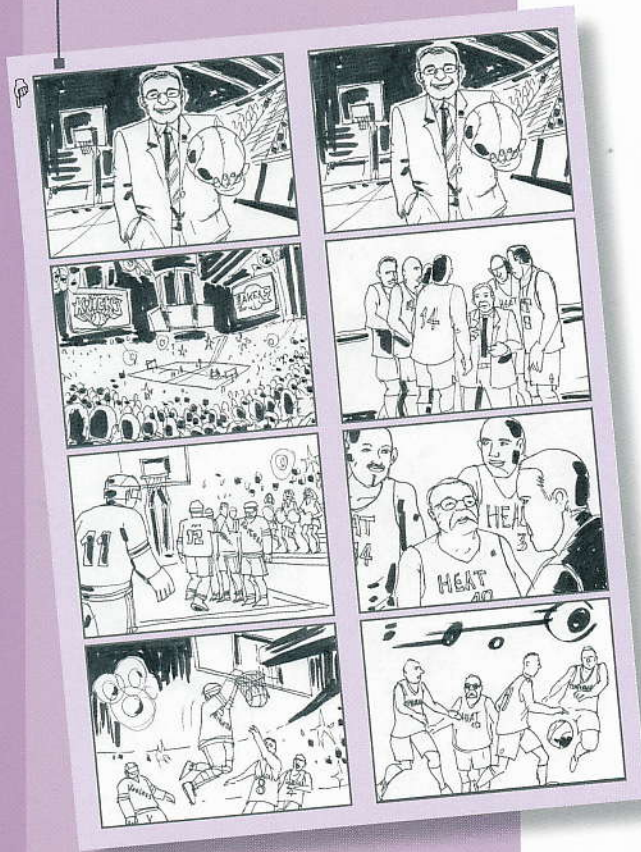
For the final storyboard, the order of frames needs to be correct as there will be no numbers.

□ Saving time

With clean sketches not much time is needed for clean-ups when you've finished and your output rate will become more effective.

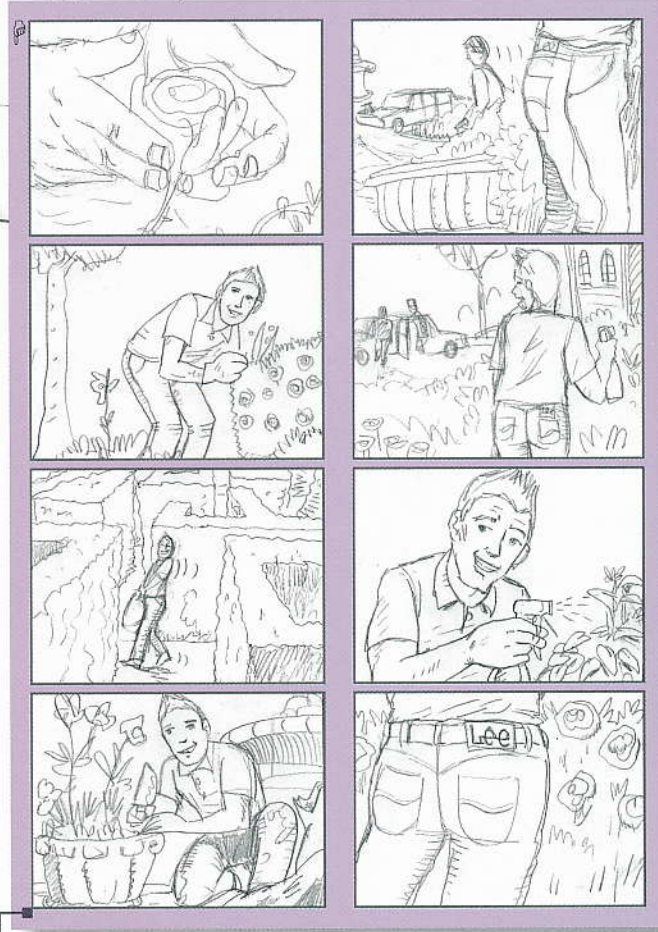
□ Doubling up

Don't be afraid to copy and paste frames on your board. It's common practice in advertising because storyboards for commercials often need to be delivered the next day.



□ First series of sketches

After the initial meeting the director, or another member of the creative team, might want to take photocopies of your sketches for reference. If this happens, wait for their comments before working on the clean-ups as you'll need to incorporate their comments.



□ Using pencil

After a briefing meeting you might have to draw cleaner sketches, perhaps more detailed than usual, in order for the director to discuss the film with the producers and take the production to the next stage. However, you won't be expected to make these sketches during the meeting. Work in pencil: it will be faster and easier to make adjustments and revisions.

OVER TO YOU

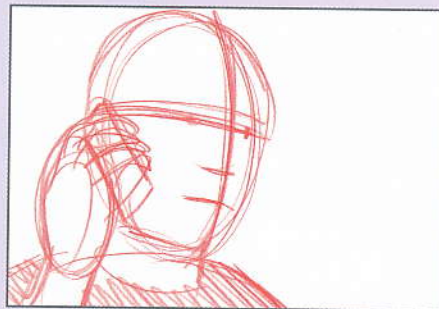
To get used to sketching with simplified shapes, use photographs. With the help of a friend, shoot your own photo sequence and then draw the photos as rough sketches, as quickly as you can. Then complete the drawings, using just the sketches, without looking at the photos. This will help you get used to simplifying your drawings and to using just a few lines to convey all the information you need.

1 Photo sequence

Plan a sequence as if you are shooting it for a film. Start with a mid shot and then move to a close-up, as shown in the example below.

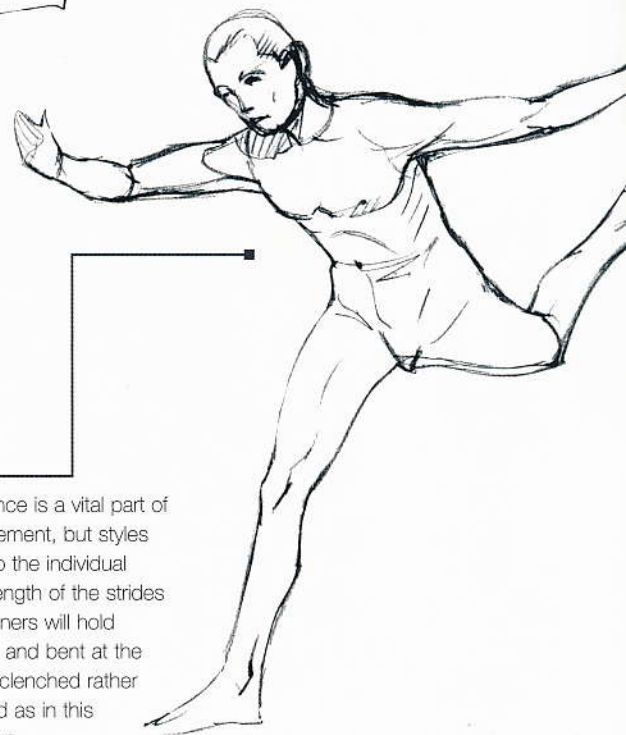
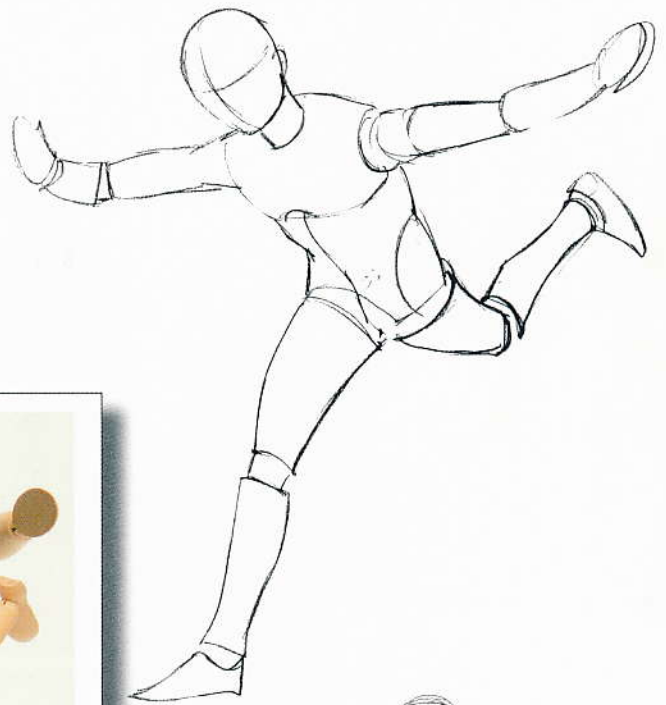
**2 Rough sketches from photos**

With the digital camera display in front of you (or a monitor if you can download the photos on a computer) execute quick sketches from the images you have taken.

**3 Finished drawings from sketches**

At this point, with the help of a light box, trace your sketches into stylized and simple drawings.





Running □

Maintaining balance is a vital part of the running movement, but styles vary according to the individual runner and the length of the strides taken. Some runners will hold their arms raised and bent at the elbow, with fists clenched rather than outstretched as in this dramatic depiction.

LESSON 15 PERSPECTIVE BASICS

-  films
-  TV
-  advertisements
-  games
-  animation

Perspective – the two-dimensional representation of three-dimensional objects, or creating the illusion of depth – is another important element that storyboard artists need to study. Here's a brief summary of what it all means.

If you draw two separate figures on a sheet of paper, it isn't obvious which one is closest – but if you superimpose them, then you create the illusion that one is closer than the other. If you want to give the illusion of depth using two figures that are the same shape and size, all you have to do is reduce the size of one of them, which has the effect of making it seem further away.

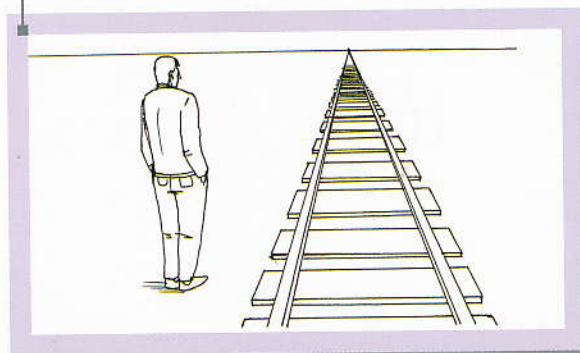
Another classic way of demonstrating perspective is to look down a set of railway tracks. In reality, the tracks are parallel to each other – but to create a sense of distance in a drawing, they need to converge at a point known as the "vanishing point". This is known as single-point perspective, because both tracks converge at the same point.

When you apply the same system to a more complex subject of which you can see two sides (the front and side walls of a house, for example), each side has a different vanishing point. This is known as two-point perspective.

One-point perspective

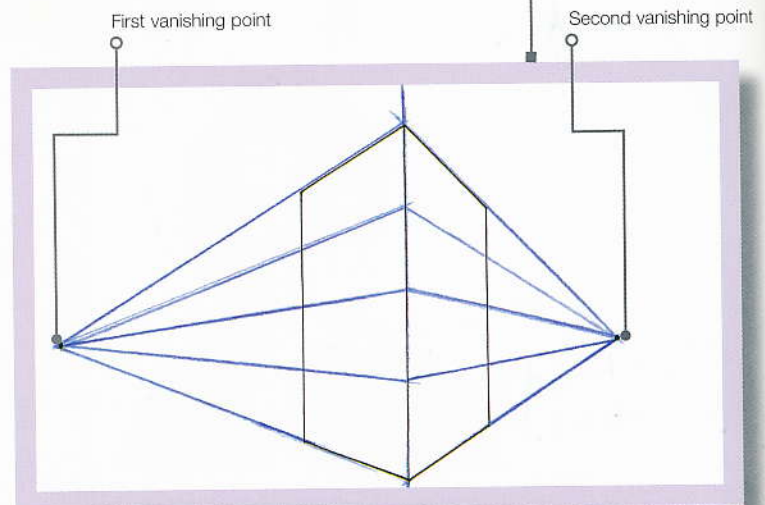
Here we can see the most obvious example of a one-point perspective: railway tracks receding into the distance and the imaginary vanishing point on the horizon.

The vanishing point



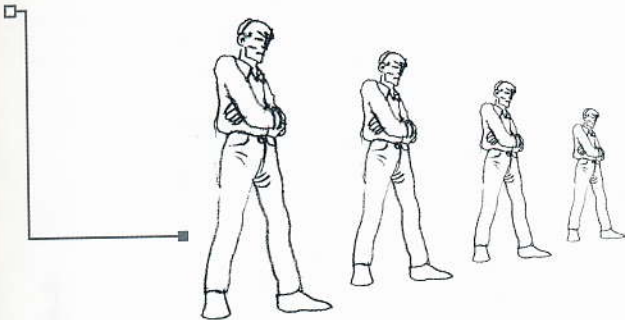
Two-point perspective

Two-point perspective exists because we live in a three-dimensional world. By constructing two vanishing points, each one appearing at a different point on the horizon, we can simulate the three-dimensional effect of objects in space on a two-dimensional, or flat surface.



ing distance through variations in size

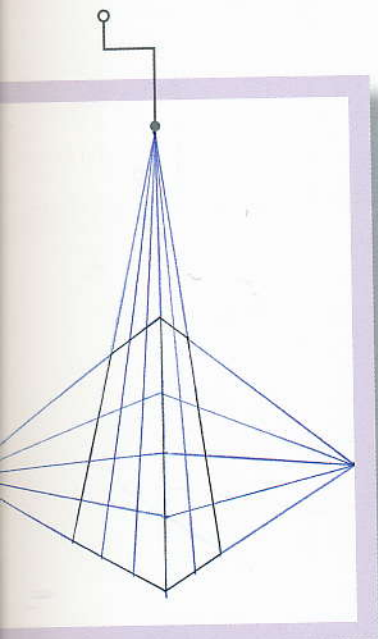
ing the size of the farthest figure on the right, the impression is given that he is the farthest away from the viewer.



Three-point perspective

Three-point perspective takes into account the concepts of height, width, and length. With three-point perspective you can create bird's eye (see page 102) or worm's eye views (see page 103). This is achieved by showing that, as well as receding off into the two-point distance, objects in space also recede to a third point either above or below, depending on where you are standing when you observe these objects.

Third vanishing point



OVER TO YOU

To understand how perspective works, look at things in a photo that have straight lines – roof lines or a pavement, for example – and try to detect their vanishing points, as shown in the pictures below.

By using a digital camera, you can also see how the perspective changes when you change the slant and angle of the image. Changing the angle of an image is a really useful exercise, because when you draw a storyboard you often need to exaggerate some shots to make them more obvious, even if this angle will not be so dramatic in reality. For example, if you exaggerate a low-angle shot in a storyboard, the production team will be aware of it, even if they then shoot it from a normal low angle.



LESSON 16 DEVELOPING YOUR OWN STYLE



films



TV



advertisements



games



animation

As a storyboard artist, your style needs to be clean and simple, so that your lines are clear and can be easily understood. A clean, simple style also enables you to work quickly, which is essential in a deadline-driven world, and will also leave you time to make any necessary corrections.

It's natural for your style to develop over the years, but there are also things that you can do to help yourself along the way. Clearly, the more you draw, the more confident you become and this gives you a nice fluid hand. You must keep practising. It's normal to have a "heavy" hand if you haven't picked up your pencil for a while, so don't worry if, for example, you get home from a holiday and find that you can't draw as fast as you used to. It happens to everyone, professionals included; the important thing is to carry a small sketch pad with you at all times to jot down anything that catches your eye, so that you don't get out of practice.

You also need to have some sort of idea of how other artists work, so that you remain aware of what styles are commercial. Generally, production houses do not like working with storyboard artists whose style is too elaborate and "arty". An underground style, which would be all the rage in the comics world, does not work in storyboards.

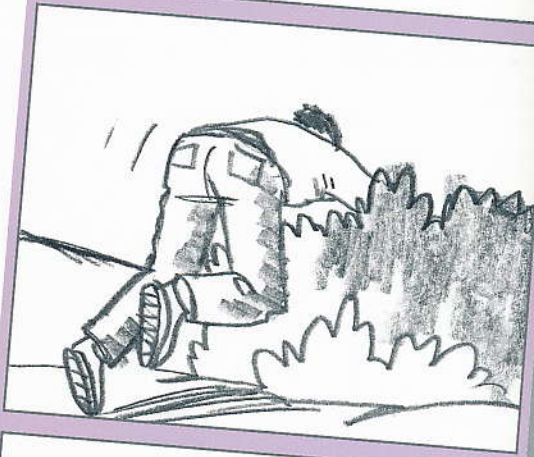
Same image, different materials

A good artist always has a wide range of drawing materials in his or her studio. Experiment with them by reproducing the same frame in different media in order to get to know the effects and results of each of them.

Using a simple thin black marker.



Using graphite pencils.



Mixing different thicknesses of black markers.





This rendering is too busy and appears overworked.

□ Same image, different techniques □

Even when using the same drawing material the rendering and the results can be quite different when changing techniques. In both these examples black markers have been used but there is variation in the inking techniques.



A simple rendering is the most effective.

TIP

If you go over the outline of your main subject with a large-tipped marker, it will stand out more from the scene. However, do not overdo your storyboards. Often it is better not to keep touching up the board because there is a risk that you'll add unnecessary and distracting details. Begin by evaluating how much time you have to produce your work and act accordingly.



One of the more effective exercises to develop your own style is to draw an illustration and then reproduce it as quickly as possible, as if you were drawing without really thinking about your subject. At a certain point you will notice how your hand moves naturally and how drawing has been simplified to its basic components.

Detail is important for an artist and so, when you are just starting out, you always have a tendency to add details and to embellish your work, going over the image countless times. This is fine if the image is going to be published as an illustration or work of art, but for storyboards it is unnecessary.

You need to be versatile and to be versed in a number of styles, because this will enable you to adapt to different assignments in different settings – vital for a professional freelance storyboard artist.



□ **Line techniques**

Using one pen allows the storyboard artist to be as fast as possible while remaining true to the brief. Hatching and cross-hatching are used to show form and the direction that light hits the face.

□ **Introducing colour**

This storyboard for a television commercial required a seventies feel. A black marker was used for the large black areas and the colours were added digitally afterward.



□ **Creating atmosphere**

This storyboard is an exercise in style and composition. A good way of developing your style is to copy stills from a well-known film in a sequence – this also helps with continuity practice. In this example only one pen was used and the techniques of hatching and cross-hatching created atmospheric shadows and patterns.

