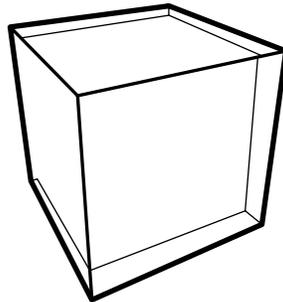


A  
N E W  
P E R S P E C T I V E

**SAMPLE CHAPTERS AND CHAPTER OUTLINE**

A New Understanding of Perspective for All Visual Art Forms Including:  
Drawing, Painting, Photography, Motion Picture and Video Game Design



© 2008 Steven Aguilera

This document may be reproduced freely so long as no part of it,  
nor its copyright information, are removed or tampered with in any way.

To learn more and to order this book, visit:

[www.PerspectiveBook.com](http://www.PerspectiveBook.com)

Updated: 6/6/09

# INTRODUCTION

---

Perspective has long been perhaps the most difficult subject in all of art. This should be no wonder, *since we have been operating with so much missing and false data behind how it truly functions.*

At best, what we had were techniques we memorized for drawing cubes and railroad tracks.

Building the entire subject up from scratch, *A New Perspective* contains new breakthroughs which totally redefine what perspective is and how it really works.

What's more, in this day and age, perspective is now used by many relatively new artistic professions which have few or no learning materials written for them. These include photography, motion picture (directing, camerawork, visual effects, set design, etc.), video game design, computer graphics (website design, software design, graphic design, etc.), animation, virtual reality<sup>1</sup> and many others. With a universal<sup>2</sup> understanding, perspective can be applied to any such activity.

*So unlike other perspective books, this new material is intended for all fields of visual art.*

Part of the problem is that perspective was originally developed primarily for drawing and painting, hundreds of years before anyone ever heard of something as routine today as a photograph. It should be no surprise, then, that no one had fully developed this firmly established subject to include the many art forms which have arisen over the past few decades alone.

But even if you are not an artist, the scientific advances contained here can still be used by anyone with an interest in imagery and form.

This book is also written with the safe assumption that the reader has had no previous experience with perspective. It is, however, geared for both beginners and advanced users in mind.

The experienced artist will notice that the majority of this book consists of completely new material that has never been available before and contains answers only hinted at over the centuries.

---

<sup>1</sup>**virtual** (created, simulated or carried on by a computer and not in actual form) **reality** – any computer-created environment which enables a person (who may wear special gloves and goggles, etc.) to enter and move around while interacting with objects as though inside of it.

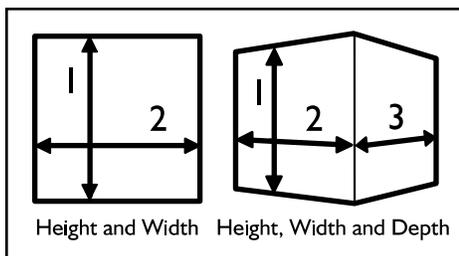
<sup>2</sup>**universal** – applicable or common to all purposes, conditions or situations.

## CHAPTER I WHAT PERSPECTIVE REALLY MEANS

According to one dictionary, *perspective* originally comes from the Latin words *per* meaning “through” and *specere* which means “to look.” These are combined to mean “to look through” or “to look at.”

However, the meaning of a word can change and usually even splits into several meanings over time. The “art definition” of perspective specifically describes creating the appearance of distance into our art.

This emphasis on distance stems from it being a difficult and impressive effect to achieve, especially upon paper that is completely flat. Here we are attempting to convey a sense of reality with space and depth on something which has none. As such, the most typical “art definition” of perspective has evolved into “the technique of representing a three-dimensional image on a two-dimensional surface.”



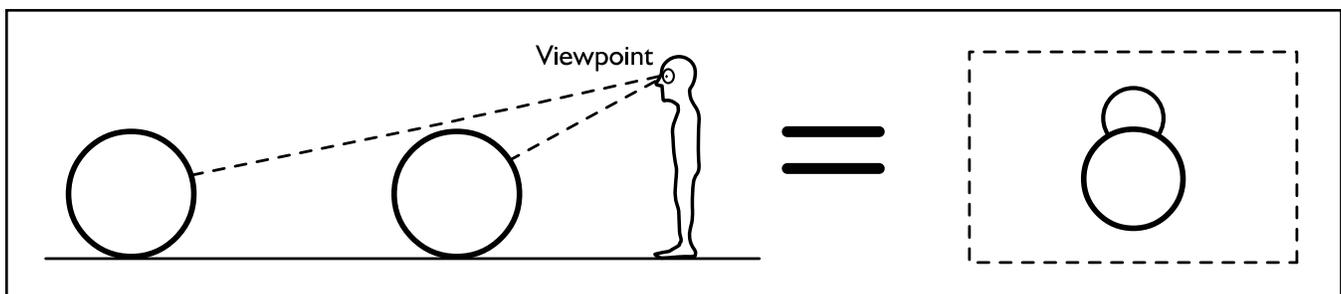
But being *three-dimensional* means that an object has height and width, not just depth alone. (left) Despite this, perspective became less about three-dimensional form than obsessing almost exclusively on that third dimension of depth. This is so much the case that it is commonly referred to as *depth perspective*.

Furthermore, perspective already exists while seeing in reality where no kind of flat surface is involved.

There are also art forms that make no use of flat surfaces in their final states such as interior design, landscape design, stage set design, sculpture, architecture or in any kind of display or exhibit.

So “the technique of representing a three-dimensional image on a two-dimensional surface” does not actually explain what perspective is at all, despite any true importance that depth may have.

First understand that our *viewpoint* is simply that position we are seeing things from. (below)



With that in mind, *perspective basically means the same as “viewpoint” and “position.”* For example, “It looks good from my *viewpoint*,” “It looks good from my *position*” and “It looks good from my *perspective*.”

Oddly, this meaning of perspective is primarily used outside of art.

So the most general definition of perspective is “*a position in relation to different positions.*” (above) This example shows the position of our eye in relation to the positions of objects.

Applying this to art, we do not necessarily mean the viewpoint of the *artist* in relation to the subject<sup>1</sup>. More specific, what matters is the best perspective for the *audience*. A more universal “art definition” of perspective, then, is “*creating viewpoints that best communicate a subject to an audience.*”

Perspective is about establishing “an eye” in your art through which your audience sees. So although it has been considered the most difficult subject in all of art, its concept is quite simple.

For instance, something commonly seen in bad movies and TV shows are scenes where the camera is just stuck way on one side of the room, with all the actors on the other, and that’s about it. But does it really have to cost any more time or money to put the camera over *there* instead of *here* to gain a more interesting perspective? Something that looks good can look bad from a poor perspective and something bad can look better from an improved perspective.

<sup>1</sup>**subject** – the main topic in a work of art, like a person, object or scene.

Thus, the audience's placement is as significant to the artwork as the placement of the subject.

Art is also more effective when an audience feels like participants in it, rather than just spectators of it. *Perspective invites the participation of your audience by establishing their viewpoint within your art.* Otherwise, the effect is to detach your audience on some level.

But what did "the technique of representing a three-dimensional image on a two-dimensional surface" have to do with anything? By introducing a sense of depth we create space and an extension of reality into your art, enhancing your audience's participation with it. When things appear more real, they become real to their senses to some degree, even if below their conscious awareness. This pulls the audience in, letting them experience what may have only previously existed in your imagination.

So regardless of your art form, if understanding how your audience sees it and participates in it is important to you, it is necessary that you understand how perspective works. This is really something that nearly all professionals in the visual arts must deal with, ranging from film directors to bridge builders, or anyone else that presents imagery to audiences, customers or clients.

Although there is no reason we cannot also have a subject called "perspective" about making a two-dimensional surface appear three-dimensional, this is still a somewhat limited and arbitrary<sup>2</sup> thing to do.

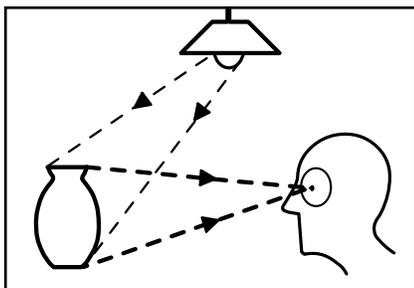
In the end, the real goal of perspective is that of creating a viewpoint for your audience that will best communicate your subject and serve its particular message. The methods for making an image look three-dimensional while on a two-dimensional surface only exist to further that goal. That things look totally realistic is not always our priority either. Yet, perspective contributes to all of these things, giving it a far more complete and important role than it had ever been given before.

---

<sup>2</sup>**arbitrary** – based on preference, prejudice or convenience rather than reason, fact or genuine rule.

## CHAPTER 2

## LIGHT AND THE EYE

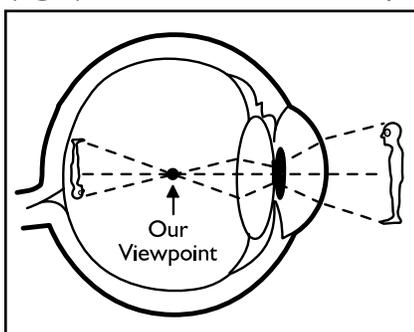


Light bounces off of objects just like a ball bounces off the ground, except those countless rays bounce in countless directions from there.

The only reason we can see anything at all is because some of those rays bounce their way into that 1/2 inch at the front of our eyes. (left)

This light is then projected onto the inside back wall of the eyeball, which is called the *retina*, as if it were a curved movie screen. (below) It contains cells called *rods*<sup>1</sup> and *cones*<sup>2</sup> which read this light similar to how film does in a camera.

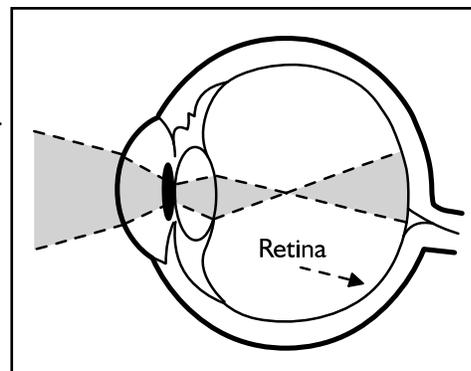
But first, rays converge<sup>3</sup> at a point before they hit the retina. (right) This is called the *focal*<sup>4</sup> point since all rays are focused there.



Here is the most precise location of our viewpoint. (left)

As light continues on its way to the retina from there, notice the image is now reversed. (left)

I once read an art instruction book describing a psychological<sup>5</sup> theory<sup>6</sup> which stated that because an image is projected onto the retina upside-down, everything that we see—right now—is also upside-down.



Since the 1800s, psychological testing on this has been conducted using special glasses that reverse vision. It has been concluded that we just do not know the image is upside-down because it has always been upside-down. But if that were true, the direction of my eyes would not correspond to the direction of my finger as I point it around. The fact that they always match is the only test I need.

<sup>1</sup>**rods** – rod-shaped cells in the retina that are sensitive to dim light.

<sup>2</sup>**cones** – cone-shaped cells in the retina that are sensitive to bright light and color.

<sup>3</sup>**converge** – to move or direct toward each other.

<sup>4</sup>**focal** – relating to a focus (a point at which rays of light converge or from which they then diverge).

<sup>5</sup>**psychological** – of psychology (the scientific study of the mind, its mental states and processes).

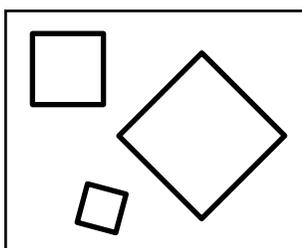
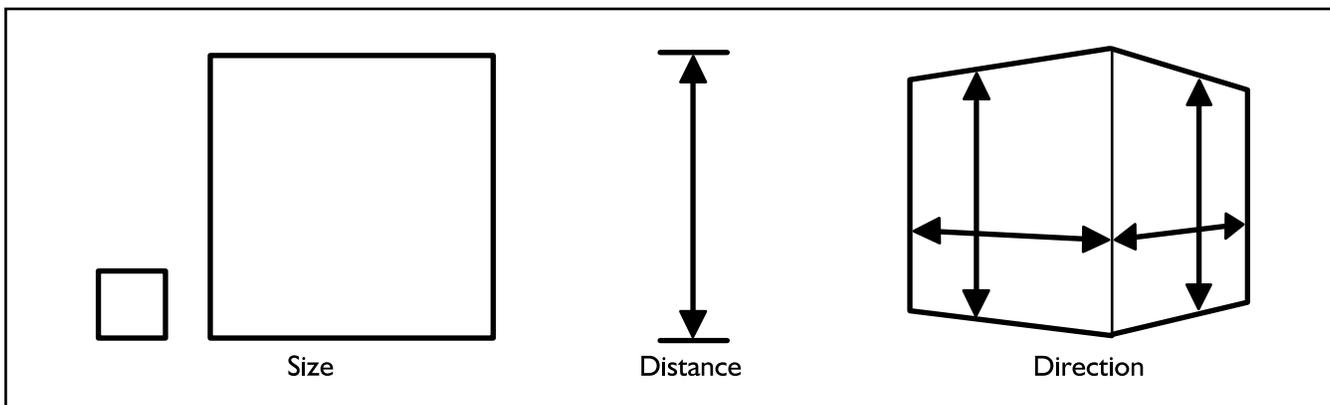
<sup>6</sup>**theory** – a proposed explanation or assumption, but which is still based on limited information or knowledge.

## CHAPTER 3

## PERSPECTIVE BASICS

Form is defined as “the shape of something, regardless of what material it is made of.” Especially in art, a form can refer to an object, a person’s body or the appearance of these. Any form consists of only three basic things:

1. it has *size* or *amount*
2. it covers *distance*
3. it extends in different *directions* (below)



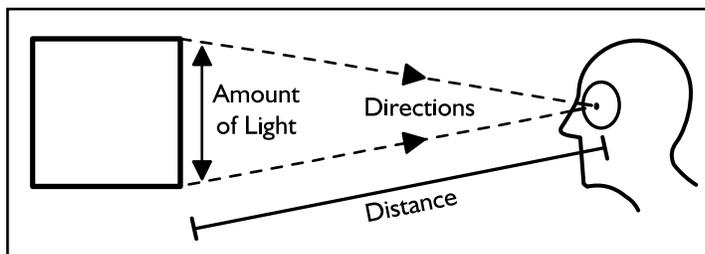
So the *amounts* of *distance* and *direction* between the parts of a single form create its particular shape. (above right) Observe this in a few forms around you.

Next, we also have different overall forms. (left) Each can have its own size, are separated by a certain *distance*, and have *direction* in relation to other forms. This direction includes how each is turned, along with where they are located around each other. Observe this between a few forms in your vicinity as well.

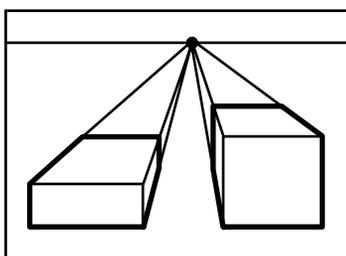
Actually, everything has form whether matter<sup>1</sup>, energy or space.

For example, the energy of light has a form consisting of an overall *amount* which is traveling across *distance* in specific *directions*. (right)

A single ray, however, is only one-directional. Combining many allows for *multidirectional* light. We will refer to this amount of light arriving at us from an object as its *angle of light*. (right)



This angle of light contains an “amount of direction,” which is the most basic definition of an *angle*. Really, the only purpose of an angle is to establish or measure an amount of direction.



Drawing three-dimensional form has been dealt with in a method called *linear<sup>2</sup> perspective*, which has been defined as “a means of producing a three-dimensional image on a two-dimensional surface by the use of lines.” (left) Here, depth is primarily achieved through the use of converging lines which seem to extend out to the distance. This has limited application since it deals mainly with drawing with lines on flat surfaces, excluding it from any art form like stage, window display or designing amusement park attractions.

So here, again, we need to employ an understanding of perspective that is more universal.

<sup>1</sup>**matter** – something that occupies space and has an actual body or substance.

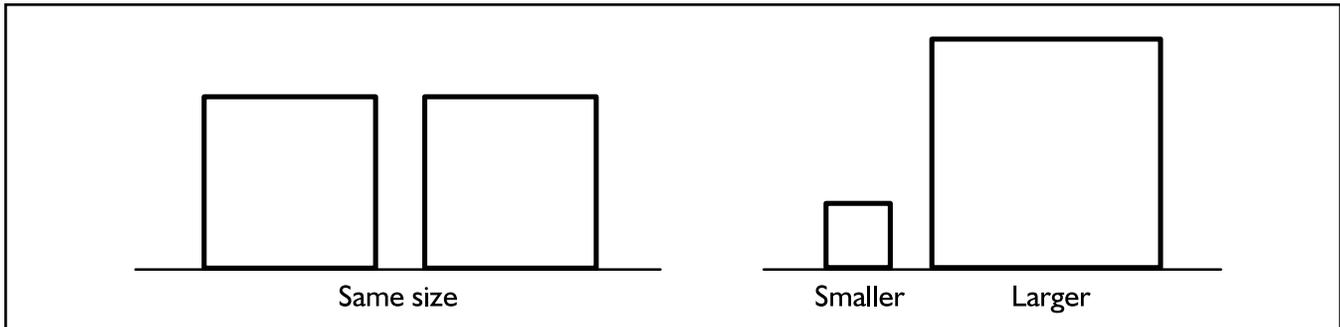
<sup>2</sup>**linear** – characterized by an emphasis on line.

Recall that our most basic definition of perspective is “a position in relation to different positions.” With this, we can even offer our perspective on a problem according to our position on that issue.

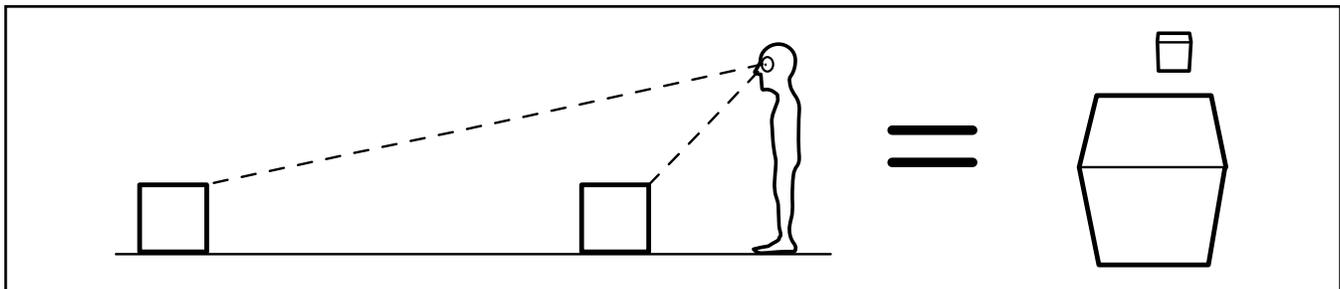
But that may not be specific enough for our needs here. We will then introduce a new subject called *form perspective*. This is about “*our position in relation to forms*” or “*forms from our perspective.*”

This subject follows laws which are more complete than just observing converging lines that suggest a feeling of depth on a flat surface. It is a basic law of form perspective that *size, distance and direction are the only three things that can affect how large or small a form appears.*

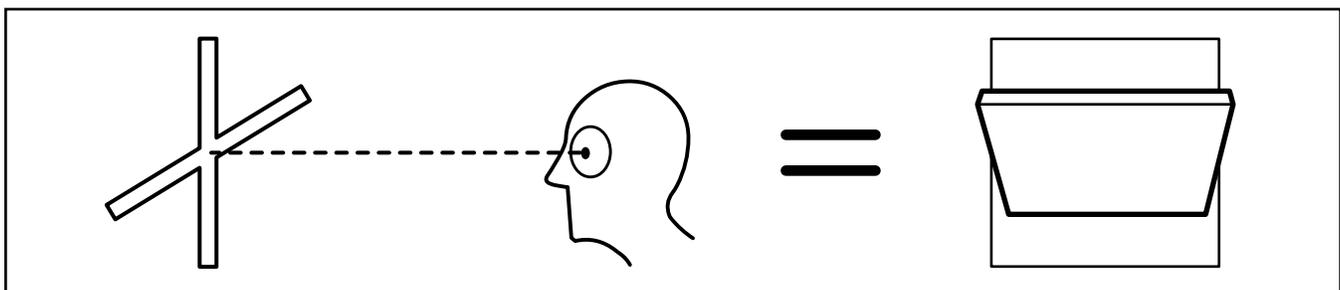
First, the actual size or amount of a form will affect how large or small it looks. (below)



Next, its amount of distance from us also determines how large or small it appears. (below)



And finally, the amount of direction (the angle) it faces us affects its apparent size as well. (below)



*This combination of size, distance and direction determines the appearance of every form around us.*

Therefore, with all of that in mind, a more expanded definition of form perspective can be stated as “*the size, distance and direction of forms from our position.*” That translates into “how large forms are to us,” “how far forms are to us” and “what angle forms are to us.” This may or may not be applied to art.

That definition demonstrates how limited the subject of depth perspective really is since the size and direction of a form are just as important as its distance to us.

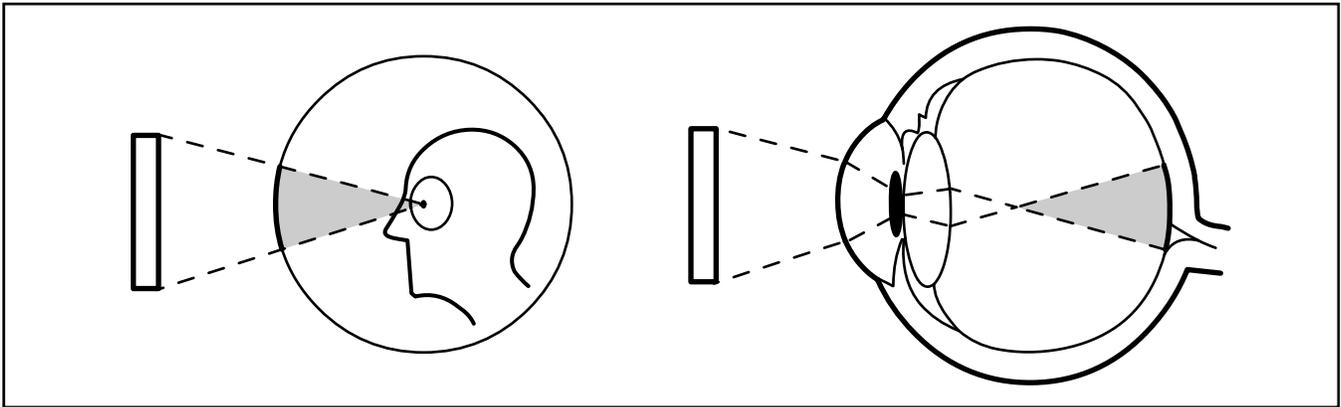
Also notice that “three-dimensional” is not a part of form perspective’s meaning because any form, even if more two-dimensional, still represents a form we are looking at.

Yet, vision is not mentioned either, since with our eyes closed we do relate<sup>3</sup> to forms in some way. Still, form perspective can also be stated as “the size, distance and direction of forms from our *viewpoint.*”

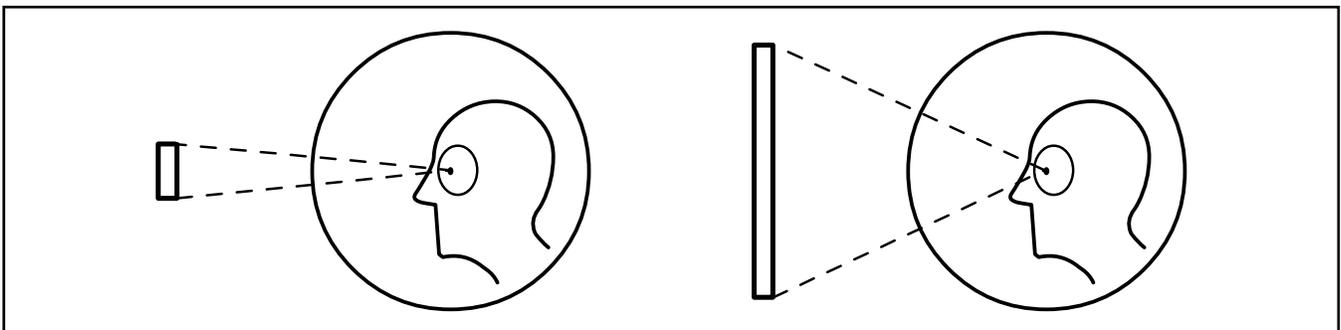
With the appearance of forms as our primary purpose here, let us focus now on *apparent form.*

<sup>3</sup>relate – establish or demonstrate a connection.

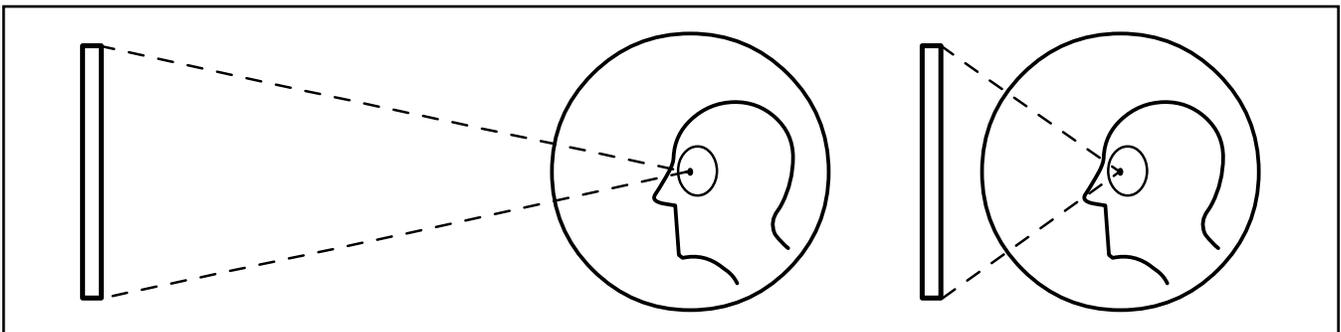
We start by placing a circle or sphere around our viewpoint. (below left) Note that the angle of light projecting through this *measuring sphere* is the same angle projecting onto the retina. (below right)



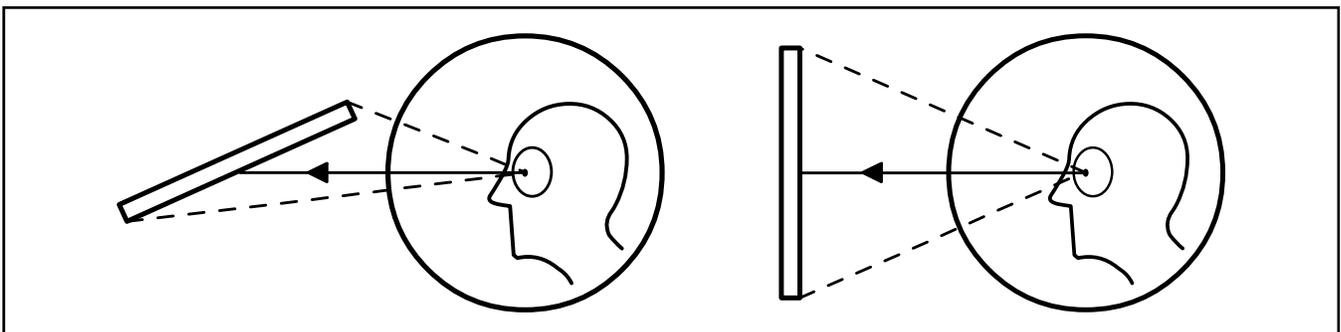
This amount of direction projecting onto the retina determines how large or small a form appears. So regarding size, a smaller form has a smaller angle of light compared to a larger form. (below)



Next, the more distant of these two forms has a smaller angle of light, even though the forms are exactly the same size. (below)



And finally, the more perpendicular<sup>4</sup> in direction a form is to us, the larger it will appear. (below)

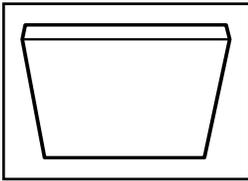


It can be seen here that the angle of the form itself will affect its angle of light.

<sup>4</sup>perpendicular – a line positioned 90 degrees to another line.

Also note that the part of a form that is perpendicular to us in direction is also the closest in distance and so will appear largest in size. (right)

Seeing forms from an angle is called *foreshortening*. We define this as “the compressed appearance of something not perpendicular to us.” (left)



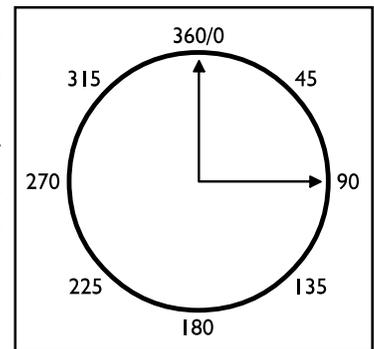
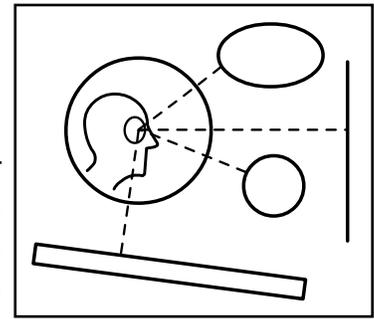
*Fore* means “the front part,” indicating that part of the form closest to us. With that in mind, according to conventional<sup>5</sup> perspective, this compressed appearance is achieved by “shortening” those lines going from this front part into the distance.

Angles are measured in *degrees*. To demonstrate, we can use a circle like a clock. Rather than 60 spaces for minutes, we have 360 spaces for degrees while the two “clock hands” create a particular angle. (right)

This example shows an angle of 90 degrees—also called perpendicular or a *right angle*. This does not mean “pointing right.” The dictionary defines *right* here as “erect from a base, not slanting or sloping,” which is the angle a form makes to the ground when standing straight up, as in *upright*.

There is no natural basis for using 360 degrees to measure direction. The benefit is that 360 divides in many convenient ways in making angles.

However, that entire 360 degrees is mostly useful for specifying a particular direction rather than constructing angles. The widest angle is really a flat 180 degree line.



## THE FORM FORMULA<sup>6</sup>

Size, distance and direction make up what I call the *form formula*.

*None of these three can exist without the other two.* First, without distance, we could not have a size for something. Second, no distance could exist without an amount for it. And finally, the existence of two- or three-dimensional form could only come from having two or three basic directions to work with.

Also, *affecting one, affects the other two in some way.* Changing a form’s direction to us also changes its distance to us (one end is now closer and the other farther), along with its apparent size. (above left)

And since these ingredients are connected in a specific relationship within a form, should we draw something with one of these three incorrectly applied, we would disrupt its particular balance and distort its appearance, making it “out of proportion.” For example, too much distance can make a person’s head look too wide. The wrong direction can make their nose stick out too much.

The correction of such errors means figuring out which part or parts of the form formula are upset within your subject and fixing that, restoring it to proper proportions.

This can involve the size, distance and direction:

1. within an individual form
2. between different forms
3. of any forms in relation to us

<sup>5</sup>**conventional** – based on tradition, whether religious, historical or of artistic rules.

<sup>6</sup>**formula** – a list of ingredients for making something.

# CHAPTER OUTLINE

---

These are the contents of *A New Perspective* (the average chapter is only two to three pages long).  
*Photography & Filmmaking Edition* – Soft cover, 3 parts, 31 chapters, 120 pages, 180 illustrations.  
*Universal Edition* – Soft cover, 5 parts, 49 chapters, 188 pages, 350 illustrations.

---

A separate bonus chapter on **Color and Color Depth** is also offered.

Numerous widespread falsities about color, including color mixing and color harmony, taught to all of us since our earliest schooling, are exposed. Very few artists are aware of these facts, contributing to color being such a difficult and confusing subject for many.

Materials correctly describing the role that color plays on depth have been very scarce. A collection of methods for enhancing depth through color has also been researched and assembled here.

---

## i. Introduction

## ii. How to Read This Book

### **PART ONE: BASIC THEORY**

---

Very little of the information in this part is covered in other perspective books. Yet, these are some of the most important basics upon which all of perspective is based.

**1. What Perspective Really Means** – Perspective traditionally means “the technique of representing a three-dimensional image on a two-dimensional surface.” A much more complete understanding of perspective is given here, applicable to artists in any field – whether a flat surface is involved or not.

**2. Light and The Eye** – Briefly describes the nature of light and how the eye uses it to see.

**3. Perspective Basics** – Reveals the three main ingredients that make up any form. These are also the only three things that can affect how large or small something looks. Their relationship is responsible for the appearance of every object that we see and explains ways an image becomes “out of proportion.”

**4. Angle of View** – Defines how our angle of view (how wide of an overall area we are able to see of the scene) affects our perspective of a subject.

Explained too, is the true cause of a distortion which occurs on a flat surface and how to regulate this.

**5. Depth vs. Flatness** – Reveals new observations behind how the three-dimensional appearance of an object is affected by how close or far it is from us. Its effects on our depth perception are also explored. Includes a simple method for adjusting the three-dimensional appearance of any subject at will.

**6. Overlapping** – The benefits of overlapping as a powerful perspective technique are discussed, along with a certain relationship between overlapping and the flatness of a scene.

**7. Thinking In Three Dimensions** – Offers basic rules to consider while attempting to visualize a scene in perspective. Consists of several simple questions that even many professionals fail to consider when trying to set up the best shot in relation to their subject.

The validity of the influential “left-right brain theory” and three-dimensional thinking is examined as well.

### **PART TWO: ADVANCED THEORY**

---

This part contains a great many new discoveries spanning from the causes and behaviors of everything from three-dimensional form to specific distortion characteristics.

**8. Understanding Form** – Here contains the first explanation behind the true behavior of physical form. Includes a further detailed breakdown of the three ingredients of form.

**9. Form Perspective** – (forms from our perspective) Cuts to the basics of perspective and specifically describes what allows the appearance of any object to exist. An important advance in art and science.

**10. Apparent Distance** – Reveals what causes any appearance of depth, along with its importance to the artist. The actual basis of depth perception is also put forth.

**11. Apparent Size** – The effects of objects looking smaller with distance are examined.

**12. Apparent Direction** – We learn how “viewing angles” affect how three-dimensional an object looks. The basis of depth vs. flatness is described in great detail as well.

An old perspective premise is also totally redefined here and altered forever based on new discoveries. No artist who has studied perspective before will approach drawing in the same way after reading this.

**13. Motion** – A subject not covered in perspective books before, this chapter will be particularly useful to those who deal with art forms such as motion picture, animation and computer graphics. Uniquely defines what motion actually is and its relationship with time. Demonstrates how the effects of movement create depth, along with simple guidelines that regulate how fast or slow one can make anything appear. With this, an artist can move beyond a three-dimensional form and into a “four-dimensional form.”

**14. Focus** – A topic not often described in perspective, its effects on depth are clearly outlined.

**15. Aerial Perspective** – *Aerial* means “pertaining to the air.” Particles within the air like dust or smoke between us and those things we see create heightened depth. Several myths about this are laid to rest.

**16. Light and Dark** – Covers how levels of light and dark affect depth. Includes contrast and shadow.

**17. Artistic Depth Cues** – A *depth cue* is “a suggestion of actual depth,” such as seeing objects getting smaller as they get farther. “Artistic depth cue” is a new term to perspective, having the aim of creating depth in more interesting, creative and unlimited ways than those offered in perspective books or nature.

**18. Amplifying Depth** – This chapter deals with how to increase the existing depth of any scene.

**19. Depth Perspective vs. Form Perspective** – In short, a rough categorization of depth cues and how they can be mixed to maximal effect.

**20. Past Experience** – Understand the influence of your audience’s past experience with a particular subject and its effects on how your perspective scene may be perceived.

**21. Size Cues** – Lists ten ways to suggest a subject's actual size. This is basically about “size perception.” For example, filmmakers cannot just assume that their audience will understand that their spaceship is supposed to be enormous. They have to demonstrate this to them through size cues.

**22. Distinguishing Size and Distance** – Our inability to distinguish an object’s size and distance allows us to use miniatures in film. Still, there are several means by which we can distinguish size and distance, thus enhancing our depth perception. This includes the benefits of working with one eye versus two.

**23. Audio Perspective** – A new subject to perspective books, *audio perspective* can greatly enhance the participation of your audience. Adding a three-dimensional sound to a two-dimensional picture lends a greater three-dimensionality to the overall experience. The simple, basic factors regulating this are given.

**24. Distortion** – An advanced look into exactly what distortion is and why it can occur in a drawing or photograph. This is especially applicable to any artist whose work is displayed on a flat surface.

Covers the characteristic appearance of distortion itself, including a comparison between the two main distortion types. Simple, detailed diagrams of these are also provided.

## ***PART THREE: TECHNICAL THEORY***

---

Here we learn basic theory as it relates to the application of perspective in a variety of different art forms. But regardless of your particular field, each chapter should contain something you can apply.

**25. Distortion vs. Accuracy** – Discusses how attainable and desirable accuracy is over distortion.

How distortion can be used to the benefit of your art is also explored.

**26. The Audience** – How our subject is presented to an audience is of critical importance to the artist. This includes how the subject is shown in a scene and how the picture itself is placed in front of them.

Misconceptions surrounding the relationship of the audience's viewpoint to a scene are sorted out.

Provides too, a solid reference as to how far we really need to go to create any artistic world.

**27. Size vs. Distance** – The sizes and distances of objects in a photo or film can be manipulated so the audience sees these differently from how they actually are. An example is the use of miniatures in film.

Basic laws governing such practices are summarized here.

**28. Photography** – Similar to perspective, the subject of photography also contains its own complexities. The simplification of the use of lenses is proposed. Also learn the true effects lenses have on perspective.

And finally, understand what lens distortion is really about.

**29. Motion Picture** – The effects of perspective on motion picture, virtual reality and video gaming are covered. These include turning the camera and zooming compared to actual motion across distance.

**30. Understanding Basic Shots** – Basic shots like close-ups, wide (angle) shots and long (distant) shots carry either incomplete or confused meanings. Precise understanding of these will reduce chances of miscommunication, confusion or other problems in getting exactly the type of shot you want.

**31. Perspectives of People** – Properly positioning our viewpoint to a person being illustrated is outlined.

Includes a discussion on effectively shooting comedy and those reasons this is commonly misunderstood and misapplied, causing the exact opposite, more boring effect instead.

Learn why it is commonly perceived that “the camera adds ten pounds” to a person's weight.

**NOTE: Parts four and five are included only in the *Universal Edition of A New Perspective*.**

## **PART FOUR: CONVENTIONAL THEORY**

---

For those of you who studied perspective drawing before and found it hard, here you will find out why. This takes a frank and honest look at the subject, correcting and updating many dozens of its most basic flaws, glaring omissions and misconceptions perpetuated for centuries.

**32. The Picture Plane** – Considered “the foundation of perspective,” the picture plane only describes the flat surface we work on. Picture plane theory has mostly just been an interesting exercise in the past used to fill in the void of genuine understanding for how perspective really worked. As it turns out, it is not actually one thing but has three separate meanings instead. Complicated notions about its relation to the scene we are depicting are finally made clear, while its true, unsuspected effect is brought into view.

**33. The Vanishing Point** – (“that point at which parallel lines appear to converge into the distance.”)

Learn how every definition of vanishing point ever stated is wrong.

Once correctly understood, simple, never-before uses for it are brought into light.

**34. The Horizon Line** – The *horizon line* is that place where the earth and sky appear to meet.

There is an old familiar perspective rule that “the horizon line is always at eye level.” The exact reason for this behavior has finally been discovered and is spelled out here for the first time in art.

Arbitrary rules surrounding the horizon line, perpetuated in most perspective studies, are also dispelled regarding its “proper” placement in a picture.

Also explains any effects that the curvature of the earth plays on the horizon line's true appearance.

**35. The Cone of Vision** – This topic basically involves the overall area we are able to see in a picture. Several other concepts have become entangled with this, making something more confusing than need be.

**36. The Line of Sight** – The *line of sight* can be generally summarized as, “the direction we are looking.” Although that sounds simple, the line of sight in conventional perspective is not actually one thing but has taken on at least *seventeen* different meanings, unbeknownst to most or all artists. Each of these meanings are distinguished and clarified from each other, valid or not.

## **PART FIVE: DRAWING THEORY**

---

This is basically where all other books on perspective *start*.

This contains more instruction than most books, including new techniques, but provides explanations as to exactly why each technique works—something often disregarded or misunderstood in other texts.

**37. Linear Perspective** – *Linear* means “characterized by an emphasis on line.” This technique uses converging lines to suggest depth, just as the sides of a road converge together as it gets farther away. Here the artist learns about the six main methods associated with this concept and makes sense of their confusing terminology and limited ideas of application.

**38. Guide Lines** – The names given to those lines used while constructing objects in a drawing are more complicated than necessary. Tips on their usage are provided.

**39. The Accuracy Point** – The *accuracy point* is a new concept which describes the most accurate spot in a picture. It is used as a reference point for the accurate placement of everything in that scene.

**40. Direction Points** – This chapter instructs one on how to establish the proper angles of objects being illustrated so as to avoid distorting them excessively in creating more realistic imagery.

**41. Shadows** – Procedures and tips are provided for the proper illustration of an object’s shadows in perspective. Different types of light sources such as bulb light and sun light are described.

**42. Reflections** – One gains an understanding of the fundamental laws behind the nature of reflected imagery while also how to avoid the common mistakes that beginners make while drawing them.

**43. The Ellipse** – Drawing circles from different angles can be challenging. Not only are all of the main methods for doing this expressed here with clarity, also included are why these methods don’t always work properly. Without this knowledge, which was not understood prior, a student can feel they are not able to perform the procedure correctly, even when they do so, since the problem lay in the procedure itself. Specifically, there is a difference between how an ellipse behaves in reality versus on paper.

**44. Measuring Size** – Consists of several techniques for accurately measuring the sizes of objects in spite of their changing apparent sizes at various distances from us.

**45. Measuring Distance** – Four technique categories cover how to draw any object as it gets farther. Explained is not just how to do the methods, but exactly *why* they work, which is usually missing.

**46. Measuring Direction** – Shows an optional but more precise method of drawing an object at angles.

**47. Mechanical Perspective** – *Mechanical* (though the use of drawing tools) *perspective* is the process of converting plans into three-dimensional drawings. In this way, an architect can convert blueprints into a drawing of a finished house. This procedure is explained simplistically, along with its general limitations.

**48. Arbitrary Perspective Systems** – There exists simplistic versions of perspective used for certain practical purposes which have taken on a level of intense sophistication and complexity. Understanding their purpose and place has a disarming effect for what can be an overly-intimidating subject.

**49. Drawing People** – A missing step is explained that has made the art of drawing people or animals from imagination much more difficult than it need be in perspective.

---

## **A Final Word**

### **Glossary**

### **Index**