An essential resource for those seeking enlightenment on the vast, intricate, and fascinating subject of perspective.

FIRST EDITION

The Art and Science of Perspective

Volume 2: Cataloguing 1200 Kinds of Perspective

Alan Stuart Radley

Dictionary Of Perspective

Behold the epic story of perspective. Explore our 30-year project to unify knowledge on perspective, vision, imaging and spatial topics across all disciplines. This unique monograph explores the origins, principles, and applications of perspective, guiding further scholarly study.

DICTIONARY

OF

PERSPECTIVE

SERIES VOLUMES

1. Past, Present, and Future of Visual and Optical Perspective	
2. Dictionary of Perspective	3. Natural and Visual Perspective
4. Graphical and Mathematical Perspective	5. Simulated Perspective and Illusion
6. Instrument and New Media Perspective	

Dictionary

Of

Perspective

Alan Stuart Radley

THE
ART AND SCIENCE
OF
PERSPECTIVE

- VOLUME TWO -

FIRST EDITION
2026

Perspective Research Centre
Blackpool, England

Dictionary Of Perspective

By Alan Stuart Radley

Keywords

Perspective, linear perspective, art, optics, vision, geometry, architecture,
SFX, VFX, CAD, CGI, AI, 3D, 3-D, VR, AR, MR, XR, film, metaverse,
geometry, analytical geometry, projective geometry, descriptive geometry,
size, distance, scale, resolution, shape, form, computer aided design,
geographic information systems, virtual / augmented / mixed reality,
satellite imagery, space, measurement, satellite communications,
history of art, history of science, history of mathematics, technology,
three-dimensional imaging, 3-D modelling, illusion, immersion,
surveying, navigation, aeroplanes, stereoscopic perspective,
celestial maps, maps of the universe, 1-D, 2-D, 3-D, 4-D perspective,
theatre and stage design, medical imaging, mirrors, 3-D illusion,
computer vision, robotic vision, LED display, LED wall, holograms, holography,
digital filmmaking, special effects, computer generated imagery, drones,
3-D laser scanning, cinema, 3-D cinema, mechanical design, vision science,
head-up displays, 3-D printer, holographic printer, photography,
virtual production, animation, stage lighting, fireworks, volume display,
drawing, painting, binocular vision, technical drawing, eyesight,
engineering drawing, mechanical drawing, machine drawing,
remote sensing, photogrammetry, cartography, panoramas,
multiverse, Internet, world wide web, hypergram, screen, display,
camera, telescope, microscope, computer, topography,
IMAX, sphere theatre, television, New Media,
Euclid, Leonardo da Vinci, Leon Battista Alberti, Kim Veltman,
Filippo Brunelleschi, Piero Della Francesca, Ted Nelson, Albrecht Durer.

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www.PerspectiveResearchCentre.com

for

Kim Veltman

and

Philip and Ellen Radley

THE ART AND SCIENCE OF PERSPECTIVE BOOK SERIES

For over 500 years, perspective held a preeminent place in the Western academic tradition. Encyclopaedias and 'divisions of philosophy' held that perspective—the science of the transmission of light rays—is foundational to and substantially underpins the arts/sciences. Indeed, on the pivotal importance of perspective, Leonardo da Vinci said, *"Perspective, therefore, must be preferred to all the discourses and systems of human learning"*.

Today, perspective is central to key developments across a range of subjects, including *art, photography, television, cinema, cartography/maps, astronomy, topology, photogrammetry, scenography, archaeology, architecture, gardens and the environment, etc.* Recent developments also have strong links to perspective, such as *GIS, GPS, VR/AR, SFX, computer graphics, robotic vision, Artificial Intelligence, digital filmmaking, virtual production, medical imaging, stereography, panoramas, holograms, and space flight.*

Unfortunately, perspective, as a distinct and principal subject discipline, has fallen out of fashion and is no longer recognised as a keystone of progress. This may be because perspective is a vast, multifaceted, somewhat mysterious, and apparently loosely connected subject that can elude even senior academics, leaving it poorly understood and largely unexplored. But it is a profoundly influential topic. Whereby perspective is the very definition of an interdisciplinary subject, with countless sources, links, pivotal theories, and elementary relations that penetrate to the core of key phenomena in the arts, sciences, and technology. Accordingly, we wish to gather and unite all perspective knowledge, heralding the birth of perspective as a primary branch of learning.

Surprisingly, no book covers the theoretical and technical foundations of perspective in a broad, comprehensive way, so we're compiling a monograph, *The Art and Science of Perspective*, to provide essential knowledge on visual and technical perspective.

DICTIONARY OF PERSPECTIVE

The *Dictionary of Perspective* is a standard lexicon on perspective, projection methods, vision, and spatial concepts. It begins by introducing a new perspective category theory, before giving a comprehensive inventory of visual perspective categories/forms. Perspective views/images can be extraordinarily complex, comprising multiple and interrelated optical phenomena, composite, mixed, and blended perspective types/forms, numerous visual layers/components, etc. Our new categorical scheme can mitigate complexity, enhance your understanding and real-time comprehension of perspective images, enable their efficient capture/creation/use, and expand their range of applications.

We use a broad, multifaceted approach to our subject:

> Perspective <IMAGING CLASS> is the use of a visual image to view, match, represent, create the illusion of, or immerse in, the visual appearance of a spatial object/scene.

Terminology is important. In the field of perspective, concepts often have multiple names, and a single name may refer to different or even opposite ideas. We shall cross-reference these names and link to standard terms. Established terms are used wherever possible, but new ideas require new terms. We omitted optical/ray and geometrical diagrams from the dictionary, as other volumes in the series include these.

In sum, provided is a complete survey of visual, optical, and technical perspective.

Thank you, dear reader, for your valued attention, help, and kind patience.

I remain, sincerely yours,

Alan Stuart Radley

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PROLOGUE

It is my hope that this first-ever *Dictionary of Perspective* will be well received and find practical use with a wide-ranging audience. The aim of the *Dictionary of Perspective* is to serve as a repository of all common terms used in the perspective discipline, and to operate as a trusted source of information for perspectivists, or anyone working in art, science, or technology who is dealing with, or must understand, appropriate parts of this complex field. In preparing this first edition of the dictionary, an exhaustive review of the vast literature on perspective has been conducted. I decided to include all primary perspective terms, old and new, even when a term is obsolete today, in the belief that even the most obscure terms hold meaning that may prove useful as we forge the path ahead.

Entires are listed alphabetically. This is simple when the entry consists of a single word. However, in the field of perspective, a large number of terms are compound words made up of more than one word. In almost all instances, compound entries made up of more adjectives/adverbs appear under the relevant noun or verb. Many entries have subentries and consist of lists of alternative types/forms of perspective and related ideas. The entries often start or end with common synonyms and antonyms, and sometimes with a *technical note*. Next to the main entries are comprehensive cross-references and lists of related terms found elsewhere in the dictionary, presented under a s*ee also* list. This dictionary uses British spellings and includes bibliographic references, though it is not etymological.

With all these cross-links and lists of related terms, I have attempted to make the paper version of the dictionary eminently navigable, but this has proven especially difficult, due in part to the size and complexity of the subject matter and to the fact that some terms have dozens of synonyms (including historical terms). Due to this profusion of names, it was sometimes convenient to place certain identical (or similar) definitions under multiple main entries, and to save the reader time by avoiding searching or jumping about within complex terminological and etymological structures (at the expense of a larger dictionary). We apologise for repeating definitions; a dictionary is for quick lookup, not continuous reading.

I sourced definitions for most terms from my 5000-volume *Library of Perspective* and thousands of related articles/papers. A few definitions are informed by online sources such as encyclopaedias and AI 'mashup' tools, but no such information has been trusted without corroboration. I defined most terms myself, some of which appear to be new to the field. It's unclear if these apparently new terms represent new concepts; in any case, I've marked additions/changes to orthodox ideas as: *New / Refined Term*. The dictionary seeks wholeness and precision in summarising perspective. This has resulted in a dense text that may lack clarity. However, the dictionary should be used in combination with the entire 6-volume monograph, as some entries may be unclear without the detailed technical explanations and diagrams provided therein. Unfortunately, only the first two volumes have been published; readers must wait for the rest.

A key goal for the *Dictionary of Perspective* has been to produce the most up-to-date, complete and informative compilation of perspective art/science/technology terms available. Nonetheless, perspective is complex, making summarisation challenging due to time and resource limits. I've struggled to understand it fully and hope I haven't misunderstood or omitted anything essential. I apologise for any errors and will correct inaccuracies in future editions. Certainly, much remains to be done before perspective has its ultimate reference. Ultimately, I must publish and hope for the best.

PREFACE

Perspective deals with **natural perspective**, including visual perspective, or how we see things, and **artificial perspective**, or how we represent that concept in diagrams, drawings, pictures, photographs, films, television, computers, etc. Given such a straightforward definition, one might assume that there is little to learn about perspective and label it as a standard visual method involving well-known principles. But nothing could be further from the truth. Perspective is a highly technical, kaleidoscopic, labyrinthine, and wide-ranging subject, often presented with unexplained 'facts', that work to confuse, plus perplexing mysteries, and exciting possibilities.

Perspective is a fascinating, beguiling, and somewhat slippery topic that evades simple description. There are many books on artificial/graphical perspective; some exemplify the practical aspects of technical drawing, whilst others explain the artistic rendering of spatial reality in paintings, photographs, or films. Many authors have studied natural/visual perspective with ingenuity and fine results, and much has been learned about the details of human visual perception, whereby (for example) binocular vision and stereoscopic 3-D is a popular focus of attention. Others have dealt with the history of representation systems and how different cultures have employed visual methods to record spatial reality. Indeed, thousands of manuals and treatises have been written on perspective, culminating in the 2,500 pages of Prof. Kim Veltman's historical monograph comprising 8 volumes, which includes a bibliography listing 15,000 titles spanning time.

Given these facts, why would anyone attempt an ambitious new series of books on perspective? Hasn't everything worth saying already been related in many other works? It seems to the author, at least, that the answer is emphatically no, and for several reasons.

First, we have many different kinds of perspective, and far more types than almost anyone has realised. The classic form of perspective that we learned (at least something about) at school is graphical/linear perspective; which asks how to draw a picture on a plane surface that represents a three-dimensional object/scene in such a way that the various portions of the picture, in their mutual relations, present the same aspect as do the corresponding visible parts (or outlines) of the object/scene. However, there are many other kinds of perspective, and this *Dictionary of Perspective* lists 1,200 types! The subject of perspective is vast, and there is a need for accurate definitions of all kinds of visual/optical perspective in one handy place, thus for a detailed reference publication.

Second, we have the related problems of complexity and diversity in the subject matter. A logical approach begins by asking: What is perspective? Unfortunately, answering this question is fraught with difficulties. Perspective turns out to be one of the most fundamental, theoretically challenging, perplexing, yet elusive subjects. But why is perspective such a challenging topic? This is partly because innumerable types of perspective are known. We have visual, mathematical, graphical, and instrument kinds of optical perspective, etc. Secondly, multiple types of perspective tend to operate simultaneously, making it difficult to identify the root causes of specific visual effects. For example, we cannot easily separate environmental optics (or environmental perspective) from the human visual system (the second type of visual perspective).

Overall, it seems that nobody has clarified the different facets of the subject by providing strict logical definitions; while unifying all of the primitive notions, axioms, principles, and inference rules that relate to perspective types/forms and associated visual phenomena. This shall be our task, to map the field of perspective—a rapidly evolving, and highly technical discipline that underpins fundamental topics in art, science, and technology.

Photograph / Physical + CGI Reality
Natural + Artificial (Synthetic) Perspective

Composite / Synthetic / Mixed / Blended / Simulated Perspective

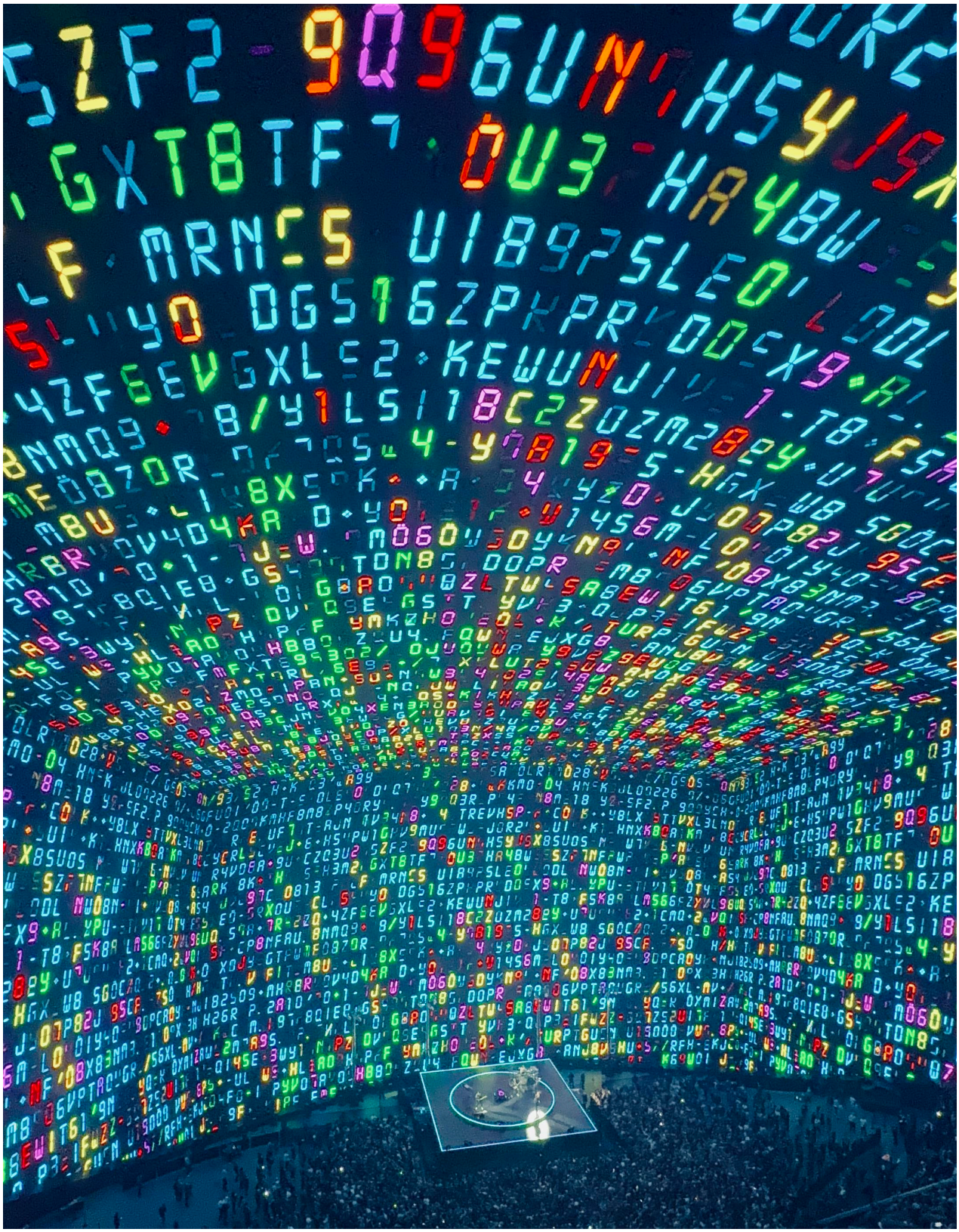

Figure 1: Sphere Theatre, Las Vegas (2023).

An 18,600-seat auditorium with interior wrap-around dome-shaped spherical LED screen of size 15,000 m^2 and with 16K resolution. Allows perspective image shaping that provides a 3-D experience.

Perspective Research Centre

—Vision Statement

Dr Alan Stuart Radley FRSA
Scientific Director
Perspective Research Centre
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ALAN S. RADLEY [1]

Perspective Research Centre

SUMMARY

The Perspective Research Centre (PRC) is a research and educational institute focused on the visual dimensions of art, science, and technology.

PRC collects materials on the history, theory, and applications of perspective, projection methods, vision, imaging, and spatial concepts. We provide open access to perspective resources for the benefit of all. Afforded is a vast archive of information on perspective, including a subject *Dictionary, Library, Gallery, Bibliography* and *Encyclopedia*; plus links to countless publications on this vital topic. We have spent over three decades gathering, indexing, and carefully organising, this unique knowledge bank to provide easy access to everything known on perspective.

PRC seeks rational insight into the various classes/categories/forms, technical methods, practical applications of perspective, and associated visual media. A basic goal is to gather perspective knowledge as developed in both Western and non-Western cultures. All types of perspective are studied, falling under **natural**, **artificial**, and **synthetic** classes*;* leading to detailed analysis of *visual, graphical, mathematical/geometrical, linear, curvilinear, spherical*, *aspective*, *negative (reverse/inverse/inverted/diverging), proto/pseudo*, *axial, bird's-eye, parallel, modular, glide, accelerated, anamorphic perspectives, etc.*, plus various kinds of *simulated, illusive, augmented, or virtual perspectives* and *mixed real/digital form*s.

But why study perspective today? Surely it is a well-understood, essentially historical topic, of interest mainly to artists, designers, and architects. Indeed, perspective has been, and continues to be, eminently useful as a graphical technique for depicting/modelling/enhancing spatial realism. But perspective is also a scientific discipline closely linked with modern innovations including *Computer-Aided Design (CAD), Geographic Information Systems (GIS), Medical Imaging (MI), Computer-Generated Imagery (CGI), Computer Vision (CV), photography, 2-D/3-D cinema, Special Effects (SFX), Virtual/Augmented/Mixed Reality (VR/AR/MR), digital filmmaking, Artificial Intelligence (AI), etc.*

Perspective drives artistic, scientific, and technical progress to a great degree. Nonetheless, perspective likely has countless other applications—types/methods/facets—that have yet to be discovered. Unfortunately, today, even the known perspective forms are mired in confusing complexity, and a full cataloguing of all classes/branches has not been performed. In any case, the story of perspective has only just begun, because it will shape our human future in profound and varied ways that we can barely imagine.

We aim to unite all perspective knowledge in a single framework: **perspective category theory** (PCT), heralding the birth of perspective science as a primary branch of knowledge —with established foundational theory and, above all, unified laws. By collecting, linking, developing, and applying the types/forms, facets, phenomena, theories, principles, and methods of perspective, the PRC can support knowledge organisation, education, and technology development across a range of artistic, scientific, and technological disciplines.

[1] The vision presented herein reflects Professor Kim Veltman's concept for an Institute of Perspective, which he founded and ran as the Perspective Unit at the University of Toronto (1990-1996), and the Maastricht McLuhan Institute (1998-2020).

Painted / Photograph / Physical + CGI Reality
Natural / Artificial / Synthetic Perspective(s)

Graphical CGI / Mixed / Synthetic / Linear / Spherical / Simulated / Blended / Combined Perspective(s)

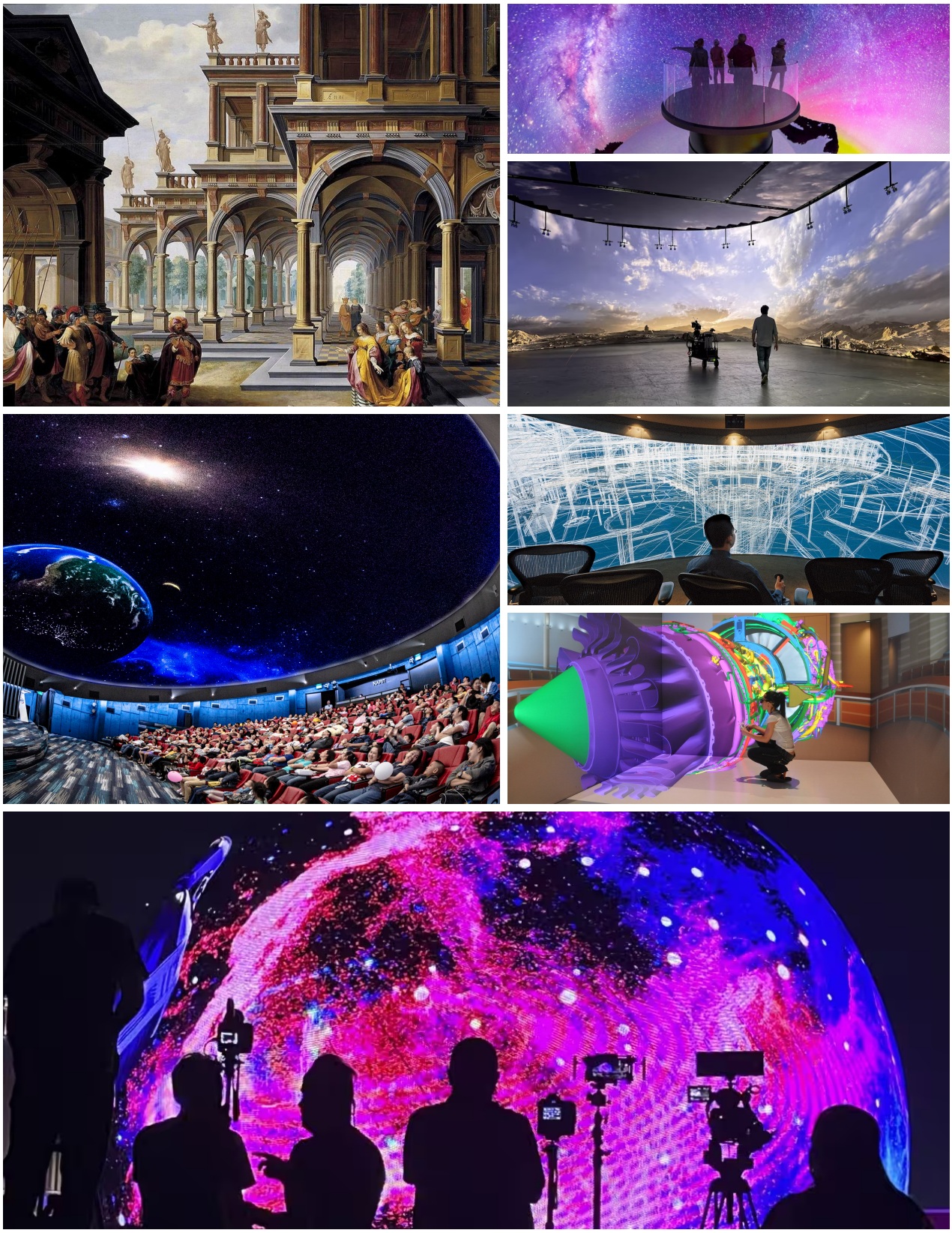


Figure 2: Natural, artificial, and synthetic perspective(s).

Perspective types often merge, or blend, on a particular occasion to produce a composite perspective system (often without the observer noticing); whereby, for example, visual, instrument, and New Media types form compound perspective(s).

Introduction

The Perspective Research Centre (PRC) has a rich 30-year history. PRC developed from two past organisations, the Perspective Unit at the University of Toronto, and the Maastricht McLuhan Institute (MMI) at the University of Maastricht. We have inherited an important scientific legacy from these organisations, including the *Library, Gallery, Bibliography, Encyclopedia of Perspective*, etc.

For over 30 years, Professor Kim Veltman [1948-2020] was the acknowledged world's number-one expert on perspective, and also the founder and director of these organisations. Following his sad passing in April 2020, PRC maintains the official papers of Veltman's lifetime works—as listed in the *Kim Veltman Archive* [6], including unpublished letters, articles, books, treatises, and other manuscripts. This incredible knowledge bank consists of 2.9 million words and 10,000 pages spread across over 400 publications on perspective and related topics, making Veltman one of the most prolific scientists ever.

We curate other important archives on perspective, including the work of past collaborators Professor Marshall McLuhan, Professor Sir Ernst Gombrich, Professor B.A.R. Carter (*Professor of Perspective at the Royal Academy*), and Professor Kenneth Keele (*President of the Royal Society of Medicine*).

Today, the exciting work of the PRC continues—being the only institute dedicated to **visual, optical, and technical perspective** operating anywhere in the world. Our goal is a single route of access to all knowledge on the seminal subject of perspective.

Library, Dictionary, and Encyclopedia

The PRC curates a collection of unique and world-leading materials on perspective and related topics.

Established over 40 years, our *Library of Perspective*, consists of 5,000 physical volumes (catalogued), 10,000 digital papers/books, hundreds of articles/theses/treatises, and 33,000 digital images [7]. Today the library is unsurpassed in the private field, and in the future, we shall continue collecting new materials on perspective, whereby we aim to collect all specialised literature in the field(s) of perspective, spatial concepts, imaging and vision.

Our *Dictionary of Perspective* is a standard lexicon of all terms on perspective; identifying 1,200 classes/categories/forms of perspective and over 500 visual methods/instruments [8]. Provided therein are definitions, listings of synonyms, narrower/broader terms, etymology, etc., for every type of perspective.

The PRC maintains the standard world *Bibliography of Perspective;* initially developed by acclaimed architect Professor Luigi Vagnetti and later expanded by Professor Kim Veltman—who together spent 90 years compiling a list of 15,000 perspective titles spanning time [9].

In 2020, PRC published the Bibliography of Perspective as part of the *Encyclopedia of Perspective* (2,500 pages), a colossal project that Kim Veltman worked on for over 40 years, and the definitive work on its subject matter, a wonder to behold. It details the fascinating history of perspective, beautifully presented in all of its origins, kaleidoscopic source(s), vast literature(s), and in a wondrous variety of expressive forms. Veltman also penned many other works on perspective and related topics, including articles, lectures, books, etc, all accessible on the PRC website.

Gallery, Museum, and Monograph

We are also busy cataloguing our *Gallery of Perspective*; being a vast collection of perspective-related images collected over 30 years. The gallery consists of 33,000 drawings, paintings, photographs, microfilms, slides, films, stereograms, holograms, and related materials. Our developing *Museum of Perspective* is a collection of early perspective instruments, timeline-data, and historical records on visual-methods. The museum works with the present book series or *Monograph on Perspective*, in a quest to gather everything known about perspective, vision, imaging, and spatial topics.

Leonardo da Vinci

Italian polymath Leonardo da Vinci was an early pioneer of perspective techniques, employing a supremely visual approach to his remarkably inventive studies of the natural/built world(s). The 6,500 pages of Leonardo da Vinci's notebooks contain ca. 100,000 sketches, diagrams, and drawings. The PRC maintains a database of these images plus owns a rare 750-volume library on Leonardo da Vinci, including one-of-a-kind manuscripts cataloguing and explaining his scientific methodology in full.

Our founder, Kim Veltman, was a leading scholar of Leonardo da Vinci; wherein he wrote three major treatises, plus over a dozen influential papers on Leonardo. We are working on the *Encyclopedia of Leonardo Da Vinci* (3,000 pages), which gathers, for the first time, all of Veltman's insightful writings on the great polymath into a single place.

In summary, we aim to '*study perspective in greater detail, in a broader scope, and with more coherence than previously attempted*'; seeking grand unification of perspective knowledge across all subject disciplines.

The Art and Science of Perspective

In a strange quirk of fate, no book exists on the theoretical foundations of technical perspective; specifically to define, analyse, and unify all of the principles, types, forms, methods, instruments, systems, and applications of visual/optical perspective.

Henceforth, we are gathering everything known on this subject into a comprehensive monograph on technical perspective, entitled: '*The Art and Science of Perspective*'. Explored therein will be the foundations of perspective in terms of elementary theory, and we shall identify all of the primary classes and the numerous sub-categories in this respect. We wish to minimise the number of primitive notions, axioms, principles, and inference rules that relate to perspective phenomena, while unifying all known theories that comprise the entire subject matter of perspective (past and present aspects).

Desired are solutions to the paradoxes that have plagued perspective theories/methods throughout time, including the debate(s) over the nature of human vision and whether perspective is an objective or subjective method. Whilst it is certainly not possible to solve all such problems in this work, we aim to comprehensively identify and describe the nature and implications of many of these same issues.

We wish to spark interest in visual and optical perspective, advance the subject by popularising it, and showcase the powers and capacities of related visual, imaging, and spatial concepts. We shall explain how advances in the theories/methods of perspective drive human artistic, scientific, and technical progress to a great degree.

Monograph defined

A monograph is a specialist writing on a particular subject concerned with a single species, genus, or class of things. It is a complete account of one specialised topic, nothing being neglected which is necessary for a perfect knowledge of it, and is concerned with investigating the principles of the subject and its conclusions. It is assumed that the readership of a monograph has a professional, educational, or practical interest in the subject matter. In any case, dear reader, I hope that you will find the forthcoming material interesting, useful, and even entertaining!

Perspective Works by Kim Veltman

Dr Kim Veltman produced the first truly comprehensive monographs on perspective; running to 4,000 pages, and Kim wrote these wonderful works after a lifetime of diligent study. These books represent an incredible resource for present and future generations of perspective scholars. The volumes are available in digital and print formats from the PRC website (sometimes without plates/figures).

Kim's works concern the history, literature, and bibliography of perspective; and are as follows:

1. Studies on Leonardo da Vinci 1: Linear Perspective and the Visual Dimensions of Science and Art (1986, 573 pages).
2. Studies on Leonardo da Vinci 2: Continuity and Discovery in Optics and Astronomy parts 1 and 2 (8 volumes of unpublished manuscripts, 1200 pages).
3. The Sources of Perspective (1994-2020, 600 pages, published by the PRC as the Encyclopedia of Perspective, volumes 1, 2).
4. The Literature of Perspective (1994-2020, 600 pages, published by the PRC as the Encyclopedia of Perspective, volumes 3, 4, 5,6).
5. The Bibliography of Perspective (1994-2020, listing 15,000 titles, and published by the PRC as the Encyclopedia of Perspective, volumes 6, 7, 8).

These 17 volumes provide modern-day scholars with a historical overview of perspective methods, theories, and applications, plus give an exhaustive bibliography of the primary and secondary literature. However, the aforementioned works do not examine in detail the main technical features of visual and optical perspective or provide an overarching theoretical framework for the subject as a whole.

Scope of Proposed Work

The '*Art and Science of Perspective*' aims to provide a central core of knowledge on visual, optical, and technical perspective for all practical purposes (ref. natural, artificial, and synthetic types). In this respect, we exclude arcane mathematical proofs and philosophical discussions from our analysis, limiting our exposition to topics that impact real-world perspective phenomena, methods, and applications.

We define perspective as the formation of a visual image—or a representational pattern—of a visible state of affairs in a spatial reality (e.g., physical, illusive, imagined space, etc.). But many forms of perspective fit this broad definition, therefore, in this monograph, we shall limit our exposition to optical perspective. Whereby optical perspective encompasses all forms of perspective that use, or purport to use, light, or electromagnetic radiation, to analyse/represent a spatial scene; including all wavelength ranges from gamma rays, x-rays, the visual spectrum, microwaves, radio, etc.

Accordingly, we include the natural, artificial, and synthetic perspective types (e.g. visual, mathematical, graphical, instrument, simulated, and New Media categories). Excluded are other forms of technical perspective, such as contact perspective and symbolic perspective (ref. literal, metaphorical forms); plus purely algebraic forms of mathematical perspective; that is, mathematical images composed of letters and symbols that do not (directly) relate to visual images.

It is noteworthy that all types of visual, optical, and technical perspective have strong links to mathematical perspective, and most are subject to the vagaries of human vision/perception. Indeed, perspective raises fundamental questions about the nature and limits of human perception/understanding of spatial reality, problems that have puzzled scholars for 2,000 years—and are still debated today.

Henceforth, we shall examine human vision and visual perception, including physical/physiological/psychological optics.

Optical Perspective

Optical perspective <IMAGING CLASS> is concerned with capturing, measuring, or representing realistic views/images of dimensional space (or producing immersions into, or illusions of, spatial reality). Once again, optical perspective encompasses all forms of perspective that use, or purport to use, light, or electromagnetic radiation, to analyse/represent a spatial scene, including all wavelength ranges from gamma rays and x-rays to the visible, microwaves, and radio.

Some forms of optical perspective employ artificial/simulated 'light-rays' that lie beyond the bounds of ordinary physics. Said techniques can sometimes operate on an impossibly vast or tiny visual scale, or produce images that pass straight through solid objects, etc. However, using such techniques does not necessarily make the resultant visual images any less real, accurate, or 'visual/optical' (ref. heavenly vista, sub-atomic 'imaging', medical optics, Virtual Reality, etc).

Notably, we have adopted the term optical or technical perspective for a broader range of meanings than purely 'optical' phenomena, such as photography (for example). Included in that term is any systematic optical-related process that produces visual images (of any form) that concern any type of spatial reality (including represented/illusory/artificial/imaginary realities). Excluded from our analysis are several other kinds of visual perspective, including sonar (sound 'imagery'), magnetic, mechanical, gravitational perspective(s), etc.

As we shall learn, there are many different categories of optical perspective. Still, all involve spatial imaging principles that reflect aspects of scene/object geometry with varying degrees of visual realism or accuracy.

New Media Perspective

Optical perspective is simultaneously both an old and a new subject discipline. It has established and well-known classes/forms such as graphical and linear perspective combined with proven theory/methods, however, many new forms of perspective are currently in development and result from inventions in the related field(s) of digital technologies and New Media.

Whereby New Media perspective refers to the particular imaging capabilities and visual transformations a digital computer system provides. Said system typically consists of multiple networked instances of other instrument/computer perspectives.

Examples of technologies that fit under the umbrella of New Media perspectives include: *Internet and web-based information systems, networked cameras and telescopes, Internet Of Things (IOT) frameworks, remote-sensing instruments (for example, satellites), digital television systems, smartphones, and networked devices, satellite imaging systems, GPS, plus Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), Extended Reality (XR), Artificial Intelligence (AI), and digital Metaverse systems, etc.*

In the case of a highly developed New Media perspective, images/views from one or more of the other categories of perspective, may be connected/linked together and then viewed, surveyed, modelled, ordered, constructed, matched, mixed, explored, cross-matched, etc. Ergo, a key part of our exposition is to identify, define, and analyse all the types, features, principles, and implications of New Media perspective and the myriad of interrelations with more traditional forms of optical perspective.

For an author to make any predictions regarding the future of New Media perspective is a perilous activity. New digital inventions are coming fast, furious, and everywhere. To avoid false conclusions, our focus is on the fundamental principles, methods, and functions of perspective, which can hopefully be (at least partially) foreseen ahead of technological breakthroughs.

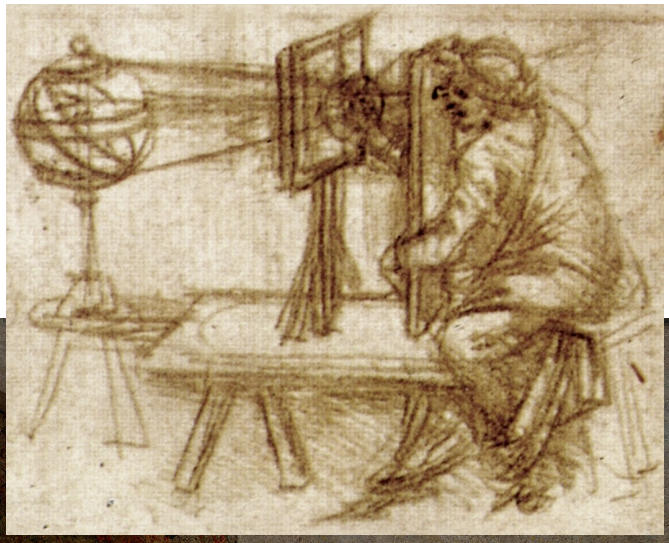
Plan of Work

We shall publish the monograph in six fascicles:

1. Past, Present, and Future of Visual and Optical Perspective
2. Dictionary of Perspective (1,200 types/forms)
3. Natural and Visual Perspective
4. Graphical and Mathematical Perspective
5. Simulated Perspective and Illusion
6. Instrument and New Media Perspective

Our intention is to publish the volumes in numerical order. Note that the first technical volume is '*The Dictionary of Perspective*', which, with volume one, will be published in advance of the other volumes, because the discussions they contain are essential to understanding the content of subsequent volumes.

We are working hard to complete the monograph on perspective, but it is a significant undertaking, and completion of all volumes will be delayed for a short period (final goal: 2027-8).



Perspectograph

Use of a glass, veil, perspective window, or perspective ‘net’, plus fixed eye-point, to make an accurate perspective drawing of an armillary sphere.

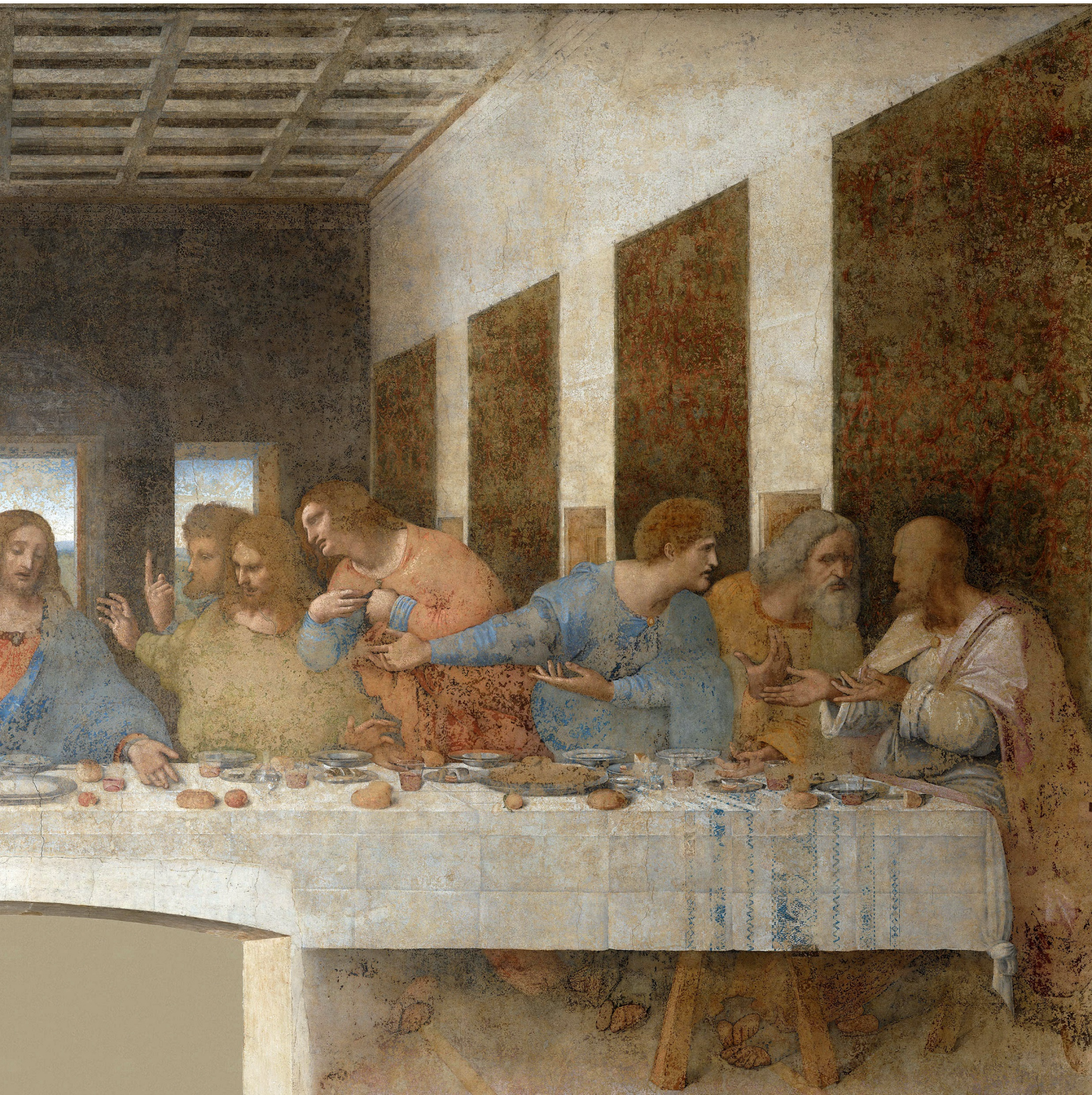
Leonardo da Vinci
Codex Atlanticus, c. 1478-1519

The Last Supper, Leonardo da Vinci, c. 1495 - 1498

About the Dictionary

The art of perspective is to make what is flat
appear in relief, and what is in relief flat.

Leonardo da Vinci



About the Dictionary

This one-of-a-kind dictionary is an essential resource for all 'perspectivists' or anyone concerned with visual/optical/technical perspective. It deals with **natural perspective**, including visual perspective or how we see things, and **artificial perspective** or how we capture, measure, represent, and explore spatial reality with images, diagrams, pictures, photographs, models, films, television, computers, plus using cameras, telescopes, microscopes, mirrors, projectors, etc.

Will be of vital interest to 'vision-based' professionals; including artists, photographers, filmmakers and SFX professionals, architects, lighting designers, illusionists, CAD engineers, VR/AR plus digital metaverse content creators, 3-D software developers and game designers, etc. Plus, anyone fascinated by how we perceive, represent, and create illusions of spatial reality or design 3-D elements of physical space.

All types of perspective are included, leading to detailed analysis of *visual, graphical, mathematical/ geometrical, linear, curvilinear, spherical, aspective, negative (reverse/inverse/inverted/diverging), proto/ pseudo, axial, birds-eye, parallel, modular, glide, accelerated, anamorphic perspectives, etc., plus various kinds of simulated, illusive, augmented, or virtual perspectives and mixed real/digital forms.*

Perspective is a multi-faceted subject that covers a far wider range of visual phenomena than many realise, and is a key to understanding major categories of art/science/technology in the past 500 years. Related topics include s*pace, time, optics, human eye/ vision, colour, drawing, mathematics and geometry, reality, illusion, imagination, and representation*. Perspective is central to key developments in various subjects, including *art, photography, television, cinema, cartography/maps, astronomy, topology, photogrammetry, scenography, archaeology, architecture, gardens and environment, etc.*

Recent developments have strong links to perspective; such as *Geographical Information Systems (GIS), Computer Generated Imagery (CGI), Computer-Aided Design (CAD), Special Effects (SFX), Virtual/ Augmented/ Mixed Reality (VR/AR/MR), Medical Imaging (MI), robotic vision, drones, etc.* Perspective lies at the epicentre of progress and is pivotal to everything humans will achieve in the future.

This one-of-a-kind volume can inspire and inform teachers, students, researchers, and practitioners about the origins, technical details, complexity, and compelling history of visual/optical perspective. It is a must-have for anyone seriously interested in the visual dimensions of art, science, technology, and culture; and it makes a fine and valued addition to any school, college, or university library.

Dictionary, Encyclopaedia, and Textbook

A dictionary defines words concisely, unlike an encyclopedia, which describes a subject comprehensively. The current dictionary seeks to hit the middle ground between what is normal for an alphabetical listing of terms in a subject area, or a dictionary compendium, and providing somewhat longer definitions, that can give the reader combined information related to rapid-lookup, relevant context, plus fairly complete, introductory information about the topic in question.

Library, Dictionary, and Encyclopedia

It is a simple task to list the goals we initially had in mind when embarking on the long project of developing the dictionary of perspective:

- **First-ever Dictionary of Perspective**: definitions of 4,000 terms, including 1,200 types/forms of perspective, as well as many lists, tables, and illustrations that enhance understanding of the definitions.
- **Mapping a primary branch of knowledge:** Works to establish the new subject-discipline of visual/optical perspective; which is explored in greater detail, broader scope, and with more organisation than previously attempted. Past, present, and likely future perspective theories/systems/instruments are outlined, and everything is comprehensively explained in 360,000 words, complete with synonyms, cross-referencing, etc.
- **Grounded in the vast literature of perspective**: Gathers together information from the PRC *Bibliography of Perspective* (15,000 perspective titles), the PRC *Encyclopaedia of Perspective* (one-million words), plus the PRC *Library of Perspective* (5000 specialist volumes), with hundreds of specialist titles consulted.
- **Alphabetical catalogue**: a comprehensive inventory of all known perspective types, image forms, phenomena, principles, methods, systems, instruments, models, theories, goals, products, functions, and applications.
- **Blended and staged learning resource**: Uniquely combines the best features of a textbook, a dictionary, and a practical handbook. It is the second volume of a monograph on visual/optical perspective.
- **An instant classic for those seeking enlightenment:** the cornerstone of groundwork for people researching the complex, confusing, and inherently mysterious subject of visual/optical perspective.
- **Perspective Category Theory**: unites all perspective knowledge in a single framework, heralding the birth of perspective science as a primary branch of knowledge—with foundational theory and unified types/laws.

Factual Mistakes, Typos, Errata, etc.

This *Dictionary of Perspective* took a little over 5 years to produce, and I hope that it finds frequent and valued use by readers, opening up what can sometimes be a vast, complex, confusing, and inherently mysterious subject. In any case, we are happy to receive feedback, corrections, and/or reader suggestions(s), all of which we shall consider for the next edition!

Past Reference Works

Perspective is an old subject with an active and vibrant present, plus an exciting future. But it seems an anachronism that the vast and ancient subject of visual/optical perspective should have arrived at the present epoch without a dedicated, readily available or in-print dictionary. The present volume provides the first attempt at filling this void in the vast literature of humankind. We provide an exhaustive listing of all types/forms of perspective, methods, systems, and instruments of perspective, and related phenomena and technical terms, etc., plus a small set of subject experts are included, although the dictionary is not biographical in any sense.

A small caveat, or perhaps even a large caveat, is needed in relation to our claim that the present volume is the first ever dictionary of perspective. In the introduction, we detailed the ongoing task of resurrecting Kim Veltman's Perspective Unit and the Maastricht McCluhan Institute, which were effectively dedicated to the study of visual/optical perspective for over 30 years; from which we have inherited a large *Library of Perspective* and an associated bibliography.

Within the associated digital materials, we found a couple of digital files, both titled 'dictionaries of perspective': one in an undecipherable or corrupt Greek language (86 pages of corrupt, unreadable text) and another in German (192 terms in readable text). Unfortunately, both of these files lacked title, date, or author information. In any case, we did not use the contained definitions, but for the German text, we checked that no terms were listed that we had not already included in the present work

Finally, and more significantly, a 460-page French volume entitled '*Dictionnaire Historeique De La Terminologie Optique Des Greces*' from 1964 and authored by Charles Mugler indicated that at least one major dictionary on a related subject (optics) had been written. Indeed, several other specialist dictionaries on optics, or optical-related subjects, are known, and in particular the well-respected '*Dictionary of Optometry and Vision Science*' from 1986-2018 by Michael Millodot. The latter volume represented a major effort, for example, listing definitions for over 5000 optics-related terms.

In any case, I stand by my claim that no major dictionary of visual/optical/technical perspective has been published, and indeed, certainly the present volume is doubtless the first such dictionary to appear in the English language. How do I know this claim is true? Well, we simply consulted our *Bibliography of Perspective*, with 15,000 titles, and conducted dictionary searches at major libraries worldwide.

In sum, I believe this to be the first dictionary of its kind and hope it sets a good example.

Dictionary Omissions

As far as what is omitted, we do not provide exhaustive treatment of the functional details of how the human eye works, either physically/optically or in physiological and/or in psychological or visual perception terms, and because that information is available elsewhere, and because several specialist dictionaries or compendia are available on those specific areas. Rather, here we focus on transformations of optical scene/objects purely in visual, geometrical and optical imaging terms.

Plus, we do not deal with the specialist subject of 3-D-to-2-D mathematical transformations, which involve many abstract examples; rather, we focus on practical, image- and optical-based transformations. Plus, another large topic not covered herein, at least in a comprehensive manner, is optical illusions, which run to many thousands of types. Although no book has thus far been written on this latter subject, we think it deserves a separate volume.

Dictionary Inclusions

As for what is included, we have attempted to be fairly broad in our definition of visual/optical perspective and to allow the dictionary to serve as the starting point for more detailed research and learning activities. We include all known types/forms of perspective, plus perspective phenomena, methods/instruments, and also common terms that apply to related processes. Several obsolete types, terms, and instruments are included, not least because they can provide context for modern principles, theorems, methods, and perspective types/forms.

Dictionary Scope

The aim of the *Dictionary of Perspective* is to serve as a repository of all common terms used in this discipline and to operate as a source of information in the widest range of fields dealing with any aspect of how we humans view, match and represent, create immersions into or illusions of, the third spatial dimension.

Ergo, hopefully, it can serve as a resource fo*r artists, photographers, filmmakers, cinematographers and SFX professionals, architects, visual designers, illusionists, CAD engineers, AR/VR designers, digital multiverse or metaverse content creators, and 3-D software designers, etc.* In addition, it can help others searching for answers to their queries regarding natural perspective processes, and the phenomenon of visual perspective or how we see the spatial world, plus how we represent that concept in *diagrams, pictures, photographs, models, films, television, plus using cameras, telescopes, microscopes, mirrors, projectors, etc.*

Overall, we wish to survey, map, and index the multiple and diverse types/forms, theories, methods, and phenomena of visual/optical perspective.

Painting / Represented Reality
Artificial Perspective(s)

Painting / Graphical / Linear Perspective(s)

Figure 3: Graphical Perspective (paintings)

Top: Graphical / painting perspective by Canaletto, c.1733.
Bottom: Graphical / painting perspective by Dirck van Delen, c.1633.

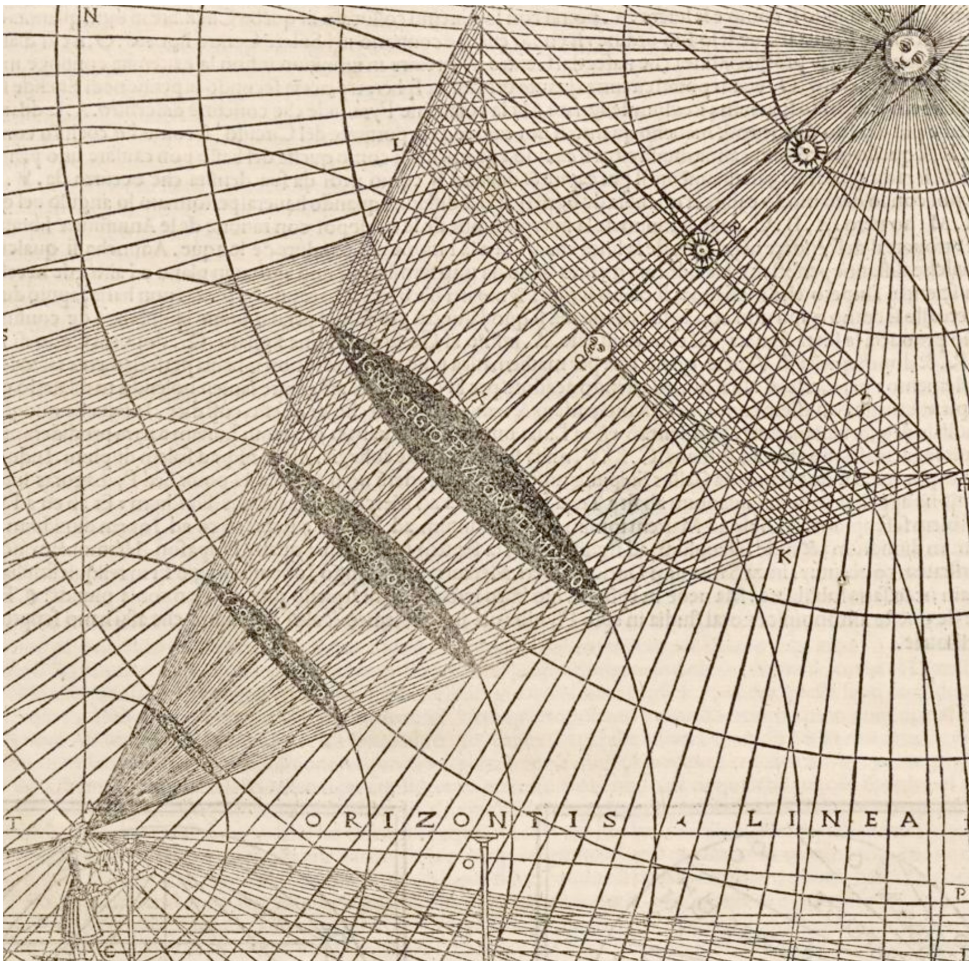
Perspective Category Theory

Perspective ‘creates’ a systematic space—it creates room for bodies to expand plastically, and to move gesturally, it enables light to spread out in space!

Erwin Panofsky
Perspective as a Symbolic Form, c. 1927

Artificial Perspective

Drawing / Graphical / Visual / Environmental / Linear Perspective(s)



Light ray optics (including one-point linear perspective) by Vitruvius, c. 1521

Drawing / Painting / Represented + Physical / Photographic Reality
Artificial Perspective(s)

Drawing / Painting / Graphical / Linear / Curvilinear / Patchwork Perspective(s)

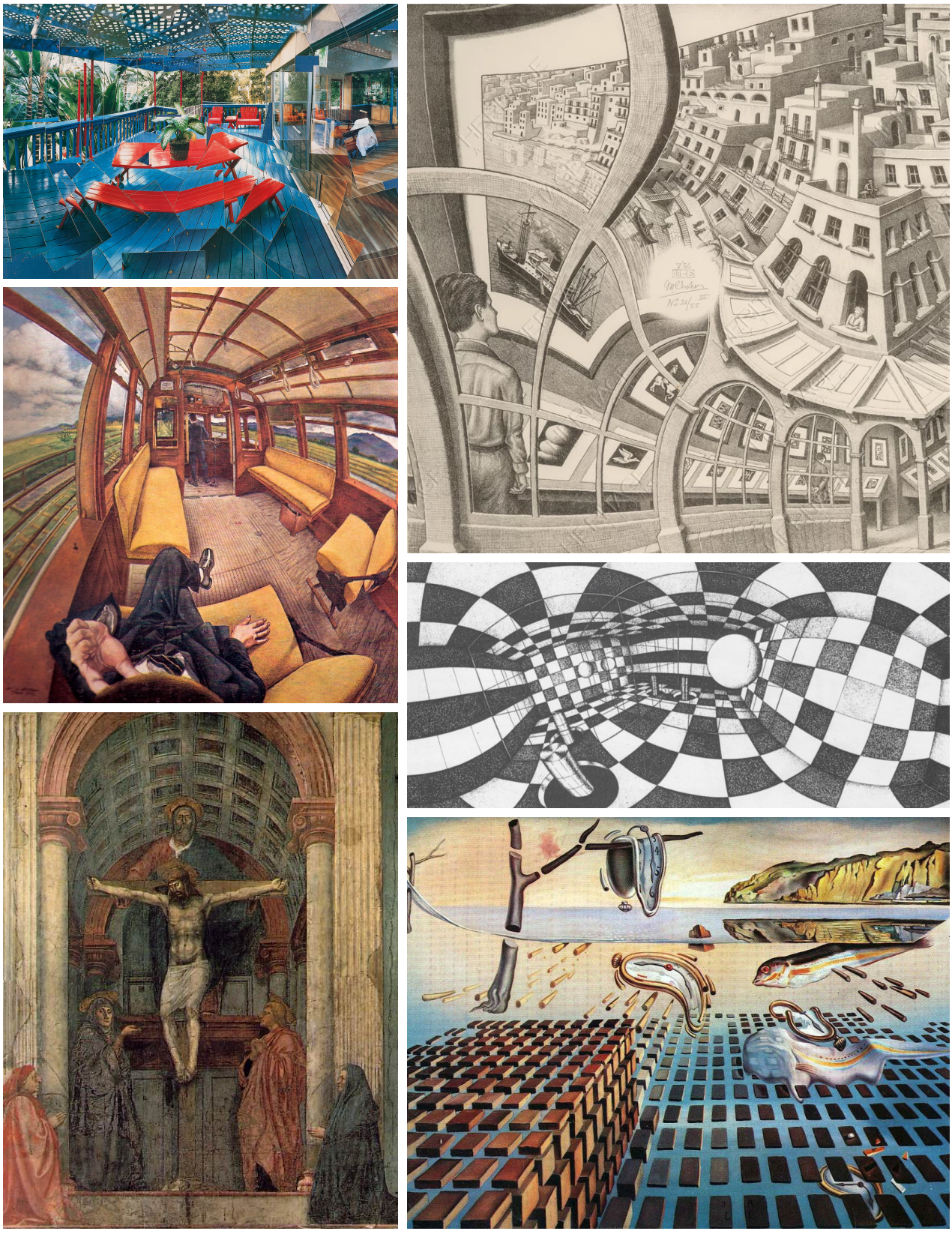


Figure 4: Changing Forms of Perspective Representation

Top left: Terrace Without Shadows by David Hockney (1985). Top Right: Print Gallery by M.C. Escher. Middle Left: Perspectiva curvilinear, by L. G. Serrano (1954). Right:, Gaja in a Chessboard, By E. Frisia (1993). Bottom left: Holy Trinity by Masaccio (1427). Right: Disintegration of Memory, Salvador Dali (1952).

Introduction

Perspective deals with **natural perspective,** including visual perspective, or how we see things, and **artificial perspective**, or how we represent that concept in diagrams, drawings, pictures, photographs, films, television, computers, etc. Given such a straightforward definition, one might assume that there is little to learn about perspective and label it as a standard visual method involving well-known principles. But nothing could be further from the truth. Perspective is a highly technical, kaleidoscopic, labyrinthine, and wide-ranging subject, often presented with unexplained 'facts', that work to confuse, plus perplexing mysteries, and exciting possibilities.

The classic form of perspective that we learned (at least something about) at school is graphical/linear perspective; which asks how to draw a picture on a plane surface that represents a three-dimensional object/scene in such a way that the various portions of the picture, in their mutual relations, present the same aspect as do the corresponding visible parts (or outlines) of the object/scene. However, there are many other kinds of perspective, and in this *Dictionary of Perspective*, we list 1,200 types/forms!

Perspective is a rapidly evolving and highly technical discipline that underpins fundamental topics in art, science, and technology. Several different classes of perspective are known. We have visual, mathematical, graphical, and instrument kinds of optical perspective, etc. However, multiple types of perspective tend to operate simultaneously, so it is difficult to identify the root causes of specific visual effects. For example, we cannot easily separate environmental optics (or environmental perspective) from the human visual system (visual perspective of the second type). Overall, it seems that nobody has clarified the different facets of the subject by supplying strict logical definitions; cataloguing all classes/branches, while unifying all of the axioms and principles that relate to perspective types/forms and associated visual phenomena.

Introduced is a scheme to unite all perspective knowledge in a single framework: **perspective category theory** (PCT), heralding the birth of perspective science as a primary branch of knowledge—with established foundational theory and, above all, unified laws.

Perspective Category Theory

We begin by identifying the visual and symbolic classes of perspective, which correspond to the two basic kinds of images: visual and non-visual. At once, we shall discard symbolic perspective (e.g., literal/metaphorical perspective) and other forms related to mental outlook/prospect, imagination, etc., as well as the logical, symbolic, and language-based dimensions of perspective, as being outside the present discussion (ostensibly).

Visual perspective <IMAGING CLASS> (of the first type, or not primarily related to the human visual system) is when a visual image is used to **view, match, represent, create an illusion of, or an immersion into,** the visual appearance of a spatial object/scene. In this book series, we are mainly concerned with one class of visual perspective, namely, optical perspective.

Optical perspective <IMAGING + PROJECTING CLASSES> is concerned with **viewing**, **recording** <CAPTURING> **presenting** <DISPLAYING> and **interpreting** <DECODING> images of, or **projecting** <PROJECTING> images into, a three-dimensional space (e.g. the physical world). It encompasses all types of perspective that use, or purport to use, light, or electromagnetic radiation (ref. real, imaginary, or simulated light-rays, etc), to capture/project visual aspect(s) of a spatial scene; including all wavelength ranges from gamma-rays, x-rays, visible-spectrum, microwaves, radio, etc.

We have two types of optical perspective <IMAGING CLASS>. Firstly, **technical perspective** is any systematic process producing a detailed *visual image, view, measurement, representation or model* of a three-dimensional (3-D) object or scene. Technical perspective is formed by optically, mathematically, geometrically, or logically correct/known/consistent principles. Technical perspective is an objective method (of representation), or else an optical imaging process, and can be separated into distinct categories.

Secondly, **non-technical perspective** is any non-systematic process producing a *visual image, view, representation or model,* of a three-dimensional (3-D) object or scene. Non-technical perspective is formed using optically, mathematically, geometrically, or logically incorrect/unknown/inconsistent principles/methods. Subjects classified under non-technical perspective include *aperspective, axial and negative perspective, freehand drawing, non-representative art, cubism, etc.*

Noteworthy is that perspective category theory (PCT) enables us to identify the sources (and types) of perspective processes and resultant phenomena operating in a practical situation. However, sometimes more than one category is involved simultaneously to produce a particular perspective view/image, a process called **category overloading.**

An example of category overloading is that mathematical perspective often contributes to other kinds of technical perspective. Such mathematical contributions arise either from natural optical effects resulting from the laws of physics/optics, or from an inherent instrument perspective and/or a visual perspective (second type), or from the application of human-designed rules/algorithms to a visual scene.

Technical perspective has six categories:

- **Natural Perspective:** images/views of natural and built worlds, including **visual perspective (second type)** or direct looking at physical reality using human or animal vision (ref. view of a three-dimensional object/scene). Includes **environmental perspective**, viewpoint geometries, or naturally occurring optical effects such as projection of light beams, shadows/outlines, line-of-sight problems, translucency/reflection/colour effects, astronomical, atmospheric, underwater optics, etc. Environmental perspective includes (aspects of) human-designed optical vistas (e.g., architecture, gardens, etc.);
- **Mathematical Perspective:** images/views of a spatial reality, by geometrical modelling of a spatial reality or mathematical shaping of appearance(s); includes the second mathematical type or *geometrical perspective* (graphical calculations), and also the third type *projection perspective* dealing with mathematical projections;
- **Graphical Perspective:** images/views of a spatial reality as **created on media** (old and new), by copying or creating the appearance(s) of a spatial reality, or making representations of a spatial reality;
- **Instrument Perspective:** images/views of spatial/physical reality, by looking at, capturing, measuring, projecting a spatial reality using optical instruments and machines; and/or by projecting appearance(s) or representation(s) of a spatial reality;
- **Simulated Perspective:** designed illusive/immersive images/views of a spatial reality, by visual illusion or optical adjustment of physical reality by the construction of a false spatial reality, or by the representation of a false spatial reality (distorted/transposed scene geometry);
- **New Media Perspective:** images/views of a spatial reality as **created by New Media,** and by connecting/linking, ordering, constructing, matching, mixing, exploring, and cross-matching: multiple image(s)/view(s) of a spatial reality.

AI-related perspectives are included under the New Media perspective category, as explained later.

Our goal is to simplify and clarify the subject of perspective, and we must identify, gather and integrate a vast number of perspective facts, principles, types/forms, methods, systems, and phenomena. Henceforth, we are building an accurate taxonomy to catalogue all classes/branches of perspective—a monumental task that has not been previously performed.

Visual Perspective (Second Type)

To begin, we have a type of natural perspective named **visual perspective (2nd type or retinal perspective)**—sometimes called 'true' perspective—that applies when a human views a scene in the real world (unaided eyesight). We shall (briefly) skip over other types of natural perspective, including topics such as shadow projection, environmental optics, and animal vision.

Visual perspective (2nd type) refers to a human looking at a scene from a specific viewpoint, whereby produced is a set of image transformation effects correlated with visual aspect, depth and/or vanishing points (for example). Said effects (or perspective phenomena) depend on scene geometry relative to the observer's station or viewpoint, or the particular distances and viewing angles of scene structural elements (ref. apparent object size/shape and location, etc).

Visual perspective produces images enabled/limited by human visual apparatus. Several related visual processes accrue, including scene projection onto a curved retina, binocular perception, a narrow field of distinct vision, a shallow and curved plane of distinct vision (horopter), and scene perspective changes due to a moving head/eyeball. Human vision is inherently complex and involves many interrelated physiological and psychological mechanisms, and certain key visual processes, such as binocular perception, remain poorly understood.

Mathematical Perspective

Next, we have **mathematical perspective,** which refers to the operation of algorithmic rules to transform (or model) the appearance of scene/object geometry. One example is transforming an object's form/scale or outline/shadow (visual appearance) according to a particular mathematical law/rule—happening either within a representation (e.g. a drawing) or in a real/live optical image. Ergo, mathematical perspective is comprised of geometric transformations such as projection, translation, reflection, rotation etc., plus related image distortion effects.

Mathematical perspective often involves applying a valid theory of spatial geometry to a real-world problem (sometimes on a grand scale). Examples include *modelling sun position relative to an earth-bound observer, Global Positioning Satellite (GPS) calculations, calculation of latitude/longitude, mapping of 3-D spherical earth coordinates onto 2-D maps, and astronomical calculations such as prediction of planetary orbits*. Mathematical perspective often contributes to the other kinds of technical perspective. Such mathematical contributions arise from natural visual effects resulting from the laws of physics/optics, the inherent instrument perspective, or the application of human-designed algorithms to a visual scene.

We have three kinds of mathematical perspective:

- **Algebraic Perspective** [non-visual class]: application of algebraic formulae.
- **Geometrical Perspective** [analytical visual class]: employs graphical calculation.
- **Projection Perspective** [projective visual class]: employs spatial projection.

Algebraic perspective refers to mathematical images composed (solely) of letters and symbols. Accordingly, we have categorised this as a form of symbolic perspective, hence it is a non-visual class of perspective.

Geometrical perspective employs analytic geometry, also called coordinate geometry, or the use of algebraic symbolism and methods to represent and solve spatial problems. Analytic geometry refers to spatial modelling using graphical points, lines, and multi-dimensional objects, shapes, surfaces, and solids. Ergo, due to its inherent links with analytical geometry, we have categorised geometrical perspective as a form of visual perspective (1st type).

Another form of visual perspective (1st type) is **projection perspective,** which refers to applying projective principles to create an image or view of a spatial scene or object. This type employs either **descriptive geometry** (i.e. parallel perspective: plan, front-elevation, side-elevation views within a machine/technical drawing), or **projective geometry** (e.g. linear perspective), to produce images of spatial reality. It is common practice (in art, science, technology, etc.) to study the visual classes of mathematical perspective; namely geometrical perspective (images formed by graphical calculation), and projection perspective (images formed by optical projection), as well as any combination of the two.

Graphical Perspective

Another form of technical perspective is—**graphical perspective**—which attempts to create accurate representations of spatial reality **on** media (old/new media). For example, graphical perspective may simulate an illusory three-dimensional (3-D) view—produced by notional and 'natural looking' vanishing points, foreshortening, the effects of aerial perspective, etc. Often a graphical perspective is employed for transcription in technical drawing, or for artistic purposes. Graphical perspective is also extensively employed for computer-generated imagery, including applications such as *Computer Aided Design (CAD), digital games, animation, and movie special effects (SFX, SPFX, FX) etc.* Examples are images made using linear and parallel forms.

As an aside, linear perspective, while ostensibly 'invented' during the Renaissance, in actuality most of its component elements developed over several hundred earlier years (but not 'unified' vanishing point(s)). Nonetheless, the precise mathematical rules of linear perspective did not emerge until 1415-20, with the **legitimate construction** by Alberti.

Instrument Perspective

Next, we have **instrument perspective**; which is generated whenever an instrument, of one type or another, is used to **capture, measure or project/display** an image of a spatial scene or object (i.e., an aspect of physical reality).

A captured perspective image is an image formed by an instrument of a scene that has undergone a particular set of visual transformations relative to the scene geometry. One example is when a camera lens creates a 2-D image of a 3-D scene (ref. photographic perspective)—and image transformations unique to the lens itself (or another lens with similar optics) are introduced.

Other kinds of instrument perspectives are employed for moving image capture/projection, including those provided by cinema and television cameras. Here, moving images also capture the dimension of time, producing motion perspectives. Associated camera techniques include zoom and pan, 'dolly' shots, first-person tracking, and the use of interchangeable focal-length lenses. Plus, we have many 'arbitrary' camera movements, etc.

Patently, the instrument perspectives of today provide far more informative views of physical reality, because they are more detailed, sensitive, colourful, and all-encompassing. For example, we have high-tech telescopes (on the ground and in space); that can form images of incredibly faint and distant objects (up to 13 billion light-years distant!).

Sometimes a special type of device, here called a **perspective measuring instrument**, is explicitly employed to make accurate measurements in the physical world. Whereby, a perspective measuring instrument—is defined as an instrument whose operating mechanism is based on accurate modelling theories/principles of perspective, thus enabling accurate dimensional measurements to be taken in relation to a particular aspect of spatial reality.

Types of perspective measuring instruments used for specific purposes include: **for general tasks**: t*he ruler, callipers and compass*. **For navigation:** t*he quadrant, cosmolabe, the proportional compass, and the sextant*; **for astronomy:** *astrolabes, sundials, telescopes and planispheres;* and **for cartography:** *the theodolite, etc.*

Of course, instrument perspectives are not limited to image measurement but also relate to image capture, projection, and display. In this respect, many innovations have occurred, ranging from the earliest, such as the *magic lantern* (an early projector) and *kinetoscope* (an early cinema camera/projector), to *computer displays*, plus *cinema techniques* such as *wide-screen and 3-D cinema*, and *immersive movie/TV systems* (including IMAX/Sphere 'spherical' theatres). Sometimes an optical instrument is used for both image capture and projection.

One example is a plane mirror image of an object. The reflected image appears at the same distance behind the mirror as the object is in front, only laterally inverted (apparently). Ergo, the illusion of a doppelgänger *mirror world* is created.

Mirror perspective is a unique class of instrument perspective that can form amazing optical effects commonly employed in magic tricks, stage illusions, etc. For example, clever mirror arrangements can produce unusual perspective-related: *image-fictions, illusions, ambiguities, invisibilities, distortions, and paradoxes, etc.*

Noteworthy is that the visual, mathematical, and instrument perspective types; often tend to merge, or blend, on a particular viewing occasion to produce a **combined perspective system** (often without the observer noticing). Plus, remember that various kinds of mathematical perspective, will inherently be involved in, and contribute to, all of these other forms of perspective. We can conclude that everyday perspective effects are many and varied, and complex indeed!

New Media Perspective

The term **New Media perspective**, refers to the particular imaging capabilities and visual transformations provided by a new media system. The New Media perspective, consists of multiple linked instances of other *natural/ instrument/mathematical/graphical perspectives (ref. a perspective multi-system)*.

Examples of New Media perspectives include: *Internet and Web-based information systems, streaming TV networks, smartphone applications, networked devices, satellite imaging systems*, *GPS, and VR, AR, MR, and XR systems,* etc. More recently, the Stagecraft Virtual Production Environment provides a seamless blend of actors with physical and virtual/digital environments during filming.

Overall, in the case of a highly developed *New Media perspective system/model,* views from one or more of the other *categories of perspective* (listed above), may be *connected/linked-together and then ordered, constructed, matched, mixed, explored, overlaid, and cross-matched, etc*. The result is the formation of a new class of multi-view/multi-time/ multi-scale perspective. Henceforth, a new era is emerging: multiple, all-encompassing virtual 'worlds'!

To produce a true multi-view perspective, it is a requirement that all of the contained perspective views must be adequately linked, indexed, registered and hence integrated together, and in such a manner that the resultant blended real/virtual world(s) are readily explorable. Specific examples of New Media perspective systems that work this way include *Google Maps, Google Earth*. Such systems create full-blown Virtual/Extended Reality Worlds from a combination of thousands of images, often photographs of the same area taken from slightly different viewpoints or from a variety of locations in space/time. Through advanced mathematical techniques, it is then possible to merge all of these images into a single virtual image space.

Ergo, such a *Virtual/ Extended Reality World*, enables efficient navigation and rapid viewing of a huge number and a great variety of different perspective views; possibly including images (and related 'visual' constructions) taken from 'mathematically' created and/or normally 'impossible' viewpoints!

Managing Complexity

We've identified six classes of visual perspective, highlighting its complexity; how do we manage it?

Perspective category theory has been developed to foster rapid classification of perspective facts/ principles/types/methods/systems/phenomena, and to enable detailed analysis of all forms of visual/ optical perspective. Ergo said theory allows us to define all top-level classes/categories/forms of technical perspective and elucidates links between the same, whilst providing a practical framework that encapsulates, or accommodates, many (or all) visual theories of spatial imaging/projection/viewing in a single model.

In any case, perceptions change across different media—and since our spatial perception is altered by each new medium we introduce, we need to manage, measure, and understand these effects. It is important to remember also that many perspective views/images are subject to the capabilities and limitations of the human visual system or visual perspective (2nd type).

Another interesting category/form of *optical perspective* are *perspective illusions*, or images that evoke the illusion of, or immersion into, a spatial reality, as explained below.

Perspective Illusions

Perspective techniques are sometimes used to create visual illusions. Typically a **perspective illusion** makes false impressions of *size, depth, position, place (immersion), or transparency* for objects/people. One example is when dimensionality is adjusted within a scene, making an object appear farther away, closer, larger, or smaller than it is.

The four types of *optical perspective illusions* are:

1. **Visual Perspective Illusion**: illusion by perceptually adjusted appearance (false direct view of physical reality);
2. **Graphical Perspective Illusion** (includes *perspective drawings/paintings*): illusion by graphically constructed appearance (false apparent view of spatial scene);
3. **Instrument Perspective Illusion***:* illusion by secondary visual images (VR/AR, holograms, etc), and/or projected appearance (false-formed view of 3-D scene);
4. **Forced Perspective Illusion:** illusion by physical construction of a false physical reality (apparent), or by the representation of a false physical reality (distorted/ transposed scene geometry with apparent illusive effects).

Now, let's examine these illusion classes.

Visual Illusions

Firstly, we have a **visual perspective illusion,** or the formation of a false view of physical reality. Here, the illusion is caused by the visual/environmental optics and related 'false' perceptions. A classic illusion is the apparent bending of a half-submerged stick (scene appearance does not match physical geometry).

Graphical Illusions

Next, we have **graphical perspective illusion,** where the goal is to copy physical reality or create the appearance of a spatial reality (actual or imaginary scene). When we wish to copy reality, a representation of 'true' reality is created, such as a *perspective drawing* of a real-world scene (a graphic that reflects aspects of the appearance or actual geometry of a spatial scene). As an alternative, we can use graphical perspective to represent an imaginary world; for example, a *perspective drawing* of a scene from the '*Lord of The Rings*' book.

Instrument Illusions

Thirdly, we have **instrument perspective illusion**, where the goal is to form a false (secondary) view of, or project a false appearance of, an actual or imaginary scene (the view distorts/changes certain aspects of the depicted scene geometry, but accurately reflects certain other aspects of depicted scene geometry). Noteworthy is that the illusion is caused by the instrument itself. One example is *Virtual or Augmented/Extended Reality*, where a 3-D virtual scene is projected into a person's field of view. Another well-known example of an instrument perspective illusion, is a **hologram**, which produces a real-space three-dimensional image by reconstruction of light wavefront(s).

Yet another form of instrument perspective illusion is **projection mapping,** similar to '*Mixed Reality*' techniques such as video mapping and spatial *Augmented Reality.* In this technique, real-world 2-D/3-D objects, often irregularly shaped, are sometimes used as a display surface for video projection (usually by rear or back-screen projection).

Transparent Illusions

An interesting form of instrument-generated illusion is a **transparent perspective illusion** which produces transparent, see-through, or multi-layer views/images of a three-dimensional object/scene.

There are two basic types of transparent perspective. Firstly, we have a projection of transparent views/images of three-dimensional objects/scenes onto a computer display. A second type of transparent perspective illusion is similar to '*Mixed Reality*' techniques, such as spatial *Augmented / Extended Reality.* In this latter technique, 3-D transparent or multi-layer views of an object are projected onto/into the physical environment, and sometimes stereoscopically through a *Virtual Reality* or *Augmented Reality* headset (for example).

Oftentimes, both types of transparent perspective employ 3-D projected data/models from CAD or CGI models, or 3-D projected data/models from 3-D computer scanning methods such as tomography, x-ray systems, or else from magnetic resonance imaging, etc.

It is sometimes possible to project transparent, true-scale, and multi-layer views of an object's interior structures onto a real-world object, enabling a person to see inside the object. Whilst another type of instrument perspective illusion is the type of *Virtual/Extended Reality* headset system debuted by the US company Apple in 2023 and named *Apple Vision;* whereby an interactive '*Mixed/Augmented Reality*' world is projected, or overlaid, onto the physical world.

Simulated and Forced Perspective Illusions

Finally, we have **simulated perspective illusion.** Here, the goal is illusion by constructing a false reality (the appearance of a false reality) or by representing a false reality. The scene's physical geometry is distorted/transposed relative to its expected appearance (e.g., unnatural scaling or object positions), creating an optical illusion. Noteworthy is that the illusion is caused by the nature of the scene geometry itself. For example, the illusion makes an object appear farther away, closer, larger, or smaller than it actually is (the scene's appearance is wholly at odds with the actual geometry).

An example of *forced perspective*, is when stage scenery employs false horizons, unnatural object scaling, false and 'accelerated' vanishing points, painted panoramic backdrops, mirror illusions, etc., to create the illusion of a distant background or the presence of ghostly figures, etc. It is noteworthy that simulated and forced perspective Illusions may come in various forms, for example, unique arrangements of 2-D and 3-D scenography, unusual photographic backdrops, large graphic elements, and even large-scale holograms, etc.

Mirror / Hybrid / Mixed Illusions

Importantly, all (or some) of the different categories of optical perspective illusion may be combined and blend together. Plus, many other types of spatial illusion(s) are possible, which are not (wholly) related to optical perspective but rather have visual, physiological, and cognitive sources.

Overall, the subject of optical perspective illusions is vast, with hundreds of illusions identified within the categories defined herein. In summary, we can state that optical perspective has been widely employed to produce optical illusions of various kinds. Indeed, producing the false illusion of depth or 3-D on a 2-D picture surface (mimesis) is one of the primary applications of perspective.

Perspective Phenomena

An individual perspective category/form demonstrates, and is recognised by, certain perspective phenomena. Perspective phenomena refer to apparent, generalised changes in the visual features of objects and scenes that occur according to a particular type of perspective and its inherent processes. One example is foreshortening, which has two types/components (possibly interacting): the geometrical or axonometric class and the optical or perspectival class.

Overall, certain forms of graphical perspective can produce the illusion of 3-D space on a flat picture surface by employing flat images that evoke specific perspective phenomena—or **size/depth/shape/position cues,** including:

- **Diminution of Size**: remote objects are smaller.
- **Foreshortening**: axonometric/geometric and optical/perspectival types.
- **Diminution of Form**: remote objects are less distinct.
- **Degradation of Form**: apparent shape changes.
- **Diminution of Colour/Contrast**: Aerial Perspective.
- 'Natural looking' vanishing points, horizon line.
- ++ other depth/size/shape cues etc.

It is important to note that not all forms of graphical perspective employ/exhibit every single type of perspective phenomenon. *Parallel perspective* (for example) uses only the *aspect of form* and *axonometric foreshortening* but not *diminution of size*, *optical foreshortening*, *horizon line, or vanishing points*.

Perspective Principle / Method

A **perspective principle** refers to an imaging mechanism, composable into a perspective method consisting of (at a minimum) real/modelled scene/object and picture-plane/surface structures, plus one or more <OPTICAL>, <MATHEMATICAL>, <GRAPHICAL>, <COMPUTER> process(es), working to produce a visual representation which reflects certain aspect(s) of a spatial reality.

A **perspective method** is any imaging technique that works to instantiate one or more *perspective principle(s),* resulting in a detailed **visual image, measurement, representation, model, view, or projection,** of a 3-D object or 3-D scene. Typically, one or more such methods are combined to render a view/image/measurement/model according to a particular category of technical perspective.

Formerly, a perspective method is encapsulated in perspective principles (imaging mechanisms), mathematical formulae, and theoretical or practical technique(s), etc., and typically consists of physical, optical, or information-processing structures/processes that are applied systematically to a 3-D scene. Such structures/processes can form naturally in the human eye or be applied with instruments, computers, or graphical techniques like linear perspective.

Perspective System

A perspective system is a particular scheme of visual/optical/technical perspective that operates as a unit of perspectival image-making capability, image-projecting capability, or else image-analysis/matching functionality. The perspective system may be comprised of one or more *categories of perspective*, operating with corresponding *principles and methods of perspective*.

A salient example of a perspective system is a person in a cinema theatre watching a movie. We have multiple types of perspective contributing to the overall visual experience. First, we have production of the movie using a combination of natural/environmental plus camera or instrument perspective(s). Next, we have instrument perspective from the projector in the cinema, and finally, visual perspective when the viewer looks at the movie screen images. Therefore, we have several interoperating perspective systems/categories that produce a corresponding set of visual transformations for the resultant perspective images. In this case, the 'image-chain' passes from camera, projector, to human-eye, and the entire procedure is considered to be a single perspective system.

Notice how perspective category theory helps us to identify which types of *perspective principles, methods, and phenomena* are evident in a practical situation. However, consider that the *linear perspective* form is both a *mathematical* and a *graphical perspective* simultaneously. Hence, a particular perspective image/view may fall under multiple categories (and be shaped accordingly). Another factor to consider is the psychological dimensions of v*isual perspective*, which can strongly affect the perception of views/images as well. The aforementioned perspective elements help us to break down what would otherwise be a highly complex (and often obscured) group of optical/geometrical/perceptual processes. Ergo, *perspective category theory* allows us to identify and separate *technical perspective* into an eminently manageable set of readily identifiable facets.

Perspective Model

A **perspective model** is a *perspective system* that enables the building of a comprehensive three-dimensional visual representation of a spatial reality. A **virtual perspective model** is a C*omputer Graphic* (CG) copy of the overall form/structure of, plus material/optical processes within, a spatial reality*;* and includes mathematical modelling to accurately represent complex visual facets. Correct scaling, proportions, and arrangement of linked images are set up to form a coherent, unified, often interactive, copy of a spatial reality. Oftentimes, accurate *multi-view/multi-scale/multi-time images/views* may be created in relation to mapped object/scene facets. Examples of *virtual perspective models* include *CAD, CGI, CV, GIS systems, Virtual, Extended, Augmented Reality, etc.*

Goals of Perspective

A ***perspective image*** is a visual image formed by a *category of optical perspective* that works to **view, match, represent, and make an illusion of, or apparent immersion into, spatial reality**.

Goals of *optical perspective* <IMAGING CLASS>:

- **View:** look at a spatial reality—capture/prescribe/observe *perspective images* of a 3-D scene.
- **Match**: measure a spatial reality—figure/survey/classify/match/cross-match *perspective images* of a 3-D scene.
- **Represent**: copy a spatial reality—model/index/link/mix/explore *perspective images* of a 3-D scene.
- **Illusion/Immersion**: false impression of viewer's place, false object dimensionality: size, depth, transparency, etc.

Patently, the five **goals of perspective** relate to specific outcomes tied to generating perspective image(s), of one kind or another. Each goal may be met by a s*ystem of perspective* that embodies the c*ategories/forms of perspective*, with corresponding *perspective phenomena,* and utilising one or more *principles*/m*ethods of perspective*.

As stated, *technical perspective* falls under the heading of *optical perspective*, and is any optical process that forms a detailed visual image, measurement, representation, model, or view, of a 3-D object or scene (ostensibly). These outcomes relate to the ***products of perspective;*** or attaining ***subsumptive data*** *(whole/part),* ***ordinal data*** *(figure/size/scale/position) and/or* ***determinative data*** *(state/activity)* from a perspective image and in relation to a spatial reality.

Perspective unlocks a whole universe of visual complexity. The various classes of technical perspective can produce an exceptionally diverse range of visual images/views. Perspective, in general, enables *capturing, observing, prescribing, measuring, calculating, classifying, modelling, surveying, mapping, indexing, gauging, certifying, linking, mixing, exploring, displaying, and projecting* perspective images, of the physical world. These are the ***functions of perspective*** (or a partial subset of the same).

By now the reader will be aware that the field of visual/optical/technical perspective is highly complex; and further that everyday perspective scenarios—such as a person watching a movie or television program, or else looking at a painting or photograph, are examples of perspective processes that can only be fully understood by using strict logical definitions/concepts, including appropriate application of *perspective principles, facts, methods, systems, and associated theory, etc.*

New visual solutions can be created using perspective views, but the effectiveness of this method for specific problems remains unclear. Key challenges for a generalised perspective system must be addressed.

Problem of Scale

A fundamental tenet of *linear perspective* is the inverse size-distance law, which states that if one doubles the distance, the represented size is one-half. If one tripled the distance, the size was one-third and so on. Indeed, this law is still basic and applies to many problems in science/engineering.

In 1967, Benoit Mandelbrot (1924-2010) wrote an interesting article on Fractals that questioned the universal applicability of the size-distance law [52]. Mandelbrot's article concerned the size of the coast of Britain, and implicitly introduced a spanner into this assumption by showing that **size** was a function of both **scale** and **distance**. The measured coastline length depends upon scale or the apparent 'jaggedness' of coastal outline. Accordingly, walking or taking a boat around the coastline will involve travelling vastly different distances in each case! Modern mapping systems like *Google Maps* do (or should) implicitly consider related 'scaling' effects when calculating route distances/arrival-times for walking, driving, etc.

In a sense, we have been vaguely aware of this ever since the 17th century. The shape of an ordinary image is transformed entirely when we change its scale in a telescope or a microscope. What is needed is a new approach to perspective—***multi-scale perspective***—that takes into account scale as well as distance, so that any given shape only applies within a given range of scales. This multi-scale capability is vitally important in a world where we travel between scales with greater frequency. True multi-scale views/images/measurements would open the way for a better understanding of, and producing links between, *nanoscopic, atomic, microscopic structures and macroscopic happenings* [10].

Problem of Viewpoint

There is another fundamental problem that affects all *perspective methods and applications*. Images of spatial objects taken from different viewpoints are entirely different in shape. This is due to the singular optics and geometry associated with a particular viewpoint (ref. *aspect and perspectival foreshortening, etc.*). Each view contains unique (but partial) information about the 3-D scene or 3-D object under inspection.

To visually probe—or model/understand—an object/scene sufficiently, we often need to employ a multi-view perspective, in which we take (and combine) views from different viewpoints and directions. This can potentially be performed using a new media system (networked digital media). Accordingly, views taken from multiple points may be linked and then algorithmically combined to produce an accurate model of the 3-D geometry of the spatial scene. However, so doing is non-trivial. Ergo, the problem of viewpoint integration is a common yet largely unsolved requirement for media systems in general.

Problem of Time

Perspective is not only concerned with ***physical space;*** but with ***time*** also, or it should be (in truth). Wherein time can be defined as the continuous progress of existence and events in the past, present and future! Put simply, time deals with motion and change—and relates to object states/activity ***(determinative data)***, plus changes in the 'spatial' object/scene facets ***(subsumptive and ordinal data)***. Patently, the physical world is the result of many interrelated and interoperating processes that occur across a wide variety of space/time scales.

We need to capture, record, and manipulate systemised time-flows—in our perspective views (ref. films)—using ***multi-time perspective***. With the aid of 'temporal' focus and lens techniques, a continuum eliminates the gap between macro- and micro- time-flows. Ergo, the viewer could jump straight to any point in space/time, and choose the correct time-flow rate to observe a particular process. Typically today, we see a narrow range of time-flows provided by a single image stream, limited at one end by the camera frame rate—and the other by the overall length of recording time. Needed are ways to overcome this deficiency—and develop 'conjoined' image space(s) with hyperlinked time-flows that can be—*indexed, classified, linked, mixed, combined, searched, and explored*.

Problem of Reality

Perspective views/images, are the primary way we obtain knowledge of physical reality. We are constantly looking at the world directly with our eyes or through optical and sensing instruments to observe perspective representations of all kinds. Whereby photographs, drawings, paintings, diagrams, moving TV and cinema images, plus computer/mobile screens, are ever close at hand, enabling the rapid consumption of a nearly unlimited number of perspective views/images.

But there are significant problem(s) related to the correct interpretation of each perspective view/image. How do we make the 'perceptual leap' from what is often a flat or two-dimensional picture taken from a single viewpoint, and then construct an accurate understanding (or model) of a three-dimensional scene/object? Ostensibly, this process is physically impossible. How then is an accurate encoding/decoding, of a perspective image even attainable (on certain occasions)?

Questions surrounding the degree of correspondence with reality, and the inherent limitation(s) in this respect of perspective views/images are much debated. In a sense, there is no single '*optical reality*'; because each perspective image involves unique visual, optical, geometrical, and (often) psychological factors such that particular solutions are required. Hopefully, in at least some cases, we can fruitfully begin the process of analysing perspective processes/outcomes as explained herein (ref. decoding images of spatial reality).

Ambiguities of Name / Type / Definition

Perspective is a complex topic, one beset by problems in establishing accurate, precise, consistent, and widely accepted concept definitions. Such problems arise because experts have employed different terms for the same concept, or used the same term for different concepts, etc. These problems are compounded because people use the term 'perspective' imprecisely, sometimes referring to both perspective method(s) and outcome(s). We have attempted to sidestep these problems by using overt concept definitions, but ambiguities and issues remain, as explained below.

Categorical ambiguity: A perspective category refers to a specific class of perspective system (or perspectival method); with a corresponding set of optical, mathematical, graphical, instrument/illusive, or new-media processes. Oftentimes, more than one category is involved simultaneously to produce a perspective view/image; this is called **composite perspective** or **category chaining**, as when we use a camera (instrument perspective) to photograph a natural scene (natural perspective). Sometimes the same sub-class can appear under multiple top-level categories; named **category overloading**; for example, when we have a linear perspective drawing, which seems to be equally a graphical and mathematical process simultaneously.

At this stage, we need to distinguish between two kinds of perspective-image form (perspective outcome). A **perspective geometric image form** refers to the overall (apparently transformed) geometry (e.g. object lines/outline) of a perspective image/view, including (for example) the edge outlines, number and position of any vanishing points, horizon lines, etc. Whereas a **perspective optical image form** refers to the overall (possibly transformed) light-ray intensity and wavelength/wavelength detected features, colour/contrast facets of a perspective image/view.

Category/Form ambiguity: Sometimes a perspective type appears to be both a perspective category (method) and perspective form (outcome) at the same time. But why is this so? The answer is that (for example) linear perspective is a name that applies to both a perspective category (a method/process) and a perspective geometric image form (image shape or appearance geometry) simultaneously. This may seem a little confusing, but if we consider that the optical perspective is defined as an image-making process, it becomes clear that we can refer to either the process and/or its outcome(s) as required.

Our scheme clarifies the multiple, sometimes confusing uses of perspective terms. This is evident in linear perspective, which has many variants/dopplegangers: first, in different (process) categories, including graphical and photographic categories; and second, in different (transformed image) perspective geometric forms, such as 1-2-3-point perspective images.

Mode of Visual Appearance

Many distinctions can be made for *visual/optical/technical perspective*; including *natural*, *artificial*, *synthetic perspective(s)*; plus the *imaging* and *projective* types. Unfortunately, the complexity of visual/optical perspective (as a subject) increases significantly when we expand out the developing taxonomy from these basic concepts, whereby we have identified 1200 types of optical perspective as detailed in this *Dictionary of Perspective*. And subject complexity only increases when we consider that the different types of perspective can combine, interrelate, and do so in various ways, plus with a host of associated facets.

What to do? Perhaps only to consider what perspective is, in and of itself. Perspective relates to a **mode of visual appearance**—or a particular way that spatial reality appears—given a visual operation or set of image detecting/projecting methods, using specific recording/display apparatus, and with perceptual interpretations/assumptions, etc. Accordingly, we humans employ various perspective methods, to view, measure, calculate, represent aspects of spatial reality, and to immerse into, or create the illusion of, perspective appearances.

Natural, Artificial, Synthetic, Simulated Perspective

Earlier, we identified the natural, artificial, and synthetic classes of perspective. **Natural perspective** includes visual perspective (second type) and environmental perspective or the optics of natural scenes. **Artificial perspective** includes mathematical, graphical, instrument, simulated and New Media types.

A **synthetic perspective** is any systematic or accidental combination of natural and artificial perspective. Note here that the real/represented or natural/artificial spaces are visually identical and merge perceptually, unlike with **combined perspective** where the spaces remain distinct perceptually (see later). According to a broad definition of synthetic perspective, many perspective categories/methods/images fall under this class; and because the capture and viewing of optical images (from physical reality) inherently involves interaction of natural and artificial classes; for example when using human eyesight (natural perspective) to view photographic images (artificial perspective) of physical reality (environmental perspective). Normally, all types of optical views/images fall under the synthetic moniker, including 1-D, 2-D, and 3-D optical image types. Ergo, included in this definition are perspective images of physical reality produced by any kind of perspective instrument or new media system, etc.

Simulated or forced perspective refers to designed <FALSE> illusive/immersive images/views of a spatial reality, by visual illusion or optical adjustment of physical reality, or by the representation of a false spatial reality (distorted/transposed scene geometry). Included in this definition are all perspective methods that produce the illusion of a 'false' 3-D space, including AR/VR/XR, stereoscopes, accelerated perspective, etc.

Accelerated perspective is a type of simulated and (possibly) synthetic perspective that employs false perspective to increase the perspective recession, or increase the converging angle of lines directed towards vanishing points, thereby increasing the apparent depth. Consider also the reverse: **decelerated perspective.**

Single, Composite, Mixed Perspective

Perspective is a set of image transformation processes, whereby the perspective image chain consists of either a **single perspective** category of a perspective system or many, as in **composite perspective** when more than one (artificial/synthetic) category is involved simultaneously to produce a perspective view/image.

Visual/optical/technical perspective can be separated into two classes: firstly the **imaging perspective** class: capturing/forming an image/view, measurement, representation, or illusion, of a spatial reality (3-D); and secondly, the **projecting class**: projecting visual images, light-beams/pencils and/or object shadows into physical reality. However, we can have a third class, **mixed perspective** that refers to a combination of imaging and projecting classes; as can happen with cinema projectors, mirrors, virtual reality, etc.

Ordinary and Blended (Double) Perspective

Object space refers to the target space of a perspective system, through and into which the spatial scene/object(s) is/are observed. In classical perspective, with optical situations operating in the local environment, the object space is Euclidean, infinite, isotropic, three-dimensional, homogeneous, and kinaesthetic. Object space is identical to the so-called metric, isotopic, and/or surveyor's space, and consists of 1-D, 2-D, or 3-D object/scene structures in a 3-D spatial reality.

We have two types of spatial class; ordinary and blended perspective. **Ordinary scene perspective** is an image/view of a spatial scene that comprises a single scene, or is comprised (optically and truly) of a homogenous geometry, or geometrically unified spatial scene, being a spatial scene that is not composite (i.e. not synthetic), being **geometrically unified (from all viewpoints)** and consisting of a single-scale space. This is the perspective that we experience when looking at the natural environment or photographs, paintings, movies, etc.

Blended scene perspective, or double/multi-scene perspective, is an image/view of a spatial scene that comprises two or more separate (and differently scaled/structured) spacial geometries; whereby the resultant scene appears to (falsely) consist of a homogenous spatial geometry (single-scale space); however, in reality, two or more geometries have been combined (often seen as such from only a single viewpoint) to appear as a fully united and integrated spatial geometry. Another type is **blended image perspective,** or multi-view perspective, defined as when several images/views of a spatial scene are blended or merged into a single image-space.

Real, Represented, and Combined Perspective

Image space refers to an apparent visual/optical space formed/generated by a perspective system of one kind or another. In a classical perspective image (ref. spatial recession form such as linear perspective) said viewed/represented space is non-Euclidean, anisotropic, inhomogeneous, and three-dimensional (ostensibly). Still, sometimes it can be an apparently true 3-D space as with stereoscopic/immersive methods such as a virtual reality system, etc. However, often said image is formed onto a planar or flat picture plane and is, therefore, in reality, a two-dimensional image space that forms an apparent or false 3-D imaginary/illusive space. In the case of monocular visual perspective (2nd type), the perspective image is formed onto a spherical retina that is largely a two-dimensional recording surface, and is, therefore, ostensibly a two-dimensional image space that again forms a type of false 3-D apparent/imaginary or illusive space in the case of visual or retinal perspective.

A **combined perspective** (**multi-view type**), is any view/image that contains both **real** and **represented views**, which are overlaid but visually separated. An example might be looking through a gun sight, where you see a real-world perspective view of the outside world and simultaneously superimpose a represented sighting and/or optical scaling overlay that works in combination with the aforementioned view. Note that the real/represented spaces are visually distinct unlike with synthetic perspective where the spaces merge.

Another type of **combined perspective** (multi-scene type) is a class of **synthetic** and **blended scene perspective**, or an image/view that combines natural and artificially modified spatial scene elements. This is any perspective image formed from a synthetically unified spatial scene, a composite or optically unified scene (typically seen from a narrow range of viewpoints) that appears to consist only of a single-scale space. Requires use of simulated/forced/accelerated perspective methods and similar illusive techniques, to create the illusion of a single-scale space. **Blended**, or **double perspective**, is a combined perspective that can produce apparently hidden or invisible regions of space for objects to hide within or be rendered invisible, and/or regions of multi-scale space similar to the Ames distorted room illusion

Correspondence Problem

The 'correspondence or equivalence problem' of linear perspective; refers to the fact that for a 2-D monocular image of a 3-D object projected onto an image plane (or 2-D surface), the projection does not contain adequate information to unambiguously identify the 3-D object form/position; whereby many differently shaped/located 3-D objects can potentially produce the very same image form. To help solve this problem, we employ contextual factors, including often a metric grid or framework structure.

Metric Grids and Framework Structures

A **perspective framework** refers to an object space containing regular physical or geometric structures and/or metric-grids, sets of parallel and orthogonal lines, etc. Said structures, when observed/imaged, are named as **regular perspective** (regular shapes) as opposed to **irregular perspective** for irregularly shaped object forms. Useful understanding or decoding of a perspective image involves correctly interpreting an image's projected shape/size distortions.

This is where a method such as linear perspective comes into its own, whereby (often) we employ known perspective framework structures, including known ground plane geometry, upright picture plane, plus parallel lines and/or a metric grid, etc. Such structures enable humans to accurately decode the perspective image in geometric terms. Not every object space contains such structures, but many artistic/photographic linear perspective images reflect spaces that do contain (at least partial) framework structures.

Often, an object's apparent geometric features will be dramatically altered by the rules of perspective projection (for example). Indeed, this is what the perspective of forms is: visual changes of size/shape/angle/location according to viewpoint (sans parallel types). Since space is invisible, we need ways to structure spatial reality to enable reverse-engineering, or comprehension, of places/things. Geometrical assumptions—or known contexts—are used to solve such image decoding problems. We employ known perspective axes/lines/planes/grids/horizons to segment, order, index, measure, and gauge physical space.

Certain kinds of perspective, for example, multi-view parallel perspective, can provide a solution to the **correspondence problem** (reconciling object/image equivalency). However, no monocular 'convergent or parallel' perspective can entirely sidestep the **problem of scale**—because any increase in projection scale/resolution reveals new structural details and thus apparent shape/size changes in the perspective image. Using monocular perspective to view/image an unspecified spatial reality with wholly uncertain geometry, one cannot unambiguously identify the source spatial object/scene geometry—without adequate knowledge of key perspective method facets (ref. known viewpoint, standard picture-plane geometry, recognised objects, established metric grid, manifest projection scale/resolution, etc). In a way, a graphical perspective method such as linear perspective is a quantitative construction of space—whereby we employ pre-determined knowledge of spatial forms—or use of known, often designed, and regular scene geometry.

Ergo, we humans rely on the organisation of space through regular, recognisable patterns, often employing chequered planes of established size/structure to segment, order, index, measure, and gauge physical space.

Conclusion

Perspective is any visual, optical, or geometrical method of viewing, matching, representing, convincing illusions of, and apparent immersions into, spatial reality.

Patently, and regardless of type, perspective is an abstraction of reality. And as noted by Kim Veltman, perspective is a **halfway station where geometry and physical reality meet**—it is a link between the **ideal** and the **actual**. Hence, our views of physical reality are limited because data is inevitably lost when capturing the visual details of a spatial scene or object, and when analysing and interpreting the same. Assessing the degree of reality correspondence achieved with any perspective view/image relates to the 'objective' factors of vision/optics/geometry, plus 'subjective' elements from vision/philosophy/psychology. Perspective is an unsolved problem of the ages!

Unfortunately, perspective only takes us so far in comprehending physical reality. We must apply logic, scientific knowledge, contextual factors, and data from experience, to correctly and unambiguously interpret perspective views/images. Whereby perspective lies at the heart of many vision-related topics, theories, and inventions. It has been directly linked to the development of diverse fields, including *optics and vision, photography and cinema, astronomy, geography, engineering, cartography, architecture, stonecutting, surveying, and archaeology*.

A key requirement is to unify or integrate the vast number of *perspective principles, phenomena, theories, categories, forms, methods, systems, etc*. Hence, the approach presented here, whereby we are building an accurate taxonomic tree of *perspective types/forms*, and formulating a theoretical framework that can support the use of *perspective methods/systems* as applied in all application areas (across multiple disciplines). The various *types/forms, principles, phenomena, methods, systems, instruments,* etc., of *visual/optical/technical perspective* lie behind all such applications; either explicitly in terms of instrument designs and visual operating methods, or implicitly in terms of the ways that visual images are captured, processed, networked/shared, viewed, and comprehended in a host of optical, virtual, or digital ways. Ergo, today's perspective images are more detailed, colourful, distinct, wide-field, and realistic. Plus, perspective views/images—of both still and moving kinds—are far more numerous, relevant, and readily available, and thus impactful, than ever before.

In conclusion, perspective has profoundly influenced many visual theories, important discoveries, and practical methods within art, science, and technology. Perspective is a keystone to progress, and it is truly a foundation of human civilisation. A key challenge is applying both old and new forms of perspective in auspicious ways, enabling us to visualise, model, and create a more humane world.

Origins of the Dictionary of Perspective

A few words on how I came to write the *Dictionary of Perspective* seem pertinent. It all really began as a result of the passing of my dear friend and mentor, Kim Veltman, in 2020, when his closest friends and relatives suggested that I would be the ideal person to continue Kim's monumental work on perspective and that I should inherit his library and scientific work, which subsequently occurred.

To begin in 2020, I spent a considerable amount of time (6 months) transporting Kim's art/scientific library to my house in England before publishing Kim's 8-volume Encyclopaedia of Perspective in January 2021. I then spent another 6 months or so creating a full catalogue of the 5000-book library. In the meantime, I founded the Perspective Research Centre and built a website. All without major external funding, but with significant financial help from friends of mine and Kim.

Prior to this, I had been studying perspective and knowledge organisation on a full-time basis with Kim for over 2 decades. However, in mid-2021, I began my own research into perspective in earnest, setting the goal of producing a comprehensive 6-volume monograph on the technical aspects of the subject. By late 2023, I had produced the first draft of an introductory volume, but I had begun to realise that the subject was vast, far larger than I had imagined, and that in order to produce volumes with the necessary rigour, detail and scope, I would need to create a *Dictionary of Perspective*, and further that no such book had thus far been written.

Around 2021, I realised that I would need my own theory of perspective and also a taxonomic breakdown of perspective, so as to organise my studies. Over the next 5 years, I made many perspective lists of various kinds (over 100 such lists, each typically running to 100s of items), plus related concept diagrams (over 50 flowcharts, typically each with 50-500 items), all in line with the creation of an ontology of perspective. Eventually, I began amalgamating the various lists into 25 'mother' lists of perspective types/forms, methods, phenomena, and instruments. Next, I collated all of these lists into a single list of terms in late 2024, after which work began in earnest. The next phase of the dictionary, completing and filling out all of the definitions, lasted two more years of full-time work.

The reader may ask: Where did all of the definitions for the terms and types/forms of perspective come from? Well, many definitions are based upon the work of Kim Veltman and the writings of prominent experts, as well as from books and papers in the *Library of Perspective*. Plus, some definitions have been informed by online dictionaries, encyclopaedias, and artificial intelligence systems, etc. Also, I coined many new terms and definitions to represent novel ideas from perspective category theory.

TERM	DEFINITION
Accelerated Perspective	Accelerated perspective is a type of simulated and (possibly) synthetic perspective (apparent spatial structure) that employs forced perspective to increase the perspective recession, or increase the converging angle of lines directed towards vanishing points, and so to increase the apparent depth.
Axial Perspective	Axial, fishbone, or vanishing vertical axis perspective is a type of graphical perspective in which the apparent spatial scene is arranged around a vertical axis with multiple 'stacked' vanishing points.
Axonometric Perspective	A type of parallel/orthographic projection used for creating a pictorial drawing of a spatial object, where the object is rotated around one or more of its axes to reveal multiple sides.
Combined Perspective	Any view/image that contains both real and represented views. An example might be looking through a gun sight; whereby you see a real view superimposed with a sighting scale (spaces are visually distinct).
Composite Perspective	Often, more than one category is involved simultaneously to produce a perspective view/image; named as category chaining, such as when we use a camera (instrument perspective) to photograph a scene (natural perspective), and then view the photograph using visual perspective (2nd type).
Curvilinear Perspective	A type of central perspective in which the perspective scene has an overall curvilinear shape similar in form to the views projected by a fish-eye lens; and normally the image has 2-5 vanishing points.
Cylindrical Perspective	Employs a cylindrical picture plane to form images of a spatial reality, or employs a cylinder of vision to observe/represent spatial reality, or else creates a distorted cylindrical image in the lateral object plane.
Double Perspective	A type of combined perspective illusion in which two separate perspective spaces are merged into a single simulated real-space view with illusive properties, by means of two falsely receding metric grids.
Forced Perspective	Designed illusive/immersive image/view of a spatial reality, by visual illusion or optical adjustment of physical reality, and/or by the construction and/or representation of a false spatial reality.
Geometrical Perspective	A graphical perspective image/view of a spatial reality, as defined by the rules of projective geometry, linear perspective, etc., and/or associated/alternative mathematical/geometrical methods.
Graphical Perspective	The representation of a spatial reality using artificial methods, such as drawing/painting. Can include CGI methods such as CAD, computer graphics, plus VR/AR/MR, AI images, etc.
Instrument Perspective	Images/views of a spatial reality, formed by looking at, capturing, measuring, projecting a spatial reality using optical instruments; and/or by projecting the appearance(s) of a spatial reality.
Linear Perspective	A mathematical, geometric system used in art to create the illusion of three-dimensional depth and space on a two-dimensional surface. May approximate natural views/images formed by the eye/ camera (under narrow-field and for distant viewing). Normally covers artificial graphical images and drawings/paintings with 1-3 primary vanishing points, but can involve secondary vanishing points.
Mathematical Perspective	Images/views of a spatial reality, by geometrical modelling of a spatial reality or mathematical shaping of appearance(s); includes geometrical perspective, and also mathematical projection.
Mixed Perspective	A combination of imaging and projection perspective classes, in particular a physical interaction between them, includes cinema, holograms and Virtual Reality systems.
Natural Perspective	Images/views of natural and built worlds, including visual perspective (second type) or direct looking at physical reality using human vision. Includes also environmental perspective; viewpoint geometries, and/or the projection of shadows/outlines, reflections, astronomical events, etc.
Negative Perspective	A type of graphical perspective in which distant objects increase in apparent size at increasing distance. Also referred to as Byzantine, reverse, inverse, inverted or divergent perspective.
New Media Perspective	Images/views of a spatial reality as created by a new media system, by connecting/linking, ordering, constructing, matching, mixing, exploring, and cross-matching: multiple images of a spatial reality.
Parallel Perspective	Graphical perspective in which the viewer's position is at infinity (scale of object does not depend on its location), and we have two kinds: orthographic (true size drawing) and oblique projections.
Simulated Perspective	Designed illusive/immersive images/views of a spatial reality, by visual illusion or optical adjustment of physical reality, or by the representation of a false spatial reality (distorted scene geometry).
Spherical Perspective	Spherical perspective is any optical view/image that comprises 5-6 primary vanishing points (corresponding to 5 or more of the 6 cardinal directions) towards which everything is laid out.
Synthetic Perspective	A synthetic perspective is any systematic or accidental combination of natural and artificial perspective. Note that the real/represented or natural/artificial spaces are visually identical and merge perceptually.

Table 1: Common Perspective Types/Forms

TERM	DEFINITION
Perspective Category	A generic class of perspective system/method for producing an image/view, measurement, representation, or illusion, of a spatial reality. There are six primary optical/technical perspective categories: Natural, Mathematical, Graphical, Instrument, Forced, and New Media Perspective(s).
Perspective Direction	Visual/optical/technical perspective can be separated into two classes: firstly, the **imaging class**: capturing/forming an image/view, measurement, representation, or illusion, of a spatial reality (3-D); and secondly, the **projecting class:** projecting visual images, light-beams/ pencils and/or object shadows into physical reality.
Perspective Facet	In compositional terms, each category/form of perspective exhibits certain perspective facets, defined as: optical assembly (scene optics), projection mode (detector features), observation mode (detector scenario), and image facets.
Perspective Form	A perspective form is the visual outcome of one or more perspective process(es), and consists of image(s)/view(s) created by the same. Examples include linear, curvilinear, and spherical perspective. Patently, various perspective forms are possible for each instantiation of a perspective category and/or (overloaded) set of categories.
Perspective Function	Perspective, in general, enables capturing, observing, prescribing, measuring, calculating, classifying, modelling, surveying, mapping, indexing, gauging, certifying, linking, mixing, exploring, displaying, and projecting perspective images, of a spatial reality. These are the functions of perspective.
Perspective Goal	The goals of optical perspective <IMAGING CLASS> are to view, match, or represent spatial reality; and/or to create Illusions of, and/or Immersions into, a spatial reality.
Perspective Illusion	Perspective techniques are sometimes used to create visual illusions. Typically, a perspective illusion makes false impressions of size, depth, position, place (immersion), or transparency for objects/people.
Perspective Method	Any imaging technique that works to instantiate one or more perspective principle(s), resulting in a detailed visual image, measurement, representation, model, view, or projection, of a 3-D object or 3-D scene.
Perspective of Forms	Refers to combined visual appearance factors such as perspective of points, lines, planes, solids; whereby the apparent shape of an spatial object/scene is observed/captured/defined, and relating to surface-projection(s), and/or the apparent outline(s) of objects/scenes. Relates also to perspective phenomena such as diminution of size and diminution of form (loss of outline), degradation of form (loss of shape), and foreshortening, plus formation of vanishing points, etc.
Perspective Phenomena	Perspective phenomena refer to the apparent and generalised changes to spatial object/scene visual features that occur according to a particular type of perspective and its inherent processes.
Perspective Principle	A perspective principle refers to an imaging mechanism, comprised (at a minimum configuration) of real/modelled scene/object and picture-plane/surface structures, plus one or more perspective process(es), working to capture an image/view of, or project outwards an image/shadow/outline into, certain aspect(s) of spatial reality.
Perspective Process	One or more <OPTICAL>, <MATHEMATICAL>, <GRAPHICAL>, <COMPUTER> process(es), working to produce a visual representation (or view/image) which reflects certain aspect(s) of spatial reality.
Perspective System	A perspective system is a particular scheme of visual/optical/technical perspective that operates as a unit of perspectival image-making capability, image-projecting capability, or else image-analysis/matching functionality.
Perspective View	Any live (real-time) / recorded (photograph or movie) perspective image of a spatial scene.
Projection Scale	Projection scale is the optical magnification (size in the picture plane) employed for a perspective view/image.
Projection Scale Resolution	Projection scale resolution is the smallest level of structural detail—or size interval (in object-space units)—discernible within a perspective image. Using an increased projection scale, may result in new structural details becoming visible, which relate to the improved projection scale resolution (within limits of the method).
Size / Distance Law	A fundamental tenet of optics is the inverse size-distance law, which states that if one doubles the distance to an observed object, the represented size of said object becomes one-half of the original (apparent or projected) size. Relates to diminution of size perspective.

Table 2: Perspective Concepts (Perspective Category Theory)

TERM	DEFINITION
Categorical Ambiguity	Sometimes a perspective type appears to be both a category (method) and form (image outcome) at the same time. But why is this so? The answer is that (for example) linear perspective is a name that applies to both a perspective category (a method/process) and a perspective geometric image form (image geometry) simultaneously.
Category Chaining	A perspective category refers to a specific class of perspective system, with a corresponding set of optical, mathematical, graphical, instrument/illusive, or new-media processes. Oftentimes, more than one category is involved simultaneously to produce a perspective view/image; this is called category chaining, such as when we use a camera (instrument perspective) to photograph a natural scene (natural perspective), which is then viewed by a human (visual perspective of a second type).
Category Overloading	Sometimes the same perspective sub-class can appear under multiple top-level categories; named as category overloading; for example, when we have a linear perspective drawing which seems to be equally a graphical and mathematical process simultaneously.
Equivalence / Correspondence Problem(s)	The so-called 'Correspondence' and/or 'Equivalence' Problem(s) of monocular perspective; refer to the fact that for a single 2-D image of a 3-D object projected onto a 2-D image plane, the projection does not contain sufficient information to unambiguously identify all of the geometric details of said 3-D object (ref. object shape/size/angle/location).
Planes / Visual Angles Problem	The **eye** deals with 'visual angles', or inherently measures the apparent angular size of an object (projected image angular extent on a spherical retina); whereas **perspective** (linear form) deals with the size of an object (or image) created by an entirely different method, being projection onto a picture plane (typically). A spherical retina causes planar objects that subtend smaller visual angles (each at identical depth distance(s) from the viewpoint, to create correspondingly smaller images relative to the identically sized (projected) images of linear perspective.
Problem of Space	Since space is invisible, we need ways to structure spatial reality to enable reverse-engineering of perspective views/images, or comprehension, of spatial scenes/objects. Geometrical assumptions—or known contexts—are used to solve such image decoding problems. We employ known axes/lines/planes/grids/horizons to segment, order, index, measure, and gauge physical space. Examples are ground plane metric grids and checkerboards patterns, etc.
Problem of TIme	Desired are ways to explore time on multiple scales; viewing images using natural-speed, slow-motion, or fast-forward time-flows, much like a typical video player.
Problem of Viewpoint	Due to the singular optics and geometry associated with a particular vantage point. Each view contains unique (but partial) information about the scene or object under inspection. We often need to consider multiple views to probe visually—or model/understand—an object/scene sufficiently.
Real / Simulated Problem	Problem of distinguishing between the **real** and the **simulated** (digital/AI-generated) perspective images/views; or identifying physical related, as opposed to virtual and/or digital sourced/ generated, perspective images/views.
Scale / Shape / Size Problem (Extrinsic Simplicity)	Measuring **size** implies measuring also the dimension of **shape**—wherein perceived object shape is a variable quantity that becomes fixed (or quantified) only at a specific **projection scale** or optical magnification. Thus **shape** and **measured size** are both function(s) of the **projection scale** and associated **projection scale resolution**; which is named the scale/ shape/size problem of optical/technical perspective.
Shape Sufficiency and Levels of Abstraction (Intrinsic Simplicity)	A perspective image captures (or represents) physical reality using geometric **Forms** that are valid only at a particular dimensional **scale**. For example, while making a perspective drawing of a spatial scene using linear perspective, we assume that within the depicted reality (at the chosen **scale**), the ground plane, picture/image plane, plus vertical-planes, etc., are all sufficiently flat, and any orthogonal(s) exist as sufficiently parallel and sufficiently rectilinear. Ergo, **geometrical simplification(s)** underpin all artificial perspective methods/ systems (plus even some natural perspective processes).
Validity of Linear Perspective	According to Pavel Florensky, linear perspective is based on 6 premises which are false (one and all): 1) We live not in euclidean but in a visual space which is bounded, finite and distorted; 2) The point-of-view of beholder is not the centre-of-world; 3) A monocular point-of-view ignores binocular aspects; 4) Fixed position of beholder is not the usual case; 5) Whole world is not static; 6) Excludes all psycho-physiological processes such as memory. The result is that we humans (re)construct images with a fragmented and roving eye/mind that is closer to the principles of reverse perspective.

Table 3: Fundamental Perspective Problems

Table 4 (opposite): Applications of Perspective

DISCIPLINE	VIEW	MATCH	REPRESENT	ILLUSION	IMMERSION
Anatomy / Medicine	Medical Imaging, CT, MRI, CAT scan, X-RAY, Electron, Nuclear Imaging, PET, Ultra-Sound Imaging.	Kinaesthetic Modelling, Replacement joints/limbs, Paediatrics, Oncology, Ophthalmology, AI.	Medical Illustration, Brain Imaging, Radiology, Medical Education, Robotic Surgery Training.	Viewing Body's Internal Structures (real-time), Cardiology, Radiation Therapy, Gastroenterology.	Stereography and VR/AR, AR Operations, 3-D Printers, 3-D Remote Surgery, AI, Micro and Key-hole Surgery.
Archaeology / Natural Sciences	Remote Sensing (Active, Passive, Microwave)	Photogrammetry, Metrology, Surveying, AI.	NeRF, LIDAR. Topography, Sedimentary Maps.	RADAR, VR Imaging. GNSS, IMU, Earth Maps.	Built Environment VR, AR, XR, MR Surveying. AI.
Architecture and Environment	Buildings, Columns, Fountains, Gardens, Environment.	CAD Models, Multi-Modal Building Simulations, AI.	Idealised Buildings, Interiors, Furniture.	Future Building VR for Building Reality Experience.	Environment walk throughs. Lighting Simulations, AI.
Astronomy	Telescopes - Ground and Space; optical, gravity, particle.	Survey Telescopes, Universe Modelling, Star Atlas, AI.	Astronomical Seasons, Planetary Orbits, Eclipses.	Star Atlas (virtual), Solar System Fly-throughs.	Planetarium IMAX, Sphere Theatre.
Artistic Subjects	2-D & 3-D Art, Drawing, Painting, Sculpture, Installations.	Modelling (various types), Light shows, Visibility Maps, Large scale installations.	Intarsia, Letters, Marquetry, Polyhedra, Proportion, Symmetry, Quadratura.	Light and light-scapes, Lumia, Stage Lighting, Projection Mapping, AI.	Sphere and IMAX Theatres, Drone Light Displays, Fireworks, Stage Lighting.
Cinema	2-D Cinema, Large Format, High Frame Rate (HFR), Time-elapsed views of Earth.	3D Photogrammetry, Digital Filmmaking, Virtual Production.	Motion Capture, Blending of Practical and CGI Characters/Topics.	Digital Filmmaking, Virtual Production, SFX, Widescreen, Practical Effects,.	Stereographic Cinema, Virtual Production, Volume Screens.
Computer	Artificial Intelligence (Generative Images). Hypergrams (BAEM images).	Artificial Intelligence (Computer Vision), GIS, GPS, AI.	Computer Graphics, CGI, Animation, SFX, CAD. Layering of world views.	3-D, Volume and Holographic Displays. 3-D Simulations.	Digital Metaverse, VR, AR, MR, ER. Digital Multiverse, AI.
Cosmograms / Information Visualisation	Cosmograms. Visual relationships. Global viewpoint + Focus.	World Trees/Types, Data Spatialisation, Anthropocene, Biosphere.	False perspective for realism, Multi-View/ Multi-Time Perspectives.	Social, Cultural Modelling. Ecological relations. Literal / Visual Linkages.	VR / AR Information Visualisation. Tree of Life. Cognitive Media Stack.
Crystals / Gems / Symmetry	Natural Crystals, Gemstone Optics.	Symmetry Modelling (atomic, molecular, facets)	Microstructure modelling. Modal Structures.	Gemstone Simulation. Light scattering, dispersion.	Atomic / Sub-atomic Structures.
Drones	Aerial / Sky Photography, Aerial / Sky Movies.	Photogrammetry, Metrology, Surveying.	Panoramic Views, 360-Degree Spherical Views.	Bird's Eye Views, Panoramic Fly-Throughs.	Virtual Reality Trips, Panorama / Volume Displays.
Education / Research	Perspective for Visualisation (many topics).	Perspective for Modelling. Perspective vs. Perception.	Perspective for Visualisation / Representation.	VR, AR, MR, XR. Limits of Visual Perception.	Virtual Reality, Problem / Solution.
Engineering Drawing and Design	Technical Drawing, and Design Drawing. Descriptive Geometry.	Machine drawing: Plan, Elevation, Axonometric, etc. AI.	CAD Systems, Mechanical & Optical. Physics + optical models.	VR, AR, XR, AI. Design fly-throughs. Human scale experience.	Virtual Reality, AI. Artificial Intelligence (viewpoint generation).
Entertainment	Visual, Graphical, Instrument illusion(s).	Ray Tracing, Holograms. VR and AR Glasses.	3-D Animation, Computer Games, SFX, CGI.	Transparent views, Holograms. Light shows.	Projection Mapping. Pepper's Ghost, etc.
Extended Reality	Virtual Reality	Augmented Reality, AI.	Virtual Reality	Augmented / Mixed Reality	Mixed Reality, AI.
Geography	Cartography / Maps (Multi-layer / Multi-mode).	Photogrammetry. Google Maps, AI.	Topography (scanning/ modelling of topography).	VR, AR, MR, XR. Printed / Physical Models.	Spherical Displays. Volume Displays.
Geometry	Analytic Geometry	Descriptive Geometry	Projective Geometry	VR, AR, MR, XR.	VR, AR, MR, XR.
Measurement / Measuring Systems	Compass (trigonometry, sector, reduction), Perspective Box/Window. Sextant, optical gauges.	Ruler, calliper, protractor, gauge, dial, slide-rule, nautical slide rule, airplane slide-rule, quadrant etc.	Pantograph, planisphere, planetarium, theodolite, astrolabe, orary, planetary globes, cosmolabe.	Head-up Displays, Car Dashboard Projections. 3-D Printing, Scale Models, Holographic Printers.	Grand Scale of Earth/ Universe - Planetarium IMAX, Sphere Theatre, Perspective Window(s),
Microscopy	Optical, Electron, Particle, Atomic Force Microscopes.	Optical, Scanning Microscopes.	Artificial Intelligence image characterisation.	Digital Imaging, Multi-Scale, VR Images, Micro-Maps.	Sphere Theatre Visualisation.
Nature / Life Sciences	Invisible Worlds, Fractals. Nano, Micro, Macro Worlds/ Structures/Abstractions.	Panoramas, Ballon Images. Mountain-scapes, City-scapes, Earth from air/ space.	Shape Grammars, Phyllotaxis, Computer Vision, Environmental Monitoring.	Rainbows, Undersea World, Heavenly Vault, Mirage, Aurora, Camera Obscura.	Spherical Displays. Volume Displays. IMAX / Sphere Theatre.
Optics	**Capture**: Lens, mirror, glasses, telescope + camera (multiple types), binoculars, Meta-Lens for 3-D images.	**Projection**: zoetrope, kinetoscope, magic lantern, projector, light-field optics, Hypergrams, etc	**Display**: TV/Cinema/Games. Explore: Hypergrams for image: querying / sequencing / exploration.	Stereoscope, holograms, kaleidoscope, catadioptric cistula, camera obscura & lucidia, Magnifiers etc.	Internal / External Object VR. Hyperspectral analysis, Macro/Micro/Nano Structures, Holographic Imaging.
Photography	Film, Digital - 2-D. Polarisation views/scenes.	Hypergrams. Spectral analysis.	Expand Field of Vision. 360 Degree Cameras/ Displays.	Film, Digital - 3-D Images. Expand Field of Vision.	Curvilinear, 360 degree spherical methods.
Science / Mathematics	Visualisation/simulation, Atomic & Sub-Atomic.	Mechanistic World - Material Analysis.	Chemistry, Compounds, Proteins. Micro-structures.	Horizontal/Vertical Causality. Scientific vs. Platonic World.	Mechanics, Sonar. Gravity vs Quantum.
Sociology	Origins of Perspective	Inner vs Actual Space	Graphical vs. Actual Space	Scientific vs. Cultural Space	Microcosm / Macrocosm
Space (Outer)	Environmental Monitoring.	Orbital Dynamics.	GIS, GPS, Space Flight.	Star Charts (virtual).	Large Scale Modelling.
Technology	Computer Vision, Information Visualisation.	Robotics, Sight Enhancement. Computer Vision, AI.	Engineering, chip manufacturing.	Internet of Things, CGI. Lighting, Visibility models.	Digital Metaverse, VR, AR, MR, ER, AI.
Theatre / Scenography	Theatre backgrounds. Viewpoint modelling.	False sense of place. Wayfinding, Imaginary Scene.	Forced Perspective. Journey representation.	Perspective Illusions in Theatre or real scene.	IMAX / Sphere Theatre with Live Performance.
Television	2-D Television	Live Streaming of Events.	Digital Overlays (CGI).	3-D Television, Holograms.	Spherical Displays
Vision	Human & Animal Vision - types, mechanisms.	Systemised Spaces - Gunsights, Binoculars, Telescopes.	Perspective for looking at Internal/External Structures	Computer Games - First and Third-Person Perspectives.	AR, VR, XR Systems, (Oculus, Apple Vision), AI.

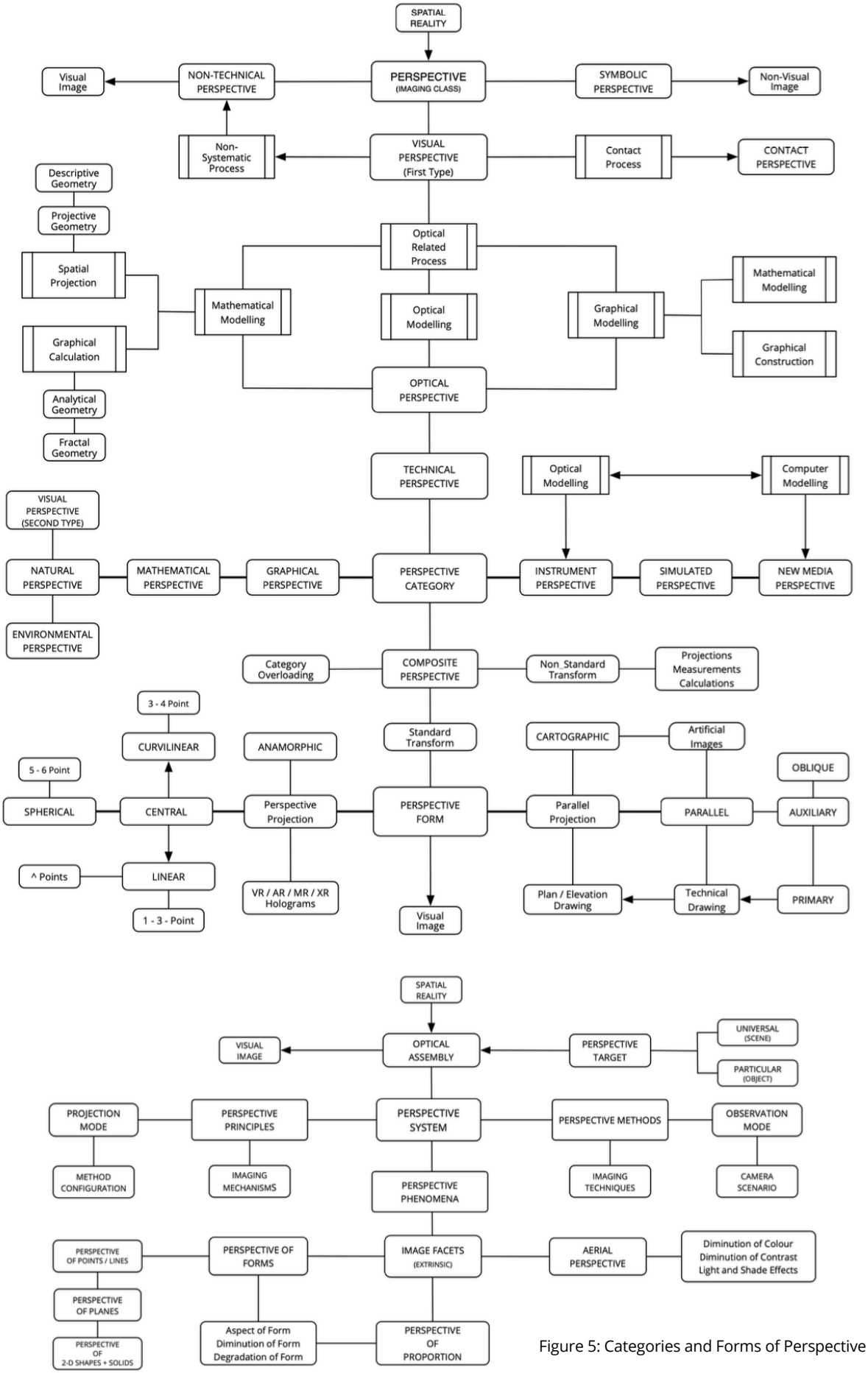


Figure 5: Categories and Forms of Perspective

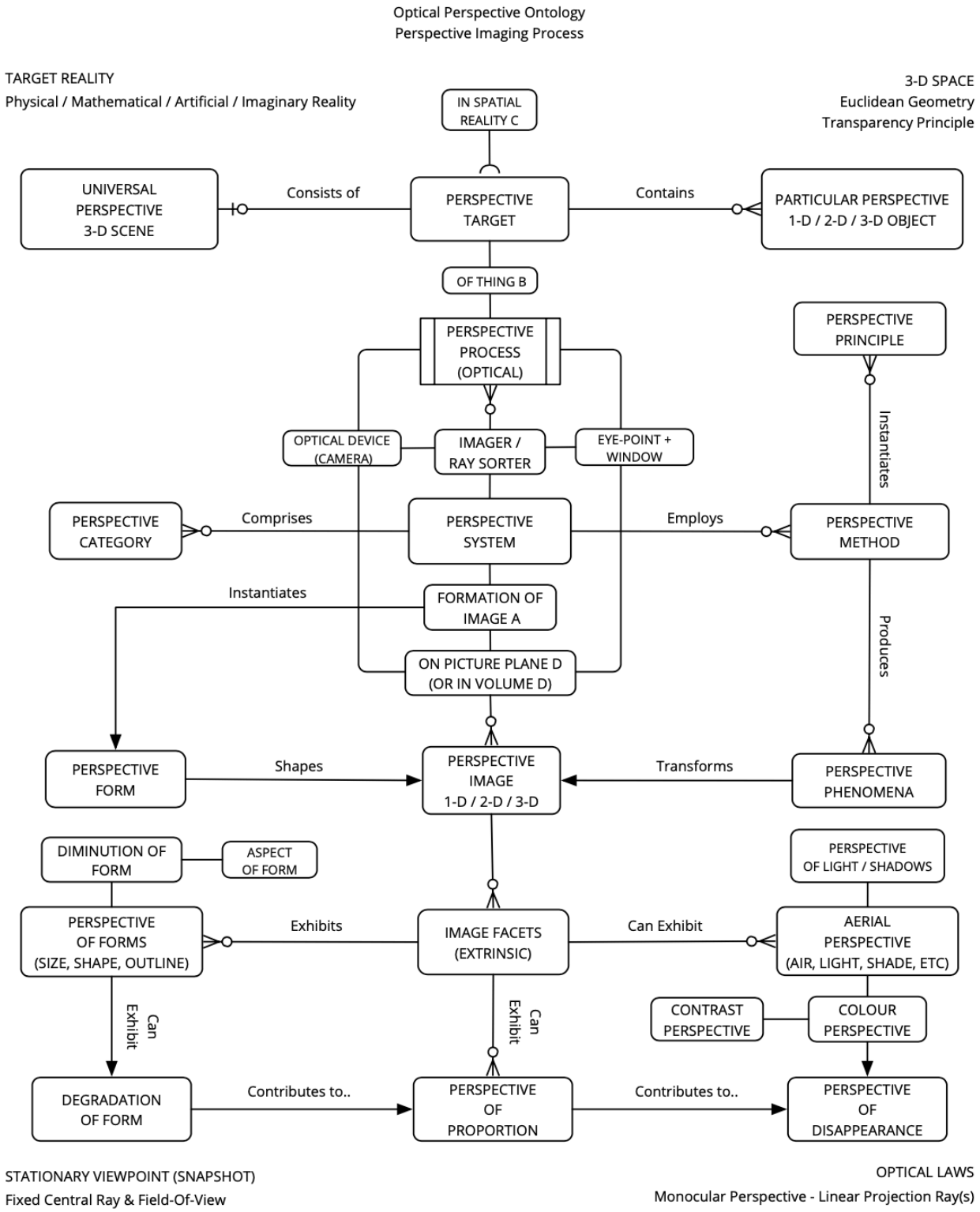


Figure 6: Perspective Imaging Process

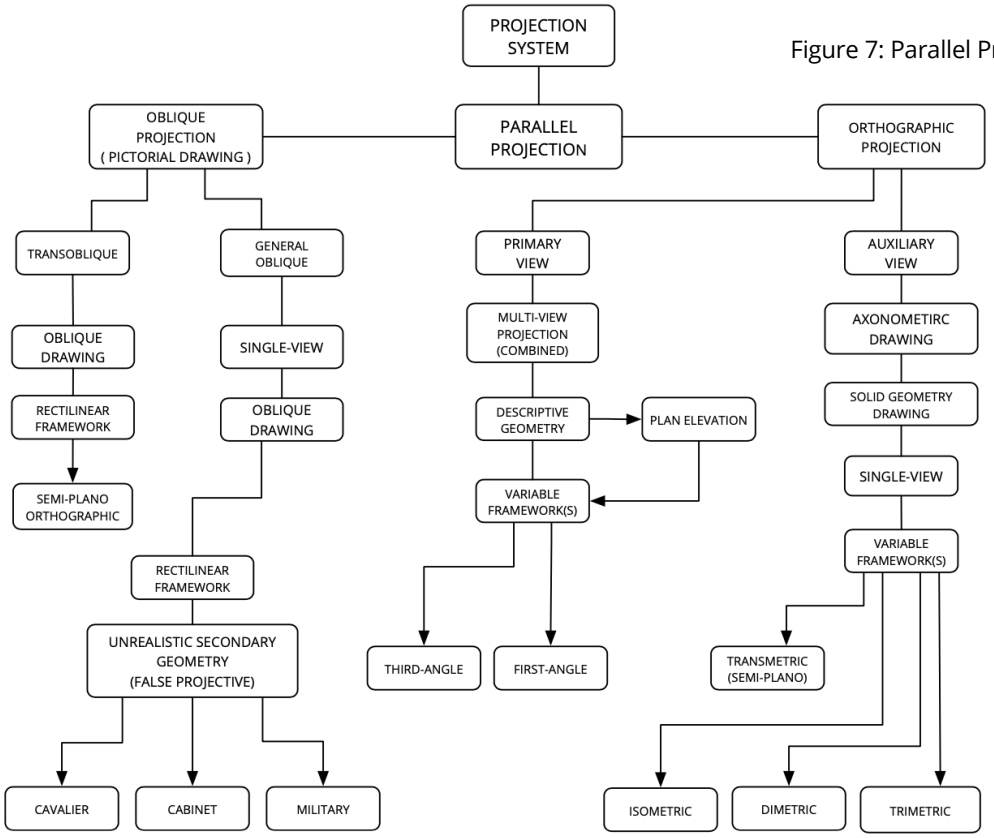


Figure 7: Parallel Projection

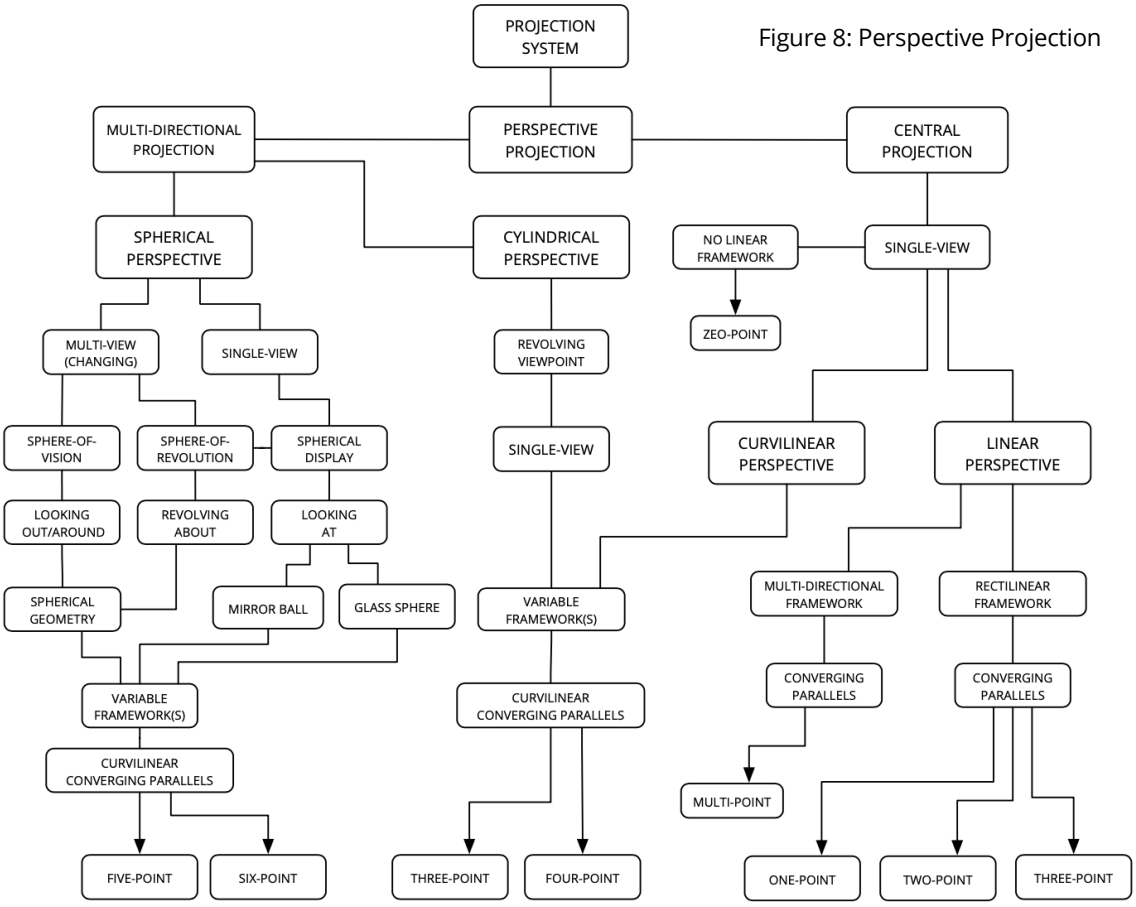


Figure 8: Perspective Projection

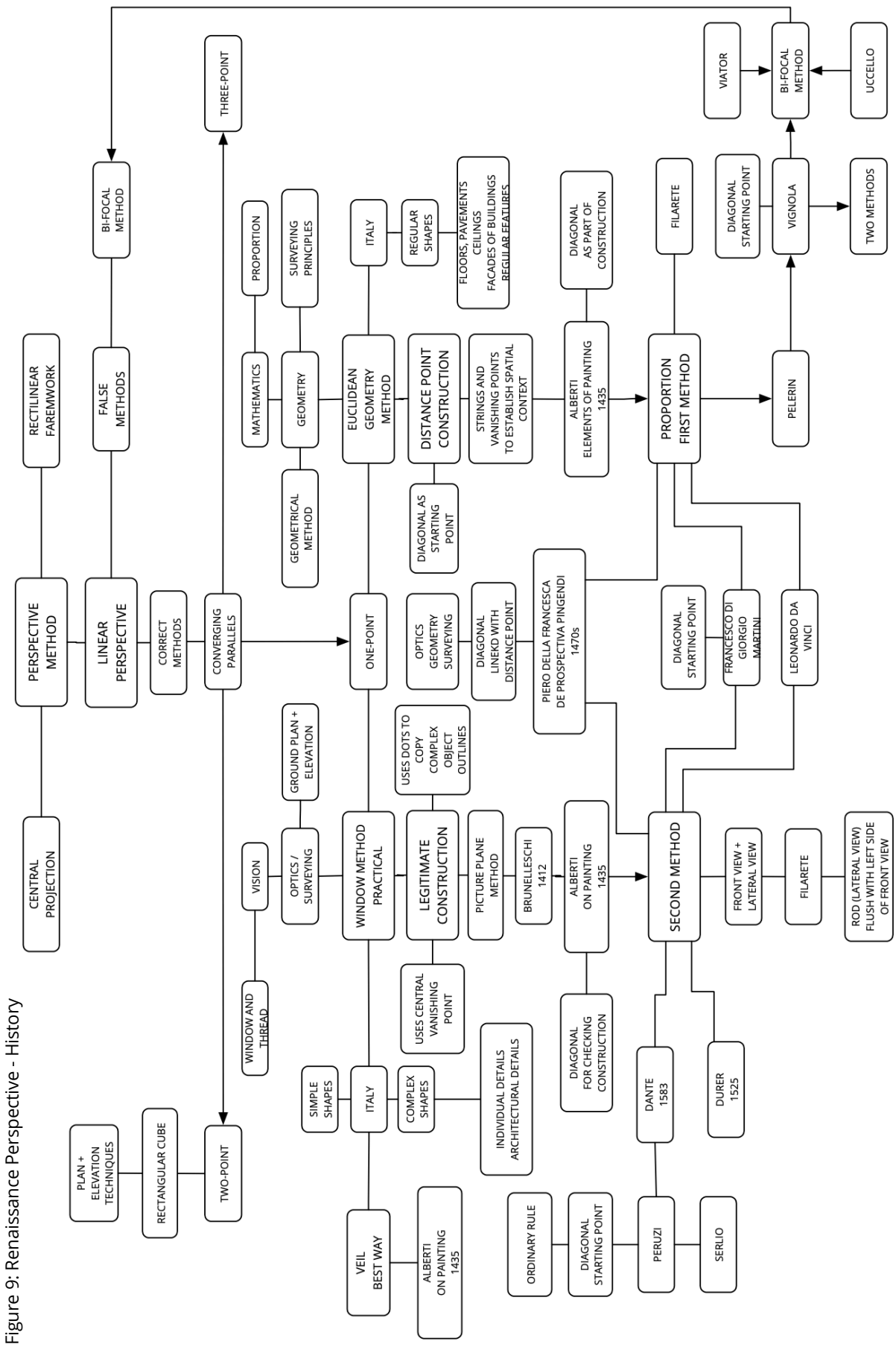


Figure 9: Renaissance Perspective - History

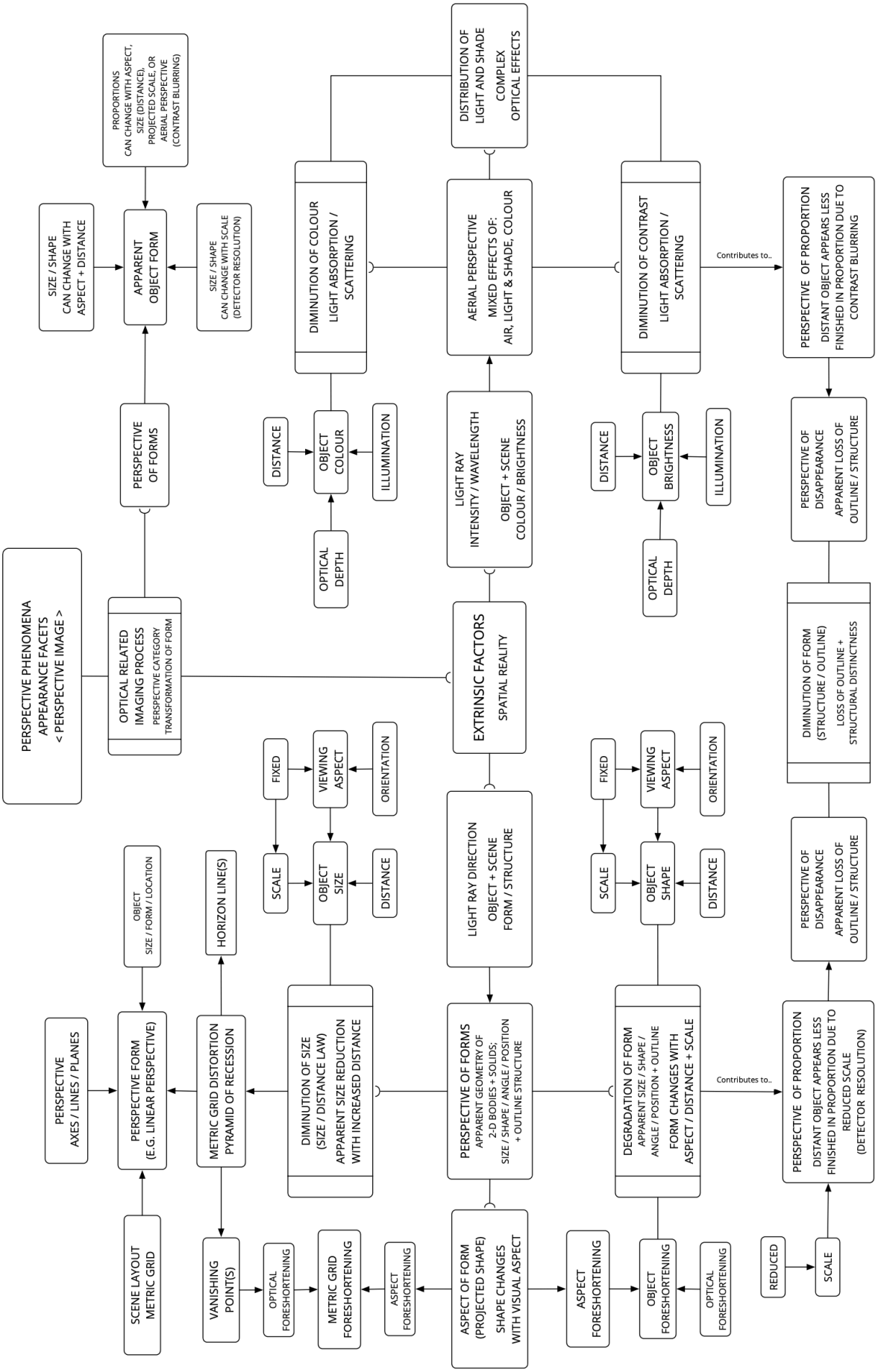


Figure 10: Perspective Phenomena - Extrinsic Factors

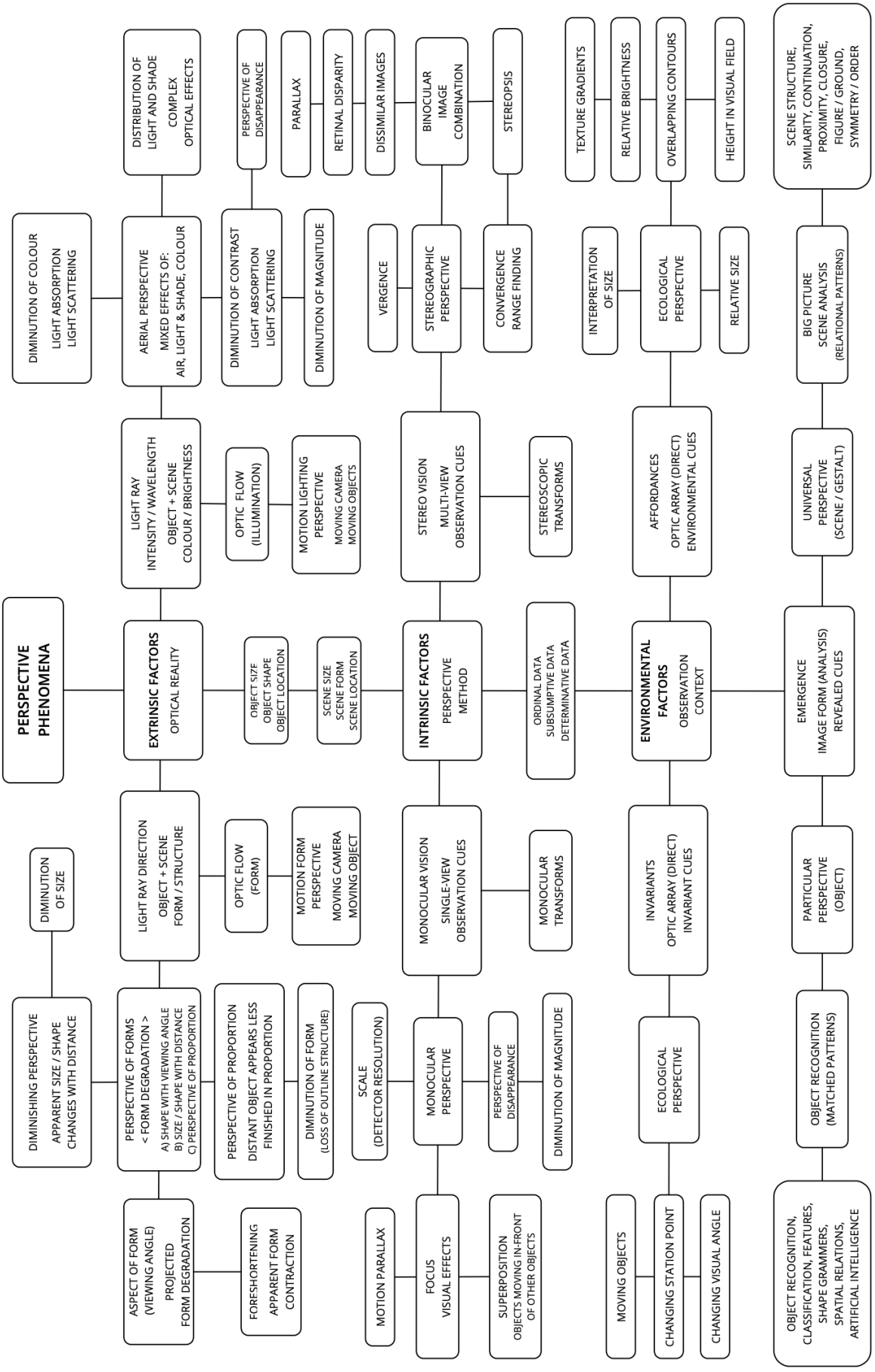


Figure 11: Perspective Phenomena - All Factors

ACRONYM	MEANING
3DGS	3-D Gaussian Splatting
4Pi Microscopy	Laser Scanning Fluorescence Microscope
ADAS	Advanced Driver Assistance Systems
AGVs	Automated Guided Vehicles
AI	Artificial Intelligence
AR	Augmented Reality
BOOM	Binocular Omni-Orientation Monitor
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CAT	Computerised Anatomical Tomography
CCD	Charge-Coupled Device
CGH	Computer-Generated Holography
CGI	Computer Graphic Imagery
CinemaScope	Wide-screen anamorphic cinema format (2.35:1- 2.66:1).
Cinerama	Wide-screen three-projector cinema format (2.65:1).
CircleVision	Multi-projector wide-screen movie format (360-degree FOV).
CPU	Central Processing Unit
CT	Computed Tomography
Cubism	Art Movement
CV	Computer Vision
DEM	Digital Elevation Model
DSM	Digital Surface Model
DTM	Digital Terrain Model
EDM	Electronic Distance Measurement
EM	Electron Microscope
GIS	Geographic Information System
GNSS	Global Navigation System
GPS	Global Positioning System
GPU	Graphics Processing Unit
GUI	Graphical User Interface
HMD	Head Mounted Display
HSI	Hyper-spectral Imaging
IMAX	Wide-screen cinema format (1.43:1-1.9:1). Current standard.
IOL	Interocular Lens
IOT	Internet of Things
LASER	Light Amplification by Stimulated Emission of Radiation
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEEM	Low-Energy Electron Microscopy
LFC	Light Field Camera
LFD	Light Field Display
LIDAR	Light Detection and Ranging
LLM	Large Language Model

ACRONYM	MEANING
MI	Medical Imaging
MR	Mixed Reality
MRI	Magnetic Resonance Imaging
NeRF	Neural Radiance Field
OCT	Optical Coherence Tomography
OLED	Organic Light-Emitting Diode
OMNIMAX	Wide-screen spherical dome-shaped cinema format (1.9:1). Current standard.
Panavision	Wide-screen anamorphic cinema format (2.39:1). Current standard.
PCT	Perspective Category Theory
PEEM	Photoemission Electron Microscopy
PET	Positron Emission Tomography
RADAR	Radio Detection and Ranging
SAR	Spatial Augmented Reality
SC	Spatial Computing
SEM	Scanning Electron Microscope
SEOSS	Stabilised Electro-Optical Sighting System
SFX	Special Effects
SLR	Single Lens Reflex Camera
SPHERE Theatre	A 516-foot diameter dome theatre in Las Vegas features a 16K LED screen for 18,000 attendees and serves as a spherical display.
STEM	Scanning Transmission Electron Microscopy
SVG	Scalable Vector Graphics
TEM	Transmission Electron Microscopy
Tidd-AO	Wide-screen anamorphic cinema format (12.2:1). 70mm film.
UAVs	Unmanned Air Vehicle
Ultra Panovision	Wide-screen anamorphic cinema format (2.76:1). Current standard.
VDU	Visual Display Unit
VFX	Visual Effects
Virtual Production	Filmmaking that combines physical and virtual elements with LED panels and game engines.
VistaVision	Wide-screen anamorphic cinema format (1.85:1).
VLA	Vision Language Action Model
VLM	Vision Language Model
VR	Virtual Reality
VSD	Visible-surface Algorithm Determination
X-Ray	High-energy EM radiation / imaging.
XR	Extended Reality

CONCEPT	ACRONYM	DEFINITION (SIMPLIFIED)
Angle of Projection (Image Plane)	AOP (IP)	Projection angle of 3-D object/scene geometry measured at, and relative to, the 2-D picture/ image plane. Relates to image-plane distortion class.
Angle of Projection (Object Aspect)	AOP (OA)	Projection angle of 3-D object/scene geometry as directed to the station point. Image geometry is notionally independent of image plane shape/angle.
Angle of View (1)	AOV (1)	Fixed direction of vision. Synonyms: angle of vision (1), axis of vision.
Apparent Field of View	AFOV	The angular diameter of light seen through a camera/binocular/telescope/microscope eyepiece, usually between 40 to 80 degrees, indicating perceived image size and "immersion."
Directing Plane	DP	An imaginary plane drawn through the spectator's eye, and orthogonal to the angle of view (1) or line of sight.
Distance of the Eye	-	Perpendicular distance from the station point to the point where it meets the picture plane.
Distance Point	DP	Vanishing points of horizontal lines that make an angle of 45-degrees with the picture plane.
Essential Lines	-	Horizon line (eye-level), vanishing lines (converging), transverse lines (horizontal/vertical), ground line.
Field Of View (B)	FOV (B)	The visual field or the total angular field captured/represented/displayed in a perspective image/view of a spatial scene. Synonym: pyramid of vision.
Ground LIne	GR	Line of intersection of ground plane and picture plane.
Ground Plane	GP	Geometrical / terrestrial plane: a horizontal plane on which the spectator and the objects viewed are supposed to stand. At right angles to picture plane.
Ground Point	-	Orthogonal projection of the principal vanishing point onto the ground line.
Horizon Line (Primary)	HL (P)	The line in which the horizontal plane containing the eye (plane of sight - horizontal) meets the picture plane. Horizon appears at eye level.
Image	IM	A visual representation of a spatial object/scene.
Object	OB	Any spatial object/scene, or the subject we are about to view or delineate (in perspective).
Orthogonal Line	O_LINE	A line orthogonal to the picture plane.
Picture Plane	PP	A transparent vertical plane supposed to exist somewhere between the spectator's eye and the object to be represented.
Plane of Sight (Horzontal)	POS (H)	An imaginary horizontal plane drawn through the spectator's eye, and orthogonal to the angle of view (1) or line of sight.
Plane of Sight (Vertical)	POS (V)	An imaginary vertical plane drawn through the spectator's eye, and orthogonal to the angle of view (1) or line of sight.
Point of SIght (1)	POS (1)	Orthogonal projection of the viewpoint onto the picture plane.
Pyramid of Spatial Recession	-	Has its base towards the eye/camera-oculus and the apex at the horizon; thus objects of equal size, situated in various places, will be seen by different pyramids which will each be smaller in proportion as the object is farther off.
Set of Parallels	P_LINE	A set or system of parallel lines in object space.
Transverse Line	T_LINE	A line parallel to the ground line.
True Field of View	TFOV	The physical angle visible through an optical instrument, measured in degrees, representing the actual size of the "window" to the real world.
Useful Field of View	UFOV	In optics, this refers to the sharp, undistorted portion of the TFOV.
Vanishing Point (Artificial / Principal)	C (VP)	The point of convergence of the perspectives of all orthogonals. Orthogonal projection of the viewpoint onto the picture plane - equates to the central VP.
Vertical Line	V_LINE	A line perpendicular to the ground plane.
Vertical Plane	V_PLANE	Vertical plane, perpendicular to the picture plane.
Viewing Angle Direction of Vision Field of View Angle of Projection	VA (1,2,3)	Viewing angle has several meanings in relation to perspective: 1. Synonym for (perspective image): **Direction of Vision** or alternatively **Field of View**. 2. Synonym for: **Angle of Projection** (Image Plane Aspect and/or Object Aspect). 3. Synonym for: **Useful FOV - Visual Perspective [2nd type]**. Viewing angle is the maximum visual angle for acceptable image quality from optical devices or displays. Synonym for working angle or apparent field of view.
Viewpoint / Eye	O or E (Oculus)	Real or constructed viewpoint. The fixed viewpoint from which a perspective view is projected / constructed.
Working Angle	WA	A display's "working angle" refers to its Apparent Field of View (AFOV).

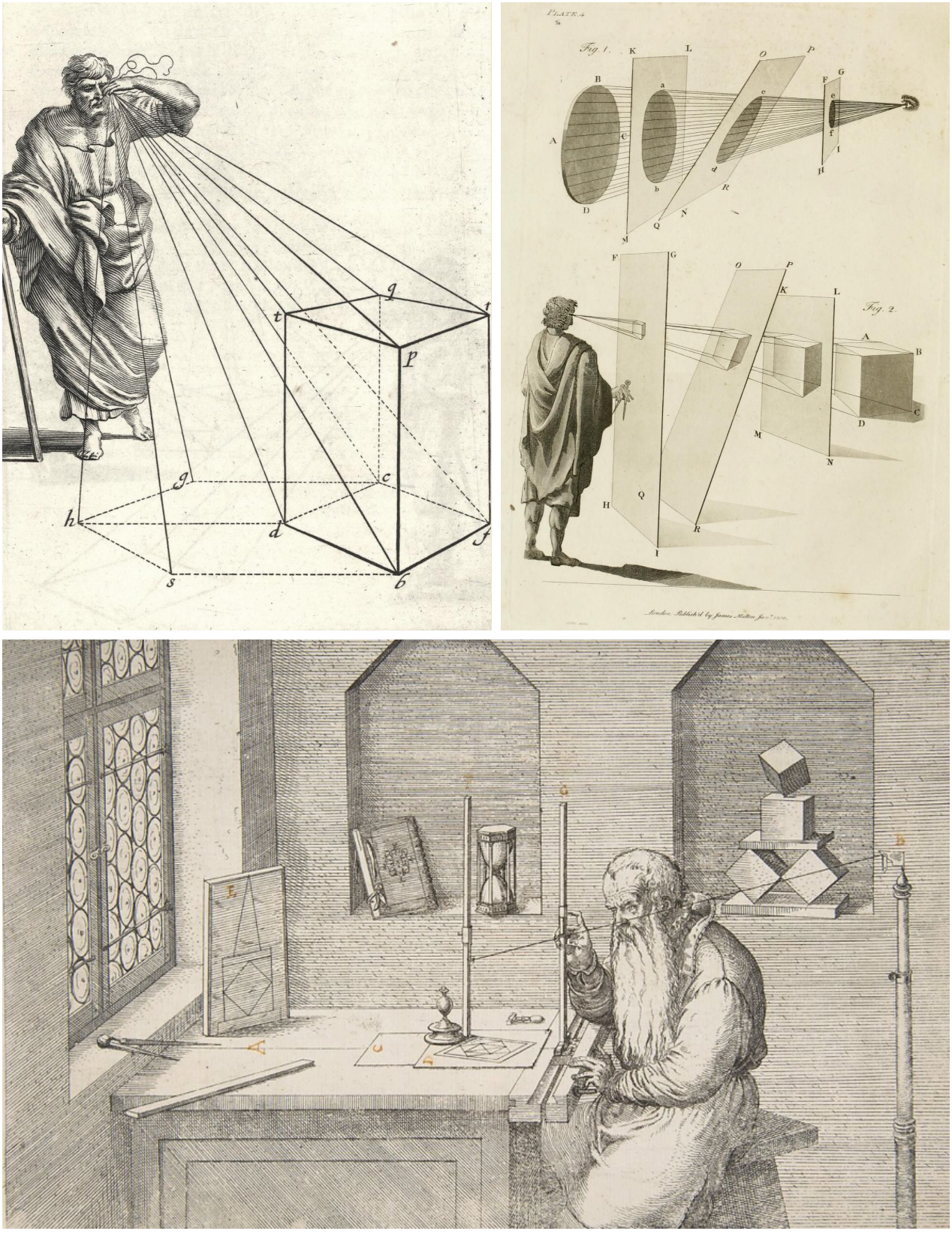


Figure 12: Visual / Drawing / Graphical

Top (left): Visual perspective by J. Malton, c. 1800. Top (right): by A. Boss, c.1648.
Bottom: Using a perspective instrument to capture a perspective measurement, c.1610.

Perspective Catalogue

Perspective can be defined as the geometry of the ways in which light specifies the world of surfaces from which light is reflected! Linear perspective of the classical sort would only be one small part of it, for that is merely the perspective of the edges of rectangular objects!

Lawrence Wright
Perspective in Perspective, c. 1983

Artificial Perspective

Painting / Graphical Perspective

Les Demoiselles D'Avignon by Pablo Picasso, c. 1907

TERM	DEFINITION	1-D / 2-D / 3-D
1-D Perspective **<< NEW Term >>** 1-D Object 1-D Image 2-D/3-D Object Space 2-D/3-D Image Space	**Perspective image of a point** (rare term: singular projection of a 1-D point) One-dimensional (1-D) perspective representation of a point (possibly aberration-free projection), being a 1-D perspective view/image/measurement/calculation, or 1-D plan/elevation projection, etc., of one-dimensional (1-D) object point, present in a 2-D or 3-D object space, and represented in a 2-D or 3-D image space. See: 1-D, 2-D, 3-D Perspective.	
2-D Perspective **<< NEW Term >>** 2-D Object 1-D/2-D Image 2-D/3-D Object Space 2-D/3-D Image Space	**Perspective image of a 2-D form** (rare term: e.g., 2-D line projected as 1-D point or 2-D line) One or two-dimensional (1-D/2-D) perspective representation of a 2-D form (line or planar shape), being a 1-D/2-D perspective view/image/measurement/calculation, or 1-D/2-D plan/elevation projection, etc., of a two-dimensional (2-D) object form, present in a 2-D or 3-D object space, and represented in a 2-D or 3-D image space. See: 1-D, 2-D, 3-D Perspective.	
2.5-D Perspective (A): Computer Games: Sky-box or Sky-dome 3-D **<< NEW / Refined Term >>** Fixed 3-D Video Games	The term **2.5-D (two-and-a-half-dimensional)** perspective refers to object representations or image movement in a video game environment restricted to a two-dimensional (2-D) plane with little or no access to a 3-D space that otherwise *appears* to be three-dimensional. One example is that early 2-D and 2.5-D computer games were often viewed from a plan or side-elevation view, with apparently dimensional, sprite-like characters. A common computer game version of the 2.5-D technique is a **skybox**, in which the spatial environment is enclosed in a cuboid. The sky, distant mountains, and other distant objects are projected onto the cube's faces (using cube mapping), thus creating the illusion of a distant three-dimensional environment. A **skydome** is similar, but uses a sphere or a hemisphere instead of a cube. Skyboxes and Skydomes are examples of **fixed 3-D,** which refers to a 3-D representation of the game world in which foreground objects are rendered in real time against a (relatively) static background.	
2.5-D Perspective (B): Techniques: 3/4 Perspective, Pseudo-3-D **<< NEW Term >>**	So-called **2.5-D, 3/4 perspective,** and **pseudo-3-D** describe graphical projections and techniques that try to give an impression of spatial depth, typically using parallel projection. Examples of other pseudo-3-D techniques include billboarding (textured objects that face the camera), parallax scrolling, and scaling (approximation of perspective recession). See: billboarding, parallax scrolling/scaling, pseudo-3-D perspective.	
3-D (Artificial Representation) [1, 2, 3 ,4 ,5] **<< NEW Term >>** Representation or Simulation of the Third Spatial Dimension or Depth Monocular vision Binocular vision Uni-angular Multi-Angular Unlimited Angular Omni-Angular Optical Perspective Technical Perspective Instrument Perspective Graphical Perspective Visual Perspective (2)	In artificial perspective (imaging class), there are at least five kinds of 3-D representation: **1. Uni-angular, monocular representation of a spatial scene/object** A 1-D/2-D/3-D image/view/measurement/calculation of a spatial scene/object captured/depicted from a single viewpoint or viewing angle. A 2-D linear perspective image of a spatial scene/object projected onto a 2-D surface or picture plane is one example, captured from a fixed viewing angle. **2. Uni-angular, binocular representation of a spatial scene/object** A 1-D/2-D/3-D image/view/measurement/calculation of a spatial scene/object captured from a fixed central viewing angle, using a binocular method (twin apertures looking at very slightly different viewing angles). Viewing a stereoscopic image of a spatial scene/object is one example, employing monocular perspective depth cues and certain binocular depth cues. **3. Multi-angular, monocular, or binocular representation of a spatial scene/object** A 1-D/2-D/3-D image/view/measurement/calculation of a spatial scene/object captured from multiple viewing angles, using either a monocular or binocular method. Viewing a hologram image is an example of multi-angular binocular 3-D, employing depth cues such as monocular perspective, focusing plus (partial) natural scaling and variable resolution effects, binocular vergence and parallax, plus 3-D shape changes due to (a narrow range of) multiple viewing angles, etc. **4. Unlimited-angle representation of a spatial scene (monocular or binocular, includes mirrors)** A 1-D/2-D/3-D image/view/measurement/calculation/model of a spatial scene/object captured/ modelled from (ostensibly) every viewing angle, using either a monocular or binocular method. Viewing/exploring a digital model (CAD computer modelling), or a Virtual Reality world, is an example of either unlimited viewing-angle monocular or unlimited viewing-angle binocular 3-D. With binocular 3-D, employed can be depth cues such as monocular perspective (looking out/around plus looking in/ at), possibly focusing, and (fully) natural scaling, variable resolution effects (zooming perspective), binocular vergence and parallax, plus 3-D shape changes due to multiple viewing angles, etc. **5. Omnidirectional representation of 2-D scene/object (monocular) or 3-D scene/object (binocular)** For example, a type of 3-D perspective that enables a flat 2-D image to project the same aspect or geometry from omnidirectional viewpoints. See Andotrope, Zoetrope, and 3-D/2-D Perspective. The above list is by no means exhaustive. Any of the monocular/binocular depth cues are available to aid in the representation of 3-D, depending upon the limitations of the method/media employed.	

TERM	DEFINITION
3-D (Natural Space - Viewing / Imaging / Representing) **<< NEW Theory >>** Third Spatial Dimension or Depth Physical Space 3-D Space or tri-dimensional space is a mathematical space, in which 3 values (coordinates) are required to determine the position of a point Monocular vision Optical Perspective Natural Perspective Visual Perspective (1) Visual Perspective (2) Mathematical Perspective Graphical Perspective Linear Perspective Instrument Perspective Simulated Perspective New Media Perspective Perspective Category Category Overloading Composite Perspective Perspective Form Perspective of Form Perspective = Method + Outcome Perspective Goals = View, Match, Represent, Illusion, Immersion Target Spatial Reality: Natural (physical) / Artificial / Illusive / Imagined (Artistic) Image Spatial Reality: Visual or Optical / Graphical / Mathematical / Instrument / Simulated / New Media Perspective	**Perspective classes / categories / types / forms and 3-D** **Visual perspective (**1st type) is using an image to represent or create an illusion of a spatial object or scene. **Optical perspective** uses light or EM radiation to capture images of spatial reality. **Technical perspective** is a systematic process that produces a detailed image or representation of a spatial object or scene. Ergo, **visual/optical/technical perspective** <IMAGING CLASS> is the formation of an image representing a state of affairs in a target spatial reality. Overall, perspective is complex, with issues in defining concepts accurately/consistently. Let's explore further. Perspective category refers to a specific class of perspective system (or perspectival method); with a corresponding set of optical, mathematical, graphical, instrument/illusive, or new-media processes. We have six primary categories: **natural and visual perspective** (2nd type)**,** plus **mathematical, graphical, instrument, simulated** and **New Media perspectives.** Oftentimes, more than one category is involved to produce a perspective view/image (**category chaining**); this is also called **composite perspective (1),** as when we use a camera (instrument perspective) to photograph a natural scene (natural/environmental perspective), then use visual perspective (2nd type or eye/retinal class) to view the resultant photograph. Sometimes the same subclass can appear under multiple top-level categories; named **category overloading**, for example, when we have a linear perspective drawing, which is equally a graphical and a mathematical process. Often, a perspective type appears to be both a **perspective category** (method) and a **perspective form** (outcome) simultaneously. But why is this so? The answer is that (for example) linear perspective is a name that applies to both a perspective category (a method/process) and a perspective geometric image form (image shape or appearance geometry) simultaneously. We have (at least) 4 classes of **perspective form** (outcomes or **perspective phenomena**): 1) **Perspective of Form** <GEOMETRIC FACETS>, linear perspective is one example. 2) **Gradient of Colour perspective** <OPTICAL FACETS> (aerial perspective - perspective of). 3) **Gradient of Acuity perspective** <OPTICAL + GEOMETRIC FACETS> (image clarity/sharpness). 4) **Gradient of Chiaroscuro perspective** <OPTICAL FACET> (contrasts between light and dark). The graphical type of linear perspective (perspective of lines/outlines) provides a linear structure for the depiction on a surface of the apparent size, shape, and relative position of the objects constituting a 3-D spatial scene; that is, for the representation of physical space. This is a type of perspective image/view that most people are familiar with and learned about in school (ref. checkerboard/geometrical perspective, horizon line, central vanishing point, etc). But graphical is only one of 3 types of linear perspective (perspective of lines/outlines): • **Graphical/Artificial Linear Perspective:** When we construct a drawing of a spatial object/ scene according to 1-2-3 point perspective. • **Visual/Natural/Optical Linear Perspective:** when we look at or capture an image of a spatial object/scene with an optical instrument, or a particular type of object space, such as a metric grid. • **Physical Constructed Linear Perspective:** use of simulated, forced perspective to change the physical environment according to the appearance rules of 1-2-3 point perspective. Perspective is complex as it reconciles 3-D physical space with 2-D visual/represented space. Achieving perfect equality is often difficult because there is no 1:1 correspondence among the dimensions involved. Patently, information may be lost in this process due to the inherent optical limitations of a single point of view, plus aspect of form changes and scale/size relations, resulting in reduced (or concealed/confused) visual information structures/details. Overcoming aspects of this geometric correspondence—or equivalence—problem is a key 'goal' of visual/optical/technical perspective. A perspective category, such as linear perspective (graphical type/form), embodies standard mathematical relationships for image transformation factors. But in a real-world situation, such as using a camera, the apparent distance, size, and shape features may differ significantly from expected results. Such differences increase towards the edges of an eye/lens image, where wide-field perspective distortions come into play, leading to curvilinear/spherical perspective effects, etc. Patently, for cartographic, astronomical, engineering and technical drawing, etc., it is desirable to employ accurate image analysis techniques, which explains the use of parallel perspective and/or other counter-distortion methods. In conclusion, both natural/visual and artificial perspective categories produce a structured space that emanates partly from spatial reality, partly from the perspective method, and partly from the visual scale(s)/resolution(s) involved, and this process occurs by the application of perspective principles/methods/theory (whether realised or not).

TERM	DEFINITION	3-D
3-D Display - Design (1, 2, 3, 4, 5, 6): **A, B, C, D, E, F, G** **<< NEW Term >>** Surface Display Light Field Display Lenticular Display Holographic Display Swept-Plane Display BOOM AR system Near-Eye Display Distant Display Flat Display Volume Display Hologram Display Reflection Hologram Fan-Hologram Flat Screen Stereoscopic Volumetric Other Optical Image Hologram Image Reflection Image Retinal Image Monocular vision Binocular vision Instrument Perspective Visual, Combined, Mixed, Blended Perspective Technical Perspective Visual (2) / Optical Perspective	A surface 3-D display device, or other type of optical/volume 3-D display, can convey depth using binocular cues from film or digital images, and/or by application of one or more other depth cues. There are at least six basic kinds of 3-D surface displays used for binocular vision: **1. Stereoscopic surface display (uni-angular, multi-angular, VR/AR [plus BOOM])** Stereoscopic displays produce a 3-D effect using stereopsis, but can cause eye strain and visual fatigue. Stereoscopic 3-D displays are commonly used in VR/AR. Also, a BOOM AR overlays a digital universe onto the physical universe. Holograms are intrinsically stereoscopic (no eye-strain). **2. Light field 3-D surface display (mostly uni-angular type)** A light field display produces a realistic 3-D effect by combining uni-angular stereopsis and accurate focusing depth cues for the displayed content. **3. Lenticular auto-stereoscopic 3-D surface display (uni-angular parallel type)** A lenticular 3-D display produces a parallax-type 3-D stereoscopic image/view. **4. Holographic 3-D surface display (multi-angular type)** A holographic display produces a more realistic 3-D effect using interactive holograms (holographic images of motion type), by combining multi-angular stereopsis and accurate focusing depth cues, moving station point, variable-resolution effects (zooming), binocular vergence and parallax, plus 3-D shape changes due to multiple viewing angles for the displayed content. At the time of writing, no widely available holographic displays have been invented or adopted for widespread use (excluding mirror images of all types). **5. Swept Plane 3-D Display:** a motion technique that creates a light volume illusion using a rotating 2-D semi-translucent surface. This volumetric display allows a 360-degree viewing angle. **6. Virtual 3-D Display (projected field of view): generation of a 3-D display using a VR headset** **Distance from Observer's Eye** We can also classify surface displays in terms of distance from the observer's eye: **Distance of 3-D display: A: Near-eye, B: Distant, as in TV or theatre screen** 3-D displays can be near-eye displays, as in VR headsets, or farther from the eyes, like a 3-D-enabled mobile device, a 3-D TV, or a 3-D movie theatre. **Display Form** We can also classify the displays in terms of display/image form: **Physical screen 3-D display: C: Flat, D: Volumetric (curved / spherical)** Notably, the term "3-D display" can also refer to a volumetric display, which may generate content that can be viewed from multiple angles (volume screens, etc). **Real-space image 3-D display: E: Hologram, F: Reflection hologram, G: Other** Still, other kinds of displays are possible, for example, projection onto retina, and andotrope, etc. See: 3-D, 3-D perspective (1, 2, 3, 4), volume display, andotrope, fan-hologram, BOOM, visual perspective.	
3-D Display - Views (1, 2, 3, 4) **<< NEW Term >>** Uni-Angular Multi-Angular Unlimited-Angle Omni-Angular Monocular vision Binocular vision Optical Perspective Technical Perspective Visual Perspective (2)	For an artificial perspective image display system, there are three kinds of 3-D view: **1. Uni-angular view of uni-angular image of spatial scene/object** An ordinary 2-D perspective image displayed on a surface display or computer monitor. **2. Multi-angular view of uni-angular image of spatial scene/object (see: panoramic perspective (2A))** The term "3-D" is used for a volumetric display that shows uni-angular images of a spatial scene taken from multiple viewing angles (camera changes direction of observation), whereupon the images taken from different angles have been 'stitched together', and are notionally viewed in a 3-D space, but without experiencing true observer-based angular perspective changes. Only (uni-angular) perspective depth cues are available (from observer perspective). Example: 2-D images viewed/presented in a 3-D space. **3. Multi-angular view of multi-angular image of spatial scene/object (see: panoramic perspective (2B))** The term "3-D" is also used for a volumetric display that generates content viewed from multiple angles, i.e. multi-angular images captured/generated by/for viewing from multiple viewing angles, whereupon the onlooker (may) experience multi-angular perspective depth cues (on directional screen canvas). Example: 3-D images viewed from multiple angles. See: Volume display. **4. Omnidirectional representation of 2-D scene/object (monocular)** A type of 3-D perspective that enables a flat 2-D image to project the same aspect or geometry from omnidirectional viewpoints. See Andotrope, Zoetrope, and 3-D/2-D Perspective. See: 3-D display design, hologram, computer display/monitor, andotrope, LED volume screen.	

TERM	DEFINITION
3-D Film Monocular vision Binocular vision Instrument Perspective	Three-dimensional (3-D) or stereoscopic films create the illusion of spatial depth, using special glasses. Although they originated in 1915, their high production costs and lack of standardisation limited their use. 3-D films gained popularity in the 1950s and saw a resurgence in the 1980s and 1990s, particularly with IMAX and Disney. Their success peaked with Avatar in December 2009, after which interest declined. This may be because stereoscopic/binocular methods are only one class of several ways humans interpret 3-D, including other depth cues and perspective phenomena such as structured changes in image size and shape as seen in ordinary linear perspective.
3-D Modelling (1, 2) Solid Modelling Single-Scale Multi-View Multi-Scale	**1. Three-dimensional physical model** Three-dimensional physical model of a spatial object/scene (normally a single-scale image/view, and may be true or life-sized scale, or be at a reduced/magnified scale). **2. Three-dimensional computer model** Three-dimensional modelling is the computer graphics process of developing a mathematical coordinate-based representation of the visible surface(s) of a spatial object in three-dimensions using specialised software, by manipulating edges, vertices, and polygons in a 3-D image/model space. See: computer/digital perspective, CGI, CAD, geometry, ray-tracing, Hoberman sphere, wire-frame perspective, New Media perspective, 3-D display design, 3-D display views.
3-D Perspective **<< NEW Term >>** 1-D/2-D/3-D Object 1-D/2-D/3-D Image 3-D Object Space 2-D/3-D Image Space	**Perspective image of a 1-D2-D3-D form** (ordinary definition of perspective) One, two, or three-dimensional (1-D/2-D/3-D) perspective representation of 1-D/2-D/3-D form, being a 1-D/2-D/3-D view/image/measurement/calculation, or 1-D/2-D/3-D plan/elevation projection, etc., of 1-D/2-D/3-D spatial form, present in a 3-D object space, and represented in a 2-D or 3-D image space. See: 1-D, 2-D, 3-D Perspective.
3-D Perspective (1): Depth Illusion Classes: A, B, C, D Illusion (general) Illusion of Depth Illusion of 3-D Immersion in 3-D Graphical Perspective Instrument Perspective	**3-D Perspective Illusion: 1. Illusion of depth in a spatial object/scene** Depth illusion of spatial forms present in a natural, artificial, or synthetic spatial reality. The four classes of perspective 'depth' illusion are: **A. Flat/plane picture plane:** Spatial illusion by perspective representation on a 2-D surface (monocular depth cues). Includes swept-plane displays/fan holograms. **B. 3-D modelling perspective:** Spatial illusion by physical or computer modelling (monocular/binocular depth cues - may employ multiple or changing eye, station, or viewpoint). **C. Stereoscopic views using mirror images, or virtual reality stereoscopic views/images:** Spatial illusion by stereoscopic views of mirror or virtual reality (binocular depth cues). **D. Stereoscopic views of a false reality: c**onstruction or representation of an artificial 3-D stereoscopic image/view of a spatial reality, formed by an adjusted, illusive, or false reality perspective which is also called 'false' or 'trick' perspective (views of natural/built world)—being visual illusion by the construction of a false spatial reality, or by the representation of a false spatial reality (distorted/transposed scene/physical geometry). See: perspective illusion, forced and accelerated perspective, and simulated perspective.
3-D Perspective (2): Illusion Types: A, B, C, D **<< NEW Term >>** Illusion (general) Illusion of Depth Illusion of 3-D Immersion in 3-D Graphical Perspective Instrument Perspective Visual Perspective (2)	**Perspective illusion: 2. False visual impression of scene geometry or optical facets** Perspective techniques are sometimes used to create optical illusions. Typically, a perspective illusion makes false impressions of size, depth, position, place (immersion), or transparency for objects/people. One example is when dimensionality is adjusted within a scene, making an object appear farther away, closer, larger, or smaller than it is. The four types of optical perspective illusions are: A. **Visual Perspective Illusion:** illusion by perceptually adjusted appearance (false direct view of physical reality); B. **Graphical Perspective Illusion** (includes perspective drawings/paintings): illusion by graphically constructed appearance (false apparent view of spatial scene); C. **Instrument Perspective Illusion:** illusion by secondary visual images (cinema, holograms, etc), and/or projected appearance (false-formed view of 3-D scene); D. **Simulated** (**Forced) and/or Synthetic Perspective Illusion:** illusion by physical construction of a false physical reality (apparent), or by the representation of a false physical reality (distorted/transposed scene geometry with apparent illusive effects). See: perspective illusion, forced/accelerated perspective, simulated/synthetic perspective.

TERM	DEFINITION	3-D
3-D Perspective (3): Representation (A, B, C) **<< NEW Term >>** 2-D Representation Monocular Binocular view (fixed station point and viewing angle) Binocular view Holograms (changing station point, and multi-directional viewing angle) Graphical / Instrument Perspective Virtual Reality World (unlimited viewpoints / angles)	**3-D Perspective: 3. Perspective as a representation of a spatial reality** We can define perspective as the formation of an image/view—or a representational pattern—of a state of affairs in a spatial reality, which can be produced by a range of natural, artificial, or synthetic processes. Ergo, we can consider perspective to be a representation of a spatial form present in a natural, artificial, or synthetic spatial reality. The three classes of perspective representation are: **A. Uni-angular image: monocular or fixed-angle binocular** Fixed viewing-angle monocular representation, or notionally fixed central viewing-angle binocular representation; being an (apparent or real) 3-D view/image/measurement/calculation (optical/geometric projection) of a spatial form. Includes all types of perspective that exhibit spatial recession on 2-D surface (e.g., linear perspective), and also fixed central viewing-angle stereoscopy and auto-stereoscopy. Normally, this class of perspective representation has a fixed/real, or fixed/simulated, viewing position/scale. **B. Multi-angular image: holograms (limited multi-angular binocular images)** Multiple viewing-angle stereoscopic image, or a limited multi-angular binocular image, being a view/image/measurement/calculation/representation (holographic projection), of a two or three-dimensional spatial form. Normally, this class of perspective representation has a limited range of viewing position(s)/scale(s). **C. Unlimited-angle image: virtual reality (unlimited binocular), or mirror images** Unlimited viewing-angle(s), plus roaming station point(s), image, of stereoscopic type, being a binocular three-dimensional perspective view/image/measurement/calculation/representation (holographic projection), of two or three-dimensional spatial form. This perspective representation offers unlimited viewing positions and is often a new media system.	
3-D Perspective (4): Spherical Panorama **<< NEW Term >>** Total, Circular, Panoramic	**3-D Perspective: 4. Spherical panorama: monocular vision** Imaging/projecting (mixed perspective) type of technical perspective that captures/represents/ projects a full 360-degree spherical panorama for a surrounding visual scene. See: Circle of revolution perspective, circle of vision perspective, cylinder of revolution perspective, cylinder of vision perspective, sphere of revolution perspective, sphere of vision perspective, sphere of vision, looking-out/ around/looking-in/at at perspective, circular/spherical/curvilinear perspective, Dick Termes and termespheres.	
3-D Perspective: Stereoscopy (5 - A) Binocular Vision Visual Perspective (2)	**3-D Perspective: 5 A. Stereoscopy: binocular vision** 3-D perspective (visual type) is any type of stereoscopic perspective view that gives a human being an impression of depth by using his/her binocular vision or binocular perceptive system. Humans have binocular vision, which means there is an overlap of a portion of the visual world perceived by each eye (each eye sees the same object from a slightly different viewing angle). This binocularity of human vision, or the difference in the shapes of the separate images from each eye, can be used by the brain to provide the impression of 3-D or dimensional relief for nearby objects. Ergo, the physical world appears as a natural 3-D perspective view due (in part) to the binocular capability of human vision. Note that a live mirror image is inherently a stereoscopic image. Note that monocular depth cues (including monocular perspective) also play a (major) part in the human perception of spatial extension or depth. See: binocular vision, mirror.	
3-D Perspective: Stereoscopy - auto-stereoscopy (5 - B)	**3-D Perspective: 5 B. Stereoscopy: auto-stereoscopy** Form of artificial 3-D stereoscopic view made without using special headgear, glasses, or something that affects vision, for example, autostereograms, or lenticular, integral, parallax displays, etc. Volumetric and some LED displays are also (in a sense) autostereoscopic, as they produce a different image for each eye, but only in terms of the apparent screen viewing angle.	
3-D Perspective: Stereoscopy - binocular optics (5 - C)	**3-D Perspective: 5 C. Stereoscopy: binocular optics** A way to capture, produce, or view an artificial 3-D stereoscopic image/view is by using instrumentation. Holograms, stereograms, 3-D cinema, Virtual Reality headsets, etc., are systems that generate binocular images/views that use binocular depth cues to give a realistic impression of depth.	
3-D Printer CAD Modelling in 3-D	A 3-D printer is a device for additive manufacturing, constructing physical objects from CAD or digital models through layer-by-layer material deposition under computer control.	
3-D Scanner	Refers to the production of a perspective image/view of a spatial scene by use of a projecting beam of EM radiation upon a scene, whereupon the reflected beams is analysed for changes that enable scene spatial or 3-D geometry to be calculated or inferred. See: Laser/ Radar Scanning Perspective, space, depth, distance, light, 3-D, 3-D perspective.	

TERM	DEFINITION
3-D Space - Concept of Space Natural Space Represented Space Physical Space Optical Space Visual Space Space-convergent Space-divergent Space-parallel Space-curved Space-tessellation of Space (Euclidean) Space (imaginary) Space (ludic) Space (mathematical) Space (metaphysical) Space Box 1-D, 2-D, 2.5-D, 3-D Perspective Depth Cues Perspective Phenomena	Space is a three-dimensional continuum defining positions and directions. In classical physics, it is viewed as three-dimensional, while modern physics combines it with time into a four-dimensional spacetime. This concept is crucial for understanding the universe, though debates persist about its nature—whether it's an entity, a relationship, or a conceptual framework. In geometry, three-dimensional space, typically Euclidean, requires three coordinates for positioning, often referring to a 3-D region or solid figure. Ultimately, 3-D space represents the mathematical and physical model of our world, described by length, width, and height. **Core concepts** • **Coordinate Systems**: In mathematics, the most common way to map 3-D space is the Cartesian coordinate system, using three axes (x, y, and z) that meet at a central point called the origin. • **Physical Reality**: Everything we touch and move exists in 3-D. While a flat drawing has only length and width (2-D), a physical object like a cube or a ball adds the third dimension of depth. • **The Fourth Dimension**: In physics, especially under Einstein's Theory of Relativity, time is often treated as a fourth dimension (t), merging with space to form a 4-D "spacetime continuum". **Space and Perspective <IMAGING CLASS>: Object or Target Space, and Image or Perspective Space.** Perspective encompasses natural perspective—how we see things, and artificial perspective—how we represent this in various media. Perspective principles and methods are essential for understanding space, particularly the third dimension. Accordingly, we have three kinds of space: A) physical 3-D space (object space); B) natural optical space [2-D/3-D image space] or natural visual image space (2nd type) [monocular/binocular], and C) artificial/instrument image space [2-D/3-D] or graphical/represented image space [2-D/3-D]. N.B. Image space = perspective space. See: space, space-convergent, space-curved, space-tessellation of, space (artificial perspective), space (Euclidean), space (imaginary), space (ludic), space (mathematical), space (metaphysical), space (optical), space (physical), space (visual [A,B]), space box, space curves, space diagram, space point, spatial ambiguity.
3-D Space - General Types Relating to Perspective (abbreviated list) **< NEW / REFINED Term >** Types and Concepts of Space that are relevant to the field of Visual / Optical / Technical Perspective	Accelerated Space, Anamorphic Space, Blended Scene Space, Blended View Space, Category Chained Space, Category Overloaded Space, Cleft Space, Combined Space, Complex Space, Composite Space, Compositional Space, Convergent Space, Divergent Space, Double Space, Fragmented Space, Manifold Space, Mixed Space, Multi-Plane Space, Multi-Scene Space, Multi-View Space, Parallel Space, Simple Space, Split Space, Synthetic Space, UniversalParticular Space, 3-D Spaces (Visual Types), 1-2-3-4-5-6 Point Space(s), 3-D Modelled Space, 360-Degree Space, Aberrated Space, Abstracted Space, Space, Algorithmic Space, Animated Space, Astronomical Space: General / Tilted, Astronomical Space: Gnomic, Astronomical Space: Orthographic, Astronomical Space: Stereographic, Augmented Reality Space, Axonometric Space, Bifocal Space, Binocular Space, Bitmap Space, Black-Mirror Space, Box Space, Camera Space, Captured Space (Image), Celestial Space, CGI Space, Chequerboard / Chessboard Space, Cinematic Space, Circle of Revolution Space, Circle of Vision Space, Correct / True Space, Cube Space, Cube-Grid Space, Cubist Space, Cyclopian Eye Space, Decelerated Space, Descriptive Geometry Space, Digital Space, Double Axonometric Space, Double Exposure Perspective, Double Horizon Perspective, Exterior Space, Fish-Eye Lens Space, Flat Sphere Space, Flattened / Compressed Space, Forced Space, Foreshortened Space (1,2), Four-Dimensional Perspective, Fractal Space, Front-Projection Space, Geographic Space, Geometrical Space, Gestalt Space, Glass Ball Space, Glass Camera Shot Space, Globe Space, Gott Space (map projection), Holographic Space, Homogenous Space, Hyperspace, Illuminated Space, Illusive Space, Image Space, Imaginary Space, Invisible Space, Interior Space, Intermediary Space, Invisible Space, Lenticular Auto-Stereoscopic 3-D Space, Mapping Perspective, Matte Camera Shot Space, Measured Space, Microscopic Space, Mirror Ball Space, Mirror Camera Shot Space, Mirror Space, Mixed Reality Space, Modular Space, Monkey Bar Space, Monocular Space, Montage Space, Multi-Aspect Space, Multi-Layer Space, Natural Space, Negative Space, Opaque Space, Optical Printing Space, Orthographic Space, Overlaid Space, Overlapping Space, Panoramic Space, Parallax Display Space, Parallax Space, Paraline Space, Patchwork Space, Perspective Space, Photographic Space, Physical Space, Picture Space, Projected Space, Projective Geometry Space (Desargues), Psychological Space, Random Dot Picture Space, Rear-Projection Space, Reverse Perspective Space, Shadow Space, Substituted Space, Swept Plane 3-D Space, System Space of Renaissance Perspective, Tactile / Haptic Space, Target / Object Space, Telescopic Space, Tilted Camera Shot Space, Transparent Space, Vector Space, Virtual Reality Headset Space, Virtual Reality Space, Virtual Space, Visual / Optical Space (live view), Volume Display Space (Concave), Volume Display Space (Convex), Wire Frame Space, Zero-Point Space, Zoomable Space (Digital), Zoomable Space (Optical).

TERM	DEFINITION	3-D
3-D Space - Geometry of Object / Target Space Image Space	**Geometry** studies properties of space, including distance, shape, size, and figure positioning. **Basic kinds of coordinate space geometry (sample types only)** • Body-Coordinate System Space [3-D]: object and/or image space. • Cartesian Space (Cartesian coordinates) [3-D]: object and/or image space. • Flat Space [2-D], Curved Space [2-D/3-D], Riemannian Space [3-D]: object or image space. • Flat Spherical Space [2-D], Spherical Space [2-D/3-D] (polar): object or image space • Euclidean Space [2-D/3-D], Non-Euclidean Space [2-D/3-D]: object and/or image space. **Kinds of perspective space <IMAGING CLASS> (abbreviated list)** • Linear Perspective space [2-D]. Physical or scene-based Linear Perspective space [3-D]. • Curvilinear space [2-D/3-D], Cylindrical space [2-D/3-D], and Spherical space [2-D/3-D]. • Visual space (2nd type or retinal) [monocular/binocular - 2-D/3-D]. • Represented or graphical space: 1-D Space, 2-D Space, 2.5-D Space, 3-D Space. • New Media / Virtual Reality / CGI Space: interactive 3-D model or 3-D optical model of spatial reality. • Sphere / Circle / Cylinder of Vision Perspective [2-D/3-D]: spherical/circular space, with eye as origin. • Sphere / Circle / Cylinder of Revolution Perspective [2-D/3-D]: spherical/circular space, with object as origin.	
3-D Space - Invisible (1, 2) Intrinsic Property of Space Invisible Region of Space Invisible Perspective	**1: Space is Invisible (intrinsic property of space)** Space is invisible, and we humans rely on recognising standard shapes within spatial views/images and on orienting ourselves in relation to, and mapping/understanding, dimensional scenes/objects. **2: An "Invisible" region of Space (objects present but illusion of emptiness): Invisible Perspective** Perspective methods/systems can produce an apparent region of physical space that is invisible, or that can contain objects hidden from the viewer of a spatial scene. Note that the space is not blocked in any detectable sense, but rather the view appears open, empty, and unobscured.	
3-D Space - Perspective Categories of **<< NEW Term >>** Physical Space Optical / Visual Space (2nd type) Artificial / Instrument / Represented Space Natural Space Mathematical Space Graphical Space Instrument Space Simulated Space New Media Space	In terms of Perspective Category Theory, category refers to the components of a perspective system <IMAGING CLASS>, or a conjoined set of Optical/Mathematical/Graphical/Instrument/Simulated/New Media processes involved in producing a perspective image/view. Each perspective system category deals with a specific kind of 2-D/3-D image space, or with transforming an object/target space into a perspective space. Sometimes the same perspective subclass appears under multiple top-level categories; this is called **category overloading**, and it involves multiple kinds of perspective space. Also, when more than one category is involved in producing a perspective view/image, as in **category chaining** or **composite perspective (1),** multiple kinds of perspective space are involved. **Kinds of perspective space (natural and artificial classes) - [all may be 2-D/3-D (apart visual)]** • **Physical Space** ————————— Natural Perspective • **Optical Space** ————————— Optical Perspective • **Visual Space** ————————— Visual Perspective (2nd type) - [monocular/binocular] • **Mathematical Space** ————————— Mathematical Perspective • **Graphical Space** ————————— Graphical Perspective • **Instrument Space** ————————— Instrument Perspective • **Simulated / Illusive Space** ————— Simulated Perspective • **Digital / New Media Space** ————— New Media Perspective	
3-D Space - Perspective Invisibility Methods / Systems **<< NEW Term >>** Invisible Space Invisible Perspective Perspective Illusion Invisible Objects	Perspective methods can create an apparently invisible region of space containing hidden objects, presenting an unobstructed view. There are many invisibility techniques, but the basic classes are: A) **Optically produced invisibility** (live image viewing); and B) **Filmic or digital / New-Media produced invisibly** (live or recorded image viewing); and C) **Combined optical and digital/New Media produced invisibility** (live or recorded image viewing). We can list some **optically produced invisibility methods**: A) **Angled mirrors** can make objects appear 'invisible' by diverting light rays and creating a (secretly) split, fragmented or diverted view. B) **Specially arranged mirrors/prisms** can make objects appear 'invisible' by diverting light rays and creating a (secretly) split, fragmented or diverted view. C) **Lenticular 'invisibility cloaks'**, can make objects appear 'invisible' by diverting light rays and creating a (secretly) split, fragmented or diverted view. D) **Double/blended space illusion** (physically adjusted environment): manipulation of false' vanishing points can result in a multi-scale space in which objects can potentially be hidden. E) **Rotated/diverted view Illusion**: in 1983, magician David Copperfield famously made the Statue of Liberty disappear in a massive televised illusion using a rotating platform to shift the audience's view while obscured by a curtain. Different apparent and true viewing directions. See: invisible space, invisible perspective, 3-D space - perspective Invisibility methods/systems, optical special effects, mirror perspective, concave/convex mirrors, mirror hologram, virtual mirror space, perspective illusion.	

TERM	DEFINITION
3-D Space - Transformed Perspective Space(s) **<IMAGING CLASS>** **< NEW / REFINED Term >** Accelerated Space Anamorphic Space Blended Scene Image Space Category Chained Space Category Overloaded Space Cleft Space Combined Space (multi-view, multi-scene) Complex Space (A, B) Composite Space Compositional Space (A, B) Convergent Space Divergent Space Double Space Fragmented Space Invisible Space Manifold Space Mirror Space Mixed Space Multi-Plane Space Multi-Scene Space (A, B) Multi-View Space (Single Scene) Multi-View Space (Multiple Objects) Multi-View Space (Orthographic) Multi-View Space (New Media) Parallel Space Simple Space Simulated Space Sphere of Vision Sphere of Revolution Synthetic Space Unified Space Virtual Mirror Space Virtual Reality Space Augmented Reality Space Virtual Space Volume Display Space	**3-D Space - Transformed Perspective Spaces** Several kinds of systematically transformed perspective spaces are identified to achieve **perspective viewing, matching,** and **representation** goals, as well as **illusory, immersive,** and **optical/visual special effects**; some of the more unusual ones are detailed below. Note that this is only a sample list, and that combination(s) of these and other kinds of space can be employed to produce a large number and wide variety of transformed perspective spaces. Sometimes, different names refer to the same type of optical/visual effect, due to the varied history of perspective terminology. **Transformed perspective space(s) (natural / artificial) - [all may be 2-D/3-D (apart visual)]** • **Accelerated / Forced Space** - type of simulated and (possibly) synthetic perspective (apparent spatial structure) that (for example) employs forced perspective to increase the perspective recession. • **Anamorphic Space** - view/image with global geometry distortion. • **Blended Scene Space** - comprises two or more separate spatial geometries (indistinct). • **Blended Image Space** - multi-view image containing separate images/view (distinct/indistinct). • **Category Chained Space -** single category image involves multiple categories and spaces (normal case). • **Category Overloaded Space -** multiple categories produce multiple or blended kinds of space. • **Cleft Space -** split or fragmented space at two different distances or planes from the eye/camera. • **Combined Space (multi-view) -** image contains both real and represented views (distinct). • **Combined Space (multi-scene) -** synthetically unified scene - single scale-space (distinct/indistinct). • **Combined Space (universal + particular) -** universal scene and particular views. • **Complex Space (A) -** interaction of artificial and natural perspective(s). • **Complex Space (B) -** central rays falling between all object/image point(s) are not symmetrical. • **Composite Space -** more than one category is involved to produce a perspective view/image. • **Compositional Space (A) -** derived partly from art (graphics) and partly from nature (vision/ optics). • **Compositional Space (B) -** universal scene and particular views. • **Convergent Space -** diminution of size perspective (ref. linear perspective). • **Divergent Space -** Graphical space in which objects increase in apparent size at increasing distance. • **Double Space** - two separate perspective spaces are combined into an apparent direct or simulated real-space view that exhibits illusive properties (indistinct). • **Fragmented / Split Space** - Use of layered or multi-view approaches, for example, a cleft space for spatial manipulation, with actors at two different distances from the camera. • **Invisible Space or Invisible Perspective**: a visually hidden region of a spatial scene. • **Manifold Space** - A combined image consisting of both a reflection and a transmission. Such as when you see your own reflection in a shop window while simultaneously seeing the shop's interior. • **Mirror Space (ordinary reflection)** - a plane mirror. See: "virtual space" entry below. • **Mirror Space (types):** convex/concave mirror, hologram mirror, faux space mirror illusions (many types). • **Multi-Plane Space -** Any perspective method that enables in-focus imaging of transparent or semi-transparent planes of space to be captured in one or more images, or else represented. • **Multi-Scene Space (A) -** synthetically unified scene - single scale-space (indistinct). • **Multi-Scene Space (B) -** unified scene by image blending/combination, image overlay/ substitution, or another method - single or multiple scale-space (district or indistinct). • **Multi-View Space (Single Scene) -** changing viewpoint in real time (CAD/ digital games). • **Multi-View Space (Multiple Objects) -** when a single image contains multiple objects (multiple aspects). • **Multi-View Space (Orthographic) -** first or third-angle projection. • **Multi-View Space (New Media) -** linkage and interactive exploration of a 3-D digital model/world. • **Non-Unified Space -** non-unified (central) vanishing point gives a non-scientific space. • **Parallel / Paraline Space -** the graphical space of parallel projection or primary views (1st/3rd angle). • **Simulated Space** - designed illusive/immersive images/views of a spatial reality, by visual illusion or optical adjustment of physical reality. • **Sphere of revolution / sphere of vision space**. Possible mixing of, see: spherical view (1,2,3) • **Synthetic Space -** any (systematic) or accidental combination of natural and artificial perspective. • **Unified Space -** unified (central) vanishing point gives a scientific space. • **Virtual Mirror Space** - AR-enabled screens with cameras that reflect users in real-time for virtual clothing try-ons and immersive experiences. • **Virtual Reality Space**: virtual or augmented reality space that is stereoscopic in form. • **Virtual Space -** Space behind a mirror is the perceived location of reflected images, a 3-D illusion created by the brain interpreting reflected light as originating from behind the mirror. • **Volume Display Space (convex screen)** - static or camera-relative generated background views. • **Volume Display Space (concave screen)** - static or camera-relative generated background views. See: Accelerated, anamorphic, blended, combined, complex, composite, compositional, divergent, double, fragmented, invisible, manifold, mirror, multi-view, simple, simulated, synthetic, unified, virtual, Virtual / Augmented Reality, New Media perspective(s), 3-D space - general types and 3-D space - perspective categories of.

TERM	DEFINITION	3-D / A
3-D Visual Perception: Images Perceived as In-front of our Eyes!	An astounding fact is that there is a psychic phenomenon corresponding with the stimulation of the retina by rays of light, whereby we see light, and thus images, as something existing solely in the 3-D space before our eyes! In actuality, vision involves 2-D images impacting the 2-D retina.	
3-D Visual Perspective: Classes **<< NEW Terms >>** Imaging Class Projecting Class Illusion / Immersion Class	Perspective Category Theory identifies 3 basic **classes of perspective**, corresponding to the goals of perspective: to view, match, represent, create an illusion of, or immerse in the visual appearance of a spatial object/scene. Accordingly, **optical perspective <IMAGING CLASS>** is any perspective that uses, or purports to use, light, or EM radiation (ref. real, imaginary, or simulated light-rays, etc), to capture images/views of a spatial reality. We also have the **optical perspective <PROJECTING CLASS>**, which projects images/shadows forward into spatial reality. Finally, we have the **optical perspective <ILLUSIVE / IMMERSIVE CLASS>**, which creates the illusion of, or immersion into, a real, simulated, or virtual optical world overlaid, displayed, or inserted into the human visual field. N.B. It is important to realise that just as with **composite perspective** (**category chaining**) and **category overloading**, we can have examples of **class chaining** or **composite perspective classes**, as well as **class overloading**.	
3-D/2-D Perspective or Omnidirectional Perspective Display 360-Degree Views of 2-D Object	A new type of swept plane display 3-D perspective that enables a flat 2-D image to project the same aspect or perspective geometry from omnidirectional viewpoints or multiple station points, that is, the 2-D image looks identical in perspective projectional terms from a full 360-degree point of view (the image does not display viewpoint-dependant geometry outline changes or aspect projection changes). Another way of describing 3-D/2-D perspective is that it produces 360-degree Identical views of a flat or 2-D object or scene. See also: Andotrope, Zoetrope, swept plane display, volumetric display.	
360-Degree Perspective	Formation/generation/viewing of a 360-degree image/view of the entire surrounding spatial scene, optical vista, or panorama. See: Circle of revolution perspective, circle of vision perspective, cylinder of revolution perspective, cylinder of vision perspective, sphere of revolution perspective, sphere of vision perspective, sphere of vision, looking-out/around and looking-in/at perspective, circular/spherical/curvilinear/panoramic perspective, Dick Termes and termespheres.	
Abaco School Euclid Fibonacci Leon Battista Alberti	In his *Elements*, Euclid explored the basic properties of ratios and proportions of lines and surfaces, as well as their equivalents and transformations. In the 13th century, interest in these problems was revived by Leonard of Pisa (Fibonacci), who introduced them into the curriculum of the Abaco school. In 1430, Leon Battista Alberti applied these geometrical principles to perspective in his *Elements of Painting*. Piero della Francesca (c.1480) developed this approach, devoting the first two books of *On the Perspective of Painting* to these geometrical demonstrations based on proportional diminution.	
Abacus	An abacus, also called a counting frame, is a hand-operated calculating tool used from ancient times until the adoption of the Arabic numeral system. An abacus consists of a two-dimensional array of slidable beads. In early designs, the beads (or stones, etc) could be loose on a flat surface. Later, the beads were made to slide on rods and built into a frame, allowing fast manipulation.	
Aberrated Perspective Projection **(Ref. Partially Inverse Axonometry)**	A class of artificial perspective drawing, view, or representation (typically using graphical or New Media digital perspective but may include optically produced kinds of anamorphic distortion), whereby the appearance of the object and/or scene suffers severe large-scale aberrations in terms of (for example) distorted or altered image size/shape/position elements. See: artificial perspective, graphical perspective, digital perspective, computer perspective, New Media perspective, simulated and synthetic perspective, anamorphic perspective.	
Aberration (Chromatic) Instrument Perspective	Chromatic aberration, or colour fringing, is a colour distortion that occurs when an optical system (containing refractive elements) cannot focus all colours of light (from an object point) onto the same point on the image plane. It's caused by the system's refractive index, which varies depending on the wavelength. See: aberrations (optical systems), aberrations (1,2), aberration (blur-spot size), light, light-ray.	
Aberration - Optical **(Blur-Spot size)** Instrument Perspective Blur Spot Size Wave Optics Perspective Phenomena	Optical aberration is a property of optical systems, such as lenses, that causes light to spread out over a region of space rather than being focused to a point. Aberrations cause the image formed by an optical system (of a point source) to become blurred or distorted, with the nature of the distortion depending on the type of aberration. In ray optics, the (geometrical) blur spot size is the diameter of the circle of light that results when a lens is out of focus (the size of this circle may, however, be limited by wave optics in reality), or when the the rays from an object point suffer from a one or more aberrations such as spherical aberration, coma, etc. Note that the most common type of macroscopic image aberration is distortion. Whereby, distortion or incorrect image shape can (often) be classed as a perspective image distortion (or phenomena), in which the projected image shape is incorrectly structured/proportioned, scaled, and/or incorrectly positioned, etc. See: aberrations (optical systems), aberrations (1,2), aberration (blur-spot size), light, light-ray.	

TERM	DEFINITION
Aberrations: Classes (1, 2 [A, B]) **<< NEW / REFINED Term >>** Optical Class Distortion Class Natural Artificial Perspective	1. **Optical aberration: image point defects:** An optical defect in which rays from a point object do not form a perfect point after passing through an optical system (eye, lens, camera, etc). This class of aberration can be accurately assessed or measured relative to paraxial optics, or pin-hole lens/camera optics. Common monochromatic types include: spherical, coma, astigmatism, and higher-order aberrations. Plus all aberration types can vary with the wavelength of light, named as chromatic aberrations (colour). 2. **Distortion: image shape/form/structure defects that arise due to viewpoint geometry relative to object structures in the environment or object space (i.e. aberrations not due to imaging system characteristics alone):** Distortion or incorrect image shape can (often) be classed as a perspective image distortion, in which the projected image shape is incorrectly structured/proportioned, scaled, and/or incorrectly positioned, etc. Many times this class of aberration, or distortion, in a perspective image cannot be objectively measured, because: A) **Shape/form is subjective and/or dependent on perspective type:** it may be unclear what the correct or most natural shape for an image/view is, and in relation to which types of perspective. For example, is a visual, linear, curvilinear, spherical projection more or less real than other types. B) **Shape/form is multi-facetted:** image shape depends on a number of different factors, including viewpoint, viewing angle, projection surface shape/position, projection scale, and projection scale resolution, etc. N.B. Parallel or primary views may resist or preclude distortions in image size/shape/position. See: size/shape/scale problem, shape sufficiency problem, equivalence / correspondence problem, projection scale, projection scale resolution, Florensky (Pavel), objective perspective, validity of linear perspective.
Aberrations: Types (optical system) [1, 2, 3, 4, 5] Instrument Perspective Lens / Camera / Telescope / Microscope	A Lens or other optical imaging system will exhibit certain image defects or optical aberrations whenever we consider light rays that enter the optical system outside an infinitesimally small region surrounding the optical axis, named the paraxial region. A well-designed optical system still has these aberrations, which degrade image sharpness and other properties, but is partially corrected for rays that enter the optical system at a finite distance from the optical axis. The primary optical aberrations are as follows: 1. **Spherical aberration**: variation of focus with aperture. 2. **Coma**: variation of magnification with aperture. 3. **Astigmatism**: rays that propagate in two perpendicular planes (sagittal/tangential planes) have different foci. 4. **Field curvature**: the region of the sharp image is typically generated on a curved focal region. Positive lenses (positive converging power) introduce inward image curvature, and negative lenses introduce outward curvature. 5. **Distortion (optical system-introduced type)**: images of off-axis points depart from the paraxial expressions of image formation, that is, the shape of the images changes with field position. Classic types of optical system distortion include: negative distortion, **pincushion distortions** or inward-curving distorted object lines, and **barrel distortions** or outward-curving distorted straight lines. See: Lens, light, aberrations (1, 2), aberration (optical), aberration (chromatic).
Abney Level / Clinomater	An Abney level is a surveying instrument with a sighting tube, movable spirit level, and protractor, featuring an internal mirror for targeting while ensuring level alignment.
Absolute Perspective (1, 2) Visual Theory Philosophy	**1. Perspective as a symbolic form (see: objective perspective)** A claim that visual perspective (2nd type or retinal perspective), or another form of perspective, is an absolute form or a 'symbolic form' that has universal significance or has a universal source that applies in every situational circumstance. This view implies that perspective (especially linear perspective) is a phenomenon that is purely objective in origin and has no relative or subjective source(s), being a fundamental property and law of the universe (probably a false assumption). See book: Perspective as a Symbolic Form by Panofsky, Erwin (1927, republished 1991). **2. Apparent perspective (curved/converging space)** Absolute perceptive is also referred to as a type of apparent perspective based on visual perspective (2nd type or retinal) in which apparent space is curved, converging, and limited, with relatively close vanishing points/horizons. See book: Curvilinear Perspective: From Visual Space to the Constructed Image by Flocon A., Barre A. See book: Extreme Perspective! by David Chelsea (2011). See paper by Robert Hansen: This curving world: hyperbolic linear perspective, from the Journal of aesthetics and art criticism, 32. 1973.

TERM	DEFINITION	A
Absorption (1, 2) Light Atmospheric Perspective (A) Aerial Perspective (1) Blue or green tint to distant objects	**1. Absorption of light** Light absorption converts photon energy into internal energy, causing attenuation—a reduction in light intensity through a medium. **2. Atmospheric Absorption / Scattering for a Perspective View / Image** Atmospheric absorption attenuates electromagnetic radiation, reducing light intensity. Closer objects appear detailed and high in contrast, while distant ones are blurrier and lighter due to more atmospheric interference. Rayleigh scattering causes shorter wavelengths, like blue, to scatter more, making distant objects appear bluish.	
Abstract Art Art Movement Aspective Mondrian, Miro, Picabla, Malevich, Kupka, Richter, Rothko, Klee, etc.	Abstract art emerged in the early 20th century, employing a unique visual language of shape, colour, and line, independent of real-world references. Related terms include non-figurative, non-objective, and non-representational art, encompassing works that simplify or stylise forms and those utilising shapes or marks without external visual sources. Artists who worked in this genre include Kandinsky, Mondrian, Miro, Picabla, Pollock, Malevich, Richter, Rothko, Kupka, Klee, etc. Also relates to the so-called Rayonism art movement from artists Goncharova and Larionov. See: Expressionism, Klee (Paul), Picasso, cubist perspective, Cubism, metaphysical art.	
Abstract Perspective **<< NEW / REFINED Term >>** Artificial Perspective	Any perspective method/system or view/image that has not been directly captured/imaged from physical reality, or a perspective image/view that has been altered, changed, or processed in some way, and does not directly relate to physical or an optically true/correct reality (partially, wholly, or in actuality). Resultant perspective views/images are judged to be (at least partially) mathematical, fictional, or (physically) unreal, or possess related aspects/features. It has been claimed by some experts that all types of visual/optical/technical perspective are at least partly abstract, or that perspective may be fundamentally an abstract or subjective method. See: true perspective, geometry, levels of abstraction, shape sufficiency problem, perspective as a symbolic form (art/perspective theory as developed by E. Panofsky), subjective/objective perspective.	
Abstract Shape	Abstract shapes are created by abstracting (or seeing/perceiving) the most basic and recognisable aspects of a real-life scene/object shape and creating a simplified representation of it. See: true perspective, geometry, levels of abstraction, scale/shape/size problem, shape sufficiency problem, equivalence/correspondence problem, shape (apparent), regular geometry, platonic solids, Forms.	
Academic Perspective Definition Characteristics Central Perspective Linear Perspective One-Point Perspective Two-Point Perspective Three-Point Perspective	Identical to linear perspective (one, two, three-point perspective). A type of artificial/graphical perspective used as a drawing/representation method, which was first used by Brunelleschi around the year 1412-20, and later codified by Leon Battista Alberti in his book *Della Pittura*. Linear perspective techniques—one, two, and three-point—create the illusion of 3-D depth on a 2-D surface, defined by vanishing points on the horizon and viewer orientation. One-point focuses on frontal views, two-point on edges and corners, and three-point adds vertical convergence for dramatic angles. Academic perspective (linear form) has eight principal characteristics: 1) There is no apparent distortion of straight lines present in object space; 2) There is no apparent distortion or foreshortening of objects parallel to the picture plane, which is therefore given emphasis; 3) The apparent size of objects diminishes in an exact proportion to their distance from the observer, so that all quantities are measurable (ref. single unified spatial scale); 4) Sets of receding parallel orthogonal lines (along the central axis) appear to converge to a single vanishing point, dependent on the fixed position of the observer's eye; 5) Sets of parallels co-planar with the ground plane converge to vanishing points on the horizon line; 6) For linear perspective along the ground plane, objects higher up are further away. 7) Aspect perspective: degradation of form according to projection angle. 8) Foreshortening (combined): dimensions aligned along the depth direction are contracted in apparent size relative to dimensions in the orthogonal plane (aspect/axonometric foreshortening + perspectival/optical foreshortening due to size/distance law). Academic perspective is characterised by a fixed eye that views a scene from a stationary vantage point (image snapshots); whereby the scene is viewed over a relatively narrow field of view, which prevents curvilinear and other wide-field optical distortions. Synonyms: Linear perspective (one, two, three-point perspective), central perspective.	

TERM	DEFINITION
Academies Art / Drawing Schools	Drawing Academies and Academies of Fine Art, particularly in Rome, Florence, Milan, Paris, and London, offered drawing instruction and thus taught perspective methods. Such schools, which began in the sixteenth century, had been aimed only at a select body of professions (painters, architects, goldsmiths, etc.), but later spread in the seventeenth and eighteenth centuries to general artistic schools and academies, and in the nineteenth, to trades, secondary schools, primary schools and ultimately all interested laymen. Drawing, and the perspective it entailed, had thus become part of learning how to see, a basic ingredient seen as a founding stone of human civilisation.
Accelerated Perspective (1, 2) Illusion Forced Perspective Amplified Perspective Simulated Perspective Synthetic Perspective	**1. Horizontal convergence** Accelerated perspective is a type of simulated and (possibly) synthetic perspective (apparent spatial structure) that (for example) employs forced perspective to increase the perspective recession, or increase the converging angle of lines directed towards vanishing points, and so to increase the apparent depth. See: decelerated perspective. **2. Vertical / upward convergence** Refers to increasing the apparent height of a tower or elongated vertical object, in which the perspective vista appears deeper in the vertical dimension, and by bringing the (apparent) vertical parallels to a vertex faster than with ordinary vanishing point recision by 'distance alone' and thus we use forced perspective to increase the perspective recession, or increase the converging angle of lines directed towards vanishing points, and so to increase the apparent depth. Synonyms: Forced / amplified perspective, simulated / synthetic perspective, perspective illusion.
Accidental Measuring Point	Refers to measuring points as used for a type of linear perspective named Accidental Perspective (2), with secondary vanishing points, and potentially a secondary horizon line, etc. See book: Perspective for Art Students by R.G. Hatton, 1924.
Accidental Perspective (1, 2, 3) Artificial / Graphical Perspective Linear perspective	**1. Alternative name for linear perspective (one- / two-point type)** One of Leonardo da Vinci's names for pictorial or linear perspective. **2. Accidental / secondary vanishing point perspective** Refers to graphical perspective having angular situations other than the special case(s) of perspective projection of orthogonal parallel lines (in object space) and/or 45-degree orientation of parallels (in object space), and so the parallels are not perpendicular to, or at a 45-degree angle to, the picture plane. See: secondary / accidental vanishing point, secondary horizon, unlimited vanishing point perspective. **3. Accidental viewpoint (unique / eccentric viewpoint)** An accidental viewpoint is a singular perspective that produces a limited or ambiguous image visible only from that position.
Accidental Vanishing Point Natural, Graphical and Visual Perspective (2)	**Synonym for: Vanishing Point - Accidental (4).** The vanishing point of a group of lines that are parallel neither to the direct radial, nor to the horizontal line (A). It is further distinguished as Aerial or Terrestrial Vanishing Point as it is above or below the horizontal line. See: Vanishing point, vanishing point - accidental (4), aerial or terrestrial vanishing point.
Accolti Perspective Graphical Perspective	Accolti perspective is a method of perspective drawing for artists developed by Pietro Accolti. Accolti's work on perspective is documented in his book Lo inganno de gl'occhi: *Prospettiva Pratica* (1625), which translates to *Practical Perspectiv*e. Accolti's work on perspective was influential in the field of art. For example, Joseph Mallord William Turner created a diagram of Accolti's perspective method for a cube around 1809.
Accommodation Eye Visual Perspective (2nd type)	Human eye accommodation is the process by which the eye changes its optical power to keep an object in focus (seen with good optical clarity) as its distance varies. This happens when the lens of the eye changes shape to allow light rays to bend more or less strongly: • **Near objects:** The lens becomes thicker and more rounded to focus on nearby objects. This allows light rays to bend more strongly, or at a greater angle of refraction, thus bringing images of near objects to a sharp focus on the retina. • **Distant objects:** The lens flattens to focus on distant objects. This allows light rays to bend slightly, or at a lesser angle of refraction, thus bringing images of distant objects to a sharp focus on the retina. See: optics of eye, visual perspective (2nd type), focus/defocus, depth of field. See books: Optics, Painting and Photography by Piriene, M.H. (1970). Eye and Brain by R.L. Gregory (1998).

TERM	DEFINITION	A
Actual Horizon Natural and Visual Perspective (2)	**Synonym for: outdoor visible / physical / observed sensible horizon line.** There are different types of horizon lines, notably the actual or optical horizon, where Earth and sky meet, excluding obstructions. On a flat plane, the outdoor horizon line is formed by the ground's extent, where parallel lines converge at a unique vanishing point on the horizontal line. See: Horizon, horizon line, visible horizon, outdoor / sensible / observed / physical horizon, horizon line (types).	
Acuity Perspective Visual (2nd type) / Instrument Perspective Aberration Image Sharpness Resolution Shape-Form Sufficiency Problem	Refers to gradients of distinctiveness, sharpness, clarity, and detail that are produced at different distances from the observer. There are two basic types of visual acuity: that of distance or depth, and that which is regulated by the accommodation of the eye (adjustment of focus for object size and object distance across the visual field). Other factors may also come into play in a real-world perspective system (ref. instrument perspective), such as contrast blurring, projection scale resolution, the shape/sufficiency problem, and other optical effects related to resolution limitations for an optical system. Acuity perspective is accomplished in painting and sculpture by reducing the finish (surface detail) of distant objects, eliminating graphical detail, blurring edges of contours and interior forms, rounding angles, and eliminating (visual depth) cues of texture. See also: perspective of visual acuity, diminution of form, shape sufficiency problem. See book: Art and Illusion by Ernst Gombrich (1960). See book: Perspective: Fundamentals, Controversials, History by G. Ten Doesschate (1964) See paper: The Vertebrate Eye by R.A. Weale (1978). See paper: The Information Available in Pictures by J.J. Gibson (1971).	
Acute Line	A straight line that measures less than 90 degrees relative to another line or plane is an acute line.	
Adaptation (Eye)	Eye adaptation is the ability of the eye to adjust to different levels of light and darkness. The eye's iris, retina, and pupil work together to perform this adjustment. See: optics of eye.	
Adjusted Perspective Perspective Distortion Natural / Environmental Perspective Graphical Perspective Visual Perspective (2) Instrument / New Media Perspective False Perspective Distortion Image Correction	Adjusted perspective is the process of correcting a photo or represented image's perspective distortion to make it more visually appealing and balanced. It can also be called perspective correction, perspective control, or keystone correction. The image adjustment can be done in the camera itself using a slanted or variable-tilt relocating mirror, optics-tilt, an image-plane tilt, etc. Alternatively, the perspective distortion adjustment can be made post-image capture using digital image processing methods or during film development using optical projection techniques. **Perspective Image Distortion (image capture)** • A highly distorted perspective can make photos look cluttered and unprofessional. • It can make subjects appear unnatural in their environment. • It can be caused by using the wrong lens or by holding the camera improperly. • It can be caused by using an extreme angle of view or an oblique aspect, for example, by taking a photograph looking up at a very tall building. **How to adjust perspective distortion for an image (post-capture)** • Use the Upright feature in Lightroom software: because it can automatically correct perspective in photos. It offers options like Level, Vertical, Auto, and Full. • Use the Transform panel in Lightroom software: The Upright feature can correct distorted perspective. • Use the Transform dialog in Photoshop software.	
Advanced Perspective Optical Modelling	**Sophisticated representation or model of spatial reality (highly technical image/model)** Any category/form of artificial/graphical perspective image/view that employs sophisticated optical modelling and image construction processes and that result in the depiction of realistic perspective phenomena, including the creation of correct and possibly unlimited numbers of vanishing points and related optical distortions, etc. See: digital computer perspective, New Media perspective, CAD, CGI.	
Aerial Accidental Vanishing Point	Accidental vanishing point located above the horizontal line. See: Vanishing Point, Vanishing point - accidental (4), terrestrial vanishing point.	
Aerial Perspective - Basin-like appearance of Earth	If we ascend in an airplane, we shall find that the distant horizon rises with our height, but it appears to remain at eye level. This accounts for the peculiar basin-like appearance of the Earth when viewed from a great height or when flying in an aeroplane/balloon (ref. aspect perspective). See: Aerial schematic perspective, aerial views, aerial / flying perspective, aerial surveying.	

TERM	DEFINITION
Aerial Perspective (1, 2, 3) **<< NEW / REFINED Term >>** Atmospheric Perspective Synonym for Three-Point Linear Perspective	Aerial perspective concerns the appearance of spatial objects/scenes as affected by the air, light and shade, and colour. **1. Sophisticated representation or model of diminution of colour and contrast** Aerial Perspective (in terms of graphical perspective) is the art of giving due diminution of the (represented) strength of light, shade, and colour of objects, according to their distances and the quantity of light received by them, and to the medium through which the object is seen or presented as seen. It is the graduation of light and shade on various objects as they recede from the eye. **2. Natural space diminution of Colour and Contrast** Refers to the combined visual effects of the diminution of colour and contrast with increasing distance from the viewer; and as a result of the interaction of light rays with the atmosphere due to the effects of light extinction (absorption + scattering of light rays by atmospheric molecules). **3. Three-Point Linear perspective** Synonym for three-point linear perspective view/image in which we observe, or represent a view as seen, from a high vantage point relative to (for example) a cubic-shaped object. Aerial Perspective [1, 2]: See: absorption (of light by atmosphere). Synonyms: atmospheric perspective.
Aerial Perspective of a Cube	Synonym for: Three-point perspective view or representation of cube.
Aerial Pyramid Vanishing point Spatial recession	Describes the pyramid of spatial recession seen when flying over a city, where parallel lines converge at a distant vanishing point, creating a pyramid-shaped view. See: central perspective, linear perspective, pyramid of recession.
Aerial Schematic Perspective	A type of perspective image that depicts a spatial scene from a great height, relative to the ground plane, for example, a photograph of a city from 2000 feet in the air. Normally, the image is taken at an angle of around 30-45 degrees relative to the ground plane to provide an enhanced perspective view of buildings and other features. See: aerial and central perspective, linear perspective, pyramid of recession.

Aerial Surveying
Aerial Perspective
Stereo Mapping
Drones
Instrument Perspective
Photography
	Aerial surveys involve collecting high-resolution geospatial, topographic, or imaging data of land, structures, or environments from above using drones (UAVs), planes, or helicopters. They are essential for rapid, cost-effective, and safe data acquisition in construction, agriculture, archaeology, and environmental monitoring. Aerial surveys often use pre-programmed flight paths, with data processed by software to create highly detailed maps and 3-D models, sometimes replacing traditional manual "stereo mapping".
	Key Aspects
	• **Methods & Technology:** Utilises drones, aircraft, and sensors like Lidar, multispectral cameras, and thermal imaging to capture data.
	• **Applications**
	  • **Construction & Infrastructure:** Monitoring project progress, inspecting, and mapping large, inaccessible areas.
	  • **Environmental & Agriculture:** Assessing crop health, environmental impact, and wildlife/ marine mammal monitoring.
	  • **Archaeology & Heritage**: Recording sites, Earthworks, and monuments from the air.
	• **Advantages:** Provides a rapid, comprehensive overview, reduces or eliminates the need for personnel to work at height, and offers superior accuracy over large areas.
	• **Data Outputs:** Produces detailed 3-D models, digital surface models, orthomosaic maps, and aerial photographs.
	See: aerial perspective, stereo mapping, orthomosaic maps, drones.

Aerial Views	A perspective image/view captured from, or represented as being taken from, an elevated height such as from a machine in flight, a balloon, a satellite camera, or from a mountain top, etc. **Aerial View Technologies & Uses** • **Google Earth/Maps**: Offers 3-D, satellite, and immersive Aerial View videos. • **Historic Aerial Photography**: Resources like Historic England provide thousands of digitised photos to explore landscape changes. • **Applications**: used in archaeology, town planning, environmental studies, and legal disputes. • **Types**: Includes orthophotos, obliques, and 3-D maps.
Aeroplane / Flying Perspective	Any perspective method/system that is in flight, or any perspective image/view captured from such a machine in flight.

TERM	DEFINITION	A
Aesthetic Perspective Drawing / Painting / Graphical perspective	An aesthetic perspective is the artistic application of perspective to adequately represent the subject of a drawing/painting/graphic. For example, if we are overlooking a battle scene on an open plain, nothing is distinguishable if the eye is on level with the plain; more is comprehended when the eye rises above the plain, or is inclined and can see everything in a bird's-eye view. Perspective is always a visual technique that must be purposefully, judiciously, and artfully employed; because there may often be a better vantage point from which the scene is more clearly perceived and understood.	
Affine Perspective Mathematical Perspective	An affine mathematical or graphical perspective image is a type of linear geometric transformation that preserves parallel lines, whereas the opposite type the so-called perspective transformation (aka perspective recession etc.) is used to create perspective distortion(s), including the formation of vanishing points, etc. We can distinguish the two basic types of mathematical projections as follows: • **Affine transformations** Affine transformations are linear mappings that preserve points, lines, and planes, and correct geometric distortions from non-ideal camera angles. Utilising a 2x3 transformation matrix, they enable scaling, skewing, and rotation, extending beyond simple objects to complex shapes, 3-D models, and entire images in computer graphics, vision, and robotics. • **Perspective transformations** Used to create perspective distortion by showing how the perceived objects change as the observer's viewpoint changes. Perspective transformations require a 3x3 transformation matrix, and this is within the mathematical model.	
Affordances Perspective Phenomena Visual / Ecological Perception James J. Gibson	Affordances are the perceived opportunities for action that objects/surfaces in the environment offer humans/animals, and they are a key part of visual perception theory. Affordance is the ability of an object to evoke its use or function. It is a directly perceivable quality exuded by an object that encapsulates the relationship between an agent (or human) and its environment, and how the agent perceives what they can do with objects. For example, a flat surface may afford sitting, a door opening, while a button might afford pushing. The term was introduced by psychologist James J. Gibson in his 1966 book, The Senses Considered as Perceptual Systems. See: visual perception (2nd type), ecological perspective, James J. Gibson.	
After-image Visual Perception Visual Perspective (2nd type)	An image that continues to appear in the eyes (visual field) after a period of exposure to the original image. An afterimage may be a normal or physiological phenomenon (physiological afterimage) or be psychological (Illusory palinopsia). Physical afterimages occur because photochemical activity in the retina persists even after the original stimulus is no longer present. A common physiological afterimage of a bright object, such as light, is the dim area, or shape, that appears to float before the eyes after looking into said bright light source.	
Aggregate Space	A form of representational, image, or graphical space used in Antiquity, without a definitive, objective, and systematic connection between observer and object. Opposite to the system space of Renaissance perspective, which is a unified or integrated space that (for example) exhibits a single central or primary vanishing point for apparently converging lines, that is, orthogonal parallel lines in object space. See: ancient perspective, linear and Renaissance perspective.	
AI Drawing Artificial Intelligence Drawing	AI or Artificial Intelligence drawing, in essence, means using artificial intelligence technology to create images, graphics, or artwork. New software tools and applications can generate visuals from textual descriptions or learn from existing art styles to produce unique pieces. See also: Generative AI, Optical Artificial Intelligence.	
Aiming Circle	An instrument for measuring horizontal and vertical angles and magnetic azimuths (horizontal angular directions) in determining gunnery data and laying guns and in artillery surveying.	
Airfoot Point Visual Perspective (2nd type) Surveying Perspective	A point lying on a horizontal or ground plane vertically in line with the point of sight (1), the nadir, and the zenith. Relates to both visual perspective (2nd type) and a linear perspective construction (process). Also relates also photographic/surveying perspective. Synonym for: Foot (of Perspective). See: visual perspective (2nd type), surveying / linear perspective, Foot (of perspective).	
Airy's disk	The Airy disk is the best-focused spot of light from a perfect circular aperture, limited by diffraction, and establishes the fundamental resolution limit for optical systems. The Airy disk sets a fundamental limit on the resolution of optical systems in physics, optics, and astronomy. See: optics, lens, light, resolution (visual), projection scale resolution, size/shape/scale problem.	

TERM	DEFINITION
Airy's Projection Maps Cartography	Airy's projection is a 2-D map projection for the 3-D spherical Earth, a method that minimises the mean-square scale error. It is an azimuthal projection, which means it projects map data onto a flat surface that touches a globe at a single point. • The Airy projection is used to map regions within a small or great circle. • The projection's meridians are equally spaced straight lines that intersect at the central pole. • The projection's parallels are nearly equally spaced circles centred at the pole. • The projection's spacing increases slightly away from the centre.
Alberti, Leon Battista Artist, Author, Mathematician	Leon Battista Alberti (1404 – 1472) was an Italian Renaissance humanist, author, artist, architect, poet, priest, linguist, philosopher, and mathematician, and he epitomised the polymath. He is considered an important developer/recorder of the invention of linear perspective in drawing/painting, first developed by Brunelleschi around 1412-1420. Panofsky's (1927) interpretation of ***Alberti's costruzione legittima*** method for producing a linear perspective graphical construction remains standard. See: linear perspective, central and Renaissance perspective.
Albertian Perspective	Another name for linear perspective, named after Leon Battista Alberti.
Alethoscope Graphoscope	Uses a single rectangular convex lens to view photographs, where using perforations, hand-colouring, and the lens, an impression of simulated stereoscopy is obtained. The unit is mounted on a wooden cabinet holding the photographs. Also known as a graphoscope, it dates to the mid 1800s. See: 3-D, 3-D perspective, 3-D perspective: stereoscopy (5 - A, B ,C) photography, stereoscopy.
Algebraic Perspective	Reference to the application of numbers and algebra to probe and represent, spatial reality. See also antonym: Continuous analysis or geometry (geometrical perspective).
Alhazen Mathematician Astronomer Physicist	**Ḥasan Ibn al-Haytham** latinised as Alhazen (965 – 1040) was a medieval mathematician, astronomer, and physicist of the Islamic Golden Age from present-day Iraq. Alhazen, also known as Ibn al-Haytham, pioneered the study of light and vision. His work influenced the development of perspective in painting and other artistic techniques during the Renaissance. He is said to have invented/tested the camera obscura, a precursor of the modern photographic camera. **Light and vision** • Alhazen was the first to propose that light comes from objects, not the eye. • He believed that light travels in straight lines from objects like lanterns. • He described how the eye receives light reflected from objects. • He believed that the image formed in the eye was inverted, but mistakenly thought that light entered the optic nerve upright (as did Leonardo da Vinci). **Mathematics and scientific methodology** • Alhazen believed in using mathematical and quantitative methods to study phenomena. • He developed analytical geometry and scientific methodology. • He used conic sections to solve Alhazen's problem, which determines the point of reflection from a surface. **Astronomy** • Alhazen accepted the geocentric model of the universe, but he eliminated the equant from Ptolemy's models. An equant is a historical astronomical concept to explain planetary motion. • He wrote The Model of the Motions of Each of the Seven Planets around 1038.
Alice in Wonderland Syndrome	Alice in Wonderland syndrome, or Todd's syndrome, is a rare neurological disorder that distorts perception, causing people to see objects as smaller (micropsia) or larger (macropsia) than they are, or as closer or farther away.
Alidade (Diopter / Dioptra) Protractor / Goniometer	A device for sighting distant objects and performing tasks like triangulation on a map or measuring angles and distances from a reference point. Triangulation determines a point's location by forming triangles from known points. The alidade sighting ruler was part of various scientific and astronomical instruments. At one time, some alidades, particularly those with circular graduations like those on astrolabes, were also called diopters/dioptra. The dioptra is a sighting tube, or a rod with a sight at both ends, attached to a stand. If fitted with one or more protractor(s)/goniometer(s), or circular measuring dials, it could be used to measure angles.

TERM	DEFINITION	A
Alignment Line (1, 2) Visual Perspective (2nd type or retinal) Linear Prospective	**1. Connected spatial positions (object and image space)** An imaginary visual, actually present, or sketched, line that accurately connects one or more visual features in a perspective image; for example, a line can be drawn between multiple object positions such as the edges of a row of columns. **2. Sight line along the central axis of vision** A line that defines the direction of look, projection, or the optical axis of eye/camera/telescope, etc. Synonyms [type 2]: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).	
All-Over Perspective (1, 2, 3) **<< NEW / REFINED Term >>**	**1: Abstract Expressionism:** generalises pictorial energy across the whole canvas, creating a 'plenum' or rigorous continuum. **2: Synonym for pigeon-hole perspective.** **3: Synonym for multi-view perspective or cubist perspective.** See: Proxemic Perspective, unistic perspective, pigeon-hole perspective, Intermediary or mixed perspective, arabesque perspective, tachiste perspective, spherical perspective, axial perspective, cubist perspective, inverted perspective, bird's eye perspective, staggering perspective, ambiguous perspective.	
Allegory (visual)	Use of visual metaphor in the treatment of literary space leads to the use of visual allegory in time.	
Almanac (Perpetual)	A calendar that can track or establish quantities that change over time; for example, the Perpetual Almanac on Celestial Motions was written by the astronomer Sephardi Abraham Zacuto in the 15c. It was for oceanic navigation, and by sailors such as Christopher Columbus and Vasco da Gama.	
Almucanter (Quadrant)	See: quadrant.	
Almucanthar (1, 2)	1. **Astronomy**: a circle on the celestial sphere parallel to the horizon; a parallel of altitude. 2. **Telescope**: a telescope mounted on a mercury float, used to determine stellar altitude and azimuth.	
Altazimuth Mount	An altazimuth mount is a two-axis support system for instruments, allowing rotation about vertical and horizontal axes. Commonly used with telescopes and cameras.	
Alternative Picture Plane Perspective	Any category of perspective, or image-form, where the picture plane, is other than planar/flat.	
Altitude	The vertical height of an object or structure above a reference level, usually above sea level or the Earth's surface. Altitude can be measured in spatial or angular units.	
Altitude / Azimuth (Alt-Az) Coordinates Astronomy Celestial Sphere Instrument Perspective Camera / Telescope	Altitude and azimuth are two angles that describe the position of an object in the sky. They are used in astronomy, navigation, and gunnery. **Altitude** • The height of an object above the horizon, measured in degrees • An object on the horizon has an altitude of 0°; and one overhead has an altitude of 90° • Also known as elevation or apparent height **Azimuth** • The angle of an object around the horizon, measured clockwise from true north • Azimuth values are computed with respect to true north, not magnetic north • Can be measured with a magnetic compass **Applications** • Together, altitude and azimuth can be used to precisely locate an object in the sky • The Alt-Az system is used to determine when a celestial object is best positioned for viewing	
Ambigram Illusion	An ambigram is a symmetrical calligraphic design of glyphs that conveys different meanings based on its orientation, often appearing as visual palindromes or puns.	
Ambiguous Perspective (1, 2) **<< NEW / REFINED Term >>** Visual Perspective (2nd type or retinal) Illusion True Perspective	**1. Ambiguous image form** Perspective that employs ambiguous images or reversible figures that create ambiguity in terms of viewpoint for a perspective view. See rabbit-duck Illusion. **2. Ambiguous viewpoint** A general property of classic perspective methods (ref. linear, graphical perspective, etc) relates to the use of a stationary or established single viewpoint from which the perspective view/image is correctly formed. However, the ambiguous perspective refers to a class of perspectives that fail to establish (or perhaps require) a single viewpoint for the depicted scene (ref. A type of graphical perspective experimented with by Leonardo da Vinci, and named multi-view flat perspective).	

TERM	DEFINITION
Ambiguous Picture Perspective	An ambiguous picture perspective is typically a line drawing of a solid object (for example, a cube) where the brain cannot easily tell which viewpoint is taken and which particular side/face/angle of the object is in view, and the brain will 'flip-flop' in its attempt to perceive a sensible form. See: perspective of cube, wire-frame perspective, three-point perspective.
American Perspective	A dimensional scene depicted from too close a viewpoint, leading to extreme or exaggerated perspective distortions.
Ames Room Perspective Illusion	A special type of simulated and synthetic perspective (real-space structure) in which a room is employed with a distorted shape so as to be magnified in scale towards one corner. People or spatial objects that move, or are moved across, the room appear to grow or shrink in apparent size. See: forced or double perspective, amplified perspective, simulated and synthetic perspective.
Amplified Perspective (1, 2) Illusion Forced Perspective Amplified Perspective	**1. Amplified Perspective: Synonym for: Accelerated / Forced Perspective** Simulated and synthetic perspective (real-space structure) that employs the technique of forced perspective to increase apparent perspective recession, or increase the angle of vanishing lines directed towards vanishing points, and thus to increase the apparent depth of the optical scene. **2. Amplified Perspective: Increased projection scale / magnification** Refers to a magnified view, or an increased projection scale image, of a spatial object/scene. Relates to optical/visual magnification and/or the plate scale of a projected image (imaging form of perspective).
Anaglyph Perspective Print / Display	Anaglyph perspective is a stereoscopic 3-D effect that uses two differently filtered images, one for each eye, to create a 3-D effect. The images are typically filtered with red and cyan, and are viewed through special glasses with a red lens for the left eye and a blue-green lens for the right eye. The brain then integrates the two images to create a 3-D effect. Anaglyph perspective can be used in movies, video games, comic books, and more.
Anaglyphic Perspective	See: Anaglyph perspective print/display.
Analemma Perspective	Diagram showing the apparent path of the sun across the sky at a particular fixed location on the Earth.
Analogy	While similes ("like") and metaphors ("is") show comparison, analogies explain the underlying principle of the comparison.
Analytic / Analytical Geometry	Analytic geometry, or coordinate geometry, studies geometry using a coordinate system and is applied in physics, engineering, and space science. Antonym: Synthetic geometry.
Analytic Cubist Perspective	Describes early Cubism (1908–12), marked by fragmentary appearances and multiple viewpoints.
Analytic Perspective (1, 2)	**1. Baroque perspective method** Baroque perspective is a technique in art and architecture that creates illusions and manipulates the viewer's perception. Baroque artists used perspective to make objects appear larger, smaller, or further away than they actually are. Techniques include forced/accelerated/decelerated perspectives, anamorphosis, chiaroscuro, etc. **2. Analysis / application of natural or artificial method (e.g. linear perspective)** Technical perspective methods using mathematical analysis of optical images, or else the creation of accurate graphical images using points, lines, and vanishing points, etc.
Analytical Perspective	Any perspective method/system that employs purely (or a significant degree of) mathematical or geometrical/optical modelling techniques, and produces a perspective image/view of a spatial scan/object. See: artificial perspective, mathematical perspective, graphical perspective.
Anamorphic Cinema Anamorphic Perspective Distortion Anamorphic / Scope Lens Cinema Perspective Camera Perspective	A special kind of wide-screen cinematic process in which a cinematic camera employs an anamorphic camera lens to capture (plus minify horizontally) a wide-field view (horizontal direction), which is then recorded onto a smaller focal plane size (horizontal direction), and thus onto (for example) an ordinary-sized 35mm film. Next, when the same film image is projected using a special camera with an anamorphic image-expanding lens (in the horizontal direction), the result is a wide-field, largely undistorted cinema experience for the audience. These wide-field cinema systems were popular in the 1950s-1960s, serving both as a wide-field captured image and a wide-field observed image. Sometimes an anamorphic camera lens is still used today for the same purpose and is known as filming in 'scope'. See also: anamorphic perspective, scope, spherical, total, circular, panoramic, 3-D (type 3) perspective(s), sphere of vision, looking out/around perspective, cinerama, vista-vision.

TERM	DEFINITION	A
Anamorphic Drawing	A drawing of a spatial object that appears distorted from a typical angle but normal from a specific oblique angle or in a mirror.	
Anamorphic Lens or Scope Aspect Lens Spherical Lens	The anamorphic process, which uses anamorphic or 'Scope Aspect' lenses to optically squeeze the (horizontal aspect) image onto an ordinary-sized film gauge frame or format (normally 36mm by 24 mm), and thus to optically capture or photograph twice the horizontal area (horizontal field of view) relative to the vertical as standard **"spherical" or 'Flat Aspect' lenses.** See also: anamorphic cinema/perspective, scope, spherical, total, circular, panoramic, 3-D (type 3) perspective(s), sphere of vision, looking out/around perspective, cinerama, vista-vision.	
Anamorphic Perspective (A) Distortion / Viewpoint	Anamorphic perspective is a form of distorted projection requiring viewers to occupy a specific vantage point or use special devices (like mirrors) to see a recognisable 3-D image from a 2-D surface. Derived from the Greek *anamorphoûn* ("to transform"), it acts as an optical illusion that hides or distorts images, often used in art, street, and film to create impossible, perspective-defying visuals. See: anamorphic perspective (B) anamorphosis (A,B,C,D), perspective shift, anamorphic suspended sculptures.	
Anamorphic Perspective (B:1)	Technical perspective in which an image is distorted (magnified/minified) in scale in one of its cardinal directions (X, Y), leading to an anamorphic image shape. See: anamorphic cinema, anamorphic lens, scope lens, cinerama, vista-vision, wide-field cinema.	
Anamorphic Perspective (B:2)	A violent distortion in perspective, from too near a point of view and/or from the injudicious attitude or situation of the object, but it is perfectly true according to the laws of perspective. See books: Aberrations (1957) and Anamorphoses (1969) by Jurgis Baltrusaitis.	
Anamorphic Perspective (B:3) Fernande Saint-Martin	**Anamorphic Perspective is a Far Distance Perspective (Ref. Fernande Saint-Martin).** In medium or distant depths, this perspective modifies in a gradual way the dimensions of one of the coordinates (height or width) of the Euclidean grid, without applying the correlation defined by the law of (optical/perspectival) foreshortening in the linear perspective [foreshortening type 2). Synonyms: Anamorphic Perspective (1) and Anamorphic Perspective (2). See book: Semiology of perspective, and work of Fernande Saint-Martin.	
Anamorphic Perspective Illusion	Refers to an anamorphic perspective illusion painted onto the wall of a room/corridor, etc, whereby (for example) the (ostensibly distorted) image of a spatially flat ghost appears to change from 2-D to 3-D, and 'pop' or extend outwards into space or 3-D when viewed from the correct viewpoint, or from a particular viewing angle. A type of visual perspective illusion that is partly psychological and partly optical/graphical in origin.	
Anamorphic Suspended Sculptures Anamorphic Perspective (A) Visual Perspective (2nd type) Visual Perception Illusion Distortion / Viewpoint Forced Perspective Perspective Shift Perceptual Art Michel Murphy Jonty Hurwitz Matthieu Robert-Ortis Bernard Pas	Anamorphic suspended sculptures are 3-D, often abstract installations designed to reveal a coherent, recognisable image only when viewed from one specific station point. They are a form of installation art that uses distorted, often fragmented, three-dimensional forms hung in physical space (from strings/wires) to create an image visible only from a single viewpoint. This art form relies on perspective anamorphosis, requiring the viewer to move to a predetermined vantage point to see the intended, coherent image, whereas from any other angle, the sculpture appears to be a random arrangement of objects or abstract shapes. **Artists and Works** • **Michael Murphy:** Murphy creates sculptures using hundreds of elements (like wooden balls) suspended from the ceiling. A famous example is Perceptual Shift (2015), which appears to be a jumble of 1,252 painted wooden balls but, from a specific spot, reveals the image of an eye. • **Jonty Hurwitz:** Creates anamorphic sculptures that often rely on a polished, mirrored cylinder to correct the distortion. His work, such as The Kiss or The Thinker, often appears as a nonsensical, stretched, or distorted object to the naked eye, but appears in perfect proportion when viewed through the reflection of a cylindrical mirror. • **Matthieu Robert-Ortis:** A French artist who creates wire sculptures that, when viewed from different angles, transform into entirely different subjects, such as *The Revolution of Giraffes*, which shifts between the figures of two giraffes and one elephant. • **Bernard Pras:** Known for using discarded objects and "junk" to create anamorphic installations, which, from a specific viewpoint, form a coherent, recognisable image. **Techniques and Outcomes** • **Forced Perspective:** viewer occupies a specific, "sweet spot" in space to "unlock" the hidden image. • **Disguised Meaning:** Historically, this technique was used to hide politically or religiously sensitive images, allowing them to be viewed only by those who knew where to stand. See: anamorphosis (A), anamorphic perspective, perspective shift, perceptual art.	

TERM	DEFINITION
Anamorphosis (A) General	Anamorphosis is an optical illusion where an image appears distorted from a standard viewpoint but normal from a specific angle or in a mirror (mirror anamorphosis). See: anamorphic perspective, perspective distortion, anamorphic lens.
Anamorphosis (B)	Anamorphosis is a violent distortion in perspective, from too near a point of view, and from injudicious altitude or situation of the object, but it is perfectly true according to the laws of perspective.
Anamorphosis (C) - Large scale	Synonym for: Anamorphic perspective illusion. See work of: David Chelsea: Perspective in Action, 2017. See: cabinet of wonder.
Anamorphosis (D) - Street-Painting	Synonym for: Anamorphic perspective illusion as painted in a large scale onto a building. See work of: David Chelsea: Extreme Perspective, 2011.
Anamorphosis (E) - Table Top	Synonym and method for producing an anamorphic drawing (table top method). The table top method refers to a 3-D optical illusion created on a 2-D surface, such as paper or a tabletop, which appears distorted to the naked eye but becomes three-dimensional and properly proportioned when viewed from a specific, often severe, angle.
Anatomical Perspective Human body	Refers to capturing/making/viewing/exploring perspective images/views of the human body, and may include visualisation of internal structures. Can be in the form of artistic images, or New Media body scans projected onto computer displays, etc. See: Leonardo da Vinci and anatomical perspective.
Ancient / Antique Perspective Egypt / Mexico Ancient Greece Ancient Rome Renaissance Art / Drawing Optical / Perspectival Foreshortening Central and Linear Perspective Graphical Perspective	Ancient perspective encompasses the artistic techniques of early civilisations, including early illusionism in Greece and "eyeball" or visual perspective (2nd type) in Roman art. Unlike linear Renaissance perspective, these methods emphasised stylised depth, visual impact, and symbolism over geometric accuracy. **Ancient Artistic Perspective** • **Ancient Greece** (5th Century B.C.) developed skenographia, using geometric theories for theatrical scenery depth. • **Roman Perspective**: Found in Pompeii, these artworks used "eyeball perspective" with multiple horizon lines and aligned vanishing points. • **Renaissance Perspective (key differences)**: Unlike the fixed vanishing point of the Renaissance, ancient Roman painters used multiple projection methods and unscientific systems. Ancient drawings/paintings tend to be shown in profile and often ignore perspective phenomena such as aspect perspective, diminution of size, degradation of form (shape), vanishing points, etc. Some rare ancient Egyptian/Mexican paintings **do show optical/ perspectival foreshortening (2)**. Sometimes the term (ancient/antique perspective) is used as a synonym for axial (pseudo) perspective or fishbone/herringbone perspective in which the apparent spatial scene is arranged around a vertical axis with multiple 'stacked' vanishing points. Optical or pure perspectival foreshortening (2) is where the diminution of projected size (in the depth dimension) is dependent on distance, as recognised by the ancients **who were not familiar with axonometric or aspect foreshortening** that is inevitable when a feature is oblique to the picture plane. In their art, therefore, there is no perspective (of this aspect kind), and it is believed that they did not discover a true or realistic one-point linear perspective method as a result. See: Foreshortening (1,2), perspectival foreshortening, aspect foreshortening, axonometric foreshortening, central and linear perspective, one-point perspective. See book: Principles of Egyptian Art by Heinrich Schafer (1974). See book: Perspective in Greek and Roman Art by Richter, G.M.A. (1970). See book: Perspective in the Visual Culture of Classical Antiquity by Rocco Sinisgalli (2012).
Ancient Babylonians	Writing (symbolic perspective) emerged in Mesopotamia around 5,500 years ago, with sundials from 1500 BC marking the earliest household clocks. The Imago Mundi, a 6th-century BC Babylonian map, is the oldest known world map.
Ancient China Art / Drawing Parallel Perspective Descriptive Geometry Technical Drawing	In contrast to Egyptian, Byzantine, and Indian art, early Chinese and Japanese art did employ the perspective element named as recession of apparent size (non-systematically); but without the use of vanishing points or (object) foreshortening as seen in the Ancient Greek examples. Overall, in the art of China/Japan, spatial depth is depicted through the use of successive picture planes (spatial layering) located at different distances from the viewer, upon which (isolated) parallel projection(s) are made. Far Eastern artists used parallel perspective to structure pictorial space, which, though not (overtly) scientifically or optically grounded, follows defined principles. Today, it underpins many computer- and technical/engineering drawing systems.

TERM	DEFINITION	A
Ancient Greece, Rome, Egypt Art / Drawing Linear Perspective Graphical Perspective Orrery Quadrant	The question of whether linear perspective was known in Antiquity remains a matter of debate. Greco-Roman efforts were linked with scenography (skaenographia). This resulted in a sense of depth usually through convergence along an axis of points (fish-bone perspective) and occasionally towards a central vanishing point. However, no study of examples reveals the single vanishing point of linear perspective. Unfortunately, many classicists use the term perspective very loosely to refer to a sense of depth, with no interest in whether a vanishing point, a distance point, or other technicalities were involved. An Ancient Greek hand-powered orrery, perhaps the oldest example of an analogue computer, was used to predict astronomical positions and eclipses decades in advance. In ancient Egypt, a quadrant was used to measure angles up to 90°. Different versions could be used to calculate longitude, latitude, and time of day, etc. See books: On the Rationalisation of Sight (1988) and Art and Geometry (1946) by William M. Ivins.	
Ancient Greek Perspective Representation Phenomena Callipers Pseudo Perspective Semi-scientific Perspective	The ancient Greek experience of space was a tactile one, making a close physical connection between space and Forms in space. Some experts postulate that linear perspective was known to the Ancient Greeks, but if so the graphical technique was lost during the Middle Ages. The ancient Greeks developed the first systematic attempts at realistic depiction of depth on a flat 2-D surface; employing perspective phenomena such as aspect perspective (non-scientific type and hence non-systematically applied), recession (size diminution), diminution and degradation of form, foreshortening **(non-scientific perspectival foreshortening sometimes used but not true aspect foreshortening)**, vanishing points, etc. However, it is believed they failed to develop/ understand/apply the basic principles of linear perspective, that all the objects must be viewed from one point of sight, and orthogonal lines converge to one vanishing point, etc. In terms of instruments, the earliest calliper has been found in the Greek Giglio wreck near the Italian coast. Many types of callipers permit reading out a measurement on a ruled scale, or a dial. Some callipers can be as simple as a compass with inward or outward-facing points, but no scale.	
Ancient India Theory of Light Graphical Perspective	**Theory of Light** In Ancient India, from around the 6th–5th C. BC, Indian people developed theories on light. According to the Samkhya school, light is one of the five fundamental “subtle” elements (tanmatra) out of which emerge the gross elements. **Graphical Perspective** Graphical perspective in ancient India was characterised by a unique approach that prioritised spiritual, emotional, and narrative depth over the strict linear, geometric perspective developed in the Western Renaissance. Instead of relying on the single, fixed central vanishing point (of one-point linear perspective) to create a 3-D illusion, Indian art traditionally utilised "vertical perspective," hierarchical scaling, and conceptual, symbolic representations to organise space. **Aspects of graphical perspective in ancient India** • **Vertical Perspective and Hierarchy:** In early Indian art (e.g., cave paintings at Ajanta), perspective was often rendered vertically, with figures or objects higher up on the picture plane understood to be farther away. Furthermore, the size of figures was often determined by their spiritual or social significance rather than their distance from the viewer. • **Symbolic and Narrative Focus:** Indian aesthetics prioritised *rasa* (emotional essence) and *bhava* (mood). Artists avoided strict linear or convergent perspective to ensure the narrative or divine, symbolic meaning was not lost, for instance, by reducing the size of a deity. • **Three-Quarter View:** In traditional Indian painting and manuscript illustration, figures were often shown in three-quarter view. • **Architectural Layouts and Geometry:** Architecture was highly geometric, employing grid-based, and symmetrical planning, often using a cosmic diagram to organise depicted space. • **"Planar" Approach:** Instead of a single viewpoint, space was often presented in distinct planes (foreground, middle, background), allowing for a narrative to unfold across the scene.	
Ancient Roman Perspective Perspective Phenomena	Connections between optics and representation date back to Antiquity, with Greco-Roman scenography creating depth through convergence along an axis and sometimes a central vanishing point. Ancient Roman perspective, similar to Ancient Greek perspective, exhibits some perspective phenomena, including sometimes optical or perspectival foreshortening (Type: 2), and even vanishing points; however, the images do not exhibit the single vanishing point of linear perspective (for parallel orthogonal lines existing in object space) and so the depicted space is not unified or systematic, in a modern sense.	
Anderson, Kristi	Author of classic monograph on linear perspective "The Geometry of An Art” (2007).	

TERM	DEFINITION
Andotrope, 360-Degree Identical Views of 2-D Object **<< NEW / REFINED Term >>** Swept-plane display Omnidirectional Display 360-degree display Billboarding Holographic Video Visual Perspective (2nd Type)	Mike Andos invented a modern zoetrope that uses two back-to-back iPhones displaying synchronised videos. Mounted in a vertical obscuring tube with slits, the device spins up to 1200 RPM, creating a moving image at 40 frames per second. This setup allows viewers from any angle to see an identical 2-D image, effectively providing a 360-degree perspective. The Andotrope delivers an omnidirectional video experience resembling a flat hologram to multiple viewers simultaneously. The result is a flat or 2-D moving image that can be seen in the same aspect or appears identical from every fixed viewing direction, but as seen from omnidirectional viewpoints or multiple station points, that is the 2-D image looks identical in perspective projectional terms from a full 360-degree point of view. This device uses a principle similar to the persistence of vision effect, whereby you perceive a single stable but moving image. You can say that this is a type of 3-D display that presents an unchanged 2-D image perspective projection from all directions. Another way of describing such a 3-D/2-D perspective is that it produces 360-degree Identical views of a flat or 2-D object or scene. An Andotrope provides an omnidirectional, billboarding holographic video to multiple simultaneous viewers in all directions. See also: Zoetrope, 3-D/2-D Perspective, omnidirectional display, swept-plane display.
Angle	Two intersecting lines or planes meet at a point, known as a vertex, where the angle's magnitude is measured by the rotation needed to align the lines.
Angle - Dihedral	A dihedral angle measures the angle between two intersecting planes in a perpendicular plane, essential in geometry, chemistry for molecular conformations, and aviation for wing stability.
Angle Axiom	Refers to visual or retinal perspective, specifically that the eye makes size/distance judgements based on an angle distance axiom. See: angle perspective (1), visual perspective (2nd type), central/linear perspective, perspective of lateral distortion (1, 2, 3).
Angle of Inclination	Synonym for: Inclination of a line or plane.
Angle of Projection Viewing Angle (1, 2, 3) Useful Field of View (FOV). Field of View Light Beam Image Light Beam Axis Angle Beam Angle Object Angle of Projection = Object Aspect Distortion Class. Image Plane Angle of Projection = Image Plane Distortion Class. Combined Object and Image Plane Distortion Class. Light Axis Angle Beam Angle Image Beam Angle	In optics and perspective studies, the somewhat general term ***Angle of Projection*** has multiple meanings, but we can identify basic types as follows: A) True field of view (TFOV) or represented field of view of a perspective view/image [angle of view (2)]; B) True or represented direction of vision of a perspective view/image [angle of view (1)]; C) Apparent field of view (AFOV) of an optical instrument. D) Working or viewing angle of a Visual Display (AFOV). - monocular types. E) Working or viewing angle of an Andotrope Visual Display (AFOV) - omni-directional display. F) Working or viewing angle of a Visual Display (AFOV) - stereographic types (ref. lenticular). G) Working or viewing angle of a Hologram (AFOV). H) Working or viewing angle of an optical instrument (AFOV). I) Working angle of a Virtual Reality stereoscopic headset (AFOV - binocular type). J) Light Beam Angle of Projection [forward projection of spotlight]: Axis or Beam Angle (1,2). K) Image Beam Angle of Projection [forward projection of cinema/data projector]: Axis or Beam Angle (1,2). L) Plane mirror image or beam reflection angle (axis). M) Curved mirror image or beam reflection angle (axis), and converging or diverging angle or beam footprint. N) Graphical Perspective Angle of Projection: First or Third Angle. O) Object Angle of Projection (object aspect distortion class): 2-D Image of 3-D object sent backwards: projection geometry is notionally independent of image plane. P) Image Plane Angle of Projection (image-plane distortion class): 2-D Image of 3-D object sent backwards: projection geometry is a function of the picture/image plane shape/angle. Note that image plane distortions can be avoided using line-of-sight methods. Q) Combined Angle of Projection Distortion (normal case for relatively wide-field visual and linear perspective): 2-D Image of 3-D object sent backwards: perspective distortions due to relative angles of both object aspect and image plane shape/angle. See: angle of view, field of view, direction of vision, angle of projection, working angle, apparent field of view, true field of view, useful field of view, viewing angle, line of sight, cone of vision.

TERM	DEFINITION	A
Angle of Projection - 2-D Image Beam (1, 2) Useful Field of View (FOV). Field of View Light Beam Light Axis Angle Image Beam Angle	**Angle of Projection: 2-D Image Projection (1,2)** <FORWARDS PROJECTION>. Ref. Cinema projector. 1. **Light Axis Angle:** Projected central axis of a 2-D image beam projected forwards into spatial reality. Relates to optical perspective <PROJECTION / CAPTURE CLASS>. Angle of projection or central axis of image beam is normally measured relative to: A) the beam generator [projector directing plane]; or B), a reference line/plane in the target spatial object/scene. 2. **Image Beam Angle:** The image beam angle or angular/physical extent of the image beam projected forwards into spatial reality. Relates to optical perspective <PROJECTION / CAPTURE CLASS>. Angle of projection or image beam angle is measured relative to: A) the beam generator [projector central axis]; or B) a reference line/plane in the spatial object/scene; or C) the apparent size of the angular/physical extent or beam profile relative to a human observer's location (Useful FOV). The light beam profile may be converging or diverging.	
Angle of Projection - Image Plane	Projection angle of object/scene geometry as measured at, and relative to, the picture plane.	
Angle of Projection - Light Beam (1, 2) Useful Field of View (FOV). Field of View Light Beam Light Axis Angle Beam Angle	**Angle of Projection: Light Beam Projection (1,2)** <FORWARDS PROJECTION>. Ref. spotlight. 1. **Light Axis Angle:** The angle of a projected spotlight/light-beam central line (projected forwards into object space). Relates to optical perspective <PROJECTION CLASS>. Angle of projection or central axis of beam is measured relative to: A) the beam generator location [spotlight directing plane]; or B) a reference plane in the target spatial object/scene. 2. **Beam Angle:** The beam angle of a projected spotlight/light-beam projected forwards into object space. Relates to optical perspective <PROJECTION CLASS>. Angle of projection is a measure of beam profile size as it progresses into space, and is the beam angle measured relative to: A) the beam generator location [apex of spotlight]; or B) a reference point/plane in the spatial object/scene. The light beam profile may be parallel, converging or diverging.	
Angle of Projection - Object Geometry	Projection angle of object/scene geometry as projected from object to station point. Angle of projection is measured relative to: A) the object; or B), a reference plane in the object space, or C) the directing plane, or picture plane / detection surface.	
Angle of View (1) Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Angle of View (1): Direction of Vision** **Synonym for Line of Sight (preferred term)** All types of single-view, unified, or technical/systematic perspective methods/systems involve looking-at/observing/representing a spatial scene/object as seen from a specific viewpoint (eyestation point) and using a fixed direction of vision, the latter being an optical/geometric projection made along a fixed line-of-sight or optical axis, and (perhaps) as seen/projected relative to an object's preferred viewing direction or front-elevation. Relates to both visual perspective (2nd type) and a linear perspective construction. **Synonyms**: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).	
Angle of View (2) Field of View Visual Perspective (2nd type) Linear Perspective	**Angle of View (2): Field of View (preferred term) — [See also: Visual Ray (2)]** Synonym for the visual field or the total angular field captured/represented/displayed in a perspective image/view of a spatial scene. Relates to both visual perspective (2nd type) and a linear perspective construction. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A,B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2).	
Angle of Vision - Choice of during painting construction, and effect(s) on painting observation Angle of Vision (2) Distance Point Visual Perspective (2nd type) Linear Perspective	In books on perspective, we are told that an artist, whilst making the drawing, should set the Angle of Vision (2) or Angle of View (2) to 60 degrees, so that the distance to the point of view is rather less than the length or height of the picture. Remember that the distance point is not only the point from which we are supposed to make a tracing on an imaginary picture plane, but also (in theory) the point in front of the canvas from which the picture is to be viewed; both station points should coincide for the perspective to be seen correctly. However, an angle of 60 degrees for the visual cone seems ridiculous, since we would be so close to the canvas that we can almost touch it with our noses before we can see the perspective properly. As a result, the French recommend an angle of 28 degrees, so that the distance point is twice the length of the picture, which is far more agreeable for the painting spectator.	

TERM	DEFINITION
Angle of Vision (1) Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Angle of Vision (1): Direction of Vision** **Synonym for Line of Sight (preferred term)** Relates to both visual perspective (2nd type) and a linear perspective construction. Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Angle of Vision (2) Field of View Visual Perspective (2nd type) Linear Perspective	**Angle of Vision (2): Field of View (preferred term) — [See also: Visual Ray (2)]** **Limit of Clear Vision** General term for the total angular field captured/represented/displayed in a perspective image/ view of a spatial scene. Can be measured, or be different, in vertical (Y) or horizontal (X) directions for a particular perspective representation method, or perspective image capture, or image projection/displayed by an optical instrument. The angle subtended at the eye by visual rays from the object/scenes edge or outer boundary. The limit of the divergence of rays in any direction is what the eye can cover comfortably. It will be found that, with the head held in one position, one eye can see objects along rays making 45 degrees with the line of sight, covering both height and width. However, a small angle of around 30 degrees is commonly used as the limit for perspective views - in other words, the visual cone is assumed to have a maximum total included angle of 60 degrees. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A,B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2). See also: viewing angle (types).
Angle Perspective (1) Eye Visual Perspective (2nd type) Angle-based distance axiom	Refers to visual or retinal perspective, specifically that the eye makes size/distance judgements based on an angle distance axiom. Lateral or vertical distortion in size (relative to linear perspective) occurs for objects located some distance laterally/vertically from the central axis of vision (horizontal or vertical lateral distortion). This happens because images are projected by a spherical eyeball onto a curved retina, whereby the eye sees identically sized objects at increasing lateral distances as increasingly smaller, and because the eye measures angles rather than images projected onto a flat picture plane, as in linear perspective. See: visual perspective (2nd type), central/linear perspective, perspective of lateral distortion (1, 2, 3).
Angle Perspective (2), Aspect Foreshortening Visual Perspective (2nd type) Linear Perspective Parallel Perspective	**Another name for Aspect Perspective, or Aspect of Form Perspective** Perspective image that exhibits those perspective phenomena relating to the apparent degradation of form (projected shape changes due to aspect, viewing angle, or projection angle). This effect is also named **Aspect Foreshortening (angle or projection-based):** object features positioned along, and tilted with respect to, the viewing direction are uniformly contracted in apparent length (irrespective of relative distance), and experience proportional perspective shape distortions accordingly (e.g., object parts becoming equally contracted in length along depth direction). Whilst being patently a purely parallel-perspective phenomenon, this aspect foreshortening form may, or can, contribute to the overall composite foreshortening seen in a typical linear-perspective view/image. See: aspect, parallel perspective, linear perspective, foreshortening (1, 2).
Angular Colour Perspective	A change in apparent colour for an original surface that is angled relative to one that is parallel with the picture plane. This effect can be related to aspect foreshortening (1) whereby a colour change occurs due to the projection angle. See: aspect, aerial and colour perspective, foreshortening (1).
Angular Contrast Reduction Perspective	A reduction in apparent contrast/brightness for an original surface that is angled relative to one that is parallel with the picture plane. This effect can be related to aspect foreshortening (1) whereby contrast reduction occurs due to the projection angle. See: aspect, contrast perspective, foreshortening (1).
Angular Perspective (1, 2) Non-Central perspective Non-Frontal Perspective Linear Perspective Parallel Perspective	**1. Two-point linear perspective: angular perspective (1): Synonym for oblique angle perspective (1).** Angular perspective (first type) is a subcategory of linear perspective and is identical to two-point perspective. When the horizontal lines at the front and back of a building both converge to vanishing points, left and right, terminating at the horizon, this is called angular perspective (1). **2. Non-central perspective: angular perspective (2), oblique angle perspective (2).** Angular perspective (second type) refers to all forms of non-central perspective that use an off-axis viewing angle or project the scene from an oblique vantage point; and includes parallel projections of both the orthographic and oblique types.

TERM	DEFINITION	A
Angular Perspective (3) Middle-Distance Perspective	**3. Angular Perspective: steep angular views of objects. Synonym for baroque perspective (A, B:2, C).** Synonym for: Illusionism, Trompe-l'œil, deep recession, accelerated foreshortenings (depicted type 2). Disposes in a proximate or intermediary distance an entanglement of planes, with accentuated chiaroscuros, in a harmonic or discordant vectoriality (directions). Even when it signals a distanced lighted region in one of the superior corners of the artwork, this perspective is quite involved in an accumulation of elements in the foreground and strengthens their dimension, colour densities, and sudden foreshortenings (depicted type 2). It produces a 'kinesthetic excess; in the proxemics in relation to the treatment of elements in the medium or background levels. Similar to Cubism and cubist perspective. Defined as an Intermediary or Middle-Distance Perspective by Fernande Saint-Martin.	
Angular Picture Plane	Type of perspective projection in which the picture plane is placed at an angle, or is non-planar or not-normal, relative to the central visual axis, optic axis, or line-of-sight, of the projection viewpoint.	
Animated Perspective (1, 2, 3) Motion Perspective Cinema Perspective Photographic Perspective Computer Modelling, Wire-Frame Perspective, Ray Tracing Persistence of Vision	**1. Hand-drawn animations** Type of animated perspective in which visual images of human/animal characters, etc., are sketched (by hand one at a time) onto single drawing/movie frames, whilst being changed slightly between frames to represent movement, and then displayed in rapid succession to evoke a real-time impression of movement. **2. Computer-generated images** Type of animated perspective in which visual images of human/animal characters, etc., are created by, and within, a computer model (often individually one at a time), with slight changes between frames to represent movement, and then these same images are transferred onto movie frames, which are then displayed in rapid succession to evoke a real-time impression of movement. **3. Stop motion animation** Type of animated perspective in which individual photographic snapshots of physical models of human/animal characters are taken one at a time with slight changes between frames to represent movement, etc., which are then transferred onto movie frames displayed in rapid succession to evoke a a real-time impression of movement. See: motion perspective, persistence of vision principle/effect, cinematograph, cinema.	
Animated Photograph Animation Cinemagraph Cinematograph	An animated photograph, also known as a cinemagraph, is a still image animated to create an illusion of movement. Coined in 1917 by Kevin Burg and Jamie Beck, the term refers to their technique of combining printed photographs with animation. Animation creates movement by rapidly displaying multiple images, which the brain perceives as a single moving image. See: motion perspective, persistence of vision principle/ effect, cinematograph, cinema.	
Animation Cinema / Animated Perspective Persistence of Vision Moving JPEG File Format	Animation is creating the illusion of movement from static images, by rapidly displaying a sequence of drawings, models, or 3-D computer graphics, bringing inanimate objects and characters to life for storytelling, entertainment, and art/science. Related techniques include traditional hand-drawn (cel) animation, computer-generated imagery (CGI) for 2-D/3-D, and stop-motion using physical objects. The core principle is designing key poses (keyframes) and creating smooth "in-between" frames to transition between them, using principles such as timing, spacing, squash & stretch, and follow-through to add realism and personality. See: Graphical perspective, linear perspective, caricature/cartoon perspective, animated photograph, cinema, animated perspective, motion perspective, persistence of vision principle/ effect, cinematograph.	
Animation - In-Betweening or Tweening	Inbetweening, or tweening, is a process in animation that involves creating intermediate frames, called inbetweens, between two keyframes. The result is to create the illusion of movement by smoothly transitioning one image into another.	
Annunciation First Perspective Painting	The Annunciation in Christianity is the angel Gabriel's announcement to Mary of Christ's incarnation. Vasari asserted that Paolo Uccello's Annunciation was the first painting to employ perspective, challenging the twentieth-century view that Masaccio's Trinity held this distinction.	
Anoptike	Synonym for worm's eye perspective.	
Anthropocene System (Digital)	The anthropocene describes the period when humans significantly impact the planet. Regardless of a new geological age, our influence is evident. The digital anthropocene reflects systems that interrelate human impacts globally.	
Anthropomorphc Landscape Perspective	Any perspective method/system that produces two simultaneous pictures depicted on one picture plane surface. An example occurred in 17th-century paintings, in which a face was hidden in the landscape.	

TERM	DEFINITION
Anti-Perspective No Recession No Convergence Aspective Non-Perspective Parallel Perspective Chinese / Japanese Perspective	A perspective method/system that rejects central projection in favour of methods that avoid distortions of scale/shape that arise from (a finite) viewpoint location. Employs a spatial image that does not exhibit classic depth-based optical/geometric perspective phenomena, including recession, foreshortening, etc. The Illusionistic space of linear perspective and similar graphical techniques based on naturalistic viewpoint 'distortions' is only one way to depict the three-dimensional world. Anti-perspective refers to any representation technique that rejects the hegemony of central projection (or linear perspective). Parallel perspective, for example, preserves (in scale) the actual measurements of the objects it represents, avoiding the distortions of one-point perspective. Synonyms: aspective, non-perspective, parallel perspective, Chinese perspective.
Antique Perspective (1, 2)	1: Synonym for central or linear perspective graphical construction. 2: Refers to pseudo-perspective representation methods used in Ancient Greek/Roman times.
Antique Perspective (3)	Synonym for herringbone perspective, axial perspective, or fishbone/herringbone perspective in which the apparent spatial scene is arranged around a vertical axis with multiple 'stacked' vanishing points. See: Ancient Antique Perspective, fishbone/herringbone perspective, pseudo perspective.
Aperture	An aperture is a (possibly) adjustable lens opening that controls light admission into the eye/camera.
Aperture-Stop	The aperture stop in an optical system controls the light reaching the image plane and can be a lens/mirror boundary or a separate diaphragm.
Aphylactic Map Projection	A map projection that tries to balance distortions in multiple metric properties, rather than perfectly preserving a single metric at the expense of the others. also known as a compromise map projection.
Apparent Field of View	The Apparent Field of View (AFOV) is the angular diameter of light seen through an eyepiece or binoculars, usually between 40 to 80 degrees, indicating perceived image size and "immersion."
Apparent Perspective	Visual or retinal perspective as perceived by the human eye. See: visual perspective (2nd type).
Apparent Shape Circle in Perspective Degradation of Form Perspective	All objects are seen perspectively by every eye in every situation - but no objects appear to the eye with the true figure that we know them to possess (on every occasion) - a sphere alone excepted. A sphere has every contour in every way bounded by a circular line (from every and all possible viewpoints)! A circle, however, appears as a circle only from one point of view (in parallel perspective seen directly from above or at right-angles to the picture plane), but in every other position it appears as an ellipse! As the eye is raised, the circle appears closer to its circular form, and as the eye is lowered, it again becomes distorted and appears as an ellipse.
Appearing Point (1, 2, 3) **<< NEW Term >>** Line or optical light-ray 'divergent or radiating point' or spotlight lamp source, etc. Spotlight / Light Beams Sun-Beam Perspective Sun-Burst Perspective Shadows Natural / Visual Perspective (2)	**1. An appearing point due to perspective phenomena (optical source in image space)** An appearing point is the antonym of a vanishing point, and refers to an apparent point in a spatial reality (being a far distant point viewed from image space) out of which a set of mutually parallel lines (in object space) appear to emerge from (ostensibly), whereby the parallel lines could also be light-rays and said rays may also emit/gleam and/or move in space/time. Said appearing point typically differs from a vanishing point in that it is not assumed to be located at notional infinity, but is only at or close to the limits of observable distance. Divergence of lines/rays is wholly caused by perspective phenomena, or a combination of aspect and the size/distance law. **2. An appearing point from a diverging light beam (physical source in object space)** An appearing point due to a physical light-beam radiating point, or the origin of a light source, for a spotlight or beam of physically diverging light rays. The apparent divergence of the light rays in the beam is caused by either actual diverging rays or the expanding projected beam footprint. **3. Appearing point due to combined optical/physical phenomena** An appearing point from a physical/apparent light-beam radiating point, whereby the divergent effect of rays/lines is partly due to physical geometry and partly from perspective phenomena (ref. both A, B appearing point effects). This is when a set of (physically) divergent lines/rays is viewed or projected, with evident perspective phenomena. Evidently, when the diverging light beam extends/radiates into the depth dimension, then a combined appearance or geometry is the normal case. See: vanishing point, recession of size perspective, linear perspective, sun-beam/sun-burst perspective.
Apple Vision Pro Virtual Reality Mixed Reality	Apple markets the Apple Vision Pro (a type of Virtual or Mixed Reality headset) as a spatial computer that integrates digital media with the real world. Physical inputs—such as motion gestures, eye tracking, and speech recognition—can be used to interact with the system.

TERM	DEFINITION	A
Applications of Perspective - Metaphorical Symbolic / Metaphorical Perspective	The literal significance of perspective stems from its metaphorical use as a point of view, a standpoint, or even a plan. Early examples of metaphorical usage with respect to proto-perspective can be traced back to c. 1800 B.C., themes taken up again in medieval literature, with parallels between the rise of an individual viewpoint in both the literature and the art of the French troubadours. Renaissance and Baroque developments in perspective as a metaphorical technique followed, then later contributions including Goethe and Herder's reinterpretation of Shakespeare as a perspectival author, Percy Lubbock's claim (1921) that perspective in the sense of point of view should be the criterion for all literature, and recent developments in literary theory (e.g., Canisius, Guillen, Japp, Lintvelt, Uspensky). See book: The Social and Cultural Roots of Linear Perspective by Leonard Goldstein (1988). See book: The Psychology of Perspective and Renaissance Art by M. Kubovy (1986)	
Applications of Perspective - Physical Visual Perspective (2nd type) Linear Perspective Synthetic Perspective Simulated Perspective Forced / Accelerated Perspective	Various kinds of perspective (and related methods), have been applied to a whole variety of physical applications, including architecture, town planning, gardens and the environment, scenography, fictive ceiling painting and architecture, which, since the late seventeenth century, has been termed *quadratura*, in reference to the grid or graticule used both in constructing the quadratura motif and in transferring it to the vault. Du Pérac introduced the idea of perspectival gardens (1587) which had been developed in Tuscany through Buontalenti and others (and which led ultimately to Le Nôtre's work at Versailles). Here we have a version of synthetic, forced, or accelerated and also simulated perspective which is implemented across the whole environment to increase the angle of convergence of parallel lines, hence being a special perspective framework for the garden structure that causes the scene to appear deeper or larger than in reality. Patently the onlooker is using a type of synthetic perspective to view the scene using a combination of natural and artificial perspective. Other past uses of perspective include theatre and stage design (going back to ancient times), and more recently, the combination of digital and real-world perspectives in virtual production and the use of volume screens to film movies and television shows. See paper: Ptolemy and the Origins of Perspective by Kim Veltman (1980).	
Applications of Perspective - Technical **<< NEW / REFINED Term >>**	Perspective is central to key developments in various technical subjects, including photography, television, cinema, cartography/maps, astronomy, topology, photogrammetry, scenography, archaeology, architecture, gardens and environment, etc. Recent developments also have strong links to perspective, such as Geographical Information Systems (GIS), Global Positioning Systems (GPS), Virtual Reality (VR), Computer Graphics (CG), Computer-Generated Imagery (CGI), Computer Vision (CV), Artificial Intelligence (AI), digital filmmaking / virtual production, medical imaging, robotics, stereography, panoramas, holograms, and space flight.	
Arabesque Perspective - Depth	In a flat representation or picture, arabesque perspective conveys spatial dimensionality by employing repeating geometric patterns with undulations (linear, parallel, or crossed), which alternatively lift or push back the topological mass.	
Arabesque Perspective [A] Parallel Perspective Fractal-like Patterns	Arabesque perspective refers to an artwork with complex, repeating, and intertwining patterns, often rooted in Islamic art and geometry, where the viewpoint shifts, revealing new details and depths. These designs create a multi-layered, mesmerising effect, often incorporating abstract botanical or geometric forms that symbolise unity and the infinite. The repeating image perspective consists of rhythmic linear patterns of scrolling, uni-scalar or multi-scalar (possibly fractal-like), and interlacing images, or plain lines, often combined with other elements. See the work of M.C. Escher.	
Arabesque Perspective [B] Proxemic Perspective	**Arabesque Perspective is a Proxemic Perspective (Ref. Fernande Saint-Martin).** This perspective derives from an application of the optical perspective to linear, parallel, or crossing pictorial marks, juxtaposed or superimposed, which alternately uplift or push back the topological mass of the basic plane from front toward the back. Synonym for: Arabesque Perspective (A). See: Semiology of perspective, work of Fernande Saint-Martin.	
Arabia Theory of Light Pinhole Camera	In *De radiis stellarum*, al-Kindi proposed that all things emit rays in every direction. Ibn al-Haytham (known as Alhacen or Alhazen in Europe), in the 1010s, analysed Greek optical theories and discussed the pinhole camera and lenses in his Book of Optics.	
Archimedian Solids	The Archimedean solids are a set of thirteen convex polyhedra whose faces are regular polygons, but not all alike, and whose vertices are all symmetric to each other.	
Architect's Method (1)	Synonym for one-, two- or three-point linear perspective drawing.	

TERM	DEFINITION
Architect's Method (2) - of Drawing in Perspective	Reference to parallel perspective or descriptive geometry whereby the spatial object/scene is projected as a front-elevation, side-elevation, and plan. See: parallel perspective, technical drawing, descriptive geometry, architectural perspective.
Architectural Drawing	A drawing of the built environment, serving as a design/manufacturing plan, or else as a realistic perspective view of the same.
Architectural Perspective - Object / Scene Structures (1, 2, 3, 4, 5) Built Environment Visual Perspective (2) Graphical Perspective Linear Perspective	**1. Buildings (ancient and modern):** Representation/design/construction of buildings, roads, paths, panoramas, etc., that exhibit well-defined vanishing points, pleasant outlines/horizons, etc., and that also blend with the natural/built environments, and with 'pleasing' or natural/simulated perspective views leading to open/closed perspective views as required. **2. Fountains:** Representation/construction of fountains that exhibit 'pleasing' or natural/simulated perspective views or images/representations. **3. Churches:** Representation/construction of churches (interior/exterior) that exhibit 'pleasing' perspective views or images/representations. **4. Gardens:** Representation/construction of gardens that exhibit 'pleasing' or natural/simulated perspective views or images/representations. **5. Phantasy Environments:** Linear Perspective (and related methods) has been used to create remarkable large-scale and panoramic images and/or imaginary environments, including imaginary views of fountains, gardens, churches, monumental buildings, cities, and the interiors of churches.
Architectural Perspective - Texture Gradients	The Medici-Riccardi palace in Florence uses a simple simulated or forced perspective technique to enhance the appearance of building height, in which the wall cladding becomes more refined in terms of reduced pattern size or smaller texture cell size with increasing height, giving the impression of greater height for the building than in reality.
Architectural Perspective (1, 2) Visual Perspective (2) Graphical Perspective Technical Drawing Descriptive Geometry	**1) Type of visual / optical / technical perspective, or graphical / geometrical perspective.** Technical/graphical perspective method(s) used to depict buildings, sculptures, and built environments. **2) Perspective view / image of built environment (spatial scene / object).** Also, the architectural perspective (natural form) refers to a type of natural or environmental perspective that encompasses human-constructed environments. Examples include buildings, monuments, etc., in which churches, cities, and garden landscapes are often arranged and designed to form specific kinds of architectural space. See book: The Birth and Rebirth of Pictorial Space by John White (1967). See Book: Perspective: The Practice and Theory of Perspective as Applied to Pictures with a Section Dealing with its Application to Architecture by Rex Cole (1941). See Book: Architectural Drafting and Design by Ernest R. Weidhaas (1974).
Architectural Sciagraphy	Architectural sciagraphy, or the geometry of outlines, light, and shade, studies and represents shadows in design, visualising depth and sunlight interaction. For example, casting shadows at a 45-degree angle helps architects assess aesthetics, spatial proportions, and daylighting efficiency.
Architrave line (1, 2) Type of orthogonal construction line	**1: Physical Frame** An architrave line is the line where an architrave moulding is fitted around a door or window frame. **2: Drawing Scale Lines** Special drawing lines at the edges of technical drawings (primary / orthographic view) - often involve scale measurements and/or construction points, etc. Relates to orthographic perspective.
Area	A 2-D Surface Form, or 2-D Region of Space (possibly bounding a 3-D Volume). A measured subdivision of (the surface of) any object.
Area of Vision [A] Angle of View (2) Field of View Limits of Clear Vision	**Synonym for: Angle of View (2): Field of View (preferred term). Limits of clear vision.** The human visual field, expressed in angular units, extends about 60 degrees nasally and 107 degrees temporally from the vertical meridian, with approximately 70 degrees above and 80 degrees below the horizontal meridian. This results in a limited view within a 30-degree cone of the principal ray, rendering objects outside these limits indistinct. Optimal viewing occurs at eye level, approximately 5 feet (1.5 meters) above ground. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A,B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2). See also: viewing angle (types). See: eye, angle of vision, visual field, field of view, visual perception.

TERM	DEFINITION	A
Area of Vision [B] (1, 2, 3) Field of View Visual Field Base of Cone of Rays Visual Perspective (2nd type) Linear Perspective	**Area of Vision: Field of View (preferred term) — See also: Visual Ray (2).** Synonym for angle of vision (2) or visual field. It may be expressed in angular units or projected as an area onto a 2-D planar region of physical reality (or even expressed as a volume or 3-D spatial region). Relates to both visual perspective (2nd type) and a linear perspective construction. 1. **Area of Vision: Angular expression** Expressed as X,Y direction angles, or a solid angle. 2. **Area of Vision: Projected Line (1-D)** Expressed as a projected line (Base of Cone of Rays), or as a line on a projection plane. 3. **Area of Vision: Projected Area (2-D)** Expressed as a projected area on a projection plane. N.B. It is possible that the term area of vision could encompass a 3-D volume that extends into depth. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A,B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2). See also: viewing angle (types).	
Area Perspective Parallel Perspective	Parallel perspective in which the projected outline/shadow of a spatial object is projected onto a flat or planar picture plane located in one (or each) of the three spatial/cardinal directions. See: parallel perspective, orthographic perspective, descriptive geometry, technical and engineering drawing.	
Arena Staging	Arena staging, also known as theatre-in-the-round, is a performance space configuration where the audience entirely surrounds the central acting area.	
Aristotle Scientific Method Universal / Particular	Aristotle (384–322 BC) was a Ancient Greek philosopher whose theory of definition outlines criteria for accuracy in definitions. Aristotle's definition theory, found in Topics, Posterior Analytics, and Metaphysics, describes a subject's essence through its genus and differentia. A proper definition is the essential starting point of scientific knowledge, identifying essence rather than just a name.	
Armillary (Equinoctial) Sundial	A type of universal armillary sphere (works at any latitude), being a type of super-accurate sundial. The celestial sphere is represented by three metal bands, the thickest of which, the equinoctial hour-ring, lies along the celestial equator. The sundial measures time using the shadow cast by the central metal sphere, which represents the Earth. This sphere is mounted on a spike, or gnomon, aligned with the polar axis. As the Sun moves across the sky, the shadow moves around the equinoctial ring, falling on the associated hour.	
Armillary Circle	Circular form of armillary sphere.	
Armillary Sphere	An armillary sphere (variations are known as spherical astrolable, armilla, or armil) is a model of celestial objects, featuring a framework of rings that represent celestial longitude, latitude, and other astronomical features.	
Arrow in the Eye (metaphor)	The "arrow in the eye" perspective refers to a Renaissance artistic concept where converging sightlines were metaphorically depicted as arrows piercing the eye, symbolising how art directs vision into a scene, but also creating complex experiences where the viewer's actual viewpoint clashes with the scene's internal logic, challenging perception and highlighting the mechanics of representation.	
ars Perspectiva	Refers to the art and theory of creating realistic depth on a flat surface, as detailed in Renaissance writings and later works like Samuel Marolois's Ars Perspectiva (1615).	
Artificial Intelligence Perspective	Use of an Artificial Intelligence (AI) system to generate counterfeit/artificial perspective images; and/or novel perspective viewpoints/movies; or use of such a system to analyse image features.	
Artificial Light Camera Instrument Perspective Projection Perspective Theory of Shadows	Artificial light is light produced from man-made sources, such as electricity, fire, or candles. There are several ways in which we can classify light sources, and for example, in terms of the method of light generation and the form/structure of light rays/beams produced. **Light generation** • **Incandescent**: A common type of artificial light • **Fluorescent**: A common type of artificial light • **LED (Light Emitting Diode)**: LEDs are energy-efficient and last longer than incandescent bulbs. • **Studio strobe**: A common type of artificial light used in photography **Light ray structure** • **Parallel beam**: light rays arrive at an object/scene as parallel rays (similar to light from the sun). • **Converging beam**: a converging light beam to form a narrow spot on the object/scene. • **Diverging beam**: diverging light beam, forming an illuminated region on the object/scene. • **Unstructured light rays**: light rays that proceed outwards in all directions. See: Theatre perspective, stage lights, natural light, atmospheric perspective, lighting perspective, lighting.	

TERM	DEFINITION
Artificial Perspective (1, 2) **(optical drawing)** **<< NEW / REFINED Term >>** Perspectiva Artificialis or Optica Delineatoria. Seu de arte pictoria delineandi optice.	**1. Human-made perspective representation (PRC Theory)** Artificial perspective is concerned with viewing, matching, representing, immersion into, or producing an illusion of, a spatial reality, or projecting images/shadows into, a three-dimensional physical reality; whereby human-designed/operated perspective methods/systems/instruments are employed. It is a general term referring to any type of perspective that has been, in one way or another, created/formed by humans. Includes all types of graphical perspective, mathematical and instrument perspectives, etc. It is important to note that any example of artificial perspective may be at least partially sourced from natural perspective or from another type of perspective (for instance, an artistic drawing of a natural scene uses a combination of natural, visual, and graphical perspective types). In other words, the perspective categories tend to overlap and have multiple sources (ref. category overloading). **2. Moniker for linear perspective** Another name for linear perspective.
Artificial Reality	Use of an Artificial / Virtual Reality system (including perhaps VR Headset or VR glasses) to project into/onto physical reality perspective images (2-D/3-D type) which are then inserted into, or overlaid onto, the visual world (sometimes named Augmented Reality or Mixed Reality). See: Artificial Reality, Virtual Reality, Augmented Reality, Mixed Reality.
Artist's Perspective	The technique of graphical, geometrical, or linear perspective (e.g. vanishing points) to create the illusion of 3-D space on a flat, 2-D picture plane.
Artistic Method **<< NEW / REFINED Term >>** Visual Perspective (2nd type) Artificial Perspective Linear Perspective Graphical Perspective Viewpoint Perspective Window Picture Plane	Let us consider how an artist produces a perspective drawing/painting of a three-dimensional scene. Patently, the artist must first select a subject to paint (an object/scene) to be viewed from a fixed location, the so-called **station** or **viewpoint.** One might assume that the artist can begin by simply sketching what he/she sees whilst looking at the scene in a somewhat ad hoc manner. But normally, it is necessary to fix the viewpoint, viewing angle, and field of view in some way, because there are a large number of possible viewing angles and contrasting scene aspects or points of view that can be observed, each from a slightly different viewpoint and/or viewing angle, etc. The problem is that the artist's viewing location, plus angle-of-view, can (possibly) change whilst the drawing is under construction. To solve this problem, a 'transparent' frame is overlaid on the spatial scene, called the **perspective window** or windowpane (which may be purely imaginary and can even be wholly or partially unconscious). This perspective window is normally rectangular, and planar (or flat) in form, and serves the purpose of fixing the artist's head position (location), plus angle of vision and field of view (monocular eye position), relative to the spatial scene/object in question. Ergo, the artist begins by looking at a scene through an imaginary perspective window (or even a real glass window or semi-transparent veil), and the drawing/painting is made as if coincident with this flat and translucent windowpane. Whereby, for a representation created in such a manner, each painted object in the scene is thus depicted as a flat, scaled-down image of the object on the other side of the window. Ergo, the technique of *graphical perspective* works by representing the light that passes from a scene through an imaginary rectangle (represented as the plane of the drawing/painting), to the viewer's eyes (ostensibly a single eye). What happens when another person looks at a painting created in this way? Well, it's as if the viewer were (him or herself) looking through the same perspective window and hence viewing a representation identical to the original scene (at least in some senses, and not including binocular optical/perceptive effects). This happens because each portion of the painted object lies on the same straight line from the viewer's eye to the equivalent portion of the real object it represents. Henceforth, the viewer ostensibly sees no difference between the painted scene on the perspective window and the real-world view of the spatial scene/object. For a painting so constructed, the picture plane can be thought of as the glass of the notional windowpane through which the viewer looks into the representation of spatial reality that lies beyond. In practice, the picture plane is the same as the physical surface of the painting produced in this manner. When the resulting picture or representation is viewed from the same spot as the windowpane was created (or from an identical station point located the same distance in front of the picture), then the depicted image is geometrically identical to what was seen through the unpainted window (by the artist). See book: Drawing Systems by Fred Dubery and John Willats (1972). See book: The Complete Guide to Perspective Drawing by Craig Attebery (2017). See book: Perspective Made Easy by Ernest Norling (1967). See book: Theory and Practice of Perspective by G.A.Storey (1910).
Ascending Lines	A line positioned on an inclined plane (in object space) relative to the optical axis, or line-of-sight.

TERM	DEFINITION	A
Ascending Plane Perspective (1, 2) Natural / Visual Perspective (2) Graphical Perspective	Formation of a perspective image of an object plane that is positioned on an inclined plane relative to the optical axis, or line-of-sight (in contrast to the normal case of linear perspective, the optical axis is not parallel to the ground plane). **1. Parallel or Direct Form** Form of ascending plane perspective. An image in which the pictured object plane is aligned along a parallel (orthogonal) direction relative to the central axis of the parallel or orthographic projection. **2. Oblique Form** Form of ascending plane perspective image in which the pictured object plane forms an oblique (non-orthogonal) angle relative to the central axis of the perspective projection. **Synonyms:** inclined plane perspective. See: visual. graphical, linear perspective, orthographic perspective.	
Aspect Foreshortening	Synonym for aspect foreshortening: Type:1, or geometrical projection foreshortening (ostensibly independent of the optical or pure perspectival foreshortening facet due to the size/distance law). See: Foreshortening (general discussion), foreshortening (components and perpendicularity), foreshortening - Types (1, 2), aspect perspective, axonometric foreshortening.	
Aspect of a Slope	Synonym for: Bearing of a slope.	
Aspect Perspective (1, 2) **<< NEW / REFINED Term >>** Natural Perspective Visual Perspective (2) Artificial Perspective Aspect of Form / Aspect Perspective Viewpoint Angle Of Vision Projection Aspect Distortion Depth Cues Foreshortening (1, 2) Elements of Perspective	**1. Distance-independent length/shape/angle/position distortions (e.g. pure aspect foreshortening)** Refers to natural/artificial aspect perspective or a geometrical projection in which object features positioned along the viewing direction are uniformly contracted in apparent length (notionally irrespective of relative distance), and experience proportional perspective shape distortions accordingly (e.g. object parts becoming equally contracted in length along the same direction). This is a representation foreshortening technique that can occur (to a greater or lesser degree) with all forms of optical/technical perspective, depending on circumstances, including recession-of-form perspective or the linear/circular/curvilinear/spherical types, as well as all parallel types of perspective. **2. Distance-dependent length/shape/angle/position distortions (e.g. optical foreshortening)** Refers to natural/artificial aspect perspective in which object features positioned closer to the station point, and along the viewing direction, experience non-proportional or exaggerated perspective length/shape distortions (e.g. becoming elongated to a greater degree when closer to the viewpoint). It is the result of the classic optical size-distance law or diminution of size perspective. This is a pure optical perspectival foreshortening (type 2) technique often used by artists and comic-book artists to enhance the feeling of the third dimension, depth, or dimensionality within a drawing (including moving action in a 3-D space). An example is when a drawing of an outstretched arm shows exaggerated length or scale distortions of the hand/fingers, being an example of a non-uniform aspect perspective. This is an optical/representation foreshortening technique that can occur with diminution of size perspective or the central/linear/circular/curvilinear/spherical forms of visual/optical/technical depending on circumstances. Note that both types of foreshortening (1, 2) can combine or be operating together, depending upon circumstances, and within an image/view projected according to a diminution of size perspective, for example, as with a linear perspective image or view. See: Natural/visual and artificial perspective, aspect perspective (1, 2), foreshortening (1, 2), elements of perspective. See book: The Complete Guide to Perspective Drawing by Craig Attebery (2018). See book: Perspective Drawing by M. E. Helms (1990). See book: The Geometry of an Art by Kirsti Anderson (2007). See book: Principles of Egyptian Art by Heinrich Schafer (1974).	
Aspective	Spatial image that does not exhibit classic depth-based perspective phenomena, including diminution of size, recession, foreshortening (2), vanishing points, etc. Also named anti-perspective or non-perspective.	
Astigmatism Aberration	Astigmatism is an optical aberration that causes distortion in optical imaging systems; it is a third-order aberration that arises when the tangential and sagittal focal surfaces do not coincide.	
Astrarium Perspective Mapping of Universe	The "Astrarium perspective" concerns seeing and mapping the universe, whether through ancient mechanical marvels, virtual constellation puzzles, or digital tools, to understand celestial patterns and find hidden knowledge. In terms of the history of the term, see complex medieval clockscharts, like Giovanni Dondi's 14th-century creation, built to map the positions of the Moon, Sun, and planets, symbolising humanity's quest to understand the universe.	
Astrolabe Projection	Astrolabes are designed and constructed using a stereographic projection of the celestial sphere, typically from the South Pole to the Equator.	

TERM	DEFINITION
Astrolabium (Archidoxa) Book and Astrolabe Astrology	The Archidoxa (1569) is a notable astrological book by Leonhard Thurneisser. In 1575, he published the Astrolabium, which combined a book with an astrolabe designed to determine planetary courses and predict fate or disasters. It was used for creating individual horoscopes with volvelles.
Astrolable Inclinometer Star Chart Time keeping Analogue computer	The Astrolabe is an ancient astronomical instrument, originally developed in China and Greece, serving as a handheld model of the universe and an inclinometer for astronomical calculations. Several types of astrolabe are known, including: 1. Circular astrolabe 2. Prismatic astrolabe 3. Spherical astrolabe 4. Stereographic astrolabe 5. Universal astrolabe or saphea 6. Linear astrolabe 7. Mariner's astrolabe 8. Planispheric astrolabe
Astronomical Perspective Celestial Perspective	A wide range and huge number of different kinds of astronomical perspective have been employed throughout time, contributing to the development of civilisation (navigation, farming, astronomical observations, etc), and science. Examples include seasonal variations, sundials, navigation and cartography, solar-system and deep space studies, astronautics, etc. See: natural perspective, mathematical perspective, celestial perspective, galaxy perspective.
Astronomical Projection Natural Perspective Celestial Perspective Seasons Astronomy Maps Cartography Telescope Celestial Sphere Telescope Perspective	Astronomical projection is a key component of spherical astronomy and cartography used to represent the 3-D celestial sphere (containing stars, planets, and galaxies) onto a 2-D plane, such as a star map, photograph, or computer screen. These projections often use specific perspective models to balance, shape, and represent distance and area for observers on Earth or in space. **Types of Astronomical Projections** • **Stereographic Projection:** The most common projection used for all-sky maps and planispheres. It is conformal, meaning it preserves angles and shapes of constellations, though it distorts area near the edges. • **Gnomonic (Rectilinear) Projection:** Used for narrow-field photography (like smartphone cameras) and meteors, as it projects straight lines on the sky as straight lines on the map. It is often used for maps centred on specific objects. • **Orthographic Projection:** Represents the celestial sphere as seen from an infinite distance, depicting a hemisphere as it appears from space, with high distortion near the edges. • **General/Tilted Perspective Projection:** Simulates a camera view from a finite distance above the surface (e.g., Earth-viewing satellites or NASA World Wind). See: Perspective axis constellation, astronomical perspective, cartography, celestial sphere, spherical astronomy, perspective in astronomy, celestial perspective, galaxy perspective.
Astronomical Ring	**Astronomical rings** (Latin: annuli astronomici), or Gemma's rings, are an early astronomical instrument. It consists of three rings, representing the celestial equator, declination, and the meridian. It can be used as a sundial to tell time, if the latitude and season are known, or to tell latitude if the time is known or observed (at solar noon). It is a simplified, portable armillary sphere, or a complex type of astrolabe.
Astroscope (Smith's Octant)	An old astronomical instrument formed of two cones, on whose surface the constellations were delineated. See: Astronomical perspective, octant.
Asymptote Perspective	In a perspective projection, unlike orthographic (top-down/flat) views, the perspective (x, y, z) function in asymptote perspective distorts 3-D objects to mimic human vision, making objects appear smaller as they get further from the camera. See: visual perspective (2nd type), lateral distortion (1).
Atmospheric Perspective [A] / Aerial Perspective Colour Perspective	Atmospheric effects depth by scattering and absorbing light, making nearby objects clearer and contrast-rich, while distant ones appear blurrier, less detailed, and bluer. See: aerial perspective, light, absorption, colour, contrast perspective, perspective of acuity, and diminution of form perspective.

TERM	DEFINITION	A
Atmospheric Perspective [B] Atmospheric / Aerial Perspective Colour Perspective	**Atmospheric Perspective is a Far Distance Perspective (Ref. Fernande Saint-Martin).** This perspective mimics the transformations that objects perceived in external reality undergo when situated at great distances. Visual foreshortening (angular contrast reduction), as well as atmospheric layers interposed between object and spectator, reduce the distinctiveness of their visual variables, introducing a dissolution of their contours and chromaticity, and reducing the intervals between them, stressing their dark characters and formal masses. Synonym for: AtmosphericAerialPerspective [A]. See: Semiology of perspective, work of Fernande Saint-Martin.	
Atomistic Perspective **<< NEW Term >>**	A philosophical term that refers to the possibility of large numbers of multiple, separate, and mini perspective viewpoint(s) (real and potential), each one providing a unique (localised) view of a spatial world/reality/scene. Whereby all perspective 'atoms', being inherently subjective fragments, or multiple views, can/could be combined to form a single coherent image space and thus representing/indicating a coherent or objective whole for the notional object space. See philosopher G. Leibniz's atomistic perspective and monads, for example. See also: cubist art.	
Auditory Perspective Sound Perspective	Auditory perspective refers to the ability to imagine and understand the auditory scene (or spatial reality) from another person's viewpoint (e.g. physical location), including what they can (and cannot) hear, and how that impacts their comprehension.	
Augmentation of Form Perspective	Opposite process to the perspective of disappearance (object outline appears to grow more detailed as viewpoint approaches object, or vice-versa). See: diminution of form perspective, perspective of visual acuity, gradient of loss of acuity perspective.	
Augmented Perspective Augmented Reality	Another name for Augmented Reality perspective. A type of instrument perspective that produces a combined/mixed synthetic perspective (natural plus artificial view/image) and possibly blended (multi-scene) artificial view of the real world—physical world—with an overlay of digital 3-D visual elements. Relates to Mixed Reality (MR): being a view of the physical world—with an overlay of digital elements where physical and digital elements can merge/interact.	
Augmented Reality Simulated / Synthetic Perspective Instrument Perspective	Augmented Reality perspective is a type of computer-generated Virtual Reality perspective that overlays additional visual perspective image elements (components of visual transformation) onto a physical scene in real time. The result is a type of synthetic, mixed, combined, and possibly blended, or enhanced visual perspective (2nd type). Often, the generated visual elements augment images of natural objects present in the visual scene (ref. name tagging of objects, informational text, hyperlinks to product offers, or GPS data insertions, etc). **Key Aspects of Augmented Reality** • Real-time Interaction with physical and digital elements. • Environmental Mapping for accurate virtual object placement. • Accessible via smartphones, tablets, and smart glasses. See: natural perspective, Virtual Reality, artificial perspective, visual perspective (retinal), instrument perspective, spatial computing, New Media perspective.	
Augmented Reality Camera Virtual Reality Extended Reality	An Augmented Reality (AR) camera uses specialised software to analyse what it sees and overlay virtual information on the visual appearance of the physical world. AR cameras can be found in smartphones and other devices. **Features** • Captures an image of the physical world • AR software analyses the image • Overlays virtual information on the image • The user sees the physical world and virtual information simultaneously **Applications** • Can enhance natural environments and situations • Can help users visualise things that would be difficult to see otherwise • Can be used in many areas, including work, learning, play, and shopping **Examples** • Smartphone cameras can be used for AR • Marine cameras may have AR capabilities • Virtual camera systems can be used to create an AR effect (games, flight simulators, etc)	
Augmented Reality Headset	Augmented Reality (AR) headsets are VR headsets that enable the user to see and interact with the outside world. Examples of AR headsets include the Apple Vision Pro and Meta Quest 3.	

TERM	DEFINITION
Augmented Reality Projector Projection Perspective Spatial Augmented Reality Video Mapping Projector Projection Mapping	An AR projector is a device that projects images onto 3-D objects in a physical space to create augmented reality (AR). AR projectors are similar to regular projectors, but they need to be smaller and more efficient. It is also known as **spatial augmented reality** (SAR) or **video mapping projector**. While traditional projection displays visuals on flat surfaces (walls, screens, etc.), AR projectors can overlay customised light and sound projects onto real objects and buildings of any size. **Working principles** • AR projectors use a fixed projector to overlay images onto objects in a physical space. • The images are displayed to the user via AR wearables, such as smart glasses. • The projector acts as a light source, and the AR wearables transfer the image to the eyes. **Applications** • **Art**: AR projectors can project images onto surfaces, scale and stylise artwork, and paint murals. • **Signage**: Can be used to create branded signage. • **Healthcare**: Medical training and surgery. See: Virtual / Augmented Reality, projection mapping, spatial augmented reality, video mapping projector.
Aurora Natural Perspective	An aurora, northern lights (aurora borealis) or southern lights (aurora australis), is a natural light display in Earth's sky, mostly seen in high-latitude regions. Auroras display moving patterns of brilliant lights that appear as curtains, rays, spirals, or dynamic flickers covering the entire sky. Auroras arise from disturbances in the Earth's magnetosphere caused by the solar wind, altering the trajectories of charged particles in the magnetospheric plasma. These particles, mainly electrons and protons, precipitate into the upper atmosphere and cause ionisation and excitation of atmospheric constituents, which emit light of varying colours.
Auto-Hologram Mirror 3-D Illusion	A 3-D image formed of a spatial object, and by a special arrangement (relative to the observer/ object) of one or more concave mirrors that use a real object to form a real-space 3-D image that floats in space, the same being an auto-hologram image of the same object. See: hologram, reflection hologram, mirror, concave mirror, perspective illusion, 3-D, 3-D display.
Autokinetic Effect Illusion	The autokinetic effect is a visual phenomenon where a stationary point of light appears to move in darkness due to the lack of a reference point, leading observers to create their own frames of reference for movement.
Autostereogram (1,2 ,3) Auto-stereoscopic 3-D Magic Eye Binocular Vision	An autostereogram is a two-dimensional (2-D) image that creates the optical illusion of a three-dimensional (3-D) scene/object. They use only one (source) image to accomplish the effect, while normal stereograms require two. The 3-D scene in an autostereogram is often unrecognisable until it is viewed properly, unlike typical stereograms. The optical illusion of an autostereogram involves depth perception and stereopsis: the perception of depth arising from the different perspectives each eye has of a 3-D scene, called binocular parallax. Several kinds of autostereogram are known: **1. Lenticular prints and displays** Lenticular prints and displays are created by placing a special type of lens array over a picture, so that the image creates an illusion of depth, can change form (shape), or move as the image is viewed from different angles. A so-called lenticular lens is an array of lenses, designed so that, when viewed from slightly different angles (as seen from each eye), different parts of the image beneath are shown, leading to binocular views/images. **2. Parallax display** (horizontal pixel count is halved, reducing the image's horizontal resolution) A parallax display uses a barrier in front of an LCD to create a 3-D effect without glasses, allowing each eye to see different pixels through slits. While earlier versions required a specific viewpoint, newer models use face-tracking software to adjust visuals for a wider range of positions. **3. Random dot picture / horizontally repeating pattern picture (ref. Magic Eye images/books)** The simplest autostereogram features a horizontally repeating wallpaper-like pattern that, when viewed properly (correct vergence), appears to float above or below the background.
Autostereoscopic Display	Autostereoscopic displays enable viewing 3-D content without special glasses by using optical technologies like lenticular lenses or parallax barriers to direct separate images to each eye. Often called "glasses-free 3-D," these displays use head-tracking or multi-view techniques for, primarily, professional visualisation, public displays, and digital signage.
Auxiliary Construction Parallel Perspective Linear Perspective	Synonym for an auxiliary elevation made during perspective graphical construction; being one of two 'parallel projections' used to make such a drawing, ergo: A) the ground plane, and B) its profile. An auxiliary elevation (or profile view) is used in perspective construction to locate the projected heights of traversals (from the ground plane metric grid) and sketch them onto the picture plane.

TERM	DEFINITION	A
Auxiliary Elevation Linear Perspective	Special orthographic elevation projection used for surfaces or lines not parallel to principal planes (picture plane, ground plane and the horizontal plus vertical sight plane(s)), showing their true size or length. See: Auxiliary perspective, linear perspective, parallel perspective.	
Auxiliary Horizon Line Linear Perspective	**Synonym for Horizon Line (auxiliary or secondary). A vanishing line of vanishing points.** Secondary/auxiliary vanishing point(s) and associated secondary/auxiliary horizon line(s), being located on a plane at any angle, are contrasted from the (single) primary/principal horizon line, which is the apparent visual boundary line where all planes parallel to the ground plane (containing orthogonal lines) appear to meet land or water on the ground plane. See: Auxiliary perspective, auxiliary line, horizon line (auxiliary), horizon line (secondary), horizon line (types).	

Auxiliary Line
Auxiliary Horizon Line
Auxiliary Vanishing Point
Linear Perspective
	Auxiliary Line or Vanishing Line (1): related term: auxiliary vanishing point.
	In perspective drawing, auxiliary lines (ascending/descending/oblique parallel lines extending into depth), also known as (or producing) auxiliary vanishing points, are used to represent inclined planes or objects that are not parallel (orthogonal) to the viewer's perspective (and typically auxiliary lines are also not parallel to the ground plane). Associated auxiliary vanishing points (on an auxiliary horizon line) are located on a vertical axis above or below the primary vanishing point on the primary horizon line.
	Explanation
	• **Why use auxiliary lines?** Standard perspective drawing techniques (1-2-3-point linear perspective) focus on objects (and lines) parallel to the viewer's perspective. When drawing inclined planes (like roofs, ramps, or staircases), you need auxiliary lines to accurately represent such perspective(s).
	• **How to find them**
	  • **Identify the primary vanishing points:** These are located on the horizon line.
	  • **Locate auxiliary vanishing points:** Above/below the primary vanishing point on a vertical axis.
	  • **Use them to draw inclined lines**: Lines that converge towards the auxiliary vanishing points will accurately represent inclined planes.
	• **Examples**
	  • **Drawing a staircase:** The front/side edges of the stairs converge towards two primary vanishing points, while the risers/treads converge towards the auxiliary vanishing points.
	  • **Drawing a roof (angular perspective [1]):** The edges of the roof converge towards two primary vanishing points, while the roof's slope is represented by lines converging towards the auxiliary vanishing points.	

Auxiliary Measuring Point Linear Perspective	**Synonym for Measuring Point (auxiliary)** [See: Auxiliary perspective, measuring point (auxiliary)] An auxiliary measuring point is used for an Inclined perspective projection. Establishing an auxiliary measuring point follows the same procedure as used in one-point perspective.	
Auxiliary Perspective (A [1, 2, 3], B) Parallel Perspective Primary View Multi-View Orthographic Drawing Axonometric Drawing Descriptive Geometry Technical / Engineering Drawing	**A: Standard Auxiliary View** Refers to an Isometric, Dimetric, and Trimetric projection. Types of auxiliary view (standard classes): 1. **Front View Auxiliaries:** There are three types of auxiliary views: the first is projected from the front view, while the second and third are from the top and side views, respectively. 2. **Top View Auxiliaries:** A top-view auxiliary is created like front view auxiliary, but projected from above. The view chosen depends on the object's position and slanted surface. 3. **Side View Auxiliary:** Side view auxiliaries are drawn in the same way as front/top view auxiliaries. **B: Inclined / Slanted Surface Auxiliary View** Auxiliary perspective is a specialised projection method used in descriptive geometry and technical drawing. It is required to accurately depict inclined surfaces, which cannot be represented without distortion in orthographic views. An auxiliary view projects the object to display the true size and shape of the inclined surfaces. See: axonometric perspective, parallel perspective, primary view, multi-view, descriptive geometry, technical drawing, engineering drawing, auxiliary true height line, auxiliary elevation view.	
Auxiliary Perspective (C) Perspective Projection	**C: Perspective View / Projection** Refers to an auxiliary perspective that is projected using a perspective or conical projection. Whereby physical space can potentially contain an infinite variety of flat planes arranged in any direction (auxiliary planes), each containing associated secondary/auxiliary vanishing point(s) and secondary/auxiliary horizon line(s), and each has a unique auxiliary perspective as projected onto the picture plane.	

TERM	DEFINITION
Auxiliary Plane (A) - General Term Object Space	Physical space can potentially contain an infinite variety of flat planes arranged in any direction (in object space), and these are named auxiliary planes; contrasting with any plane that is parallel to the line of sight or projection, including, for example, the ground plane
Auxiliary Plane (B) - Special Projections Image Space	A horizontal or vertical plane that meets the outer edge of the picture plane on one side, which is sometimes used for elevation or plan views/projections from spatial bodies in object space. Relates to a linear perspective construction but may include related parallel perspective and primary views. See: space box, parallel perspective, descriptive geometry.
Auxiliary True Height Line True Length Line True Inclination Linear Perspective	An Auxiliary True Height Line (or True Length Line) is a line in an auxiliary view (ref. orthographic perspective) that shows the actual, un-foreshortened length and true inclination (angle) of an oblique or inclined line from a principal/prime view (ref. Front or Top), achieved by projecting perpendicular to the line of interest and transferring measurements from a related view, revealing its actual dimension. **Key Concepts** • **Auxiliary Views:** Special orthographic projections used for surfaces or lines not parallel to principal planes, showing their true size or length. • **True Length:** The actual measurement of a line, found when the viewing direction is 90 degrees (perpendicular) to the line itself. • **True Inclination:** The real angle a line makes with a principal plane, also revealed in the true length view. • **Height Auxiliary View:** A specific type projected from the Top View, showing the true height dimension of an inclined surface. See: Auxiliary view, true length line, parallel perspective, orthographic perspective, descriptive geometry.
Auxiliary Vanishing Point	**Synonym for Vanishing Point (auxiliary / secondary).** See: Auxiliary perspective, vanishing point (auxiliary), secondary vanishing point.
Auxiliary Vertical Plane - Special Projections Image Space	A vertical plane that meets the outer edge of the picture plane on one side, which is sometimes used for elevation views/projections from spatial bodies in object space. Relates to a linear perspective construction but may include related parallel perspective and primary views. See: space box, parallel perspective, descriptive geometry.
Auxiliary View Parallel Perspective	Auxiliary views are elevation drawings other than the front, rear, right, and left elevations (projected directly from the plan view). They are special orthographic projections used for surfaces or lines not parallel to principal planes, showing their true size or length. See: Auxiliary perspective, space box, parallel perspective, descriptive geometry.
Axial (pseudo) Perspective [A] Axiomatic Perspective Fishbone Perspective Chinese Perspective	Axial, fishbone, or vanishing vertical axis perspective is a type of graphical perspective in which the apparent spatial scene is arranged around a vertical axis with multiple 'stacked' vanishing points. A category of graphical or technical perspective in which pictorial elements are arranged with respect to a vertical 'fishbone' line of 'vanishing points' that cause elements to apparently recede or diminish in scale according to distance along each line from each vanishing point. The overall result is a multiple-viewpoint perspective that provides additional pictorial space for objects (in the vertical direction), but results in a wholly false or unnatural view that is self-contradictory because no overall systematic space is created within which objects can be related to one another. See: semi-technical perspective, axiomatic perspective, fishbone perspective, herringbone perspective, vanishing axis perspective, vanishing vertical axis perspective, Chinese perspective.
Axial Perspective [B] Middle Distance Perspective	**Axial Perspective is an Intermediate or Middle Distance Perspective (Ref. Fernande Saint-Martin).** An axial of 'fishbone' perspective simplifies parallel perspective in dividing the field in two through a virtual central axis upon which converge at regular or graduated intervals a series of oblique vectors, originating from the front or from the background. When the whole field is submitted to this perspective of organisation, the way is open to convergent perspectives, not on the central axis but on one or several points on the line of the horizon or at right angles to the same. This perspective, however was never global; in the sense of being consistently applied to all objects and scene elements, that is any vanishing points did not organise the entire visual scene. Synonym for: Axial (pseudo) Perspective (A). See: Semiology of perspective, work of Fernande Saint-Martin.
Axiomatic Perspective	Another name for axial (pseudo) perspective. See: semi-technical perspective, axial perspective, axiomatic perspective, fishbone perspective, herringbone perspective, vanishing axis perspective, vanishing vertical axis perspective, Chinese perspective.

TERM	DEFINITION	A
Axis Geometry Mathematics	Typically refers to an imaginary line about which a body rotates; but can be more specifically: • **Geometry:** an imaginary line through the centre of a symmetrical solid, around which a figure rotates to form the solid, or a line that divides something into equal halves, especially along its greatest length. • **Mathematics:** a fixed reference line for the measurement of coordinates.	
Axis Line / Central Axis Line Visual Perspective (2nd type) Linear Perspective	**Axis Line / Central Axis Line (vertical and/or horizontal): Direction of Vision** Synonym for Line of Sight (preferred term). In terms of a perspective drawing, the central axis line operates as a structural foundation and is normally a vertical or longitudinal axis. An axis line is an infinite straight line. In terms of perspective, the central axis line is a synonym for the central visual ray or line of sight; and is defined as a vertical and/or horizontal line traced along the central ray from eye/camera to the picture plane and beyond into object space. Relates to both visual perspective (2nd type) and a linear perspective construction. **Synonyms**: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).	
Axis of Symmetry	The axis of symmetry is an imaginary straight line that divides a shape into two identical parts, with one part being the mirror image of the other.	
Axis Point (Left) Linear Perspective	Axis Point located on the left-hand side of the object (or station point / centre of projection); and on the horizontal plane of projection. See: Axis point perspective, axis point (x).	
Axis Point (Right) Linear Perspective	Axis Point located on the right-hand side of the object (or station point /centre of projection); and on the horizontal plane of projection. See: Axis point perspective, axis point (x).	
Axis Point (Vertical)	Axis Point located above the horizontal plane of projection. See: Axis point perspective, axis point (x).	
Axis Point (x)	A spot on a reference line where a tool's 90° corner aligns perfectly with two vanishing points (e.g., left and vertical), allowing for accurate drawing of true 90° angles in perspective. It is often defined by the station point in plan view, or in relation to the circle of vanishing points. See: Axis point perspective, circle of vanishing points.	
Axis Point Perspective Graphical Perspective Method	Axis point perspective refers to specific points, often defined by a 90-degree triangle, that help artists maintain true right angles (90°) in perspective drawings, especially when rotating objects or setting up three-point perspective, ensuring that corners that should be square appear square, even as objects tilt. It's a technical method for creating realistic spatial relationships, locating points where lines converging on different vanishing points form perfect 90-degree angles, which is crucial for complex constructions like rotated boxes or tilted buildings.	
Axis Point Rotation of a Box	**Rotating a Box (in graphical perspective)** 1. **Set Up:** Establish your horizon line and left, right, and vertical vanishing points (VPs). 2. **Find the Axis Point:** Place a triangle with its 90° corner on the vertical reference line (from the vertical VP). Position the triangle's legs so they align with the left and right VPs, or the left and vertical VPs, to find these specific "axis points". 3. **Rotate:** Moving the VPs from these axis points allows you to "spin" the box in space while keeping its internal 90° corners accurate, even if the box appears tilted.	
Axonometer	An axonometer is a type of magnetic compass that uses a ball nib to record angular displacements.	
Axonometric Foreshortening Aspect Foreshortening	Synonym for aspect foreshortening (1), or geometrical projection foreshortening (ostensibly independent of the optical or pure perspectival foreshortening facet due to the size/distance law). See: aspect, foreshortening, aspect foreshortening, optical foreshortening, perspectival foreshortening.	
Axonometric Perspective Drawing / Projection	A parallel projection that depicts an object by rotating it around its axes to show multiple sides. See: parallel perspective, primary view, multi-view, descriptive geometry, technical drawing, engineering drawing, axonometry	

TERM	DEFINITION
Axonometric Projection System	Synonym for: Axonometric perspective.
Axonometry Primary View Parallel Perspective	Axonometry is a descriptive geometry technique that creates a 2-D representation of a 3-D object, emphasising measurement along axes. See: parallel perspective, primary view, multi-view, descriptive geometry, technical drawing, engineering drawing, axonometric drawing.
Azimuth	Azimuth is a horizontal angle that measures direction clockwise from north. It is used in navigation, astronomy, and to locate satellites or objects on the celestial sphere.
Azimuthal Perspective Projection	Azimuthal projections map a spherical grid onto a flat plane, also known as plane projections, with the poles as the "normal aspect," yielding the simplest projected grid.
Azimuthal Quadrant	An azimuthal quadrant is a navigational and astronomical tool used to measure altitude, latitude, and time. It uses a coordinate system of altitude and azimuth to locate objects in the sky.
Azure Law (1, 2, 3) Atmospheric Perspective Colour Perspective Sky Perspective Aerial Perspective Sfumato Prospettiva Aerea Leonardo da Vinci	**[1]: Atmospheric perspective:** Synonym for: colour or atmospheric perspective. The most common type of colour perspective is a gradient of the sky's colour from deep azure overhead to light blue or white near the horizon. Also, the browns and dark greens of nearby hillsides go to the azure/blue/green colour for mountains in the distance. **[2]: Painting Technique:** Background sky colour The so-called 'three-colour painting scheme' features a foreground zone that is usually brown or green, a middle ground that is blueish green, and a background that is light azure. **[3] Painting rule/technique employed by Leonardo da Vinci** who developed a sophisticated, scientific approach to perspective that went beyond simple linear systems to include "aerial" or "atmospheric" perspective. He termed this approach *prospettiva aerea*, which focuses on how the atmosphere changes the appearance of objects based on distance. Key aspects of Leonardo's perspective, particularly his "aerial" or blue perspective, include: • **Aerial Perspective:** Leonardo observed that as landscape features recede, their colours and tones shift, becoming bluer and less defined due to the density of the air. • **Colour Shift:** He instructed artists to make more distant buildings less defined and bluer, noting that if an object is five times further away, it should be made five times bluer. • **Sfumato Technique:** To achieve this, he used *sfumato*, a technique involving the blending of colour and tones to soften edges, as he believed there are "no edges in nature". • **The "Blue" Effect:** He attributed the blue appearance of distant objects to the moisture and particles in the air. See book: A Treatise On Painting by Leonardo da Vinci (c. 1651).
Back Perspective (homocentric / apocentric)	A spherical projection method in which the imaginary observer's eye is located at the south pole of the Earth (or a mathematical model of the Earth), whereupon projection points located on the Earth or celestial sphere are 'back-projected' onto a flat disc located at the equator. This is a basic operating principle of a planisphere, some cartographic methods, or certain types of astrolabe. See: astronomical perspective, planisphere, cartographic perspective.
Back Projection Background Projection Rear Projection	Image projection onto the back of a special translucent screen used as a filming backdrop (image projected from behind the screen). When used as a cinematic technique, it projects a pre-filmed background onto a translucent screen so that it appears to be behind the actors in the foreground. It was used to create the illusion of distant background motion. Also called: background projection. See: Cinema/motion perspective, front projection, camera, projector, green and blue screen.
Back-Face Culling / Culling / Back-Clipping	In computer graphics, back-face culling is a technique that removes polygons that face away from the camera. It's a type of culling, the process of removing parts of a scene that aren't visible to the camera. **Related concepts** • **Clipping:** Removing parts of an object that are outside of the camera's field of view • **Culling:** Removing parts of a scene that aren't visible from the camera • **Back-face culling:** Removing polygons that face away from the camera Back-face culling is often used in scenes with closed and opaque geometry, where it can produce a rendered scene without visible artefacts. However, in scenes with transparent polygons, rear-facing polygons may be visible.

TERM	DEFINITION	B
Back-sight (1, 2) Fore-sight Drawing Aid Optical Sight Gun sight Telescope finder Aiming Circle Cross-Hairs Vernier Scale Field of View	**1. Mechanical drawing aid (perspective drawing frame, perspective window)** A mechanical instrument that aids in visually producing a perspective drawing, employing a drawing frame combined with a 'back-sight' or variable height eyesight point (mini-oculus) mounted on a cross-staff or stick with lateral and vertical adjustments, and thus ensures a fixed viewpoint whilst making/recording a perspective drawing. **2. Optical sight / gun-sight / field-sight** Refers to an optical sighting arrow, cross-hairs, gnomon, gunsight, telescope finder or field-sight, the same being an instrument alignment pointer, or overlaid optical scale, etc, centred on the camera, telescope, or gunsight aperture line of sight or direction-of-looking, or being a scene/ object alignment aid, possibly combined with a forward position sight, and used for optical alignment purposes whereby the optical instrument is accurately/precisely directed towards the perspective target. Often, the back-sight may include alignment aids, scales, or vernier scales to help with the angular alignment of said instrument or to provide wind estimates, magnification field of view calculations, etc.	
Backlighting Foreground Subject Front Lighting	Backlighting illuminates a subject from behind, creating a glowing edge and darker areas. This technique, used in theatre to enhance depth and in painting for chiaroscuro effects, can be natural or artificial. In photography, strong backlighting can produce silhouettes.	
Backstaff Navigational Instrument	A navigational instrument for measuring the altitude of celestial bodies, used by sailors until the 1730s. **Working principles** • The user stood with the sun behind them. • Usually triangular in shape, with adjustable vanes and two arcs for angle measurements. • The user measured the shadow cast by the upper vane on the horizon vane. **Advantages** • The backstaff was an improvement on previous tools, such as the cross-staff and quadrant, which required the user to look directly into the sun • Was the first instrument designed specifically to find latitude whilst at sea	
Backwards Perspective Reverse Perspective Negative Perspective Inverse Perspective David Hockney	Synonym for: reverse perspective, negative perspective, inverse perspective. Reverse perspective (perspective à rebours) is an artistic technique used in Byzantine and Russian Orthodox icons, in which the vanishing points are located in front of the picture plane rather than behind it, causing parallel lines to diverge rather than converge. It flips the Renaissance, Western paradigm of looking "through" a window, instead emphasising the viewer as the subject of the painting. Reverse perspective is a conscious, deliberate choice in artistic representation. • **Characteristics:** In reverse perspective, objects that are further away are drawn larger, and those closer are smaller, breaking the traditional rules of linear perspective. • **Symbolism:** It creates a space where the focal point is the viewer, symbolising a spiritual, divine, or "subjective" gaze, as opposed to the objective, Earthly gaze of linear perspective. • **Cultural Significance:** Often associated with Russian Icon painting. • **Contrast with Linear Perspective:** Linear perspective uses a single, fixed, objective vanishing point to create a 3-D illusion. Reverse perspective is sometimes compared to "forced perspective" techniques in film, but the latter manipulate size for illusory depth, not to reverse it entirely. See: reverse perspective, negative perspective, inverse perspective, perspective rebours, accelerated perspective, forced perspective, illusion, diminution of size perspective.	
Badal Optometer	A Badal optometer is a device that measures refractive error in the eye. It consists of a fixed lens and a movable target. It is used to determine the spherical and cylindrical corrections needed for eyeglasses.	
Balloon Perspective	Name for a type of image taken from a high-vantage point, as was once (in the 18th19th century) only available from a human-piloted balloon flight (or from a mountaintop). See: Aerial perspective, aerial views, aerial pyramid, aeroplaneflying perspective.	
Barbari, Jacopo de'	Jacopo de' Barbari's View of Venice is a bird's-eye view of Venice in 1500 that uses perspective to create a unique visual document (or record) of the city.	
Barbaro, Daniele Venetian Geometer	Barbaro's 1568 treatise, '*La Pratica della Perspecttiva*' unifies previously scattered perspectives across disciplines and purposes, skilfully reformulating past findings. It establishes a foundational model for perspective that influenced numerous subsequent works into the 21st century. Barbaro was the first to successfully synthesise, reorganise, and codify the widely dispersed and often informal knowledge of perspective—into a single, systematically structured printed volume.	

TERM	DEFINITION
Barber Pole Illusion	A visual illusion that demonstrates biases in human motion perception, where a rotating diagonally striped pole appears to have stripes moving vertically.
Baroque Perspective (A) Quadratura Illusions Accelerated and Forced Perspective Graphical Perspective Foreshortening Spatial Recession	Baroque perspective (c. 1600–1750) emphasises dramatic illusionism, replacing Renaissance harmony with dynamic, often off-balance compositions designed to evoke awe. It features extreme foreshortening (type 2), deep spatial recession, and *quadratura* (painted architectural illusions) to merge the artwork with the viewer's physical space. Famous examples of Baroque painting include works by Andrea Pozzo (e.g., at Sant'Ignazio, Rome) and Pietro da Cortona. **Characteristics** • **Illusionism & Trompe-l'œil:** Techniques such as *quadratura* were used to create the illusion of infinite space on flat ceilings, making scenes appear to extend into the sky or heavens. • **Viewer-Centric Focus:** Unlike Renaissance works, which often presented multiple, independent scenes, Baroque ceilings were designed to be viewed from a single, specific perspective on the church floor, making the entire composition coherent. • **Dramatic Motion:** Artists used steep, angled perspectives and dynamic, twisting figures to create a sense of intense action and emotional tension. • **Realism & Depth:** Artists meticulously used light, shadow, and, in some cases, mirrors to blur the line between the painted scene and reality, enhancing the sense of depth. • **Impact:** This style was largely commissioned by the Catholic Church and monarchs to assert power and evoke emotional responses, by creating a sense of dramatic, divine, or royal magnificence.
Baroque Perspective (B: 1, 2) Reverse / Inverse / Negative Perspective	**1. Reverse / inverse / negative perspective**: see principles of. **2. Forced perspective** The techniques of Forced Perspective manipulate how we see and process our vision to trick us. For example, seeing depth where none existed, or placing real objects in juxtaposition with painted objects, etc. See: Forced perspective, accelerated perspective, decelerated perspective, reverse perspective, negative perspective, inverse perspective.
Baroque Perspective (C) Middle Distance Perspective	**Synonym for Baroque Perspective (A), Angular Perspective (3).** **Baroque Perspective is an Intermediary or Middle Distance Perspective (Ref. Fernande Saint-Martin).** Disposes in a proximate or intermediary distance an entanglement of planes, with accentuated chiaroscuros, in a harmonic or discordant vectoriality (directions). Even when it signals a distanced lighted region in one of the superior corners of the artwork, this perspective is quite involved in an accumulation of elements in the foreground and strengthens their dimension, colour densities, sudden foreshortenings (type 2). It produces a 'kinesthetic excess'; in the proxemics in relation to the treatment of elements in the medium or background levels. Similar to Cubism and cubist perspective. Defined as an Intermediary or Middle-Distance Perspective by Fernande Saint-Martin. See book: L'Art Classique, Paris, Renouard, Wolfflin (1911). See book: Space in Medieval Painting and the Forerunners of Perspective by Miriam Schild Bunim (1970). See book: The Poetics of Perspective by James Elkins (1994). See paper: Ptolemy and the Origins of Perspective by Kim Veltman (1980). See book: Changing Images of Pictorial Space: A History of Spatial Illusion in Painting by William V. Dunning. See also: Semiology of Perspective, Angular Perspective(3), work of Fernande Saint-Martin.
Barrel Distortion	Form of radial scale magnification image distortion, involving a lower-edge magnification.
Bas-relief or Low-relief Sculpture	Bas-relief is a sculptural technique in which the figures or designs are only slightly raised above the background surface. This form of sculpture creates a subtle depth, allowing for detailed and intricate designs without the pronounced projection of high-relief sculpture.
Base Line Linear Perspective	**Synonym for Ground Line (preferred term)** The baseline (or ground line) is a fundamental element in perspective drawing, defined as the horizontal line where the picture plane (the canvas or screen) intersects with the ground plane (the surface the viewer/objects stand on). Because this line exists on the picture plane, it acts as a true scale ruler for measuring depths and heights before they are projected into the 3-D perspective space. Ergo, since this baseline is at the same time a perspective line and a geometrical one, we can use it as a scale for measuring a given length thereon. **Synonyms**: ground line, picture line (1), base of picture.
Base Measuring Instrument	Perspective length measuring / scaling tool: this tool measures distances or heights that are too far away to measure directly.

TERM	DEFINITION	B
Base of Cone of Rays Visual Perspective (2nd type) Linear Perspective	**Synonym for Area of Vision (B:3) (preferred term).** Synonyms: Area of Vision (B:3), Base of Cone of Rays Refers to the (projected) 2-D base area of a visual cone/pyramid in object space. Relates to both visual perspective (2nd type) and a linear perspective construction. **Related term synonyms (Area of Vision [B:3]):** Angle of View (2), Angle of Vision (2), Area of Vision(A,B), Centre of Interest, Cone of Vision, Cone of Visual rays, Field of View, Field of Vision, Pyramid of Vision, Pyramid of Sight, Viewing Angle (2), Visual Cone, Visual Field, Visual Pyramid.	
Base of Picture (Base Line) Linear Perspective	**Synonym for Ground Line (preferred term).** Synonyms: baseline, ground line, picture line (1), base of picture. Intersection line in which the picture plane and the ground plane meet. Since this baseline is at the same time a perspective line and a geometrical one, we can use it as a scale for measuring a given length thereon.	
Base Perspective Linear Perspective	Refers to any perspective method/system that employs a perspective framework, such as a metric grid, and said structure operates (for example) as a ground plane register that enables fixing and indexing of object position within the depicted space (on said ground plane). See: central perspective, linear perspective, metric grid, perspective framework.	
Basement Perspective Linear Perspective Parallel Perspective	**Synonym: Auxiliary Perspective Plan** The basement perspective is sometimes used to avoid inaccuracies caused by the intersection of lines forming small angles. Since such intersections are often difficult to determine, the perspective is constructed from the usual orthographic plan, and an auxiliary perspective plan is placed below the perspective view. Reference book: Step by Step Perspective Drawing by Claudius Coulin, page 74. See: Linear Perspective, orthographic perspective, plan view.	
Basic Images	May refer to front-elevation, side-elevation, and plan projections of a parallel primary or multi-view perspective, or the methods/outcomes of descriptive geometry.	
Basic Perspective	Front, central or linear perspective that employs 1-2-3-point perspective.	
Beam	A broad collection of light rays is called a beam, whereby the beam can be comprised of parallel rays, converging rays, or diverging rays.	
Bearing Direction	A bearing is a direction given as a compass direction, an angle, and an east or west designation. Bearings are used in navigation and can be calculated using a compass or map.	
Bearing of a Slope **Aspect of Slope**	The bearing of a slope, often referred to as the aspect of a slope in navigation and geography, is the compass direction towards which a slope faces. It represents the horizontal direction of the fastest downhill gradient, measured in degrees clockwise from North.	
Behaim, Martin Cartography	Martin Behaim's globe of 1492 reflects the European view of the world before the discovery of America. The globe is a primary source for historical research, and shows the geographical knowledge of the time.	
Bellini, Giovanni Artist	Giovanni Bellini (c. 1430 – 1516) was a pivotal Italian Renaissance painter who transformed Venetian art with his sensuous colour and rich oil techniques, significantly influencing the Venetian school.	
Benham's Top Illusion	Benham's disk is a colour illusion observed with rapidly changing black-and-white patterns, showing pale colours when spun. The effect is also visible with stroboscopic lights and rotating fan blades, where coolers appear and vanish as speed changes. This effect is seen in stroboscopic lights when flashes are set at certain critical speeds. Rotating fan blades sometimes demonstrate the effect; as the fan accelerates or decelerates, colours appear, change, and disappear.	
Berners-Lee, Tim World Wide Web	Sir Tim Berners-Lee, the inventor of the World Wide Web, advocates for a more accessible, affordable, and democratic internet to facilitate the free flow of information.	
Beta Movement Illusion	Beta movement is a perceptual illusion described by Max Wertheimer in 1912, in which the brain combines two or more still images into perceived motion. The illusion of motion caused by animation and film is sometimes believed to rely on beta movement, an alternative to the older explanation, persistence of vision. However, the human visual system can't distinguish between the short-range apparent motion of film and real motion, whereas the long-range apparent motion of beta movement is recognised as distinct and processed differently.	
Bezold Effect Illusion	The von Bezold effect, named after Wilhelm von Bezold, is an optical illusion where a colour appears different based on adjacent colours, influenced by small interspersed areas. This assimilation effect is akin to spatial colour mixing, while large adjacent colour areas create contrast.	

TERM	DEFINITION
Bi-Lateral Perspective (Parallel and Tri-Lateral Perspective of Cubes)	Refers to a type of natural or artificial or perspective image in which the three cardinal directions exemplified within the object are viewed from such an angle that they present equal area aspects; said object may be viewed or represented with or without perspective recession (e.g. using parallel or linear perspective). See: Cube in perspective, parallel and TriLateral Projection of Cube.
Bibliography of Perspective 15,000 Perspective Titles Kim H. Veltman L. Vagnetti	The standard world bibliography of perspective; being part of Kim Veltman's monograph on perspective: "*The Encyclopedia of Perspective*" also named: '*The Sources and Literature of Linear Perspective*' [c.1994-2021]. The bibliography lists 15,000 perspective titles from throughout time. The original bibliography project was over 50 years in the making, and involved whole teams of people (more than 30 working full-time in small groups at various times and in various institutions). It all started with the first comprehensive Bibliography of Perspective - by Vagnetti, L. (1979, 520 pages). The contents of this bibliography were passed to Kim Veltman in 1980, and the list of items has been incorporated into the current bibliography. The original book title was: *De naturali et artificiali perspectiva: bibliografia ragionata delle fonti teoriche e delle ricerche di storia della prospettiva: contributo alla formazione della conoscenza di un'idea razionale, nei suoi sviluppi da Euclide a Gaspard Monge (Studi e documenti di Architettura, 9-10)*. By August 1986, the bibliography was based on the lists of 125 libraries. In addition, books and manuscripts had been consulted in 34 libraries, particularly Göttingen, Leiden, London, Madrid, Paris and Wolfenbüttel. During the intervening years, and finally in 2020, by Kim Veltman, the bibliography was updated with a large number of modern titles. Today, the Perspective Research Centre is managing the project and adding new titles as they are published.
Bifocal Construction (1, 2) Linear Perspective Bifocal Method	1. **Bifocal linear perspective construction (see bifocal method)** 2. **Bifocal Perspective** Refers to an artificial perspective graphical construction or image that contains two separately constructed images being either: • Separate images are depicted as taken from a different vantage point(s). • Separate images are depicted at different degrees of optical magnification or zoom (as if taken with separate camera lenses of different focal lengths). See also: artificial perspective, graphical perspective, multi-view perspective, magnification, zoom.
Bifocal Linear Perspective Artistic Technique 'False' Perspective Non-Scientific Perspective One / Two-Point Perspective Linear and Graphical Perspective	**Bifocal linear perspective construction** Bifocal linear perspective, often referred to in art history as a form of "constructive" or early, somewhat inaccurate Renaissance perspective, differs from modern "true" one-point or "true" two-point perspective by using two, usually centred, "false" vanishing points for a single, generally flat, subject. This method, seen in works like Uccello's Nativity, often features a central, somewhat distorted, grid and two main vanishing points, often with a "horizontal" set of lines. **Key Aspects** • **Definition:** Bifocal perspective employs two, usually centred, vanishing points to create a three-dimensional effect, often with a "central grid" or a "horizontal" set of lines. • **Historical Context**: It was used during the early Renaissance as a way to create a 3-D effect. • **Usage:** Used to create a more "true-to-life" or "natural" perspective, especially in landscapes. • **Characteristics:** It often features a central, somewhat distorted, grid and two main vanishing points out to the left and right sides of the picture, each with a "horizontal" set of lines. • **Differences from Standard Perspectives:** Unlike one-point or two-point perspective, which are scientific and use a single central or twin 'unified' space vanishing points, employs 'false' unconnected vanishing points within a 'false', unscientific, optically unreal space. **Considerations** • **Distortion**: Bifocal perspective can produce a more "curved" or "fish-eye" effect compared to standard linear perspectives. • **Early Renaissance Technique:** It was a precursor to more refined methods.
Bifocal Method (A, B) Linear Perspective Distance Points Metric Grid Alberti	**A. Bifocal linear perspective construction** A method of perspective construction described by Alberti, in which lateral lines on the central convergence or front view, are identified by drawing lines from distance points to see where they cross the outer lines of converging parallels. The method does produce a somewhat convincing central linear perspective view of a metric grid, but it **does not have any basis in optical or geometric reality because the constructed laterals are not at the correct depth positions.** **B. Multi-View type (of forming a perspective view/image)** A perspective image/view that contains two separate images within the perspective image frame; whereupon said images represent two viewing directions or separate images projected along different sight lines (may be projected at different scales also).

TERM	DEFINITION	B
Bifocal Perspective Multi-view Perspective	A perspective image/view that contains two separate images within the perspective image frame; where said images represent two viewing directions or separate images projected along different sight lines (may be projected at different scales). One example in the real world are bifocal glasses, which allow focusing on near and far objects by looking through different regions of the eye lenses.	
Binocular Depth Perception Stereoscopic Perspective Binocular parallax Binocular vision Binoculars	Binocular depth perception enables depth judgment and distance evaluation using both eyes. Note that binocular depth is most effective at close range (< 1m), but also works over a longer 1-10 m range. **Working principles** • **Convergence**: Each eye sees an object from a slightly different angle. The eyes rotate inwards towards each other, more so for closer objects. • **Stereopsis**: The brain combines the two images from each eye to create a single, more complex image. This process is called stereopsis. See: Stereoscopic perspective, binocular fusion, binocular perspective, binocular parallax, binocular vision, binoculars.	
Binocular Fusion / Stereopsis Stereoscopic Perspective Binocular vision	Binocular fusion is the brain's process of merging visual input from both eyes into a single image, crucial for binocular vision. Binocular fusion can be broken down into two types: • **Motor fusion:** Refers to the fusional movements • **Sensory fusion:** The process of combining the two images from the retina into a single perception	
Binocular Parallax	Refers to depth perception arising from the different perspectives each eye has of a three-dimensional scene, called binocular parallax.	
Binocular Perspective	Visual perspective that employs two eyes (or imaging apertures) to form a stereoscopic image.	
Binocular Vision Binocular Perspective Stereoscopy Stereoscopic Perspective	Binocular vision is the ability to see with both eyes to create a single, three-dimensional image. It's a key part of human vision, allowing us to judge distance and depth. **Working principles** • Each eye sends a slightly different image of the world to the brain • The brain combines the images from each eye to create a single, clear image • This process allows us to see in 3-D and perceive depth It is important to note that human vision is inherently complex and involves many interrelated physiological and psychological mechanisms, where certain key visual processes, such as binocular vision/ perception, are not fully understood. See: binocular depth perception, binocular fusion.	
Binoculars Field Glasses Binocular Vision	Binoculars are two aligned refracting telescopes for binocular vision of distant objects. See: Stereoscopic perspective, binocular depth perception, binocular fusion, binocular perspective, binocular parallax, binocular vision, binoculars.	
Biocular	An optical device designed for use with both eyes viewing through a single exit pupil. The term may be distinguished from binocular in that biocular instruments contain elements that are common to both eyes. See: light, optics, visual and instrument perspective.	
Biograph	A biograph instrument is a PET/CT scanner that is used in oncology, cardiology, and neurology. It is used for diagnostics, radiation therapy planning, and research imaging	
Bioluminescence Natural Perspective	Bioluminescence is the emission of light during a chemiluminescence reaction by living organisms. Bioluminescence occurs in organisms ranging from marine vertebrates and invertebrates to some fungi, microorganisms, including bioluminescent bacteria, dinoflagellates, and terrestrial arthropods such as fireflies. The light is either bacteriogenic, produced by symbiotic bacteria such as those in the genus *Vibrio,* or autogenic, produced by the animals themselves.	
Bioptic Telescope	A bioptic telescope is a miniature telescope mounted inside a pair of glasses to help people with low vision see objects at a distance.	
Bioscope	An early generic name for a movie camera, and various specific models of movie projector.	
Biosphere System (Digital)	A digital biosphere is a computer/mathematical model that uses digital technologies to simulate and monitor the biosphere. It can help us to understand the biosphere, predict environmental changes, and develop solutions to mitigate climate change.	

TERM	DEFINITION
Bird's Eye Perspective (A) Aerial Views Aerial Perspective Aerial Pyramid Graphical Perspective Photographic Perspective	Any image that is taken from a high vantage point. In artworks, proposes the fiction of a point of view of the producer being positioned at a very great height above the surface of the Earth. Though it may have acquired a realistic connotation in the aeronautical era, it was elaborated more than a thousand years ago. It frequently produces the effect of flattening the Earth's curvature under oblique viewing (or in a moving image, at first showing a curved Earth at great altitude, which then flattens out on zooming in, or when producing views taken at lower altitude). At other times in sculpture, it will employ concave-convex 3-D undulations that represent perspective phenomena within the low reliefs. See: satellite perspective, curvilinear perspective, spherical perspective, sphere of revolution perspective, Google Earth.
Bird's Eye Perspective (B: 1, 2) - Drawing Usage	Bird's-eye or elevated perspective is of two kinds, [1] angular / perspectival and [2] parallel, and is used in drawing large extensive buildings, having spacious courts and promenades, as palaces, colleges, etc. The observer is supposed to be on an eminence, and looking down as from a steeple or mountaintop position.
Bird's Eye Perspective (C) Fernande Saint-Martin	**Bird's-Eye Perspective is a Far Distance Perspective (Ref. Fernande Saint-Martin).** **Synonym for: Bird's Eye Perspective (A, B)** This perspective proposes the point of view of the producer being positioned at a great distance in height above the surface of the Earth. It frequently produces an effect of flattening the Earth's curvature under a direct or oblique vision. At other times, it provides for simulations of reliefs or concave-convex undulations of the pictorial plane, which assimilate its syntax with that of low reliefs.
Bitmap Graphics / Raster Graphics Image Format ComputerDigital Perspective Camera - Digital Photographic Perspective Graphical Perspective Vector Graphics Zooming Perspective (1,2,3,4)	Bitmap graphics are digital images comprised of a grid of pixels, each with a colour value. They are also known as raster images. Often associated with pixelation - which is an often unintentional, blocky or grainy effect in digital images where individual pixels become visible, usually caused by enlarging a bitmap image beyond its resolution. **Principles** • Each pixel is assigned a colour value, such as red, green, and blue (RGB) • The number of pixels in an image is called the resolution • The number of colours that can be used is called the bit depth • When zoomed in, the pixels are stretched and made into larger blocks (ref. pixelation) **Applications** • Bitmap graphics are widely used in technology, computing, and digital visual media • They are easy to understand and work with, and are easily compressed **Editing** • Bitmap graphics can be edited by editing each individual pixel • Bitmap images can lose quality when resized **Software** • Bitmap images can be worked with using bitmap editing software, like Adobe Photoshop, GIMP, or Microsoft Paint **Additional concepts** • The more colours you use in a bitmapped graphic, the closer the picture will look to reality • Finding a suitable colour depth is often a process of trial and error See: CGI, artificial perspective, graphical perspective, New Media perspective, image, space, 3-D, scale/shape/size problem, vector graphics, bitmap graphics, shape (apparent).
Black Mirror Clause Glass Convex Mirror Perspective Mirror	A Claude glass (or black mirror) is a small, handheld mirror, sometimes slightly convex, with its surface tinted a dark colour. Bound up in a carrying case, Claude glasses were used by artists, travellers, and admirers of physical landscapes and landscape painting. Claude glasses reduce and simplify the colour and tonal range of scenes and scenery, giving them a painterly quality. The observer turned their back on the scene to view the framed scene through the tinted mirror, a type of pre-photographic lens that added a picturesque aesthetic and subtle gradation of tones. In terms of earlier history, black mirrors were made of polished obsidian glass (volcanic rock), and were first brought back by Hernando Cortés in 1530 after his conquest of Mexico. The Aztec priests used them to conjure visions and make prophecies of the future.
Blackbody Radiation	Blackbody radiation relates an object's temperature to the wavelength of the emitted electromagnetic radiation, while a black-body absorbs all incident radiation.

TERM	DEFINITION	B
Blended Perspective (1, 2) **<< NEW Term >>** Double Perspective False Perspective Ames Room Multi-Scene and Single-Scene Perspective Simulated and Synthetic Perspective	**1. Blended scene perspective (multi-scene transformed to single-scene)** Blended or multi-scene perspective is an image/view of a spatial scene that comprises two or more separate (and differently scaled/structured) spatial geometries; whereby the resultant scene appears to (falsely) consist of a homogenous or single-scale spatial geometry; however, in reality, two or more uniquely scaled/structured geometries have been combined (often seen as such from only a single viewpoint) to appear as a fully united and integrated spatial geometry. See also: double perspective, false perspective, perspective illusion. **2. Blended Image perspective (multi-view transformed to single-view)** Blended or multi-view perspective is when several images/views of a spatial scene are blended into a single image or view. See multi-view perspective, image processing, satellite perspective, photogrammetry, point clouds, 3-D perspective. See: Hidden Images: Games of Perception, Anamorphic Art, Illusion from the Renaissance to Present by Fred Leeman (1977).	
Blivet Illusion	An impossible trident, or devil's tuning fork, is an optical illusion depicting a figure with three cylindrical prongs that seemingly change into two rectangular prongs.	
Block Perspective	Type of modular perspective in which the spatial object/scene is comprised of right-angled blocks (real, depicted, or imaginary). See also: modular perspective, glide perspective, parallel perspective, descriptive geometry.	
Blocking Cinematography	Blocking in cinematography involves determining scene composition, including actor/object positioning and camera placement, for effective editing.	
Blooming (of Image from lens, camera, or optical system) Image Lens Camera Photographic Perspective	Blooming is an optical effect in which light from a bright source appears to bleed into surrounding objects in the image. It can appear as white or coloured streaks/rays, and/or brightness blobs. **Principle** • **Imperfect lenses:** Even a perfectly corrected lens (with low aberrations) will have imperfections that become visible under intense illumination. • **Saturation:** When a pixel in an image is overfilled with light or becomes overwhelmed. • **Output stage saturation** occurs when many pixels in an image are saturated. **Outcome** • Blooming makes a scene look magical or dreamlike. • Creates a diffuse glow around light sources, bright areas, and high-contrast edges. • Simulates brightness effects on the human eye and high exposure levels on camera lenses. **Applications** • Blooming can be used as an image effect in post-production software programs. • It can be used to reproduce the imaging artefacts of real-world camera lenses, thereby making CGI imagery look more realistic.	
Blu-Ray Disc	A Blu-ray Disc (BD) is a high-capacity optical medium for HD video and data, using a blue-violet laser for precise recording and superior quality, including 4K UHD.	
Blue Perspective	Term used by Leonardo da Vinci for Aerial / Atmospheric Perspective. See: Azure Law, Aerial / Atmospheric Perspective, Prospettiva Aerea.	
Blue Screen Cinema Perspective	Movie filming technique in which actors and scene elements are shot in front of a blue background. Post-production digital movie production special effects (SFX) technique. See also: green screen, volume display, special effects, virtual production, LED volume display.	
Blue Spill / Light Spill	When an extremely bright field of background light is surrounded by very dark forms, or when an extremely bright object is surrounded by a dark background, then the light spills over into the edges of the boundary between said regions (or appears to). The result is that Forms have edges that are surrounded by a narrow colour 'blur; or ' spill'. The colour of the light spill or blur matches the colour of the light source, so a blue sky background will spill blue light, and a warm or reddish building will spill warm or reddish light.	
Blur (optical aberrations and)	See: aberrations (optical), blur-spot.	
Blur Perspective	A type of visual effect whereby fast-moving objects that traverse the image plane and whose visual structure or form is 'blurred' or becomes temporally smeared across more than one detector element. The result is the distortion of spatial form, typically so that the outline or edges of an image are de-resolved or difficult to distinguish from background features. Also linked to human vision and the tendency for a fast-moving object to be perceived in a blur!	

TERM	DEFINITION
Body-coordinate system Human Body	We can establish a human body reference frame, with features as follows: • **The mid-body or Z-axis** is the vertical axis that passes through the centre of gravity of the body/ head/eyeball when in a normal upright position (relative to a flat ground plane at 90 degrees). • **Plane A (Yaw)**: The median or mid-sagittal plane is the plane of bilateral body symmetry containing the mid-body axis. • **Plane B (Pitch):** The mid-frontal or coronal plane is a vertical plane at right angles to the median plane, and containing the mid-body axis. • **Plane C (Roll):** The mid-transverse plane is the plane at right angles to the frontal and median planes passing through the centre of gravity. Any apparent spatial position/direction can be identified relative to the above reference frame. See also: visual coordinate system, visual perspective, visual perception.
Bodyscapes	Visualisation method of showing the outside and inside of human body simultaneously and from multiple angles and possibly multiple and/or changing scales and points of view. See: Leonardo da Vinci and the transparency principle plus multi-angular perspective, CGI, computer modelling, virtual reality, medical imaging.
Bombsight Instrument Perspective Natural / Visual Perspective (2)	A bombsight is a military device that ensures accurate bomb drops by estimating the bomb's trajectory, influenced by gravity and air drag. Early models used iron sights, evolving to include airspeed and altitude adjustments. The introduction of vector bombsights allowed for wind corrections, and the integration of mechanical computers and radar during World War II further improved accuracy. Today, modern aircraft use computerised systems that combine bombing, gunnery, missile fire, and navigation.
Bonne's Projection Maps Cartography	Bonne's projection is a cartographic map projection that uses a pseudoconic shape to represent the Earth. It's an equal-area projection, meaning it preserves the area of regions on the map. **Principles of operation** • The central meridian is a straight line. • The other meridians are curved and concave towards the central meridian. • The parallels of latitude are concentric circles that are concave towards the pole closest to the standard parallel. • The projection's outline resembles a heart.
BOOM (Binocular Omni Oriented Monitor) Instrument Perspective New Media Perspective Multiverse Simulated, Combined, Mixed, Perspective Blended Scene Perspective	A Binocular Omni-Orientation Monitor (BOOM) is a virtual reality (VR) device that allows users to view a virtual environment through two eye holes. The user moves the device around with their eyes, keeping track of its orientation. Note that a BOOM VR/AR system is an example of a live multiverse perspective in which a digital universe is overlaid on the physical universe. **Principles of operation** • Consists of a small box with two CRT or LCD monitors • The box is attached to a counterbalanced arm system • The user looks into BOOM like binoculars • A tracking system measures the user's orientation and position • System presents images based on the user's orientation and position (in the real world) **Applications** • Archaeological exploration: BOOMs can be used to explore archaeological sites, especially underwater sites that are difficult to access • Architectural walkthroughs: BOOMs can be used to view 3-D designs of buildings • Scientific visualisation: BOOMs can be used to visualise scientific data • Games: BOOMs can be used to play games See: Virtual Reality, Artificial Reality, Mixed Reality, Extended Reality, 3-D (Artificial), 3-D Display: Design (1), 3-D Display: Views (3), 3-D Perspective: 4A: binocular vision, Virtual Reality headset, multiverse, multiverse perspective.
Bosse, Abraham Artist Theorist Perspectivist	Abraham Bosse (1604–1676) was a French artist and theorist who was a leading figure in the development of perspective during the Baroque period. He was a strong advocate of the perspectival techniques of Girard Desargues, a mathematician. **Treatise** • **Traité des Pratiques Geometrales et Perspectives (1665):** A treatise on perspective and mechanical drawing that was taught at the Royal Academy of Painting and Sculpture. • **Moyen universel de pratiquer la perspective sur les tableaux ou surfaces irrégulières (1653:** A treatise on how to reproduce perspective on irregular surfaces, such as architectural walls. **Drawings** • **Les Perspecteurs:** (1648) Drawings that illustrate Desargues's perspective science. • **The Ages of Man**: (1636) An engraving that is part of Bosse's printmaking work. • **The Marriage of Ladislas IV:** (1645) An engraving that is part of Bosse's printmaking work.

TERM	DEFINITION	B
Bottom Side View Bottom Profile View	Any type of perspective image/view in which a spatial object or scene is viewed or depicted from an underneath perspective, whilst also presenting a side instead of a front aspect toward the observer or camera: a bottom profile view.	
Bottom-Up Perspective	Any type of perspective image/view in which a spatial object or scene is viewed or depicted from an underneath perspective, and in one form can be said to be the opposite (or turned upside down) version of a plan view.	
Box Method (Perspective Box Method) Cube in Perspective Box in Perspective Linear Perspective Graphical Perspective 1-2-3 Point Perspective	The perspective box method is a graphical technique that uses 3-D boxes in one-, two-, or three-point perspective with a horizon line and vanishing points to create depth, serving as a foundation for building complex objects and enhancing spatial understanding. **Concepts** • **Horizon Line or Horizon**: Represents eye level, where sky meets ground. • **Vanishing Point**: A point on the horizon line where parallel lines appear to converge. • **Converging Lines**: Edge lines drawn from the corners of boxes, into depth, converge to vanishing points, showing depth. • **Parallel Lines (one-point perspective)**: Lines that stay parallel to the edges of the paper (horizontal/vertical) or the front/back edges of the box/cube, do not converge in one-point perspective, and are used to close the box if viewed front-on. **One-Point Perspective (Box-cube Directly Faces You)** 1. Draw a horizon line and a single vanishing point (VP) on it. 2. Draw a square or rectangle (the front face) on the paper (at any point in the horizontal / vertical dimension). 3. From the corners of the shape, draw light converging lines back to the VP. 4. Draw parallel lines (horizontal/vertical) to create the back edges of the box, stopping where they meet the converging lines. 5. Erase excess converging lines (lying outside box) and the horizon line if inside the box. **Two-Point Perspective (Box-cube at an Angle - in lateral plane)** 1. Draw a horizon line with two vanishing points (VP1, VP2) on it, one on each side. 2. Draw a vertical line for the nearest corner of the box. 3. From the top and bottom of this line, draw converging lines to both VPs. 4. Draw two more vertical lines parallel to the first to define the sides, stopping where they intersect the converging lines. 5. Use converging lines to create the top or bottom plane, depending on if the box is above or below the horizon line. 6. Erase excess converging lines (lying outside box) and the horizon line if inside the box. **Applications** • **Builds Spatial Awareness**: Teaches how forms recede into space. • **Foundation for Complexity**: Boxes are basic shapes (like cubes) that can serve as construction guides for drawing everything from furniture to figures • **Improves Freehand Drawing**: Practice helps you "feel" perspective and estimate vanishing points. See: Central perspective, linear perspective, graphical perspective, one-point linear perspective, two-point linear perspective, three-point linear perspective, degradation of cube, horizon line, vanishing point, parallel line, orthogonal line.	
Braque, Georges Painter	Georges Braque (1882–1963) was a French painter and sculptor known for his contributions to Fauvism and Cubism.	
Breakthrough Process Graphical Perspective	A method of subdividing the drawing surface; and projecting onto the picture plane from a plan, side-elevation, and/or auxiliary view the perspective or apparent position/length/angle of a line. See: central and linear perspective, subdividing the drawing surface (in linear perspective), component point, component point method, measuring point method, perspective (methods). See book: Felix Konig: Perspective in Architectural Drawings (p. 22). Related to Component Points.	
Breusing's Projection Maps Cartography	Breusing's projection is a cartographic map projection that uses a geometric mean of the stereographic and Lambert azimuthal equal-area projections. It was developed to balance the errors between conformal and equal-area presentations. **Principles / Features** • **Meridians**: Straight lines that radiate from the central pole and intersect it • **Parallels**: Circles that are centred on the central pole and spaced as a geometric progression • **Poles**: The central pole is a point, and the opposite pole is infinitely distant • **Distortion**: Distortion is moderate throughout, with angular deformation near the equator and rapid increase beyond a hemisphere	

TERM	DEFINITION
Brunelleschi - Invention of Linear Perspective Artist, Architect First Linear Perspective Drawing / Painting Inventor / discoverer of linear perspective	Brunelleschi's first experiment or demonstration of linear perspective was described by his early biographer, Antonio Manetti, and it demonstrated a revolutionary understanding of how objects converge on a two-dimensional surface from a single point of view. The exact manufacturing and viewing procedure of the first perspective image are uncertain, but we know certain details. Brunelleschi produced a reverse (mirror) image in his first perspective experiment by painting a highly detailed observation of the Florence Cathedral (Duomo) Baptistery onto a wooden panel and then forcing viewers to see it via a reflection, rather than looking at the painting directly (so that the view and panel image were an exact match). It is debatable how he produced a mirror image; he could have painted on the panel whilst looking through a mirror (most likely), or first painted onto a glass or thin paper panel and then transferred the image to the wooden panel (by turning the image over and copying the reversed image). He proved his new method of linear perspective through the following steps: • **Fixed Vantage Point**: He stood at the entrance of the unfinished Florence Cathedral (Duomo) and painted the scene of the Baptistery in front of him on a small wooden panel. • **Creating the Mirror Image**: Brunelleschi painted a mirror-image (a reversed view) of the Baptistery on the panel, or, as some historians suggest, he used a direct observation technique that required a mirror to verify its accuracy. • **The Peepshow Method**: He made a small, tapered hole in the painting, exactly at the vanishing point—the exact spot where his lines of perspective converged. This viewpoint allows, by use of a mirror seen through the hole, for an observer's eye to apparently be located at the exact station point of the artist (directly opposite the central vanishing point). • **The Experiment**: He instructed an observer to stand in the doorway of the Duomo and look through the back of the panel (at the unpainted side) with one eye, looking through the hole at a mirror held in the other hand. • **The Verification**: The observer would see the reflection of the painted panel in the mirror. By lowering and raising the mirror, the observer could compare the painted mirror image with the actual building. The two matched perfectly, proving the accuracy of his perspective system. **Key Aspects of the Experiment** • **Polished Surface**: He used a polished, reflective silver surface for part of the panel, or a high-quality mirror to ensure the reflection was precise. • **Verification**: The purpose of the reversal was to verify that his painting perfectly matched the visual reality seen through a mirror (a common way to judge perspective accuracy). • V**anishing Point**: The hole was crucial for ensuring the viewer stood at the exact, single point of view (vanishing point) necessary for linear perspective to work.
Brunelleschi, Filippo Artist, Architect	Brunelleschi, the inventor of linear perspective (1412-1420), transformed Renaissance painting by systematically studying how objects appear from various angles. He utilised a grid to create accurate drawings, mathematically scaling objects to represent three-dimensions on a two-dimensional surface, resulting in precise linear perspective.
Brunelleschian Perspective	Another name for linear perspective, named after Filipino Brunelleschi.
Building Block Principle Graphical Perspective	Refers to constructing complex spatial scenes, or structures by assembling, analysing, or drawing basic, fundamental components like cubes or individual, smaller, more manageable parts. This approach enables the creation of complex, three-dimensional structures from simpler forms and promotes a methodical, step-by-step understanding, whether in art or development.
Byzantine Perspective	Byzantine perspective, also called inverse, inverted, divergent, reverse, or negative perspective, is a type of perspective drawing/painting in which the objects depicted are placed between the projective point and the viewing plane; whereby distant objects increase in apparent size at increasing distance.
Cabinet of Wonder Optica Perspective Box Peepshow Peepbox Raree Show	A peep show, or cabinet of wonder, is a wooden box exhibiting pictures or objects viewed through a small hole or magnifying glass. In the 17th and 18th centuries, itinerant showmen showcased these on European streets and fairs, competing with other entertainment. The cabinets often featured multiple viewing holes, images manipulated by strings, and were decorated to resemble theatrical scenes, sometimes accompanied by narration. In 17th-century Holland, peep shows gained popularity, with artists like Pieter Janssens Elinga and Samuel Dirksz van Hoogstraten creating "perspective boxes" that enhanced depth perception. By 1700, these boxes featured large bi-convex lenses for exaggerated perspectives, primarily depicting architectural and topographical subjects. See: Perspective boxpeepshow, Ames room, blended scene perspective, double perspective, perspective illusion.

TERM	DEFINITION	C
Cabinet of Wonder - Modern Versions AI Art Artificial Intelligence 3-D Illusion Diorama Shadow Box Apothecary Shop	A "cabinet of wonder" is an intimate, miniature exhibition viewed through a small hole or magnifying glass. Combining this traditional medium with Artificial Intelligence offers a way to create immersive, small-scale, and sometimes fantastical scenes that can be viewed privately. These projects emphasise the charm of small paintings and miniatures, creating a sense of wonder and intimacy. Modern versions focus on the surprise of viewing a tiny, contained world. **Modern versions of a Cabinet of Wonder** • **Miniature AI-Art Dioramas**: Use of AI image generators to create detailed, surreal, or historical scenes, which are then printed and assembled into a physical box, often creating a type of "shadow box" or "apothecary shop" effect. A shadow box is a deep-set enclosed display case used to showcase three-dimensional objects, art, or memorabilia. • **Physical-Digital Hybrid:** Use of a physical box structure, such as a wooden cabinet or a modified cereal box, with an AI-generated scene inside, sometimes illuminated by small LED lights to create a "wonder" effect.	
Cabinet Perspective Drawing Graphical / Parallel Perspective	In this perspective class, one face of the object is parallel to the viewing plane, with the third axis angled at approximately 63.4°. Unlike cavalier projection, cabinet projection reduces the length of the receding lines by half. Synonyms: parallel, oblique perspective (related to cavalier and military).	
CAD Drawing CGI Computer Modelling Wireframe Perspective	Computer-Aided-Drawing (CAD) perspective refers to a wide-ranging and sophisticated set of New Media methods for producing a variety of perspective images of real and imaginary objects in the process of being designed. Typically, the methods of technical drawing or plan/elevation and parallel perspective views are employed within the digital system, and views can be rapidly and automatically produced on a computer monitor. Alternatively, linear perspective images (e.g., multi-view or multi-vanishing point images) can be produced of the represented object/scene, etc.	
Cafe Wall Illusion	The café wall illusion is a geometric-optical distortion where parallel straight lines (named mortar) appear tilted or sloped due to alternating offset dark/light tiles. The illusion is created because the contrasting dark/light tiles create local brightness differences in the mortar. The brain interprets these differences in a way that makes the parallel lines seem diagonal.	
Cage (Cube and Global)	A perspective method consisting of an imaginary cube centred around the observer, with its square faces divided into many smaller squares and four of its six vanishing points sitting on the horizon. This provides a stable framework for expanding the narrow perceptual window of linear perspective into the curvilinear and spherical perspective world views.	
Calculator (Aerial Navigation)	A special type of aviation calculator to aid in airplane navigation, which calculates the necessary heading and airspeed to arrive at the required destination at a certain time and with allowable fuel allowance, etc. May take into account a range of factors, including: wind speed, wind direction, true air speed, wind correction angle, heading, ground speed, distance, flight time, fuel rate, required fuel, air density, altitude, air temperature, indicated speed, true speed, etc.	
Calculator (Astronomical) Natural Perspective Seasons Astronomy	Refers to one of several kinds of astronomy calculator used for simplifying and automating complex astronomy related calculations. One example are star charts that calculate a celestial objects position in the night sky. Factor's affecting star position include: • **Earth's rotation**: stars appear to cross field of view of telescope • **Earth's orbit around the sun**: background position of stars changes each night (slightly) • **Axial precession and nutation**: Earth's axis of rotation changes slowly over long period of time • **Aberration and parallax**: Effects of the Earth's orbit around the sun • **Proper motion**: motion of the individual stars	
Calculator (Course Distance) [1, 2, 3] Maps Distance Navigation Land Nautical Aviation	Refers to one of several different kinds of navigation calculations for navigating. Types of calculator: 1. **2-D distance calculator**: straight line distance between two points on 2-D plane. 2. **3-D distance calculator**: straight line distance between two points in 3-D space. 3. **Latitude / longitude calculato**r: shortest distance (great circle /air distance) between two points on the Earth's surface. Note that the distance on a geographical map can sometimes be used to approximately calculate travelling distance by the 2-D method, if travelling in a perfectly straight line and without graduations or changes in elevation. However, this method only works for short distances because longer distances (thousands of miles/km) must take into account the Earth's curvature to produce accurate readings. Also, for nautical or aviation navigation problems, wind, air pressure and/or sea currents are other factors that must be modelled.	

TERM	DEFINITION
Callipers	Callipers measure an object's dimensions and often feature a sliding vernier scale for readings on a ruled scale, dial, or digital display.
Callipers (Gunner's)	A type of calliper used by military gunners to measure the diameter of cannon balls and the bore of cannons. They were a modified version of the sector instrument, and were used to determine the correct amount of powder to use for a cannon.
Camera (photographic process or first photograph) Film Camera Camera Obscura Photographic Perspective	The first commercially manufactured photographic camera, the daguerreotype, was created by Alphonse Giroux in 1839. Louis Daguerre discovered that latent images on a plate could be developed to visibility using mercury fumes, reducing exposure time to minutes. A hot salt solution fixed the image by removing excess silver iodide. On January 7, 1839, the daguerreotype process was announced at the French Academy of Science and dominated photography until the late 1850s. See book: The Origins of Photography by Helmut Gernshein (1982). See book: Magie Lumineuse: du theatre d'ombres a la lanterne maqique by Jac Remise, et al. See book: The Camera Obscura: A Chronacle by John H. Hammond (1981).
Camera - 180° Field of View	A 180° camera is a camera that covers an extremely wide field of view (FoV) and uses a fisheye lens (6mm - 25 mm focal length). This type of lens causes curvilinear or spherical distortions in the image; however, it allows the camera to capture a wide field of view.
Camera - 360° Field of View Spherical / Omnidirectional	A 360-degree, spherical, or omnidirectional camera can capture a 360-degree panorama. The images produced are named 'latitude-longitude' images, and can be used as environment maps or for capturing images to be projected as a dome texture light. Often used in photography, such cameras have a field of view that covers the entire sphere, or at least a full circle, in the horizontal plane. Omnidirectional cameras are important in applications that require a wide field of view, such as panoramic photography and robotics.
Camera - Cinema Cinema Perspective	A cinema camera captures moving images for projection or display, typically using mirrorless digital technology designed for video. Its definition varies by context.
Camera - Digital Photographic Perspective	A digital camera captures images in electronic memory, primarily replacing film cameras. It's found in smartphones and used by professionals for high-quality photography. Digital cameras focus light onto an image sensor using a lens and diaphragm, allowing immediate storage, editing, and display of images.
Camera - Film	A type of photographic camera that takes either single photographs one at a time, or else rapidly takes a sequence of photographs, which are recorded onto photographic film.
Camera - Stereo	A type of camera with two separate objective lenses mounted side-by-side, and with a separate image sensor or film frame for each lens. This enables the camera to simulate human binocular vision by capturing twin stereoscopic images, a process known as stereo photography. The photographs so produced often require a special stereoscopic viewer to allow each eye to view just one image (left or right), thereby enabling binocular or 3-D vision of the captured spatial object/scene.
Camera (Catadioptric)	A catadioptric camera or optical system is one where refraction and reflection are combined, usually with lenses (dioptrics) and curved mirrors (catoptrics). Catadioptric systems are used in optical telescopes, microscopes, and telephoto lenses, as well as in focusing systems such as searchlights, headlamps, and early lighthouse focusing systems.
Camera (mechanical perspective)	The camera is an instrument that mechanically produces perspective views. Rays of light pass through the camera lens and fall on the 2-D light-sensitive detector (photographic film or CCD detector), forming an image that represents the appearance of the spatial object/scene to anyone who views the image.
Camera Clara	An optical instrument similar to the camera obscura but without the need for a source of illumination.
Camera Lucida Drawing Aid	An optical device that aids artists and microscopists by projecting a superimposed image of the viewed object onto their drawing surface, enabling precise tracing.
Camera Motion Control Camera / Instrument Perspective	Motion control photography enables precise camera movement in still and motion photography, facilitating special effects. It often involves filming multiple elements with consistent camera motion for compositing. Key applications include working with miniatures and integrating them with full-scale elements. Modern technology allows programmed camera movements and records motions for CGI duplication.
Camera Obscura Magic Eye Pinhole Camera Camera Photography	Camera obscura is a natural phenomenon where light through a small hole projects an inverted image in a dark space. It also denotes a dark room or box used to project external scenes. Since the 16th century, lens-equipped versions have facilitated drawing and evolved into photographic cameras by the 19th century; a lensless variant is called a "pinhole image." See: camera (photographic process), camera (cinema), pinhole camera.

TERM	DEFINITION	C
Camera Obscura - First use in China Optics Pinhole Camera Camera Perspective Photography Instrument Perspective	The first recorded account of a camera obscura was by Chinese philosopher Mo-tzu in 400 BC. The camera obscura effect was described as how light through a pinhole creates an inverted image, calling it a "collecting-point." Scholars used this to study light behaviour and safely observe solar eclipses. Chinese findings predate Greek, Arabic, and European accounts by centuries, with scholars like Shen Kuo refining the concept of the "inverted image." **Historical Uses in China** • **4th Century BC**: Mozi noted how light through a pinhole forms an inverted image. • **Scientific Observation**: The Camera Obscura studied optics, showing light travels in straight lines. • **Solar Eclipses**: Used to safely observe solar eclipses. • **Ancient Astronomy**: Techniques in Zhoubi Suanjing tracked time via sunlight projection. Early Armillary Spheres, models of celestial objects, were also developed in Ancient China. The compass, invented during the Han Dynasty, was initially used for geomancy and fortune-telling, called the "south-governor" or "South Pointing Fish (sīnán 司南).	
Camera Ottica	A synonym for a camera obscura.	
Camera Perspective Perspective image capture or picture taking method.	Perspective image produced by taking an individual 'snapshot' image, or else a rapid series of snapshots (a moving image), using a camera (photographic or digital). An important fact is that (due to the speed of frame integration), the camera captures each snapshot image to be taken from a fixed station or viewpoint and a fixed angle of view; being equivalent (in a basic sense) to the use of a fixed window perspective technique, which also fixes the station point and angle of view. The results of camera and window perspective (method) are often (close to) identical in terms of the geometrical form of the image produced, and over a relatively narrow field of view (i.e., formation of vanishing points, horizon line, etc). Many different classes and types of cameras are known, and each form uses a particular lens design, image format, etc., along with optical features that create a perspective image with a particular set of attributes.	
Camera Point Eye Eye Point Viewpoint	The terms eye, eye point, centre-of-perspective, centre-of-projection, centre-of-vision, and camera point are all synonymous with viewpoint (visual / artificial perspective). See: eye, viewpoint, visual perspective (retinal), artificial perspective, natural perspective, central/linear perspective, geometry of vision, visual orientation.	
Cameron, James Filmmaker 3-D Movies	James Cameron (1954-) is a Canadian filmmaker known for innovative technologies in filmmaking, including 3-D techniques. Additionally, he is a National Geographic explorer who produced documentaries on deep-ocean exploration and contributed to underwater filming technologies.	
Camouflage Perspective Illusion Synthetic Perspective	Refers to a class of synthetic perspective whereby (for example) a naval ship is painted with odd patterns to disguise, or hide its presence, from enemy planes. Also tanks can sometimes be painted with false green foliage patterns for the same purpose. See: natural perspective, artificial perspective, synthetic perspective, simulated perspective, perspective illusion, false and forced perspective, accelerated perspective, decelerated perspective, blended and overlaid /combined perspective.	
Canaletto Artist Camera Obscura Pre-Photography	Canaletto is regarded as a master of linear perspective. Analysis of nine paintings reveals his precise use of perspective lines and vanishing points. Accurate reconstruction from observation is difficult due to irregular shapes in scenes like the Piazza, suggesting he likely used tools such as projection mirrors or lenses to achieve precise perspective.	
Cancelling Perspective **<< NEW / REFINED Term >>** Visual Perspective	The human visual system is adept at recognising perspective phenomena such as diminution of size perspective, converging parallels, aspect perspective, foreshortening, etc. However, the physiological and psychological opposite is also true: the human visual perceptual system is adept at removing and cancelling perspective phenomena to 'see' spatial objects/scenes as true figures. For example, even though we see the size of objects as diminishing with distance, we also 'see' these same objects as unchanging forms of a specific/fixed size. Also, we 'see' apparently converging sets of parallel lines as truly parallel lines, for example.	
Candle (1, 2)	**1. Light source:** A candle is an ignitable wick embedded in wax, or another flammable solid substance such as tallow, that provides light. **2. Light intensity measure:** A common candle emits light with roughly 1 cd luminous intensity.	
Cangiante Perspective	In Renaissance art, refers to colour mixing to lighten/darken a colour to represent perspective phenomena with a high degree of realism.	
Canon (Noon and Mechanical Dial)	A sundial cannon, or noon gun, is a device that fires a cannon at noon using an overhanging lens to focus sunlight.	

TERM	DEFINITION
Capriccios Architectural Perspective	In painting, a capriccio is an architectural fantasy, combining buildings, archaeological ruins, and other architectural elements in fictional, often fantastical combinations. These paintings may also include staffage (human and animal figures, etc). Falls under the more general term of landscape painting. This painting style was introduced in the Renaissance and continued into the Baroque.
Captured Perspective Image **<< NEW Term >>** Visual Perspective (2) Graphical Perspective Instrument / Photographic Perspective	**Optical perspective** is a process that produces visual images of a spatial reality; and we have two basic classes of perspective image (or perspective directions); namely: • **Captured perspective Image:** formation of an image or representation 'backwards' from a spatial reality. • **Projected perspective Image/beam:** sending images 'forwards' into a physical reality, or projecting light-pencils/shadows onto physical objects (2-D or 3-D). A *captured perspective image* refers to the formation of 'optical' images 'backwards' from a spatial reality onto an image or picture plane, or that result from the generation of a perspective representation of the visual appearance of a spatial object/scene (ref. viewpoint geometries). Captured perspective images include perspective drawings, paintings, computer graphics, and images formed by optical instruments such as eyes, lenses, cameras, telescopes, etc.
Cardinal Lines Land Surveying Perspective Field Cartographic Field Spatial Zones Photographic / Surveying Perspective	**Cardinal Lines: Land Surveying Method(s)** Within a perspective construction, it is sometimes found convenient to divide both the perspective and the cartographic fields into 4 spatial zones, divided by lines called cardinal lines. The zones in the cartographic field and photographic field are equal, each to each, and the intervals between the cardinal lines constitute a series of magnitudes in geometrical progression. Relates to photographic/surveying perspective. See book: Generalised Linear Perspective by J.W. Gordon (1922). See: CartographicPerspective Field.
Cardinal Points	Cardinal points refer to the 4 cardinal directions of north, south, west, and east relative to either the object, person, or scene in question, whereby for an object placed in a spatial environment, or the scene itself, these points are components of the full 360-degree circle and thus are 90 degrees apart.
Cardinal Points of Optical System Lens Camera Telescope	Cardinal points in an optical system are reference points on the optical axis that define imaging properties. They include two focal points, two principal points, and two nodal points. In ideal systems, image size, location, and orientation depend solely on these points; specifically, only the two focal points and either the principal or nodal points are needed. While only a plane mirror is an ideal system, cardinal points help approximate real optical systems. See: cartesian coordinates, cartesian perspective, space, 3-D perspective.
Caricature / Cartoon Perspective	Refers to the use of cartoon perspective elements, or cartoon representation 'style', in the drawing/painting of (for example) a human being's (sometimes) exaggerated facial features or anatomical form.
Carpenter's Perspective	Carpenter's perspective or millwork drafting involves creating detailed plans or technical drawings similar to engineering drawing, descriptive geometry, or parallel methods.
Cart Parallelogram Meatique	Synonym for **parallelogram perspective** as employed in art & perception (Illusions), and also as employed in object shape/form recovery and shape comprehension in human and computer vision. See: Parallelogram perspective, degradation of form perspective.
Carter, B. A. R.	B.A.R. Carter (1909–2006) was a British painter and professor of perspective at the Royal Academy Schools from 1975–1983. His work on perspective was published in academic journals and contributed to the Oxford Companion to Art.
Cartesian Coordinates	A 3-D space system consists of three perpendicular lines (axes) through a common origin, defining orientation and a uniform unit of length. See: cartesian coordinates, cartesian perspective, cardinal points.
Cartesian Perspective	Relates to the six cartesian spatial directions, being the four corners of horizontal space of a compass (North, South, West, East); plus the two vertical dimensions (Up, Down); whereby all primary directions are arranged at right angles to one another; and thus a type of rectangular visual or geometrical 'box' is created within which any object or direction can be assigned. See: cartesian coordinates, cardinal points.
Carto-Photo Field Photographic / Surveying Perspective	**Carto-Photo Field: Land Surveying Method(s)** A plane in which the cartographic and perspective (photographic) fields are coordinated with each other. Relates to photographic/surveying perspective. See book: Generalised Linear Perspective by J.W. Gordon (1922. See: cardinal fieldpoints.

TERM	DEFINITION	C
Cartographic Field Photographic / Surveying Perspective	**Cartographic Field: Land Surveying Method(s).** Synonym for physical, geometric, or object space. The Cartographic Field cardinal lines are: 1) The margin, or the theoretical limit of the foreground. 2) The airfoot lying on the horizontal plan vertically in line with the point of sight, the nadir and the zenith. 3) The parameter parallel. 4) The prime parallel into which the prime parallel of the perspective field projects. 5) The Horizon being a line located at infinity. Relates to photographic/surveying perspective. See book: Generalised Linear Perspective by J.W. Gordon (1922). See: cardinal field points.	
Cartographic Perspective Projections	Mapping projection of the spherical Earth's surface onto a flat picture plane (typically). Sometimes projections are made onto other picture forms/shapes. A cartographic projection is any mathematical transformation employed to represent the curved/spherical two-dimensional surface of a globe (normally the approximated spherical Earth) on a plane. There are many types of cartographic projection, including: Clark, James, La Hire, Lambert, Mercator, Rojas, etc.	
Cartography Map-Making Terrestrial Globe Earth Stereographic Projection GIS, GPS Satellite Perspective	Study and practice of making, processing, and using maps. **Processes** • Select data for a map • Decide what to include and exclude • Present information in useful and understandable ways • Geographical information systems (GIS) and digital mapping techniques **Applications** • Maps are used for navigation, politics, geography, archeology, etc. • Maps can help with large-scale industrial development **Science / Technologies / Concepts** • **Science**: Geodesy, surveying, and aerial photogrammetry • **Technology**: Satellite imagery and GPS • **Concepts**: Scale, projection, and symbolisation Related fields/technologies: Geographic information systems (GIS), Geomatics, GPS.	
Cassini's Projection Maps Cartography	A map projection introduced by César-François Cassini de Thury in 1745, it is a transverse version of the equirectangular projection. While based on a spherical Earth, it can be adapted for ellipsoidal models, complicating its math but remaining useful for surveying. It has largely been replaced by the transverse Mercator projection.	
Categorical Ambiguity (of perspective) **<< NEW Term >>**	Sometimes a perspective type appears to be both a category and form at the same time. But why is this so? The answer is that (for example) linear perspective is a name that applies to both a perspective category (a method/process) and a perspective geometric image form (image geometry) simultaneously. This may seem a little confusing, but if we consider that optical perspective is defined as an image-making process, then it becomes clear that we can refer either to the process and/or outcome(s) as required.	
Categorical Chaining **<< NEW Term >>**	A perspective category refers to a specific class of perspective system, with a corresponding set of optical, mathematical, graphical, instrument/illusive, or new-media processes. Oftentimes, more than one category is involved simultaneously to produce a perspective view/image; this is called category chaining, such as when we use a camera (instrument perspective) to photograph a natural scene (natural perspective), which is then viewed by a human (visual perspective of a second type).	
Category Overloading **<< NEW Term >>**	Sometimes the same perspective subclass can appear under multiple top-level categories; named as category overloading; for example, when we have a linear perspective drawing which seems to be equally a graphical and mathematical process simultaneously.	
Cathetus Imaginary Mirror Line into Virtual or Mirror Space. Image Reflection in Plane Mirror. Mirror Perspective	A term originally used in medieval refractive and also mirror optics. For example, the Cathetus reflection is a rule in optics that describes how to locate the image of an object that is reflected on a surface. The rule states that the image is located at the point where the cathetus line intersects the extended visual ray from the eye. **Principle** • The **cathetus line** is a perpendicular line that passes through the object and the reflecting surface. • The visual ray is the ray of light that enters the eye from the object. • The **cathetus rule** is used to determine the location of images in plane reflection and refraction. • The **cathetus rule** was used by Claudius Ptolemy in his work Optics to explain visual perception in concave spherical mirrors.	

TERM	DEFINITION
Catholicum (literal perspective)	Refers to adopting a universal 'Catholic' viewpoint on any mental/physical/spiritual circumstance, and/or pertaining to all kinds of people and their range of tastes and proclivities.
Catodioptrics Light Refraction Reflection Catadioptric	Catodioptric refers to an optical system that is comprised of, or involves, both the reflection and refraction of light. Ergo, it often refers to an optical system that uses both lenses and mirrors. Catodioptric systems are often used in telescopes, which are also known as compound telescopes. Catodioptric telescopes produce images of very distant objects, combining the large aperture (or high light-gathering power) of a mirror with the fine detailed imaging performance of lenses. **Explanation** • **Catoptric**: Refers to an optical system that uses curved mirrors • **Dioptric**: Refers to an optical system that uses lenses
Catoptric Cistula Instrument Perspective	A catoptric cistula, catoptric theatre or chest, is a box with sides lined with mirrors, in order to magnify, deform, or multiply images of any object placed inside the box. Catoptric chests were developed in Ancient Rome and featured detailed scenes, including expansive libraries, forests, and cities. Another type of catoptric cistula involved placing an animal, such as a cat, inside, and watching it interact with numerous other cat reflections (of itself) that appeared to surround it.
Catoptric Perspective [A]	The representation of objects as seen by reflection on polished planes, as steel, water, mirrors, etc. See: mirror perspective, mirror image, reflection.
Catoptric Perspective [B (1, 2)] Image Distortion Anamorphic Perspective	**1: Distorted Images** Catoptric perspective (distorted type) is a type of anamorphic perspective that uses mirrors to create distorted images that can be viewed from odd, singular, narrow, or sometimes a wide range of viewing angles. **2: Undistorted Images** Catoptric perspective (undistorted type) is a type of anamorphic perspective that uses mirrors to create accurate, undistorted images that can be viewed from standard viewing angles. See: mirror, anamorphic perspective, perspective illusion, distorted perspective, natural perspective, visual (retinal) perspective, artificial perspective, synthetic perspective.
Caustics Natural Perspective	Complex, concentrated light patterns formed when light rays are reflected or refracted by curved, irregular surfaces, such as sunlight filtering through water or shining on a drinking glass. They are caused by light focusing, creating intense, cusp-shaped patterns. They represent the "envelope" of light rays—a boundary curve or surface where light intensity converges, often creating bright, sharp lines or cusp singularities. **Visual Caustics Types** • **Cata-caustics:** From reflection (e.g., inside a coffee mug). • **Dia-caustics:** From refraction (e.g., through a glass sphere).
Cavalier Perspective (A) Drawing Parallel Projection Dimetric Projection	Cavalier perspective features one face of the object parallel to the viewing plane, with the third axis at an angle of ~63.4°. It is a dimetric projection, distinct from military perspective, which can be dimetric or trimetric, using three coordinates: x, y, and z. Related to parallel, oblique perspective (plus other types of cabinet and military perspective). See: parallel perspective projection, oblique perspective, cavalier projection, technical drawing.
Cavalier Perspective (B) Middle Distance Perspective	**Cavalier Perspective is an Intermediary or Middle Distance Perspective (Ref. Fernande Saint-Martin).** Often used in the pictorial organisation of still-life and particularly developed in the work of Cezanne and the cubists since the beginning of the 20th century, this perspective presents a relatively close view of the object, seen from above in angular fashion. Synonym for: Cavalier Perspective (A) [or a non-technical form of this type of parallel projection]. See: Semiology of perspective, work of Fernande Saint-Martin.
Cavalier Projection Drawing Parallel Projection Dimetric Projection Graphical Perspective	**Cavalier projection** (an oblique drawing type) and **Cavalier perspective** refer to the same thing in technical drawing: representing a 3-D object on 2-D paper where one face is parallel to the viewer, but the depth (receding) lines are drawn at a 45° angle and, crucially, are drawn at full scale (1:1), making the object look deep but potentially elongated; this contrasts with Cabinet projection, a similar oblique type, which halves the depth's scale for a more realistic, less distorted look, while perspective drawing (for example linear type) uses vanishing points, making parallel lines converge, unlike with parallel projection methods. See: parallel perspective, oblique parallel projection, oblique perspective, descriptive geometry, cavalier, cabinet and military projection/perspective, technical drawing.
Ceiling Perspective	Any perspective image/view taken from the top outermost region of a spatial vault or room.

TERM	DEFINITION	C
Celestial Globe Sun, Moon, Earth Seasons Astronomy Telescope Perspective Mathematical / Instrument Perspective	A celestial globe is a 3-D, inverted, geocentric model of the night sky, featuring stars, constellations, and the ecliptic mapped onto a sphere with Earth at the centre. Unlike terrestrial globes, celestial globes depict the heavens as viewed from outside and are often used for teaching astronomy, navigation, and identifying celestial objects. Modern celestial globes often include illuminated features, digital or satellite data. Celestial globes depict the positions of stars, excluding the Sun, Moon, and planets. They often present a "handedness" issue; if the stars are positioned accurately, the constellations appear reversed due to the difference between the Earth-centered gnomonic projection and the outside-view orthographic projection. To counter this, some globes are made in mirror image form, while modern versions may be transparent, introducing distortions. Opaque globes can also place constellations correctly but may appear as mirror images from outside, often requiring the use of a mirror for accurate viewing. See: celestial sphere, natural perspective, visual perspective (retinal), mathematical perspective, graphical perspective, instrument perspective, perspective image, perspective model.	
Celestial Map Perspective	Refers to a spatial map of stars, planets, galaxies, etc., which are located or mapped with respect to their relative positions in the solar system, a galaxy or in universe as a whole.	
Celestial Perspective (1, 2) **<< NEW Term >>** Natural and Environmental Perspective Mathematical Perspective Astronomical Perspective / Projection Celestial Sphere, Globe Galaxy Perspective Perspective Axis Constellation Spherical Astronomy Perspective In Astronomy Seasonal Perspective Telescope Perspective Armillary Sphere Astrolabe Parallax (A) Planetarium Spherical Astronomy Star Atlas Latitude / Longitude Right Ascension / Declination Particle Perspective Linear Perspective Parallel Perspective Aspect Perspective (1 2) Depth Perception / Depth Cues	**1. Celestial Perspective: Visual / Optical / Technical Class (synonym: astronomical perspective)** "Celestial perspective" refers to the process and outcome of obtaining a view/image of the celestial sphere, which is an imaginary, vast, concentric sphere with an arbitrary or infinite radius centred on the Earth, upon which all celestial bodies (stars, planets, Sun, Moon) appear projected. It is a vital tool for positional astronomy and navigation, allowing astronomers to map the sky using a coordinate system similar to Earth's latitude and longitude. The celestial perspective concerns capturing views/images of objects or matter existing, and processes taking place, at astronomical distances in outer space; which has implications for the perception of the apparent and also implied object forms, distances, sizes, locations, angles, etc. In terms of perspective processes/outcomes involved, to begin, we must consider the class of perspective, whereby Astronomy is broadly divided into observational astronomy (using telescopes to gather data across electromagnetic spectrums like radio, optical, X-ray, and infrared) and theoretical astronomy (using models to understand celestial phenomena). We also have gravitational telescopes and particle detectors for astronomical observations. In terms of optical and visual perspective (2nd type), we note that celestial or astronomical perspectives have different kinds; from observations of seasons (seasonal perspective), to planetary motions, stellar distances (for example parallax (A)), shape/morphology of galaxies (galaxy perspective), etc. A key difference from Earth-bound perspective, is that astronomical objects - and especially stars are incredibly large and distant - and that A) the object (e.g. a star) may not be resolved sufficiently to measure size/distance directly, and B) the light rays emanating from such an object (e.g. a star) are effectively parallel and unresolved, one relative to anther, and C) stellar objects or stars are typically not related in structural terms - or at the same distance from Earth, and thus within each constellation the stars are at vastly different distances and so only apparently visually connected. Accordingly, typical convergence, as seen with linear perspective (size/distance law), may not be applicable in many cases. Unless the imaged stellar objects are at the same approximate (or relative) distance, the rules of degradation of form perspective will not apply; but sometimes they will apply, as with a true circular galaxy that appears elliptical when seen edge on (aspect foreshortening). See also: natural perspective, mathematical perspective, environmental perspective, astronomical perspective, astronomical projection, celestial sphere, celestial globe, celestial map perspective, galaxy perspective, perspective axis constellation, cartography, spherical astronomy, perspective in astronomy, seasonal perspective, telescope, telescope perspective, armillary sphere, astrolabe, planisphere, calculator (astronomical), compendium (astronomical), cosmolabe, ecliptic, meridian altitude, meridian circle, meridian ring, parallax (A), planetarium, planispheric astrolabe, quadrant, satellite perspective, sextant, spherical astronomy, star atlas / catalogue, torquetim, universal instrument, universal measuring device, frame of reference, right ascension, declination, cartesian coordinates, cartesian perspective, equirectangular plot, perspective axes, position (Euclidean space), Euclid, Euclidean grid, Euclidean space, object space, images space, target space, Non-Euclidean geometry, particle perspective, sphere (large and small circle), airy's projection, alignment line, linear perspective, parallel perspective, aspect perspective (1,2), depth perception, depth cues, space, space - curved. **2. Celestial Perspective: Symbolic / Literal Class** "Celestial perspective" refers to viewing life or situations from a higher, "heavenly" viewpoint, focusing on long-term, eternal, or spiritual truths over immediate, mundane concerns. It is used in religious contexts for spiritual clarity, in leadership to represent a broad, strategic vision, and in art to describe a cosmic, detached view of Earth.	

TERM	DEFINITION
Celestial Sphere Moon, stars, planets Astronomy Telescope Perspective Mathematical / Instrument Perspective	The celestial sphere is an imaginary sphere surrounding Earth used to model the sky's apparent motion, aiding astronomers and navigators in visualising celestial object positions. **Principles** • The celestial sphere is concentric with Earth and has an arbitrarily large radius. • The celestial sphere's rotation causes the stars to rise in the east and set in the west. • The celestial sphere's poles correspond to the Earth's poles, and the celestial equator corresponds to the Earth's equator. • The celestial sphere is the surface on which all objects in the sky are projected. **Applications** • Used to establish coordinate systems for marking the positions of celestial objects. • Used to model the apparent motion of the sky, which helps explain the seasons. See: Ecliptic, equinox, natural/environmental perspective, visual (retinal) perspective, mathematical perspective, graphical perspective.
Central / Principal Vanishing Point	See: vanishing point (primary / principal).
Central Axis Line (of perspective) Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Central Axis Line: Direction of Vision Projection** **Synonym for Line of Sight (preferred term)** A line traced along the central ray from eye (station point) to picture plane and beyond into object space. Relates to both visual perspective (2nd type) and a linear perspective construction. Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Central Axis of Vision Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Central Axis of Vision: Direction of Vision** **Synonym for Line of Sight (preferred term).** Relates to both visual perspective (2nd type) and a linear perspective construction. Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Central Convergence (A, B) Graphical Perspective	**A: Apparent converging nature of image space in relation to diminution of size perspective.** Reference to the way that spatial objects appear to reduce in size as their distance from the eye or station point increases. Relates to the cone of vision or the visual pyramid. **B: Apparent convergence of orthogonal lines towards a central vanishing point.** Reference to the central convergence of perspective recession towards a central vanishing point for sets of orthogonal lines, or in a front view of the same.
Central Convergent Perspective	Another name for artificial, graphical perspective or the centrallinear perspective. See: artificial perspective, graphical perspective, central perspective, linear perspective, curvilinear perspective.
Central Dilation Perspective (1, 2) Graphical Perspective	**1. Inverse / divergent perspective** Another name for inverse or divergent perspective, in which the object appears to increase in scale or size as depth increases. **2. Image central magnification distortion** An example of central magnification distortion is viewing an image of a scene through a glass ball; or as reflected from a mirror/metal ball.
Central Lighting (light source)	A primary, centrally located light source (such as a ceiling fixture) designed to provide general illumination for an entire room or space. A central lighting source is often a remote system powering multiple luminaires, commonly used in emergency lighting for reliability and maintenance ease, or in architectural designs to illuminate large areas. See book: Felix Konig: Perspective in Architectural Drawings.

TERM	DEFINITION	C
Central Perspective (1, 2) **<< NEW / REFINED Term >>** Frontal Projection Linear perspective Cylindrical Perspective Curvilinear Perspective	**1. Central Perspective: Frontal view class << standard definition >>** Central Perspective (also named front or frontal perspective) is any (geometrical) perspective image/view in which the spatial scene is viewed along a single optical line-of-sight (single cardinal direction) producing a 'visual pyramid', and projected onto a flat/curved picture plane that intersects said pyramid. The two main types of central perspective are: linear and curvilinear perspective. Central perspective is a general term for any perspective projection method in which the entire dimensional scene/object is viewed along a single visual optical line-of-sight producing a single 'cone of vision', normally being a scene projected onto a picture plane that is normal to the central axis or central ray coming from the centre of projection. Another name for this process is frontal projection. Typically the scene has one or more vanishing points towards which everything is related. Object foreshortening (1, 2) occurs towards said point (aspect and perspective of recession types). **2. Central Perspective: Synonym for Central Vanishing Point << non-standard definition >>** **<< Some people use the term in this way - but it seems false/incorrect! >>** Refers to a graphical perspective image exhibiting perspective recession, such as with a linear perspective image, and being one in which each set of parallel orthogonal lines converge towards a centrally located vanishing point that is located directly opposite a centrally located eye point.	
Central Perspective (3) Linear Perspective	Synonym for one-point perspective. But perhaps not a truly accurate term / name, considered in this specific sense, since any accurate perspective construction is central (including certain forms of cylindrical and curvilinear perspective [e.g. 4-point curvilinear form(s)], and because each individual view requires a single line of sight, or unique optical axis, and so is central in this sense. Even certain types of spherical perspective (glass sphere / reflecting sphere or globe aspect) may be produced using several conjoined individual 'snapshot' views, and each view may be considered a frontal or central view when considered alone. Relates to linear perspective construction. Synonyms: Front perspective, frontal perspective. See: central projection, front / frontal perspective, linear perspective, curvilinear perspective, etc.	
Central Perspective (4) - system of	To say that perspective (linear) is a central system does not mean that a vanishing point is located at the centre, but rather it is a device focused on the central ray, that is to say the ray which travels the smallest distance between the eye and the object to be represented.	
Central Perspective Grid Linear Perspective	Reference to a metric grid that stands perpendicular to the ground with the front side of the rectangular grid parallel to the picture plane. The front-elevation of the grid is presented without any perspective or aspect distortions. See: central and linear perspective, one-point perspective.	
Central Plane / Central Visual Plane Visual Perspective (2nd type) Linear Perspective	**Central Plane / Central Visual Plane or Vertical Sight Plane (preferred term)** A vertical plane passing through station point and central axis. The central plane is a vertical plane passing vertically through the eye of the observer (station point), aligned in the depth direction along the central axis of perspective, and cutting each of the other (transverse) planes at right angles. Relates to both visual perspective (2nd type) and a linear perspective construction. Synonyms: Central plane, central visual plane, visual plane, plane of sight, vertical plane, vertical sight plane	
Central Point (1, 2) Linear Perspective	**1: Central Point Linear Perspective** Refers to: Central point linear perspective, or one-point linear perspective; or the central vanishing point of the same method, being a drawing technique that creates the illusion of depth on a flat surface by having parallel lines (orthogonals) appear to converge (meet) at a single central or primary vanishing point. **Synonyms**: front perspective, frontal perspective. **2. Centre of Perspective or Point of Sight**: Intersection point of central visual ray with picture plane.	
Central Projection Perspective	Synonym for central Perspective (1), or front and frontal perspective (linear or curvilinear perspective projections). Also linked directly to central or linear perspective (probably one-point perspective). Relates to a linear perspective construction. Synonyms: front perspective, frontal perspective. See: Linear perspective, one-point perspective, central perspective (2), central projection perspective, etc.	
Central Shadow	The core shadow (or form shadow core), which is the darkest area of shadow on a three-dimensional object, occurring where light can no longer reach it. This area is essential for defining the form, volume, and weight of the subject.	
Central Shadow Perspective	A technical drawing method used to cast accurate, realistic shadows of objects onto surfaces (like the ground) within a one-point or two-point perspective scene. It involves placing a specific light source point and a corresponding shadow vanishing point to guide the direction and length of the shadow.	

TERM	DEFINITION
Central Vanishing Point	Synonym for primary or principal vanishing point. See: vanishing point (primary), principal vanishing point, central perspective, linear perspective.
Central Visual Ray / Central Ray Direction of Vision Direction of Projection Visual Perspective (2nd type) Linear Perspective	**Central Visual Ray: Direction of Vision.** Synonym for Line of Sight (preferred term) A line drawn from the eye position to the centre of the picture at right angles (perpendicular) to the picture plane. Visual ray perpendicular to the picture plane. Refers to a line from the artist's eye perpendicular to the horizon line and called the central visual ray. Determines the centre of vision (1), or point of sight (2), or intersection point of central visual ray with picture plane. Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Centre Line Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Centre Line: Direction of Vision.** Synonym for Line of Sight (preferred term) The line leading from the viewpoint (eye / station point) to the point on the picture plane that is directly in front of the viewer's eye (point of sight(2)). Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Centre Line of Vision Direction of Vision / Projection Visual Perspective (2nd type) Linear Perspective	**Central Line of Vision: Direction of Vision.** Synonym for Line of Sight (preferred term) The centre line of vision is a line from the station point to the centre of interest of the object (ending in the focal point). In other words, it ends at the point on which the eye is fixed (point of sight(2)). This line is always represented as a vertical line in perspective drawing (plan view). Within a graphical linear perspective construction, the centre line of vision is always taken to be parallel to the ground plane (when looking straight ahead, as with a one-point perspective construction). Synonyms: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Centre of a Vanishing Line Linear Perspective	A vanishing line (of vanishing points) is any line on the plane of the picture, comprised of multiple vanishing points, whereby each vanishing point on said line is where a set of lines on the original plane, parallel to each other, appear to meet or converge towards. The centre of a vanishing line is the geometric centre of the same line, which is equal to the central or primary vanishing point on the primary horizon line for sets of orthogonal lines converging to a single point in one-point linear perspective. See: vanishing line, orthogonal line, central and linear perspective, horizon line, horizon line (types).
Centre of Canvas (1, 2, 3) Linear Perspective One-Point Perspective	**1: Centre of Canvas**: Centre of Perspective (2): Point of Sight (2) [one-point perspective] Intersection point of central visual ray with picture plane, and for a one-point linear perspective construction whereby sets of parallel lines or orthogonals in object space (along the line of sight) converge on a central vanishing point (central vanishing point can be in centre of picture plane or else can be offset to one side depending upon viewpoint position relative to depicted perspective window). **Synonyms for Centre of Caves [1]**: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point. **2. Centre of Canvas: Centre of Perspective (2): Point of Sight (2) in two/three/multi-point perspective.** Intersection point of central visual ray with picture plane, but in two/three/multi-point perspective. Identical to Centre of Canvas or Centre of Perspective (2): Point of Sight (2) in one-point perspective. Synonym for: Point of Sight (2) in multi-point perspective (preferred term) [for sets of parallel lines not all along line of sight]. Intersection point of central visual ray with picture plane. **3. Centre of Canvas**: physical centre of a picture plane, irrespective of the type of graphical projection employed or the position of any vanishing points and not related to the represented centre of vision.

TERM	DEFINITION	C
Centre of Field of Vision Direction of Vision Visual Perspective (2nd type) Linear Perspective	**Centre of Field of Vision: Point of Sight (2) (preferred term)** **Synonym for: Point of Sight (2).** Synonym for the point of sight (2) - or intersection point of the central visual ray with the picture plane. The centre of the field of vision is the point on the picture place that is directly opposite the observer's eye. It is the perpendicular from the station point to the picture plane, intersecting at a point called the centre of vision or principal point. Synonyms: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point.	
Centre of Interest (1) Field of View Area of Vision (2) Angle of Vision (2) Linear Perspective Curvilinear Perspective Visual Perspective (2nd type) / Linear Perspective	**Centre of Interest: Field of View (preferred term) — [See also: Visual Ray (2)]** **Synonym for: Area of Vision (A, B), Angle of Vision (2): Field of View.** Refers to the area of vision that of which a perspective view/image is primarily concerned. Notably, the area (of vision) that the eye takes in is only a small area - beyond this field of view, the image grows distorted and blurred; which is also what happens when we try to extend a linear perspective drawing beyond a certain field of view. When we extend a drawing beyond this centre of interest, it is necessary to turn our attention to the border of our vision, and by doing this, we form a new picture. The first picture now passes to the edge of our vision or beyond. The new picture requires a rearrangement of vanishing points. Remember that two vanishing points (ref. two-point linear perspective) will not allow you to make a panoramic drawing, and normally a form of curvilinear perspective is required for that purpose. The **Centre of Interest,** understood as **Area of Vision (A, B)** can be expressed in angular terms, but it can also be projected as an area onto a 2-D planar region of physical reality. Relates to both visual perspective (2nd type) and a linear perspective construction (process). Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A, B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2).	
Centre of Interest (2) Focal Point	A centre of interest (often used interchangeably with "focal point") is the primary subject, theme, or area in a painting or photograph that draws the viewer's eye first, preventing the image from feeling cluttered or aimless. It serves as a visual "anchor" or "payoff" for the audience, ensuring that the composition has a clear, singular focus.	
Centre of Perspective (1) (Eye) Visual Perspective (2nd type) / Linear Perspective	**Centre of Perspective (1): Eye Point / Station Point, Synonym for Station Point (1) (preferred term)** Fixed eye, viewing or viewpoint from which a picture plane (perspective image/view) is observed, created, or represented as being observed/created. Synonyms: Apex of visual cone, apex of visual pyramid, camera point, centre of perspective, centre of projection, eye, eye point, observer's point, point of sight (1), point of view, spectator's point, stand point, station point, vertex of perspective, viewpoint.	
Centre of Perspective (2) (Centre of Picture)	**Centre of Perspective (2): Synonym for: Point of Sight (2) (preferred term)** Intersection point of central visual ray with picture plane. Synonyms: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point.	
Centre of Picture Visual Perspective (2nd type) / Linear Perspective	**Centre of Picture: Synonym for Point of Sight (2) (preferred term)** The centre of picture is that point on the picture plane where a line from the observer's eye cuts it at right angles. The centre of picture also coincides with the first and principal vanishing point (for a one-point linear perspective construction). Synonym for the point of sight (2) - or intersection point of the central visual ray with the picture plane. Where the viewer is looking (also known as the focal point) - and used to identify/establish a fixed line of sight. In one and two-point perspective, the line of sight is parallel to the ground plane, and the centre of vision is on the horizon line. Older writings on perspective call the **Centre of Picture** the **Point of Sight (1):** being the eye point or station point (1) - and so they are not the same. Centre of Picture is NOT: Point of Sight (1), and is NOT Centre of Canvas. **Synonyms**: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point. **Discussion** The **centre of picture** (being a point projected onto the picture plane) is NOT the point of sight (1), which is the station point some distance lying in front of the picture plane. The two are not the same because the point of sight (1) is the station point, and the centre of vision/picture is related to the direction of vision (projection of this direction onto the picture plane). Ergo, the centre of picture is not (necessarily) the same as the centre of the canvas upon which the perspective image is located.	

TERM	DEFINITION
Centre of Projection Visual Perspective (2nd type) Linear Perspective	**Centre of Projection: Synonym for Eye / Station Point (preferred term)** Fixed eye, station point, viewing or viewpoint from which a picture plane (perspective image/view) is observed, created, or is represented as being observed/created. Synonyms: Apex of visual cone, apex of visual pyramid, camera point, centre of perspective, centre of projection, centre of vision (3), eye, eye point, observer's point, point of sight (1), point of view, spectator's point, stand point, station point, vertex of perspective, viewpoint.
Centre of Vision (1) (Horizontal Axis) Drawing / Painting Visual Perspective (2nd type) Linear Perspective Graphical Perspective	**Centre of Vision (1): Point of Sight (2)** **Synonym for Point of Sight (2) (preferred term)** The point on the picture plane **(or point of light)** directly opposite the eye of the spectator (sometimes named the centre of picture). Also, the point on the horizon line directly in front of the eye, being also the vanishing point of one-point perspective. In these terms (defined point on picture plane), it is the orthographic (parallel) projection of the station point on the picture plane. Another way of stating the same thing: the centre of vision is the intersection point of the central visual ray (or line of sight) with the picture plane (on the horizon line). This point has sometimes been called the point of light. The orthographic projection of the station point on the picture plane. Note(s): The centre of vision (1) is always at right angles to the picture plane. The centre of vision will change according to your direction of look (of actual or depicted viewpoint) - so if the line of sight is not in line with the orthogonal, then the new (changed) centre of vision will be in a different place, and we are no longer talking of a one-point linear perspective construction of a horizontal plane, but of an inclined / declined or twisted plane! **Synonyms**: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point. **Important Points** Centre of Vision(1)/Picture is EQUAL TO: Point of Sight (2), and is **NOT Centre of Canvas.** <See book: Practical Treatise of Perspective, on the Principles of Dr Brook Taylor by Edward Edwards (1805), page 25 **>** Centre of Vision(1)/Picture is NOT: Station Point or Point of Sight (1), and is **NOT Centre of Canvas**. <See book: Practical Treatise of Perspective, on the Principles of Dr Brook Taylor by Edward Edwards (1805), page 25 **>** **Discussion** The **centre of vision (1) and centre of picture** (being a point projected onto the picture plane) is the NOT the point of sight (1), which is the station point some distance lying in front of the picture plane. The two are not the same because the point of sight is the station point and the centre of vision (1)/picture is related to the direction of vision. The centre of vision (1) is the point on the picture plane directly opposite the eye of the artist, or directly opposite the depicted viewpoint. In one-point or parallel perspective the centre of vision (1) is very near the central or primary vanishing point, whether or not this vanishing point for orthogonals appears in the centre of the canvas or off to one side of the canvas due to the one-sided arraignment of orthogonals to one edge of picture plane (for example looking down the edge of a set of buildings along a long road).
Centre of Vision (2) (Horizontal Axis) Visual Perspective (2nd type) / Linear Perspective	**Centre of Vision (2): Direction of Vision** **Synonym for Line of Sight (preferred term)** **Centre of Vision (2): Axis of the Cone of Vision** This is the path along which the Eye is focused and is the central axis of the Cone of Vision. In other words, it is the central visual plane passing from the observer to the spatial object/scene. **Synonyms**: Angle of View (1), Angle of Vision (1), Axis Line, Axis of Cone of Vision, Axis of Pyramid Of Vision, Axis of Vision, Axis of Visual Pyramid, Central Axis, Central Axis of Vision, Central Ray, Central Visual Ray, Centre Line, Centre Line of Vision, Centre of Vision (2), Direct Line of Sight, Direct Line, Direct Line of Vision, Direction of Gaze, Direction of Projection, Direction of Vision, Line of Direction, Line of Projection, Line of Sight, Line of Vision (1), Looking Angle, Observation Angle, Optical Axis, Perspective Axis, Principal Angle, Projection Angle, Sight Line, Viewing Angle (1), Visual Axis, Visual Ray (principal), Visual Axis, Visual Direction, Alignment Line (2).
Centre of Vision (3) (Horizontal Axis) Visual Perspective (2nd type) / Linear Perspective	**Centre of Vision (3): Centre of Projection: Point of Sight (1): Station Point** **Synonym for EyeStation Point (preferred term)** Fixed eye, station point, viewing or viewpoint from which a picture plane (perspective image/view) is observed, created, or is represented as being observed/created. Synonyms: Apex of visual cone, apex of visual pyramid, camera point, centre of perspective, centre of projection, centre of vision (3), eye, eye point, observer's point, point of sight (1), point of view, spectator's point, stand point, station point, vertex of perspective, viewpoint.

TERM	DEFINITION	C
Centre of Vision (Inclined / Declined / Twisted Axis)	Related to Centre of Vision (1, 2, 3 - one of these options) [Horizontal Axis]; but for an inclined / declined / twisted or oblique object plane relative to the viewer's plane of sight. See: Centre of Vision (1, 2, 3) [Horizontal Axis], linear perspective (1,2,3 and multi-point), inclined perspective, declined perspective, twisted perspective.	
Centre of Visual Ray Graphical Perspective Linear Perspective	**Centre of Visual Ray: Synonym for Centre of Vision (1), or Point of Sight (2) (preferred term).** Synonym for the point of sight (2) - or intersection point of the central visual ray with the picture plane. A line from the eye perpendicular to the picture plane, which determines the centre of vision (1) or point of sight (2). Synonyms: centre of field of vision, centre of picture, centre of vision (1), centre of visual ray, focal point, point of fixation, point of light, point of sight (2), principal point.	
Centrelinead Ruler Drawing / Drafting Instrument Graphical Perspective	Centrolineads are specialised, historical technical drawing tools used to rule lines that converge at a vanishing point located outside the boundaries of the drawing board. They were primarily used in perspective drawing for architecture and engineering to accurately manage vanishing points that were too far away to be reached by a standard T-square or straightedge. These instruments are sometimes referred to as "lineads" or described in antique catalogs as "drafting" instruments. **Key Details** • **Origin**: They were invented in the early 1800s by British inventors Peter Nicholson and John Farey Jr. • **Operation**: The device typically consists of a long ruler (the blade) attached to two hinged, adjustable legs (Y-shape). These legs rest against two pins (or brads) driven into the drawing board. • **Mechanism:** By pivoting the tool against the two pins, the ruler maintains a constant alignment with a distant vanishing point. • **Types:** There are two main types: Nicholson's: A modification of a pair of parallel rulers, and Farey's: Uses two hinged, adjustable support arms. • **Replacement**: While crucial for manual drafting in the past, their use has been largely superseded by computer-aided design (CAD) software.	
Centrelined Instrument (1, 2) Drawing Graphical Perspective	**1. Surveying method** Refers to perspective image taking, or a measuring procedure in which a perspective instrument is employed to capture narrow-field (or centre-lined) spatial images/measurements from physical reality, and that can later be conjoined to form an accurate representation of a spatial scene (without wide-field optical distortions/aberrations). **2. Rifle optical sight or telescopic alignment (main + finder instruments)** Refers to an optical alignment/adjustment process for two optical sighting instruments, whereby one instrument has its pointing vector, or altitude/azimuth direction, adjusted to coincide with the second.	
Centres (Perspective)	See: Perspective centre.	
Centric Point	Synonym for vanishing point (principal or central vanishing point for orthogonal lines in object space).	
Centric Ray (Alberti)	Strikes the quantity (object) in such a way that the adjacent angles on all sides are equal. Probably a reference to the principal or chief ray in a ray bundle. Relates to a linear perspective construction (one-point linear perspective). See: principal visual ray, principal ray, ray bundle.	
Centrum (Circini)	Fixed point of a compass.	
Certification of Vision **<< NEW Term >>**	A diverse class of techniques that have the goal of certifying, or establishing the truth of, the views/images that are observed from physical reality. For example, validation of ordinal, determinative, and subsumptive data as extracted from images. May include certification of views/images obtained by direct human vision, optical instruments, new media systems, or any combination of the same.	
Cezanne, Paul Artist Aspective	Paul Cézanne (1839–1906) represents a "lived perspective" rather than traditional photographic or geometric perspective, reflecting human perception of the world. He emphasises touch, multi-view perspectives, and raw visual information, contrasting it with the limited perspective of photographs. Philosopher Merleau-Ponty notes that in Cézanne's work, as the eye moves over a surface, images vary from different viewpoints, resulting in a "warped" perspective that conveys individual perception, revealing the depth and texture of objects. Merleau-Ponty writes about one of Cezanne's methods as follows: "Gustave Geffroy's table stretches into the bottom of the picture, and indeed, when our eye runs over a large surface, the images it successively receives are taken from different points of view, and the whole surface is warped." This "warped" perspective captures the subjective perception of an individual, and Cézanne's paintings show us "the depth, the smoothness, softness, the hardness of objects." See also: aspective, modern perspective, Pavel Florensky, abstract perspective.	

TERM	DEFINITION
CGI Perspective	A Computer Graphic Image (CGI) perspective is any image created by a computer; and includes ray-tracing and computer games images, plus today could arguably include some kinds of Artificial Intelligence created images.
Chain (Surveying) Mapping Cartography Distance Measurement	A chain is a metal chain made up of links, and one type is a tool used to measure distances between points on the ground. So-called chain surveying is a method of land surveying that uses a chain to measure distances and angles between points on the ground. **Surveying Method** • A surveyor and a chainman use a chain to measure the distance between two points • The surveyor places a ranging rod at the destination point • The chain is laid out from the starting point to the ranging rod • The chainman makes sure the chain is straight and pointing at the ranging rod • A pin is placed in the ground at the end of the chain • The chain is moved forward and the process is repeated until the destination rod is reached • The surveyor records the number of full chains and links in the distance **Applications** • Used for mapping and measuring small and level areas • Used for boundary mapping, plot division, and basic layout tasks • Used when detailed accuracy is not required (otherwise optical/laser ranging is used) See: Compass or theodolite, prismatic compass, tripod, tape, arrows, and ranging rods.
Chairs	White (1956) explored the history of the development of perspective methods and studied written sources with visual evidence from Pompeian wall paintings and vases, whereupon he drew attention to foreshortened chairs depicted therein.
Charged Coupled Device (CCD) Camera - Digital	A charge-coupled device (CCD) is a light-sensitive circuit that captures 2-D images by converting photons to electrons, breaking the image into pixels. Each pixel's voltage corresponds to the light captured, outputting a digital image. CCDs have largely replaced photographic film in cameras and mobile devices.
Check Point Vanishing Point Linear Perspective Graphical Perspective 1-2-3 Point Perspective	In art and architectural drafting, "check point" refers to the use of specific vanishing points on a horizon line to create the illusion of 3-D depth on a 2-D surface. • **One-Point Perspective:** Parallel lines converge on a single vanishing point, often used for interiors or looking down a road. • **Two-Point Perspective (oblique perspective (A))**: Objects are set at an angle, with lines converging toward two points on the horizon. • **Three-Point Perspective (aerial perspective (3)):** Used to show high or low viewpoints, with lines converging at two points on the horizon and a third point above or below. • **Artist's Technique**: Use of "check points" (referring to the vanishing points) to maintain a consistent or unified perspective. See: central and linear perspective, 1-2-3 point perspective, vanishing point. See book: Linear Perspective by Willy A. Bartschi.
Checker Shadow Chub Illusion	A specific example of the well-known contrast illusion, which causes two regions of identical colour within an object/scene to appear (to visual perception) different depending on context.
Checking Perspective (Catoptric Perspective)	Synonym for catoptric perspective. Probably named checking perspective because it relates to a practical or live optical measuring perspective or a picture making method whereby object outlines are recorded directly onto a perspective window or veil, leading to an image that can be used to test or validate geometrical perspective or graphical construction methods.
Chelsea, David Artist, Teacher, Writer	David Chelsea is an artist and writer who has written about the different types of perspective, and how artists can incorporate and experiment with these in various kinds in artworks. He has written about curvilinear, spherical and extreme perspectives with great lucidity.
Chequerboard Perspective [A]	Another name for the linear perspective method (ref. one-point/central), specifically with a checkerboard or metric grid pattern located on the ground plane. See: linear perspective, one-point perspective, central perspective, chessboard perspective.
Chequerboard Perspective [B] or Chessboard Perspective	Image/view of a scene (perspective outcome) that employs a type of metric grid often used in systems/methods such as linear perspective. See: linear perspective, one-point perspective, central perspective, metric grid.

TERM	DEFINITION	C
Chequerboard Perspective [C] Proxemic Perspective	**Chequerboard or Chessboard Perspective is a Proxemic Perspective (Ref. Fernande Saint-Martin).** The chequerboard perspective is obstructed upon the internal, or as it has been called, the deductive reiteration of the formative straight lines and corners of the basic plane (often a ground plane), forming a focal or non-focal grid. Also named a 'modernist grid' in art/painting. See: Semiology of perspective, work of Fernande Saint-Martin, metric grid, centrallinear perspective, parallel perspective.	
Chiaroscuro Perspective (1): Art Usage Artistic Technique	**Type 1: Chiaroscuro: strong contrasts between light and dark.** Chiaroscuro refers to strong light-dark contrasts used by artists to create volume in three-dimensional forms, and it also applies to similar effects in cinema and photography. Chiaroscuro is one of the canonical painting modes(s) of the Renaissance (alongside **cangiante** [colour mixing to lighten/darken colour], **sfumato** or softened edges, and **unione** [painting technique where the colours transition smoothly, without hard lines]).	
Chiaroscuro Perspective (2): Gradients of Light / Shadow, and/or Relief Artistic Technique	**Type 2: Chiaroscuro: reduced contrasts between light and dark.** In a painting context, chiaroscuro perspective refers to gradients that diminish the illusion of 3-D form and the separation of figure from ground as the distance of the object/scene from the eye increases. It is accomplished in painting by **reducing the contrast between highlight and shadow values in painting/modelling**, and in sculpture by shallower carving and low or flattened relief (relievo schiacciato), which together reduce the contrast of natural light on sculpture. See: painting, artificial and graphical perspective, relief Perspective.	
Chief / Main / Principal Ray (B) Camera / Visual Perspective (2) Graphical Perspective	**Chief / Main / Principal Ray (B): Euclid named such rays the 'visual rays' and they define the visual angles subtended by the objects.** From every visible point on the object, there emanates a ray of light termed a **main** or **chief ray (the Principal Ray Type B of the ray bundle diverging from each object point)**, which (whilst the artist is recording a perspective scene) pierces the glass (perspective window) and enters the eye. Synonyms: main ray, chief ray, principal ray (B), visual ray, direction line, projection line, projection ray, centric ray - Alberti.	
Child's Perspective (1, 2) Visual Perspective Taking Visual Perception Visual Perspective (2)	**1.Child's Perspective: second person viewpoints (optical/visual perspective phenomena)** Visual perspective-taking or perspective decoding is the ability to understand that others may see things differently (in a visual/optical sense). It's an important skill that helps children develop social cognitive abilities like the so-called 'theory of mind'. **How does visual perspective-taking develop?** • **Infancy**: The basic ability to take another person's perspective is present from infancy. • **Toddlerhood**: Children may understand that what someone sees may differ from what they see. • **Early childhood:** Children may develop more complex perspective-taking skills, such as understanding how something looks to another person **2. Child's Perspective: first person perspective taking (optical/visual perspective phenomena)** Visual perspective-taking from the observe's standpoint; develops as described above. See thesis: The Acquisition and Training of Children's Visual Perspective Taking Skills, Meshongnek, J.C. See thesis: The Early Development of Perspective-Taking in Children, Susswein, B. See book: The Child's Conception of Space by Piaget, J., Inhelder, B. (1971).	
Chinese Perspective Axonometry Parallel Perspective Graphical Perspective Axonometric Perspective Japanese Perspective	Architects, engineers, and designers today rely on axonometry, a projection system first used by Chinese artists and architects 2000 years ago. Unlike linear perspective, whose perspective was objective, or looking from the outside, Chinese art used parallel projections within the painting that allowed the viewer to consider both the global (single-scale) space and the ongoing progression of time in one scroll of paper. Chinese perspective rejects the Western concept of central perspective (including overt vanishing points); instead, it produces scenes with a ladder of planes or two-dimensional scenes shown in flat or ostensibly single-scale perspective. Sometimes Chinese methods employ pictorial elements from multiple viewpoints in a single painting, a technique similar to Cubism. Another similarity is the use of conjoined viewpoints from multiple distances, displayed at the same scale. See: ancient china, axonometry, parallel and axonometric perspective, Japanese perspective, Western perspective. See book: Europa und die Kaiser von China by Festspiele, B., et al. See book: The Way of Chinese Painting by Sze, Mai-mai. See paper: Why the World relies on Chinese Perspective by Krikke (2018).	
Choreutoscope Film Projector	A pre-cinema device resembling early projectors, it used intermittent movement and featured a glass sheet with sequential drawings, often showing a 'dancing skeleton.'	
Chroma	Chroma refers to the purity or intensity of a colour, indicating how vivid it is compared to a neutral grey.	

TERM	DEFINITION
Chroma key Chroma Key Compositing	Chroma key compositing, or chroma keying, is a visual-effects technique for layering images or video based on colour hues, commonly used to remove backgrounds in newscasting, podcasting, and film. By making a specific colour in the foreground transparent, background footage or images can be inserted. While the technique can use any uniform colour, green and blue are preferred for their contrast with skin tones.
Chromostereopsis Visual Perception Visual Perspective (2) Perspective Illusion	Chromostereopsis is a visual illusion that makes two-dimensional images appear to have depth. It is commonly seen in red-blue or red-green images, but can also occur in red-grey or blue-grey images. Chromostereopsis is a naturally occurring process in which coloured images are accidentally or incorrectly perceived in depth, and should not be confused with anaglyph 3-D or stereoscopic cinema images/glasses. **How it works (natural chromostereopsis)** • Occurs when different colours are placed next to each other, making it difficult to focus on both colours. • Different wavelengths of light stimulate different areas of the eye. • Creates a perceptual disparity that makes it seem like some colours are closer or farther away than others. **What it looks like (natural chromostereopsis)** • Lines or letters of different colours may appear to be at different depths. • One colour may appear to "jump out" while another colour appears to recede. **How to avoid it (natural chromostereopsis)** • Designers can use different colours, saturations, and contrasts. • They can also place achromatic borders around each colour.
Chronometer	A mechanical timepiece that is extremely accurate and is used to measure time.
Cinema (early)	The commercial screening of ten Lumière brothers' films in Paris on December 28, 1895, marks the breakthrough of projected cinema.
Cinema Perspective Camera and Photographic Perspective Steroscopic Cinema Wide-field Cinema Oramas and Scopes (cinema systems)	A type of camera/projector or instrument perspective used to capture and later project cinematic or large-scale moving images to theatre audiences. Cinema began in the late 19th century, transitioning from optical illusions to the Lumière brothers' 1895 commercial projection in Paris. It evolved from silent, short films into a major industry through sound introduction (1927), colour, and Hollywood's studio era, later adapting to television and digital technology. Briefly in vogue in the 1950s, stereoscopic cinema seemed enacted in an aquarium tank by a cast largely composed of dwarfs or giants (ref. distorted scene geometry), because the spectator viewpoint rarely matched the camera viewpoint. The technicians had failed to do their perspective homework. All the Oramas and Scopes are of two kinds: either stereoscopic or using a wide-angle camera and a wide screen. See: Stereographic perspective, stereoscope, cinema, cinerama, cinemascope, circle vision, scope and anamorphic lenses, Vistavision, IMAX/OMNIMAX, Sphere theatre, optical special effects.
Cinematic Perspective	Cinema perspective or large-scale perspective/photographic images projected onto a large cinema screen and normally in a theatre. See: motionphotographic perspective, optical special effects.
Cinematograph	Early type of movie or cinematic perspective made using a cinematograph.
Cinerama Wide-Field Cinema Movie Photographic Perspective IMAX, OMNIMAX	Cinerama was an early widescreen projection process using three synchronised 35mm projectors on a curved screen subtending 146 degrees. Introduced in the 1950s, it aimed to enhance field of view and spatial immersion, later evolving into systems like IMAX/OMNIMAX and the 2024 Sphere theatre in Las Vegas. The screen consisted of hundreds of angled vertical strips to minimise light scattering and image washout. See also: IMAX/OMNIMAX, Sphere theatre, circle/cylinder of vision, sphere of vision perspective, curvilinear perspective, spherical perspective, anamorphic or scope lens, volume screen.
Circle - Concentric	Concentric circles are two or more circles that share the exact same centre point but have different radii, appearing as nested rings, like the bullseye of a dartboard or ripples in a pond. They are fundamental in geometry, with the area between two concentric circles called an annulus.
Circle (visual coordinates) **Altitude and Azimuth**	A circular coordinate system is often used to establish user-centric visual coordinates, both in the human visual system and for use with other types of optical systems. A common example is the altitude/azimuth system used to define the apparent (X,Y) position of celestial bodies relative to the user's or telescope's hemisphere or sphere of vision. See: sphere of vision perspective, circular and cylindrical perspective, 360-degree perspective.

TERM	DEFINITION	C
Circle in Perspective	A circle, present in spatial reality, often projects as an ellipse when viewed from any angle other than plan view (for both parallel and recession-of-form perspective types). This obeys the projection rules of uniform foreshortening (1: aspect or depth-independent type), however, in the case of a very large circle, then foreshortening of the non-uniform type (2: optical/perspectival type) may also occur, with depth-based distortions that may cause the circle to distort further, and in a non-symmetrical manner.	
Circle of Distance Linear Perspective	In linear perspective, the circle of distance is a fundamental geometric construct (a circle drawn on the picture plane) that is used to determine the depth of objects and the placement of vanishing points for diagonal lines. The circle's central point coincides with the central vanishing point, and also the point of sight (2), and the circle's radius coincides with the distance of the observer's eye from the picture plane. The circle of distance, as defined in modern perspective, effectively maps the observer's physical position in three-dimensional space onto the two-dimensional picture plane.	
Circle of Revolution Perspective **<< NEW Term >>**	**Circle of Revolution Perspective: Synonym for Cylinder of Revolution Perspective.** The capability of a circular perspective system to produce multiple views of a 3-D object by orbiting or revolving in a circle around the 3-D object in question (looking in/ looking at perspective). See: circular/cylindrical perspective, panoramic perspective, hemisphere of vision, spherical perspective, Andrew Flocon, Dick Termes, termesphere, David Chelsea, sphere/cylinder of revolution perspective.	
Circle of the Picture	A synonym for Area of Vision (3), Field of View, or Base of Cone of Rays as projected onto the picture plane. See paper: The Vertical Vanishing Point by Stanley Brampton (1947).	
Circle of Vanishing Points	A tool in drawing where, if you draw a circle with the two vanishing points as the diameter, a 90-degree angle (or an object with a 90-degree corner) will have its corner located on this circle.	
Circle of View (1, 2 [A, B]) **<< NEW / REFINED Term >>** Visual Perspective (2) Cone of Vision Central / Linear Perspective Circular Perspective	**Circle of View** has two possible meanings in relation to technical perspective. **Circle of View [1]**: synonym for a circular visual field as with a panoramic or circular perspective that takes in either a whole 360-degree of vision or of a visual scene, or a circular region thereof. See: circular perspective, circle of vision, panoramic perspective, visual field, visual field of view. **Circle of View [2: A/B]**: synonym for how a perspectivist uses either a circle or cone to define a scene's visual limits, as explained in two distinct situations below. A. **Circle of View: synonym for Field of View**: defines a circular field of view as projected onto the picture plane and/or as projected onwards into object space. B. **Circle of View: synonym for Cone of Vision**: defines the Visual Cone that is cut by the perspective window or picture plane when forming a central perspective representation. See: central and linear perspective, graphical perspective, field of view, cone of vision.	
Circle of Vision Perspective **<< NEW Term >>** Cylinder of Vision	**Circle of Vision Perspective: Synonym for Cylinder of Vision Perspective.** Circular system producing a complete circle-of-vision (looking-out/looking-around perspective). See: cylindrical perspective, circular perspective, panoramic perspective, hemisphere of vision, spherical perspective, Andrew Flocon, Dick Termes, termesphere, David Chelsea, spherecylinder of vision perspective.	
Circlevision Movie Format	Circle-Vision 360° is a movie film format developed by The Walt Disney Company that uses multiple projection screens encircling the audience, a technique made possible by placing the projectors in the gaps between the screens and above the viewers' heads. Circle-Vision 360° was developed from the Circarama format, which uses eleven 16 mm projectors. The first Circarama film was *A Tour of the West,* made in 1955. Later in 1965, Circle-Vision 360° made its official debut in the Disney complex, using a nine-camera, 35 mm format. The immersive effect of the circular screen was so strong that it sometimes made audience members dizzy, especially during fast-moving subjects or scenes, requiring the use of steadying railings for them to lean on. Disney World's EPCOT Circle-Vision 360° theatre remains part of the park's lineup as of 2026.	
Circular Perspective (A, B) **<< NEW / REFINED Term >>**	**A. Circular image** Any circular or (horizontal) multi-directional image that comprises 3-4 primary vanishing points (corresponding to 3-4 of the 6 cardinal directions), and towards which everything is laid out. **B. Panoramic cinema system/theatre** Circular perspective refers to a type of panoramic image capture and projection method in which the images observe a full (horizontal) 360-degree vista, later displayed on a 360-degree circular theatre.	
Circumferentor Instrument Perspective	A circumferentor is a surveying instrument for measuring horizontal angles, comprising a brass box with a freely moving magnetic needle over a 360-degree compass. It was replaced by the theodolite in the early 19th century.	
Circumscription	Refers to the precise outlining of forms, using geometric principles to create accurate and clear shapes.	

TERM	DEFINITION
Clarity Perspective	Synonym for detail perspective as defined by the attained visual acuity or visible outline structure for the image/view of a spatial object. See: visual acuity, perspective of acuity, detail perspective, perspective of visual acuity, degradation of form perspective, diminution of form.
Clarke Projection Maps Cartography	A map projection based on the Clarke spheroid, which was determined by Jacob Clarke in 1866. The Clarke spheroid was used in North American data until recently. **Principles / Applications** • The Clarke spheroid is an ellipsoidal representation of the Earth. • The Clarke spheroid was used in North American data until recently, when it was replaced by the Geodetic Reference System of 1980 (GRS 1980). • Used in map projections for the Sudan and in tables for the Mercator projection.
Classical Perspective	Another name for linear perspective.
Claude Glass Perspectival Instrument	A Claude glass is a small, darkly tinted convex mirror used by artists and travellers to simplify the colour and tonal range of landscapes, providing a painterly view. Users would face away from the scene to see a transcribable image of outlines and subtle tones. See: black mirror, convex mirror, concave mirror, perspective mirror (1,2).
Clinometer Instrument Perspective	A clinometer measures the angle of elevation in right-angled triangles to determine the height of tall objects. A tilt sensor measures tilting in two axes, while the "ball" in aircraft turn indicators is called an inclinometer.
Clock - Shadow Sundial	Shadow clocks or Sundials are horological devices that indicate the time of day using the shadow cast by the apparent position of the sun.
Close-Up Perspective	A perspective image that adopts a close-up view/image of a spatial object/scene, or with a small distance between eye point and object. Often associated with wide-field optical distortions, such as those seen in a fisheye lens or a curvilinear perspective, and/or with extreme foreshortening, etc.
Closed Perspective	Closed perspective is a term used to describe a particular theatrical form of perspective, referring in the first instance to the 'closed' viewpoint(s) of people and (potentially) objects/processes on the stage as opposed to the broader 'open perspective' of the audience (or distant spatial horizon, etc).
Closing Principle	Synonym for the occlusion principle of perspective (ref. linear or 'scientific' form). See: Occlusion principle (of perspective), opening principle (of perspective).
Co-ordinate planes of projection	The picture plane and the ground plane are known as coordinate planes of projection, and on them is performed all the work of constructing the perspective view. Relates to a linear perspective construction (one-point linear perspective).
Coaxial Perspective Graphical / Mathematical Perspective	In a "coaxial perspective," several spatial objects or scene elements share a common axis within a single view/image (often due to a geometry originating in object space), like coaxial rotors in a helicopter. "Coaxial" means having a common axis or coincident axes, and the original object/ scene layout/structures may be static, animated, or be user-controllable in some manner. In geometrical perspective, coaxial means that several 3-D linear or planar forms within a view/image share a common axis. We can also have a 2-D analog: whereby a coaxial layout is "concentric" on a 2-D plane, but in which 2-D/3-D objects or scene elements have a common centre.
Cognitive / Mental Perspective	Cognitive / mental perspective (visual type) refers to the creation and viewing of dimensional images inside the mind. Patently said image(s) can be either of the symbolic image type or the visual (geometrical / spatial) image type.
Cognitive Media Stack **< NEW Term >>** World Media Stack New Media Perspective Digital / Computer Perspective	A term introduced by Alan Radley in a 2017 paper 'A Universal Knowledge Machine', whereby a cognitive media stack (CMS); is a particular set of co-aligned media channel(s), visible/accessible to a single human mind, happening on a particular perceptive/thinking occasion; and which allows items or concepts (universals, class objects), things (particulars, datums, images, etc) and principles (laws, structural rules), etc; to travel up/down and hence through the various media layers; and thus to transform, mingle, co-exist and inter-relate as ideas/representations within a single mental framework (SMF) or thought-space. Within a cognitive media stack, constituent media layers through which the co-aligned channels communicate may include (for example): A) The object(s) of attention (i.e. perceived physical/mental/spiritual world (emanating from the 'Six Worlds')), B) The alphabetic/symbolic/geometric layer (encoding/representation), C) syntactic/word/sentence layer (encoding/processing), D) The logical/conceptual/belief layer (judgements), and also: E) The mental layer (conclusions).

TERM	DEFINITION	C
Collimator	A collimator narrows a beam of light by aligning rays in a specific direction or reducing the beam's spatial cross-section.	
Collinearity	Collinearity is when a set of points or objects are on a single line, or when variables are linearly dependent.	
Colour Light Object / Image Natural / Environmental Perspective Aerial / Atmospheric Perspective Colour Perspective	Visual perception of form/light based on the electromagnetic spectrum (wavelength property). Colour is not an inherent property of matter, whereby colour perception is related to an object's light absorption, reflection, emission spectra, and interference. In humans, colours are perceived in the visible spectrum through three types of cone cells (trichromacy). Other animals may have eyes sensitive to different wavelengths, such as bees, which can distinguish ultraviolet, and thus have a different colour-sensitivity range. Colours have perceived properties such as hue, colourfulness (saturation), and luminance. Colours can also be additively mixed (commonly used for actual light) or subtractively mixed (commonly used for materials). If the colours are mixed in the right proportions, due to metamerism, they may appear the same as a single-wavelength light. For convenience, colours can be organised in a colour space, which, when abstracted as a mathematical colour model, can assign each region of colour a corresponding set of numbers. Ergo, colour spaces are used for colour reproduction in print, photography, computer monitors, and television. Some of the most well-known colour models and colour spaces are RGB, CMYK, HSL/HSV, CIE Lab, and YCbCr/YUV. Because the perception of colour is an important aspect of human life, different colours have been associated with emotions, activity, and nationality. In the visual arts, colour theory is used to plan the use of colour in an aesthetically pleasing, harmonious way. See: light, natural/environmental perspective, visual perspective, colour perspective, aerial perspective, atmospheric perspective, visual perception. See books: Colour and Meaning and Colour and Culture by John Gage.	
Colour - Original or Local	Refers to the original colour of an object when viewed in white light and in close proximity.	
Colour 3-D Illusion	The phenomenon of warmer colours (colours towards red spectrum) appearing nearer in depth to viewers than cooler colours (colours towards the blue spectrum) has been studied extensively by psychologists and other vision researchers. See: aerial and atmospheric perspective.	
Colour Constancy Illusion Light Object / Image Natural / Environmental Perspective AerialAtmospheric Perspective Colour Perspective	The ability to see an object's colour as relatively constant, even when the lighting changes. This is because the visual system adjusts to the light, allowing the object to appear the same colour. **Explanation** • Colour constancy is a type of chromatic adaptation, which is when the sensitivity of the chromatic mechanism(s) change. • The human visual system can't sense or directly measure the spectral reflectance of objects, which is the proportion of light an object reflects at each wavelength. • The light reaching the eye confounds the illumination and spectral reflectance of the object. • The visual system interprets different colours as the same, even when actually different. **Examples** • A red apple will look red on a sunny day or cloudy day. • A yellow ball will look yellow in sunlight and under fluorescent light. • A coat or car will appear to be the same colour in daylight or under fluorescent lighting.	
Colour Perspective (Gradients of) Atmospheric Perspective	Gradients of changes of hue, saturation, and value and sheen of spectral colours with increasing distance of object/scene from eye. The most common type of colour perspective is a gradient of the sky's colour from deep azure overhead to light blue or white near the horizon. Also, the browns and dark greens of nearby hillsides go to the azure/blue/green colour for mountains in the distance. See: aerial perspective, atmospheric perspective, colour perspective(1,2,3), absorption (of light by atmosphere). Synonyms: aerial perspective, atmospheric perspective.	
Colour Perspective [A] (1, 2, 3) Atmospheric Perspective	**1. Original colour of object when illumined with white light.** This is the true colour of the object. **2. Apparent colour of object when illumined with coloured light.** This is the apparent colour of the object under specific lighting conditions. **3. Alterations of colour - due to medium of transmission or psychological effects at detector.** Refers to all alterations of colour due to the medium of optical transmission, original colour of the object, and psychological effects in the eye, and/or imaging detector properties.	
Colour Perspective [B]	Writing about Leonardo da Vinci's approach to painting, Kim Veltman said that for Leonardo, as a general category, colour perspective subsumes aerial perspective - and includes Leonardo's azure law concerning distant objects and perspective of shadows/reflections, all of which Leonardo tested experimentally and included in his artworks to enhance realism.	

TERM	DEFINITION
Colour Phi Illusion	When apparent motion is induced between objects with different colours, the colour of the apparently moving object abruptly changes midway along the path.
Column Perspective Colonnade Perspective	Column or colonnade perspective is a view/image of a set of regular size/shaped/spaced columns (normal case is tall cylinder-shaped columns, for example, as with the Parthenon in Greece); whereby a whole range of perspective problems, visual effects, and optical distortions, have been noticed, studied and written about in the perspective literature, and in relation to this particular type of structural framework. See: lateral perspective distortions, visual perspective (type 2)
Combined Perspective (1, 2, 3) **<< NEW Term >>** Multi-view Perspective Multi-scene Perspective Universal and Particular Perspective Visually Distinct Spaces Single Scale Space Simulated / Synthetic Perspective Double Perspective Optical Special Effects	**1. Multi-view: an image/view that contains both real and represented views.** A combined perspective is any view/image that contains both real and represented views. An example might be looking through a gun sight; whereby you see a real perspective view of the outside world, and simultaneously a superimposed represented sighting and/or optical scaling overlay that works in combination with the aforementioned view. Note that the real/represented spaces are visually distinct unlike with synthetic perspective where the spaces merge perceptually. **2. Multi-scene: an image/view that combines natural and artificial scenes.** Any perspective image (or system) formed of a conjoined or synthetically unified spatial scene, being a spatial scene that is composite (i.e. is synthetic or a combination of the natural and artificial perspective types) being optically or falsely unified (from a narrow range of viewpoints) and thus only apparently consisting of a single-scale space. Requires use of simulated/forced/ accelerated perspective methods and similar illusive techniques, to create the illusion of a single scale space. Double perspective is a combined perspective that can produce hidden or invisible regions of space for objects to hide within or be rendered invisible, and/or regions of multi-scale space similar to the Ames room illusion. Natural/artificial spaces may not be visually distinct. **3. Combination of universal and particular perspective views.** Refers to how a relatively wide-field perspective image or view consists of both an overall universal or space/scene perspective (ref. metric grid), and also one or more particular perspective views, whereupon individual objects within the scene are all projected at a unique angle-of-view (relative to each object). See: universal and particular perspective.
Combined Perspective Image	Combined perspective image: Synonym for composite perspective image (1, 2, 3, 4). See: special effects, In-Camera special effects, visual effects, optical special effects.
Cometarium	A cometarium is a mechanical device that illustrates the path of a comet around the sun.
Comic Perspective	The effort of the 2-D comic book artist to capture that difference in size and shape of 3-D objects near and far away (objects present in a depicted spatial reality). See: Size diminution, aspect perspective, anamorphic perspective, foreshortening (1, 2).
Commanding Perspective Natural / Visual Perspective (2)	Refers to an overhead or aerial perspective view or camera shot, also known as a bird's-eye view, where the eye / camera is positioned directly above the subject, and where the eye / camera is angled downwards making the subject seem smaller or vulnerable, or looking straight down (around a 90-degree angle) to offer a global perspective or show complex action from above. See: Aerial schematic perspective, aerial views, bird's eye perspective, upshot perspective, down-shot perspective, global perspective, balloon perspective, commanding perspective, aeroplane perspective, mountaintop perspective, worm's eye perspective, frogs-eye perspective.
Commensurability	Commensurability is the idea that two things can be measured or compared using a common standard. It can be used in mathematics, astronomy, ethics, and philosophy.
Common Good Perspective	The common good is a philosophical concept that explores the relationship between individual and communal interests. It's a shared value that's rooted in the idea that people can only achieve their personal good by working together to pursue the common good.
Common Perspective (A, B) Linear / Graphical Perspective	**A. Another name for visual perspective (second or retinal type), or optical perspective (camera)** Common perspective may refer to several different (familiar) types of perspective, including central/ linear perspective and its variants. But this term is most frequently applied to optical and visual space; or to the creation of views of physical space (captured by the human eye or else a camera); as opposed to representation or methods of creating artificial images of natural or artificial space. **B. Another name for linear perspective.**
Common Perspective (of a group of parallels)	The vanishing point may be regarded as the common perspective of infinitely remote points belonging to the various lines of a group of parallels. But the point of intersection of the perspective lines on the picture plane is also called the vanishing point. This double meaning may cause confusion.
Communicability Perspective	The communicability perspective is the study of how infectious diseases spread from person to person, or from animal to person.

TERM	DEFINITION	C
Compass (1, 2, 3, 4) Common types: Proportional Reduction Trigonometry Magnetic Graphical Perspective Cartography / Navigation	**1. Proportional compass or sector** A hand-held twin-legged device distinguished by the presence on the legs of various proportional scales, which served to establish the proportions between lines, geometric figures, solid bodies, and so on. Can be used to solve a whole range of spatial and perspective-related problems. **2. Reduction compass** The reduction compass or proportional dividers is a geometry tool with asymmetric-length branches to allow performing homothetic transformations, reproducing a pattern while enlarging or reducing its size and conserving shapes/angles. **3. Trigonometry compass** Or dividers are used in technical drawing for a range of purposes. **4. Magnetic compass** An instrument for determining direction on the surface of Earth by means of a magnetic pointer that aligns itself with Earth's magnetic field.	
Compass - Mining	Magnetic compass that is portable and easy to use for rapid surveying underground were high accuracy is not required.	
Compass - Oval (1, 2, 3) Oval Compass Oval Chuck Drawing Tool Marquetry Pattern Gemstone Mount	**1. Oval Compass: a specialised drafting tool used to draw ellipses.** **2. Oval Compass: decorative / symbolic artworks / pendants / jewellery.** An "oval compass" refers to a compass rose patterned inlay in an oval shape, often used in marquetry or wood inlay projects. These 'directional' symbolic inlays are made from alternating pieces of wood, typically sycamore and dyed black veneer, and can be mirror-paired; plus, they may use false perspective or forced/accelerated perspective techniques to give the illusion of 3-D. **3. Oval Compass: compass prongs in jewellery: an oval-cut diamond is held by four prongs positioned at the cardinal points (North, South, East, West).**	
Compass - Parabolic Instrument / Graphical Perspective	A parabolic compass is a mechanical device designed by Leonardo da Vinci to draw geometric shapes, such as parabolas. Da Vinci's design for the compass is a detailed drawing that shows the compass's components and how they work together. **Principle of operation** • The compass is shaped like a rectangular cone • The only moving part is a 45° inclined arm with a sliding stylus • Used to draw parabolas, which are curves defined by specific mathematical properties **Why did Leonardo da Vinci design it?** • Da Vinci's interest in parabolas came from his research into parabolic burning mirrors • Likely designed to construct the profile of a centering for making parabolic burning mirrors	
Compass - Perfect	A mechanical contraption for drawing conics, and known since the time of Al Kindi.	
Compass (Declination) Magnetic Variation Navigation Instrument Perspective	The angle between magnetic north and true north at a specific location on Earth. **Why is compass declination important?** • **Navigation**: You need declination to navigate accurately with a compass and map. • **Time**: The declination changes over (very long) time periods due to the Earth's magnetic field. **How do you calculate declination?** • Use an online calculator to estimate the declination for a specific location and date. • Calculate the declination considering difference in years between map/current year. **How do you correct your compass?** • To correct your compass, add the magnetic declination to the magnetic bearing. • Some compasses have a fixed or adjustable declination correction.	
Compass (Drawing)	A compass, also commonly known as a pair of compasses, is a technical drawing instrument that can be used for inscribing circles or arcs.	
Compass (Mariners Box Hanging)	A magnetic compass in a box with gyro suspension or hanging from a ring, designed for use at sea or in moving environments.	
Compass (Riding)	A miniature magnetic compass contained in a box for use whilst riding a horse.	
Compass (Trough) Instrument Perspective	A trough compass marks magnetic north on a plane table drawing. **Principle** • The compass's magnetic needle points to 0° on the graduated scale. • A line drawn parallel to the edge of the trough compass is along the magnetic meridian. **Applications** • Used in surveying to mark the magnetic north line on a plane table drawing sheet.	

TERM	DEFINITION
Compendiaria Majolica / Compendiaria style of Art	Compendiaria majolica is a style of art characterised by low-relief polychrome plates. Compendiaria is a decorative style that originated in the mid-16th century and was popular in Italy for about a century. It's characterised by a reduction of ornamentation to a few colours and a focus on certain shapes (or a limited number/range thereof).
Compendium (Astronomical)	An elaborate box or analogue computer containing numerous types of dials and mechanical time-telling devices, tables, even storage compartments and an astrolabe, with a loose suspension ring structure on top of the central box similar to the throne on an astrolabe.
Complex Perspective Natural / Visual Perspective (2)	Form of perspective first identified by Leonardo da Vinci in which central rays falling between object and image point(s) are not symmetrical in terms of angular approach (includes all modern types of optical perspective in situations whereby a regular shaped 3-D scene/object is viewed/depicted either at a tilted/obtuse angle or else an irregular 3-D scene/object is viewed/depicted at almost any angle whatsoever).
Component Point Linear / Graphical Perspective	Reference to a drawing point used in subdividing the drawing surface, and projecting onto the picture plane from a plan, side-elevation, and/or auxiliary view the perspective or apparent position/length/angle of a line. See: central and linear perspective, breakthrough process, subdividing the drawing surface (in linear perspective), component point method, measuring point method, perspective (methods). See book: Felix Konig: Perspective in Architectural Drawings.
Component Point Method Linear Perspective Graphical Perspective Rectilinear Perspective Graphics Method Point Projection	**Component Point Method: Synonym for Rectilinear Perspective Method or Graphics Method.** A technique in graphical perspective construction used to map 3-D objects onto a 2-D surface. It is a method of subdividing the drawing surface, and projecting onto the picture plane from a plan, side-elevation, and/or auxiliary view the perspective or apparent position/length/angle of a line. It operates by projecting specific points of an object through a picture plane to a viewer's eye (point projection). **Key Details** • **Synonyms**: Graphics Method, Linear Perspective, Point-Projection Perspective. • **Methodology**: It utilises construction lines (orthogonals) that converge at vanishing points, often relying on a plan and elevation view to determine the precise location of points in perspective. • **Rectilinear Perspe**ctive: This refers to a projection that maintains straight lines in the scene as straight lines in the drawing, unlike curvilinear perspective. • **Elements**: The method is built on key components: the Horizon Line (eye level), Vanishing Points (where parallel lines converge), and Perspective Lines. See: central and linear perspective, breakthrough process, component point, subdividing the drawing surface (in linear perspective), measuring point method, perspective (methods). See book: Felix Konig: Perspective in Architectural Drawings. See book: Perspective Design by John Mauldin (1985).
Composite Perspective (1) **<< NEW Term >>**	Often, more than one category is involved simultaneously to produce a perspective view/image; named as composite perspective or category chaining, such as when we use a camera (instrument perspective) to photograph a natural scene (natural perspective), and then view the resultant photograph using visual perspective (2nd type).
Composite Perspective (2)	Refers to having multiple vanishing points (principal/primary type) in a single scene; and thus infers the overlaying or compositing of multiple perspective views (each snapshot taken at a different time and/or viewpoint location and hence with a different or separate principal vanishing point). See: multi-plane perspective, non-unified vanishing points, multi-view perspective, false perspective.
Composite Perspective Image (1, 2, 3, 4) **<< NEW Term >>** Cinema Mosaic Image Image Overlay Spatial Overlay Composite Image Combined Image Optical Special Effects	1. A perspective image formed by more than one category of perspective. See Composite Perspective (1). 2. A mosaic perspective image or apparently single depicted space, comprised of multiple image segments or views; each captured separately and then combined using image or spatial overlays/relays/masks; including optical or graphical 'segmented' field of view combinations or using mirrors/masks, etc., or alternatively the same process achieved using digital techniques. 3. Split / fragmented spaces: Use layered or multi-view approaches, for example, a cleft space for spatial manipulation, with actors at two different distances or planes from the camera. 4. A combined perspective image (alternative name for composite perspective (1, 2, 3, 4)). **Composite Perspective Images (type 2 examples)** **A. Composite Image: Rear projection:** Involves projecting images, often using projection mapping techniques, onto stage/object surfaces to create illusions of 3-D depth. **B. Composite Image: Front projection:** Image projection onto the front of an opaque screen, which is used as a filming backdrop. See: special effects, In-Camera special effects, visual effects, optical special effects.

TERM	DEFINITION	C

Composition
Cinematography
Photographic Perspective
Cinematic / Motion Perspective
Natural / Environmental Perspective
Instrument Perspective
	In cinematography, composition refers to the strategic arrangement of visual elements within a frame to create a visually compelling and meaningful image, guiding the viewer's eye.
	Explanation
	• **Arrangement of Elements**: Composition involves how actors, scenery, props, and other visual elements are positioned and relate to each other within the frame.
	• **Guiding the Viewer's Eye**: A strong composition directs the viewer's attention to the most important elements of the scene, creating a focal point and enhancing the narrative.
	• **Techniques**: Cinematographers use various techniques to achieve effective composition:
	  • **Framing**: How the scene is set within the film frame.
	  • **Camera Movement**: Tracking, zooms, pans, tilts, and handheld movements.
	  • **Depth of Field**: How sharp or blurry the focus of a shot is.
	  • **Depth of Space**: Layering components of the scene near and far from the camera.
	  • **Rule of Thirds:** Placing elements along the imaginary lines that divide the frame into thirds.	

Composition (Perspective)	Involves the harmonious arrangement of elements within a painting, photograph, or moving image, focusing on balance, unity, and the effective communication of the narrative or subject.	
Compositional Perspective (1) **<< NEW / REFINED Term >>** Composite Perspective Anamorphosis Leonardo da Vinci	In his notebook writings, Leonardo da Vinci identifies what he calls *composite* or *synthetic perspective,* which is a combination of perspective derived partly from art (graphics) and partly from nature (vision/optics). In this latter form of perspective, we may take into account that spatial objects/scenes viewed by natural perspective can differ (by design) from artificial perspective in distinct ways (e.g. by adjusting the geometry within a drawing to create a 'synthetic' perspective comprising elements of both kinds of perspective). One example, identified by Leonardo is *anamorphosis*, when 'wholly distorted' drawings are projected by optical perspective methods onto steeply angled and/or cylindrical-shaped surfaces, and thus transformed into entirely different, but often realistically proportioned, image forms. See: Natural perspective, artificial perspective, visual perspective, composite perspective, synthetic perspective, anamorphic perspective, linear perspective, Leonardo da Vinci.	
Compositional Perspective (2) **<< NEW / REFINED Term >>**	Combined perspective image/view in which we see both a 'universal' perspective wide-field image of a spatial scene, for example consisting of a ground-plan chequerboard perspective framework, and horizon line in the distance; plus being combined into a single image along with a 'particular' perspective image of (for example) foreshortened objects present in the aforementioned object space.	
Compound Microscope	The earliest known compound microscopes, which combine an objective lens near the specimen with an eyepiece to view a real and sharply in focus but magnified image, appeared in Europe around 1620. See book: Historical Aspects of Microscopy by Bradbury, S.; Et al. (1967).	
Compound-Eye Natural Perspective Animal Vision	Compound eyes are a type of visual organ found in many arthropods, including insects and crustaceans, that are made up of thousands of tiny units called ommatidia. Each ommatidium contains a separate lens, cornea, and photoreceptor cells that can distinguish colour and brightness. Compared with single-aperture eyes, compound eyes have lower image resolution; however, they offer a very wide field of view and the ability to detect fast movement and, in some cases, polarisation. **Compound eye types** • Apposition Eye - Anthropod • Superposition Eye - Lobster • Parabolic Superposition Eye - Crustacean • Other Eye - Trilobite • Pseudo-Facetted Eye - Scutigera Ommatidia	
Computer / Digital Perspective New Media Perspective	Since the late 1980s, digital computers and new media systems have begun a series of revolutions in perspective methods and related perspective images, forms, and the associated goals/functions of perspective. In particular, developments in fields such as Computer Aided Design, Computer Graphic Imagery, Special effects, Computer/Robotic Vision, the Internet, and the Global Positioning System, have changed the ways that visual images are captured, processed, networked/shared, viewed, and comprehended in a host of optical, virtual, or digital ways. See CAD, CGI, GPS.	
Computer / Robotic Vision Camera Perspective Computer Vision	Computer vision, a subset of artificial intelligence, allows computers to analyse visual data and interpret objects and events in real-world images and videos, often using machine learning models. The application of perspective techniques in AI's understanding of vision is still an open question.	

TERM	DEFINITION
Computer Ray-Tracing (1, 2) Digital Images Animation	**1. Computer Rendering of Computer Models** Ray tracing is a computer rendering technique that can realistically simulate the lighting of a spatial scene and its contained spatial objects by rendering physically accurate reflections, refractions, shadows, and indirect lighting, etc. **2. Computer Optical Design Program (optical instrument modelling)** A computer program for designing, modelling, and characterisation of an optical system.
Computer Reality	Refers to a spatial reality generated within a digital model. See: space, 3-D, 3-D display - design (1, 2), 3-D display - views (1, 2) , spatial reality.
Computer Screen (invention / capabilities) First interactive computer display	In 1963, Ivan Sutherland's Sketchpad revolutionised computer graphics by enabling real-time design on a display via a light pen, marking the advent of interactive graphics and related functions like manipulation, indexing, and exploration of spatial images. These techniques later developed into focus-plus-context methods within perspective views/images, using hyperlinks, forward/back/omni/ manifold links, exploration of magnification/minification, spans and scales of knowledge, macro/ micro views, facetted classification, etc. In sum, many new perspective-related fields have been built on, or based upon, the pioneering work of Sutherland, including CGI, CAD, SFX, etc.
Computer Screen / Monitor / Visual Display Unit [VDU] Instrument and New Media Perspective	A computer screen is also known as a visual display unit (VDU). A VDU is a device that displays information from a computer on a screen. **What is a VDU?** • A VDU is an output device that displays images generated by a computer • It's made up of a screen and a circuit board that processes input and output signals • The screen is usually a flat panel display like an LCD or LED See: 3-D display, volume display, LED/ LCD.
Computer Tomography (CT / CAT Scan) X-Ray Perspective Transparent Perspective	A computed tomography (CT) scan is a noninvasive imaging procedure that uses X-rays to create detailed pictures of the inside of the body. CT scans are also known as CAT scans. **Principles** • A patient lies on a motorised table that slides into a doughnut-shaped CT scanner. • An X-ray source rotates around the patient, taking a beam of X-rays through the body. • Detectors opposite the X-ray source capture the X-rays that pass through the body. • A computer interprets the X-ray data and creates images. **Applications** • Diagnosing disease, such as tumours, blood clots, and infections • Planning treatment • Evaluating the effectiveness of treatment • Checking for injuries, such as bone fractures and internal bleeding • Guiding biopsies and tissue aspiration
Concave V-Shaped Plane	Perspectivists have explored the characteristics of various types of projection planes. The simplest of these is a concave V-shaped projection plane consisting of two converging rectilinear planes that meet at an angle.
Concave, V-Shaped Plane Perspective	Any method of perspective that employs a concave, or v-shaped picture plane, to form images of a spatial reality.
Cone of Rays / Ray Bundle	Refers to a cone or bundle of light rays diverging from each object point.
Cone of Vision / Visual Cone Visual Field Visual Perspective (2nd type) Linear Perspective	**Cone of Vision: (preferred term) — [See also: Visual Ray (2)]. Synonym for Pyramid of SightVision** The cone bounded by the eye of the observer at its apex and by the field of vision at its base. The object and its surroundings must lie within a 'visual cone' whose angle at the apex does not exceed about 60 degrees. This includes height and width as projected onto the picture plane. To exceed 60 degrees causes distortion. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A, B), Centre of Interest, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2).
Cone of Visual Rays	**Cone of Rays: Pyramid of Sight / Vision — [See also: Visual Ray (2)]** The cone bounded by the eye of the observer at its apex and by the field of vision at its base. Synonyms: Angle of View (2), Angle of Vision (2), Area of Vision (A,B), Centre of Interest, Cone of Vision, Cone of Vision, Cone of Visual Rays, Field of View, Field of Vision (A), Pyramid of Vision, Pyramid of Sight, Viewing Angle (B: 2), Visual Cone, Visual Field, Visual Pyramid, Visual Ray (2).

TERM	DEFINITION	C
Conflict Illusion Perspective Illusion Visual Perspective Graphical Perspective Linear perspective Geometric / Mathematical Perspective Impossible Shapes Anamorphic Perspective Reverse Perspective Context Distortion Context Illusion Ames Room Depth Cue Conflicts	Conflict illusions, often explored through geometric perspectives, occur when visual cues within a 2-D image contradict our brain's 3-D understanding of reality, or when spatial depth cues conflict with direct object recognition. They utilise perspective lines, contrast, and shading to misrepresent size, shape, and position. Such illusions are "compromise" structures in which our visual system tries to resolve discrepancies in orientation, continuity, and depth. **Key aspects** • **Size Constancy Misinterpretation (e.g., Ponzo Illusion):** When two identical objects are placed on converging lines (representing distance), the brain misapplies "size constancy," viewing the object "further away" as larger. • **Impossible Shapes (e.g., Impossible Triangle)**: These drawings use consistent line angles (3-D perspective) in ways that cannot exist in physical 3-D space, creating a conflict between local, plausible parts and a globally impossible structure. • **Anamorphic & Reverse Perspective**: A drawing on a flat surface or in a corner creates the illusion of a 3-D object sticking out when viewed from a specific, often skewed, vantage point (Trompe-l'œil). • **Line-Angle Conflict (e.g., Poggendorff Illusion)**: The brain struggles to align a line that passes behind an object because acute angles are perceived as larger, leading to a "conflict" in recognising that a straight line is not bent. • **Context / Contextual Distortion:** A 3-D illusion is created by putting objects in a 2-D drawing of a hall or tunnel, causing objects to appear distorted based on their assumed distance. • **Visual-Cue Conflicts:** These arise in "Ames rooms" or other situations where perspective tricks us into seeing a rectangular room, causing people within it to appear wildly different sizes.	
Conflicting Perspective	Conflicting perspectives are opposing or contradictory views that people hold. They can arise when people have different values, goals, backgrounds, or opinions.	
Conformal Map Projection	Conformal map projections preserve local angles and shapes, enabling accurate small-scale representation, but distort area sizes. They are ideal for navigation and weather charting, making rhumb lines straight and meridians and parallels perpendicular. Key examples include Mercator, Transverse Mercator, and Stereographic projections.	
Conic Perspective (1, 2) Cone Perspective Linear Perspective	**1. Conic picture plane** Any method of perspective that employs a conic picture plane to form images of a spatial reality. Another related type is conic-section perspective. **2. Conical Perspective or One-Point Linear Perspective** Conic or conical perspective may also refer to a one-point linear perspective image, in which, if we capture or construct a view along a tunnel structure aligned with the axis of vision, everything converges (in an apparent cone-shaped view) onto a central vanishing point.	
Conic Planes	Perspectivists have explored the characteristics of various types of projection planes. A simple cone-shaped projection plane allows the projection of perspectival images onto either the inner or the outer surface of a cone.	
Conic Projection	**Synonym for the cone of vision.** So named because all the rays of light which enter the eye from the objects viewed may be considered as forming a cone of which the eye is the vertex. See: cone of vision, visual cone, visual pyramid.	
Conic Section	Section cut through a cone.	
Conical Equal Area Projection with One Standard Often a specific form of the Lambert Equal-Area Conic. Maps Cartography Mathematical Perspective	A Conical Equal Area Projection, maps a globe's surface onto a cone, preserving area but distorting shapes, especially away from the cone's touch line (standard parallel). **Explanation** • **Concept**: Imagine wrapping a cone around the Earth, with the cone touching the Earth along a line of latitude (the standard parallel). The projection then depicts the Earth's surface as if it were projected onto the cone. • **Area Preservation:** The key characteristic of an equal-area projection is that it accurately represents the relative areas of different regions on the map. • **Shape Distortion**: However, shapes are distorted, especially further away from the standard parallel, where the cone's contact with the Earth is. • **Standard Parallel**: The line of latitude where the cone touches the Earth. • **Applications**: Conic projections are commonly used for maps of mid-latitude regions, like the United States or Australia, where area distortion is less critical than shape distortion. **Example** The Albers Equal-Area Conic Projection is a specific type of conic projection widely used for mapping areas in the United States.	

TERM	DEFINITION
Conical Perspective / Projection (A)	Another name for linear perspective (one-point or central). See: linear perspective, one-point perspective, central perspective, chessboard perspective.
Conical Perspective / Projection (B) Visual / Graphical / Geometrical Perspective	Synonym for visual and graphical perspective in which the visual cone or pyramid is intersected by a picture plane or perspective window (or equivalent procedure in for example, camera/ instrument perspective). Another name for a central or linear perspective construction on a picture plane by taking a conical projection from object space onto a picture plane or perspective window. So named because all the rays of light which enter the eye from objects viewed may be considered as forming a cone of which the eye is at the vertex. See: central perspective, front/frontal perspective, visual perspective, camera / optical instrument perspective.
Conical Projection	See: Conical Perspective / Projection (A and B).
Conjugate Vanishing Points	Conjugate vanishing points are where two vanishing points are linked by a 90° relationship. They represent the convergence points for two sets of parallel lines (typically the horizontal sides of an object) that are perpendicular to each other in 3-D space.
Constancy (Visual) Visual Perception Depth Cue	Visual constancy is the ability to recognise that an object is the same even when its size, position, or orientation changes. **Types** • **Visual form constancy:** The ability to recognise a shape or object regardless of its size, position, or orientation • **Visual object constancy**: The ability to recognise an object from its image even when it's viewed from a different angle
Constructed Perspective **<< NEW / REFINED Term >>**	Synonym for a bifocal linear perspective construction, or early, somewhat inaccurate Renaissance perspective graphical constructions, that differ from modern "true" one-point or "true" two-point perspective by using two, usually centred, “false’ vanishing points for a single, generally flat, subject. This method, seen in works like Uccello's Nativity, often features a central, somewhat distorted, grid and two main vanishing points, often with a "horizontal" set of lines.
Construction Drawing	Refers to plans for object/scene/machine construction using the methods of descriptive geometry; or parallel perspective including primary or multi-views such as plan, elevation, etc. See: technical and engineering drawing perspective, parallel perspective, descriptive geometry.
Constructivism	Constructivism is an abstract art movement that emerged in Russia in the early 20th century. Constructivist art is characterised by its geometric forms, industrial materials, a modernist/ machine/technology-inspired style, and lack of decorative style.
Construzione Legittima Abbreviata	The term "costruzione legittima abbreviata" (abbreviated legitimate construction) refers to a simplified method of linear perspective, often attributed to Leon Battista Alberti, which acts as a faster, more direct alternative to the more complex costruzione legittima (legitimate construction).
Contact Casting Perspective	Form of physical perspective construction method in which a 3-D object comes into contact with (or is pressed into) a soft recording medium (such as cement), with the result that an ‘inverse’ 3-D ‘pattern’ of the original object is produced. This is a common process when casting multiple copies of metal bodies using molten metal poured into a ‘cast’ or pattern.
Contact Lens	A contact lens is a thin, curved lens on the cornea that corrects vision or serves cosmetic/therapeutic purposes, functioning similarly to glasses.
Contextual / Context Illusion Visual Perspective Graphical / Linear Perspective Geometric / Mathematical Perspective Conflict Illusion Anamorphic Perspective Reverse Perspective Context Distortion Ames Room Depth Cue Conflicts	Contextual illusions occur when the brain misinterprets an object's size or distance due to surrounding cues that suggest depth, as the visual system applies 3-D rules to 2-D images, misinterpreting the geometric context to calculate object size. **Principles / Mechanisms** • **Contextual Distortion:** The perception of target objects is distorted by surrounding elements (context stimuli), which affect spatial attention and low-level spatial coding. • **Depth Cues:** The brain interprets 2-D configurations (such as converging lines) as 3-D depth, causing it to misjudge the distance of objects. Consequently, objects that appear farther away are perceived as larger (size constancy). • **Attentional Shift:** The perceived location of a stimulus shifts away from an attended location (Attentional Repulsion Effect). • **Spatial Attention and Receptive Fields:** Attention spreads across a figure, compressing receptive fields of neurons in the brain, leads to distortions in the perceived spatial extent. **Examples** • Ponzo, Müller-Lyer, Ebbinghaus (Delboeuf), Poggendorff, Vista Paradox Illusion(s).

TERM	DEFINITION	C
Contextual Clue	Contextual cue refers to a 3-D depth cue. Synonym for: depth cue.	
Continuous Analysis	Reference to the application of geometry and lines/planes/solids (geometrical perspective) to probe and represent, spatial reality. See antonym: discrete analysis or numbers (algebraic perspective).	
Continuous Four Point Result / Continuous Perspective	A continuous four-point perspective is a way to draw a 360-degree picture using curved lines. It differs from other perspectives in that it uses curved lines to capture the world around you. See: 3-D Perspective (Artificial/Natural), visual perspective, instrument perspective, mathematical perspective, 3-D perspective (3): Spherical Panorama, 36-degree perspective, sphere of vision perspective.	
Contour	Traced Outline of a 2-D or 3-D Object. Defined as a 1-D Line Form (or 1-D Outline) that encloses a 2-D Form, 2-D Area, or else a 2-D Surface Form (or 2- D Outline) that encloses a 3-D Form or 3-D Volume.	
Contour Mapping Graphical / Mathematical Perspective	Contour mapping is a way to represent the Earth's three-dimensional surface in two dimensions using contour lines. Contour lines are lines on a map that connect points of equal elevation above sea level. They are used to show the topography of the land, including the shape of the terrain, the steepness of slopes, and the direction in which the ground slopes. See also: CGI, 3-D modelling, computer perspectives, ray-tracing, animation.	
Contours (Illusory) Visual Perspective (2) Perspective Illusion	Illusory contours are perceived edges that appear without a change in colour or luminance. They are a type of visual illusion that demonstrate how the brain actively creates features that aren't present in the light that hits the retina. The Kanizsa triangle is a well-known example of an illusory contour. Friedrich Schumann discovered illusory contours in the early 20th century. **Principles** • **Perception**: Illusory contours are perceived as complete shapes, even though parts of the edges aren't physically present. • **Development**: Children begin to perceive illusory contours around 3–4 months of age, but it takes until around 7–8 months for them to develop adult-like abilities. **Related concepts** • **Real contours:** Contours that are defined by chromaticity or luminance • **Gestalt psychology:** Friedrich Schumann's work on illusory contours influenced the foundation of Gestalt psychology	
Contra Zoom	Synonym for: the trombone effect, commonly known as a dolly zoom, or Vertigo effect,	
Contrast Perspective	Refers to how the apparent contrast between bright and dark areas of an object/scene are reduced with increasing distance as light rays (along the line-of-sight) are gradually extinguished whilst passing through the atmosphere. Also (in another related form), the outline of an object (outline structure) decreases with distance due to atmospheric perspective, reduced visual acuity, lower detected visual distinctiveness (resolution), and thus diminution of form, etc.	
Convention / Discovery Problem	A long-standing question within art, science, and philosophy; asks if perspective is merely a human convention, or else the discovery of a natural phenomenon. It may actually be one or the other, or sometimes both—and the answer given may depend upon the category/form of perspective considered. See: subjective/objective perspective, absolute perspective, origin of perspective, validity of linear perspective.	
Conventional Perspective	Another name for linear perspective.	
Convergence (perspectival)	Perspective convergence is the phenomenon where sets of parallel lines appear to meet at a single point in the distance. This point is called the vanishing point. This phenomenon is caused by diminution of size perspective and the corresponding size/distance law of Euclidean optics. See: central perspective, linear perspective, vanishing point, convergent perspective.	
Convergence of Eyes	“Convergence" refers to the inward movement of the eyes when focusing on nearby objects, serving as a depth cue and enabling distance estimation via triangulation. Convergence is known to operate as a depth-cue and provide animals with an objective measure of object distance using the geometrical method of triangulation (interpolated).	
Convergent Micropsia Illusion	Convergence micropsia is a type of micropsia where objects appear smaller due to excessive eye convergence.	
Convergent Perspective	Synonym for optical convergence (perspectival). See: recession of form perspective, convergence, central perspective, linear perspective, vanishing point (principal / primary).	

TERM	DEFINITION
Converging Lines / Converging Parallel Lines	In a perspective drawing, parallel lines that come together towards a single vanishing point (when projected onto the picture plane or are otherwise projected or viewed in perspective). See: recession of form perspective, convergence, central / linear perspective, one-point linear perspective, two-point linear perspective, vanishing point (principal / primary).
Converging Parallels Visual Perspective (2) Linear Perspective Vanishing Points	Perspective view/image in which a mutually parallel set of lines located in object space, extending into the depth dimension, appear to converge towards, or vanish into, a single vanishing point in image space. If these same mutually parallel lines are also orthogonal lines, or are co-planar parallel lines aligned approximately along the central axis of observation, then the result is that all such lines (appear to) vanish into (or approach) a single central vanishing point (CVP); the same being a primary/principal vanishing point (for orthogonal parallel lines). Yet physical space potentially contains an infinite number of object plane(s) arranged in a variety of (inclined and oblique/twisted) directions, each potentially also containing groups of parallel lines, thus each angled object plane can have multiple (apparent) secondary/auxiliary vanishing points.
Convex V-Shaped Plane	Perspectivists have explored the characteristics of various types of projection planes. One of these is a convex V-shaped projection plane consisting of two diverging rectilinear planes angled together.
Convex, V-Shaped Plane Perspective	Any method of perspective that employs a convex, or v-shaped picture plane, to form images of a spatial reality.
Coordinate Measuring Machine	A coordinate-measuring machine (CMM) measures the geometry of objects by probing their surfaces, commonly using mechanical and laser sensors, along with optical options.
Coordinate Protractor / Land or Military Coordinate Protractor	A Coordinate Protractor is a transparent template for navigation exercises that accurately displays coordinates on scaled maps. It works with MGRS, UTM, and other metric systems and features triangular cut-outs for map scales of 1:25,000 to 1:250,000. To use it, align the map with north, then extend a thread from the center hole to a location to read angular coordinates.
Coordinate System - Spherical	A spherical coordinate system specifies a given point in three-dimensional space by using a distance and two angles as its three coordinates. These are: • The radial distance r along the line connecting the point to a fixed point called the origin; • The polar angle θ between this radial line and a given polar axis; and • The azimuthal angle φ, which is the angle of rotation of the radial line around the polar axis.
Coordinated Integrated Perspective **<< NEW / REFINED Term >>** Digital and New Media Perspective	Co-ordinated perspective is a term that refers to the linking, joining-up or merging of multiple perspectives to form an integrated whole. There are many techniques for creating coordinated perspectives. For example, we can link or merge views from a single station point whereby techniques such as spherical perspective are used to obtain a full hemisphere of views from every direction surrounding an observation point of a dimensional reality. Other types are known that link motion perspectives etc. including multi-view, multi-scale, and multi-time perspective, etc. Notionally cinema is a coordinated perspective technique in which multiple perspectives (image frame sets) are captured as a sequence and later projected in the same sequence order creating a type of multi-timemotion perspective. Perspective images held on digital media lend themselves to being linked and combined in a near-limitless number of different ways.
Coordinatograph	A device that mechanically plots X and Y coordinates on a surface for mapping or electronic circuit design.
Copernicus, Nicolaus Astronomer Mathematician	Nicolaus Copernicus (1473–1543) was a Polish astronomer and mathematician who believed the sun was at the centre of the universe. This idea is known as the heliocentric model. **Copernicus's perspective** • The sun is stationary at the centre of the universe • The Earth and other planets revolve around the sun • The Earth rotates on its axis once every 24 hours • The Earth's axis tilts, providing seasonal variations • The distance between the Earth and the sun is small compared to the distance to the stars • The stars appear to move around the Earth because the Earth rotates **Copernicus's impact** • Copernicus's ideas were controversial at the time • His work is considered the beginning of the Scientific Revolution • His ideas led to new ways of reporting discoveries and experiments
Coplanar	Points are coplanar if a geometric plane contains them all.

TERM	DEFINITION	C
Coplanar Perspective	Refers to a specific type of perspective image/view of a spatial scene; whereby all of the viewed/ represented scene elements (e.g. spatial objects or scene outlines) are co-planar or resting on the same spatial plane. A classical one/two-point perspective image/view of a metric grid is an example of coplanar perspective on the ground plane; however, there are an infinite number of alternative forms with oblique, twisted and tilted planes in any possible direction (e.g. oblique/twisted/tilted metric grids).	
Copy Book Perspective	Refers to an artist's notebook drawings that are made in the form of a perspective construction/ representation of a 3-D space/object.	
Cork Screw Perspective	A type of perspective distortion in which the image/view of a spatial object/scene is rotated along the axis of observation, whilst simultaneously the eye/camera zooms-in towards (or outwards from) the object in question. The result is a kind of 'cork-screw' smearing of visual features that occurs either during the integration of a single snapshot, or across several frames in a moving image.	
Correct Perspective (A)	Synonym for linear perspective.	
Correct Perspective (B) **<< NEW / REFINED Term >>** True Perspective	The term correct perspective refers to the generation or application of a 'correct' or 'realistic' perspective view/image; whereby said projection is assumed to reflect the 'true' shape or most realistic/naturalistic appearance of the object/scene; the same being implicitly an image chosen from several other less-realistic images/views that are possible. Patently most real-world perspective images/representations (central, axiomatic, etc) involve visual distortion according to vanishing point position and hence changes to the appearance of depicted scene/object shapes, scales, positions, etc. Accordingly, a quest ensued to impose geometrical regularity to depicted forms in general, in an attempt to impose order, repeatability and to certify sight, measurement, and representation. See also: true perspective.	
Corridor Illusion Visual Perspective (2) Linear Perspective Size Constancy Texture Gradients Phycological Optics	A visual phenomenon where the brain misinterprets object sizes based on their placement in a receding hallway, causing distant objects to seem larger, exemplifying size constancy. **Principle** • Caused by depth cues, such as linear perspective and texture gradients. • Based on the idea that depth cues affect how we expect objects to appear in size. • However, the illusion is not solely caused by perspective and contextual cues. Other factors, such as the visual system's spatial anisotropies, are also important. **Examples** • In a picture of a corridor, a figure in the distance will appear larger than a figure in the foreground. • A cylinder at the front of a corridor will appear smaller than a cylinder of the same size placed farther back.	
Cosmic Perspective	A conceptual viewpoint, often adopted in cosmology and outreach, that emphasises understanding the scale of the universe and humanity's place within it.	
Cosmogram	A cosmogram is a flat geometric figure that depicts a cosmology, or the study of the universe's origins and changes. Cosmograms can be used for philosophical contemplation, meditation, inspiration, and to represent the structure of the Earth or Universe.	
Cosmograph	A cosmograph is a type of chronograph watch, and the Cosmograph Daytona is a specific model of Rolex watch. The word "cosmograph" is Greek and means "measurement of the universe".	
Cosmography	A detailed representation (or map) of the Earth or universe.	
Cosmolabe	An ancient instrument akin to the astrolabe, measured angles between celestial bodies.	
Counter Perspective (1) Graphical Perspective Instrument Perspective	Refers to a special kind of image scaling/distortion technique, or alternatively a physical object scaling distortion method, whereby for sets of objects seen in natural or recession perspective, at a particular aspect, and at increasing distances - then the physical scale of objects increases as the distance increases and thus to 'counter' the natural size diminution that would normally occur as depth increases. As a result object forms appear to have the same size as depth increases from the viewer, a technique that can aid clarity of perception when (for example) viewing alphabetical letters on an inclined plane such as a gravestone viewed at an angle, etc. See: perspective illusion, accelerated perspective, decelerated perspective, forced perspective.	
Counter Perspective (2) Photographic / Surveying Perspective	Synonym for plan view, or a view approximately perpendicular to the ordinary perspective projection, and in which perspective phenomena related to depth do not arise since the projection is orthographic (in relation to objects located on the horizontal ground plane for example). Relates to photographic/surveying perspective. See book: Generalised Linear Perspective by J.W. Gordon (1922). See also: cardinal fieldpoints.	

TERM	DEFINITION
Cousin, Jean **Artist**	Jean Cousin the Younger (1522–1595) was born in Sens, France. Just before his death, Jean the Elder published his noted work *Livre de Perspective* in 1560 which is one of the most famous on the subject of artistic anatomy and was printed many times into the late 17th century.
Coxeter, H. S. M. **Mathematician**	Harold Scott MacDonald "Donald" Coxeter (1907 - 2003) was a British-Canadian mathematician. He is regarded as one of the greatest geometers of the 20th century, who made important contributions to the theory of non-Euclidean geometry.
Crane Shot Camera Perspective Instrument Perspective Motion and Cinema Perspective	A crane shot is a camera shot taken with a camera mounted on a mechanical arm called a crane or jib. The crane can move the camera up, down, or across the scene. **How are crane shots used?** • **Dramatic reveals**: Crane shots can reveal a landscape or cityscape in a dramatic way. • **Ending a scene**: Crane shots can be used to end a scene, often by moving the camera upwards to reveal more of the set. • **High production value**: Crane shots can give a film a sense of high production value. • **Emotional impact**: Crane shots can create a sense of superiority, escape, or alienation. They can also be used to highlight a character's loneliness or fate. **How did crane shots develop?** • D.W. Griffith used a mobile counter-balanced elevator tower to create an early crane shot for his 1916 film Intolerance. • Small, mobile camera cranes became common in the 1930s, in musicals and spectacular scenes. • Technology has improved over time, and more economical (lighter/smaller structure) cranes and jibs are now available.
Crate (Drawing aid or construct)	A notional (imaginary) orthogonal box placed around a complex object to make it easier to draw.
Craticulation or Plotting Grid Method Graphical Perspective	Craticulation (also known as the grid method or framing) is a foundational technique used in drawing and painting to accurately transfer images, scale subjects, and construct 3-D space on a 2-D surface. It is an ancient technique used to scale up, scale down, or transfer an image by drawing a grid over a reference object/image and a proportional grid on the drawing surface. • **Purpose**: It ensures accurate proportions and placement of elements, making it ideal for copying, enlarging, or transferring sketches. • **Method**: A grid of squares is drawn on, or overlaid onto, the original object/image, and a corresponding grid (often in a different ratio) is drawn on the drawing paper. The artist then draws the content of each square, allowing them to focus on small, manageable sections rather than the whole, complex image. • **Applications**: It is particularly useful for complex compositions, portraits, or when transferring drawings from a sketch to a canvas.
Criterion, Rayleigh Resolution	The Rayleigh criterion defines the minimum resolvable detail in diffraction-limited optical images, where the first diffraction minimum of one source point coincides with the maximum of another. Thus, resolution is ultimately limited by diffraction to the order of the imaging wavelength.
Cross	See: cross perspective (2) entry.
Cross Perspective (1, 2, 3) Symbolic / Graphical Perspective Cross-eye / Cross-view 3-D Image Visual Perspective (2)	**Cross Perspective (1): Cross Cultural Perspective (symbolic perspective)** A cross-cultural perspective involves examining and understanding human behaviour, beliefs, and social practices from the viewpoint of multiple cultures, rather than just one's own cultural lens. This approach recognises that there are diverse ways of living, thinking, and interpreting the world. **Cross Perspective (2): Perspective view or image of a solid cross or hypercube** See artwork: Crucifixion (Corpus Hypercubicus) by Salvador Dali, 1954. **Cross Perspective (3): Cross Perspective (visual perspective)** "Cross visual perspective" refers to cross-viewing (or cross-eyed stereoscopy), a technique used to view 3-D images from a 2-D screen without special equipment by crossing your eyes. It involves forcing your eyes to converge so that the left eye views the right-side image, and the right eye views the left-side image, creating a 3-D effect. This technique, often used for cross-eye / cross-view 3-D images, works by creating a centred 3-D image, and exploits binocular vision.
Cross Section Perspective CAD Technical Drawing	Cutting plane graphical perspective image/view in which a surface plane cut is made across the object in any particular direction, and then all of the obscuring structural elements in a direction towards the viewpoint, are removed from the view, leaving the inside of the object visible from the cutting plane in a forward direction. This is a standard graphical technique in technical/ engineering drawing and on CAD systems.

TERM	DEFINITION	C
Cross-Eye / Cross-View 3-D Image	Cross-eye 3-D (also known as cross-viewing) is a technique for viewing stereoscopic images without special glasses by crossing your eyes until two side-by-side images overlap into a single 3-D one.	
Cross-Eyed Perspective Visual Perspective (2)	Refers to the misalignment of the eyes, or strabismus, where one eye turns inward (esotropia), outward (exotropia), or vertically (hypertropia/hypotropia), causing the brain to receive two separate images instead of one. **Explanation** • **Strabismus (Crossed Eyes)**: This is a condition in which the eyes do not properly align when looking at an object, leading to one eye turning in, out, up, or down. • **Esotropia**: A type of strabismus where one or both eyes turn inward (toward the nose). • **Exotropia**: Strabismus where one or both eyes turn outward (away from the nose). • **Hypertropia/Hypotropia:** A type of strabismus where one or both eyes are vertically misaligned (one eye is higher or lower than the other). • **Impact on Vision:** When the eyes are misaligned, the brain receives two different images, which can lead to double vision, poor depth perception, and in some cases, vision problems in one eye (amblyopia or "lazy eye"). • **Causes**: Strabismus can be caused by various factors, including muscle dysfunction, farsightedness, problems in the brain, trauma, or infections. • **Treatment**: Treatment options include glasses, patching, eye exercises, medication, or surgery.	
Cross-Hatching Drawing Technique Leonardo da Vinci Graphical Perspective	Cross-hatching is a drawing technique that uses lines that cross to create light and shadow. It's a classic shading technique used by artists to add depth to their drawings. **Principles** • **Create parallel lines**: Draw a series of parallel lines that are evenly spaced. • **Add a second layer**: Draw another layer of lines that are perpendicular to the first layer. • **Add more layers**: Add layers of lines that go in different directions to create deeper shading. • **Curve the lines**: Curve the lines slightly to follow the contours of the object you're shading. **Applications** • **Creating tone**: Used to create tone, which is how light or dark something is. • **Adding realism**: Cross-hatching can make drawings look more realistic and lifelike. • **Representing light and shadow**: Cross-hatching can be used to represent light and shadow, with the white representing light and the density of crossed lines representing shadow. **Origins** • Leonardo da Vinci was a classic cross-hatching artist.	
Cross-Ratio	In geometry, the cross-ratio, or anharmonic ratio, relates to four collinear points A, B, C, D on a projective line, defining line orientation and distance signs in Euclidean space.	
Cross-Staff (Surveyors)	Synonym for Jacob's Staff.	
Crystallographic Projection	Crystallographic projection is a method of representing crystal structures in two dimensions using a conformal projection, such as the stereographic projection. It's used to study the angular relationships between crystal faces and the symmetrical arrangements of atoms in a crystal.	
Cube in Perspective (A)	Refers to projecting a true (or realistic) perspective image of a cube in 1,2,3,4,5,6 point perspective. See: Parallel perspective, technical drawing, box method, degradation of a cube, non-perspective (2).	
Cube in Perspective (B)	A cube is known to have 12 edges all equal in length and to have a perfect square for each face, but when viewed (in linear or true perspective) the edges do not appear to be equal, nor do the faces appear to be squares (lengths appear foreshortened and angles are no longer right-angled).	
Cube NOT in Perspective	Refers to projecting a parallel perspective image of a cube, without convergence of lines to vanishing points, etc.	
Cube-Grid Perspective Non-Perspective (2) Graphical Perspective Parallel Perspective Dick Termes Termesphere	Synonym for Non-Perspective (2), and the starting point for the work of Dick Termes, who noted that it is possible to tile physical space (or a view of the same) using 90-degree cubical order or sets of tessellated and touching cubes. Indeed, we commonly do this, creating cities and cubical rooms with cubical-shaped objects and buildings, whereby the cube-grid ostensibly has no vanishing points, or at least when projected according to a type of parallel and/or 2.5-D perspective, it has no vanishing points, as in the computer game Minecraft. Dick Termes uses any number of cubes in order to construct a notionally low-resolution shape/scene comprised of just cubes; he then projects these in parallel (non-perspective) and/or true 1,2,3,4,5,6 point perspective to demonstrate perspective principles. See: Parallel perspective, technical drawing, box method, degradation of a cube, non-perspective (2), Dick Termes. See book: Perspective! For Comic Book Artists by David Chelsea. See book: Extreme Perspective! by David Chelsea (2011).	

TERM	DEFINITION
Cubist Perspective (A, B) Middle Distance Perspective Pablo Picasso Graphical Perspective	**Cubist Perspective is an Intermediate or Middle Distance Perspective (Ref. Fernande Saint-Martin).** **[A]: Analytical Cubism** Analytical Cubism, was developed by Pablo Picasso and Georges Braque (approx. 1908–1912), and is the first, austere phase of the movement. It is characterised by breaking down objects into fragmented, angular, and overlapping planes to show multiple viewpoints simultaneously. **[B] Synthetic Cubism** Synthetic Cubism, the second major phase of the Cubist movement (c. 1912–1914), shifted from deconstructing objects to building them up, or "synthesising," them from flatter, simpler shapes. Pioneered by Pablo Picasso and Georges Braque, this style is characterised by brighter colours, varied textures, and the innovative use of collage—incorporating materials like newspaper, fabric, and wallpaper directly onto the canvas. See: Semiology of perspective, work of Fernande Saint-Martin.
Cupola / Dome Perspective(s) Graphical Perspective	A common theme in perspective drawings and paintings is the depiction of interior views of churches. In particular, images taken from the inside of large cupulas or domes have involved the solution of complex optical/geometrical projection problems. Perspective methods have been used to evoke various illusions, such as false-dimensional spaces, etc. One famous example of such a use of perspective is the illusion of a false vault in the ceiling of the church of Saint Ignazio in Rome, Italy, created by the artist Pozzo.
Curious Perspective	Synonym for trick perspective.
Curved and Split Projection **<< NEW / REFINED Term >>** Curvilinear, Spherical and Panoramic Perspective Perspective Immersion (3-D space) Spherical / Curved / Cylindrical Screens Photography Cinerama Mixed Projection Perspective	Curved and split projection perspective techniques are used to manipulate 3-D scenes for immersive viewing, artistic distortion, optical/visual illusion, or to fit wide-angle views onto surfaces without extreme edge stretching. These methods range from artistic drawing techniques to complex computer graphics rendering for curved displays. **Key Concepts** • **Curvilinear Perspective**: This technique uses curved lines to mimic the fisheye view of the human eye, providing a more accurate representation of space than linear perspective. It often involves four vanishing points around a centre point, causing vertical lines to bend at the top and bottom. • **Split Projection**: In computer graphics, split projection involves breaking a complex, non-planar scene into multiple, smaller, connected perspective projection pieces (frusta). This allows for the rendering of large, immersive, or curved scenes without the distortion that would occur with a single, straight-line projection. • **Curved Screen Projection**: Used in home theatres and simulation, curved screens (e.g., Elite Screens Lunette) use a constant focal distance to increase immersion, reduce the "pincushion" distortion effect (where corners appear stretched), and provide a more uniform reflection. • **Applications**: In 3-D software (like CAD), this involves projecting curves onto a surface, which can be split at points of intersection or self-intersection.
Curved Perspective (1, 2, 3, 4, 5, 6, 7) **<< NEW / REFINED Term >>** Natural Perspective Visual Perspective (2) Graphical Perspective Instrument Perspective Curvilinear Perspective	Curved Perspective may refer to (at least) one of six possible visual effects. **1. Curved / spherical picture plane - sphere-of-revolution (object); or sphere-of-vision (scene)** First we have the use of a curved projection or picture plane; combined with imaging forming lens/ camera, etc; whereby two geometric effects are the result; firstly, the objects tend to be sampled from multiple angles simultaneously (sphere-of-revolution or partial multi-view), and secondly, the entire scene exists on a circular or cylinder-shaped canvas (sphere-of-vision for display of scene). **2. Curved Image distortions (flat picture plane - wide-field projection)** Curved perspective produces images that may suffer distortions resulting in a curvilinear shape to the images (especially at the outer field). **3. Curved ray perspective:** see this dictionary entry. **4. Curved space perspective: non-Euclidean object space, or image space.** **5. Curved vanishing line perspective (object space sourced).** **6. Curved vanishing line perspective (projection method sourced).** **7. Visual perspective (2nd type) is curved due to inward curved retina.** See: natural perspective, visual perspective (2nd type), artificial perspective, central perspective, curvilinear perspective, sphere of vision, sphere of revolution. See book: Curvilinear Perspective: From Visual Space to the Constructed Image by Flocon A., Barre A. See book: La Visione Sferica: The Spherical Vision, by Adrian Dan Elias (1973). See book: New Perspective Systems by Dick Termes (1998).

TERM	DEFINITION	C
Curved Projection Graphical Perspective Cylindrical Perspective	A system of drawing which represents the appearance of a 360-degree surround (or a field of view significantly greater than 90 and closer to 180 degrees or more). Like perspective views, curved views (normally) represent a localised visual field; they model the view from a single position in space (a single fixed viewpoint or a central/frontal perspective). Alternatively, a roaming eye or a station point can be used to combine multiple viewpoints or viewing directions into a single 'composite' optical panorama. Relates to a cylindrical perspective construction. See: circular and cylindrical perspective.	
Curved Projection Ray Perspective Graphical / Mathematical Perspective	Refers to an unusual class/form of perspective system, related methods, and resultant images, in which the light-rays used to project an image from object to image space are curved or non-linear in form. This implies a non-linear or non-Euclidean object space, which could be due to a strong gravitational field, as in relativistic light-ray distortions, or to a complex/experimental non-linear ray-tracing model used in a computer program (for example). Sometimes non-Euclidean object spaces can be implied, created, or imputed using curvilinear or spherical perspective projection methods (linear rays) to mimic the non-Euclidean visual space of a wide-angle scene or an expansive/curved perspective scene.	
Curved Vanishing Line (Object Space Sourced)	Refers to a set of **mutually parallel curved lines in object space** that appear to converge towards a single vanishing point in image space (surrounding a central vanishing line), whereby the (apparent and true) curvature of said lines originates in object space.	
Curved Vanishing Line (Projection Method Sourced)	Refers to a set of **mutually parallel straight lines in object space** that appear to converge towards a vanishing point in image space (surrounding a central vanishing line), whereby the apparent curvatures of said lines is caused by the projection method (ref. curvilinear, cylindrical, or spherical perspective method or system of projection).	
Curvilinear Perspective [A] Visual Perspective (2) Graphical Perspective Curved / Cylindrical Perspective	A type of central perspective in which the perspective scene has an overall curvilinear shape similar in form to the views projected by a fish-eye lens; and normally the image has 2-5 primary vanishing points (i.e. two or more of: central vanishing point (depth direction), left plus right, and top plus bottom, vanishing points). The theory and basic reasoning of curvilinear perspective is that wide or tall forms at right angles to our line of sight (ref. lateral direction) should undergo perspectival diminution towards their extreme edges. This is related to wide-angled views that curve when projected onto the human eye's retina in Visual Perspective (Type 2)). Thus, a wide wall should appear to taper (ref. size diminution) towards both left and right. William Herdman and Guido Hauck developed methods that rely on curvilinear recession across the picture field. See also: natural and visual perspective (2nd type), artificial perspective, curved perspective, cylindrical and spherical perspective.	
Curvilinear Perspective [B]: Azimuthal	System or method of azimuthal curvilinear perspective. Azimuthal curvilinear perspective is an advanced, multi-point drawing system used to project a 3-D, 360-degree, or wide-angle, hemispherical scene onto a 2-D surface.	
Curvilinear Perspective [C]: Cylindrical	System or method of cylindrical curvilinear perspective, whereby either: 1. A wide-angle spatial scene is imaged onto a convex cylindrical picture plane (multi-view perspective). 2. A wide-angle spatial scene is projected onto a concave cylindrical-shaped viewing screen. See: Cylindrical perspective, curvilinear perspective, panoramic perspective, 4-6 point perspective, Dick Termes, termesphere, spherical perspective, Flocon (Andrew).	
Curvilinear Perspective [D]: Deininger's	System or method of curvilinear perspective developed by Deininger. Artist Thomas Deininger employs perspective in a different, sculptural context. Deininger creates large-scale, 3-D installations from everyday waste materials. His work is designed to be viewed from one specific point, where the scattered, abstract, and chaotic materials coalesce into a precise, 2-D-like curvilinear image. This approach creates a highly specific 3-D illusion of a spatial scene. See: Cylindrical perspective, curvilinear perspective, panoramic perspective, 4-6 point perspective, Dick Termes, termesphere, spherical perspective, Flocon (Andrew).	
Curvilinear Perspective [E]: Flocon/Barr's	System or method of curvilinear perspective developed by Albert Flocon and Andrew Barr. See: Cylindrical perspective, curvilinear perspective, panoramic perspective, 4-6 point perspective, Dick Termes, termesphere, spherical perspective, Flocon (Andrew).	
Curvilinear Perspective [F]: Hauck's	Synonym for a curved artwork made onto a flat picture plane, or a curved projection or curvilinear perspective made onto the interior of a cylinder or the curved retina (for example); whereby this method was first developed and experimented with by Guido Hauck in the late 19th century. See: Curved Perspective, curvilinear perspective, spherical perspective, four-five point perspective.	

TERM	DEFINITION
Curvilinear Perspective [G]: Stereographic	System or method of stereographic curvilinear perspective. Stereographic curvilinear perspective is a, often, 5-point perspective drawing technique that uses curved lines instead of straight lines to represent 3-D spaces, accurately simulating a wide-angle or "fisheye" view. It projects 3-D scenes onto a 2-D plane by curving both horizontal and vertical lines, which helps maintain the structural integrity of shapes while offering a field of view of up to 180 degrees. In one form, a stereographic projection is a conformal mapping that projects a 3-D sphere (i.e. the Earth) onto a 2-D plane (the 2-D map) from a single perspective point (antipodal point).
Curvilinear Perspective [H]: Hyperbolic	System or method of hyperbolic curvilinear perspective. Hyperbolic curvilinear perspective is a variation of a drawing system used to represent 3-D scenes on a 2-D surface where straight lines are rendered as curves, mimicking wide-angle or "fisheye" vision. While the standard curvilinear perspective uses 4-6 vanishing points to map panoramic views, the "hyperbolic" aspect often refers to the use of hyperbolic geometry (such as the Poincaré disc model) to represent space with constant negative curvature. See: Cylindrical perspective, curvilinear perspective, panoramic perspective, 4-6 point perspective, Dick Termes, termesphere, spherical perspective, Flocon (Andrew).
Curvimeter Drawing / Measuring Tool Environmental Measuring Tool Opisometer Meilograph Map Measurer	A curvimeter is a tool used to measure the length of curved lines, such as on a map. It's also known as an opisometer, meilograph, or map measurer. **Principles** • A curvimeter has a wheel, a clock face, and a hand. • Can be on a small scale for mapping, or human-sized for environmental measurements • To measure a line, roll the wheel along the line. • The hand moves around the clock face, tracking how far the wheel has traveled. • The clock face is marked with measuring units, such as centimetres or inches. **Applications** • Curvimeters are useful for calculating distances between points on a map. • They can be used when planning trips, such as hikes or family vacations. • They can also be used by people in furniture design and interior design.
Cutaway Perspective Section	A technical drawing method (normally a parallel projection) whereby the object is sliced by an imaginary cutting plane right across its dimensional body and everything backwards from the slice is removed and hence a sectional drawing is produced that shows the inside structure of the object in a forward projected direction. See: section/sectional perspective.
Cutting Plane Method	A cutting plane is an imaginary, infinitely thin plane used in technical drawings and 3-D modelling to slice through an object, revealing internal features. See: technical and engineering drawing, descriptive geometry, parallel perspective, cutaway perspective, plan, elevation, sectional perspective, 1st angle and 3rd angle projection.
Cybernetic Perspective **<< NEW / REFINED Term >>** Literal / Symbolic / Metaphorical Perspective	A way of thinking about complex systems that uses the idea of feedback and communication to understand how parts of a system interact. It can be applied to a variety of fields, including design, learning, and personality. **Principles** • Cybernetics is the study of how systems communicate and control each other. • It's based on the idea that systems are constantly exchanging information, and that the effects of a system's actions are returned to the system as inputs. • The term comes from the Greek word kybernetes, which means "helmsman" or "cox". **Applications** • **Design**: Can help guide the design process by modelling it as a cybernetic system. • **Learning**: Can be applied to learning by drawing on insights from the study of living systems. • **Personality**: Can be used to organise personality factors into a cybernetic cycle. **Concepts** • **Feedback**: The effects of a system's actions are returned to the system as inputs. • **Circularity**: Systems are constantly exchanging information. • **Homeostasis**: A principle of cybernetics. • **Parsimony**: A principle of cybernetics. • **Single-loop and double or multi-loop/level learning (ref. AI)**
Cycloids	A cycloid is the curve traced by a point on a rolling circle and is a type of trochoid and roulette, analysed using polar coordinates.

TERM	DEFINITION	C
Cyclopian Eye Eye 3-D Visual Perception	After much theoretical work, scientists determined that 'all visual lines of both eyes are judged to point to one and the same projection centre, after the visual system has processed data from both eyes.' This projection centre is assumed to lie at the centre of the axis joining the centres of the two eyes, that is the interocular axis, and is referred to as the **cyclopian eye.** See: Cyclopian Eye - Visual Lines, Identical Visual Directions, binocular perspective.	
Cyclopian Eye - Identical Visual Directions Sight Line(s) / Plane(s) Binocular Perspective Visual Perspective (2nd type)	The law of **identical visual directions** states that every retinal point in the binocular field has a partner in the retina of the other eye with identical directional value (at least potentially and under certain commonly produced conditions). Whereby, we note that this real-time visual processing procedure is similar to the registration processes which must take place when passing an image through the optical image chain — and across multiple perspective categories/spaces; whereby a mathematical process of transposition occurs and for accuracy/precision these spaces must be aligned or posses regular geometrical relations (at least for object and final image spaces), enabling perspective measurements to be taken from the final image by use of an appropriately mapped image plate-scale or magnification, field of view, spatial position, and resolution factors, etc. See: Cyclopian Eye - Visual Lines, binocular perspective.	
Cyclopian Eye - Visual Lines Sight Line(s) / Plane(s) Binocular Perspective Visual Perspective (2nd type)	A key problem of human vision is how to reconcile the separately angled vision of two eyes with a single viewpoint. Each eye sees a different degree of distortion, in terms of angles and positional information, and hence the question arises as to how the visual system or mind is able to create one visual direction from two! Several solutions have been proposed, but perhaps the best is Hering's law of **identical binocular directions**. How the human visual systems solves such a problem might seem like an arcane and unnecessary detail of ophthalmology; but the fact that this key problem can be solved, and the details of how, are central topics in natural/visual perspective and also by extension artificial and synthetic perspective theory. Ergo, human vision is a strange and complex amalgamation of physical/physiological/psychological optics. In 1942, Hering identified what he called '**visual lines**': 'a visual line is the locus of all points fixed relative to the eye which stimulates a given point on the retina'. This defines a basic oculocentric direction, based on an imaginary Cyclopion eye located in the middle of right and left eyes, a direction which is also known as the '**visual axis**'. Whereby for any position of the eyes, all points on a particular visual line are normally judged to be in alignment, that is, to be geometrically superimposed even if at different distances. This is the law of oculocentric visual direction. See: Cyclopian Eye - Identical Visual Directions, binocular perspective.	
Cyclorama / Cyc **Backdrop Perspective** Photographic Perspective Cinema Perspective Synthetic Perspective Simulated Perspective	A cyclorama (cyc) is a concave curtain or wall at the stage's back, providing a volumetric background in theatre and film. Originating from the Greek "kyklos" (circle) and "orama" (view), it emerged in 19th-century German theatre and is now globally used. Made of canvas, muslin, or plastic, cycloramas also feature in photography and architecture. An infinity cyclorama allows a seamless, endless floor illusion. The Mandalorian employs an advanced cyclorama, or volume screen, in a virtual production environment for immersive filming. Cycloramas create an illusion of sky onstage, with lighting designers varying equipment and techniques for diverse effects. They can be front-lit or back-lit using translucent materials and "bounce" drops. Pairing with a "sharkstooth scrim" adds depth, and painted scenes may be used as backdrops. Notable examples include the 1932 Broadway production of Alice in Wonderland and the 2022 The Lion King, which used a cyc to enhance actors' presence.	
Cyclotorsion	Involves the eye rotating around the line of sight (ref. vertical line rotation and thus horizontal movement of eye). These (sometimes counter) rotations are not just for shifting gaze; they are essential for maintaining stable, clear vision and accurate depth perception as the head/eyes move to track objects in the spatial environment.	
Cylinder of Revolution Perspective **<< NEW Term >>** Visual Perspective (2nd type)	**Cylinder of Revolution Perspective: Synonym for Circle of Revolution Perspective.** The capability of a perspective system to produce multiple views of a 3-D object by orbiting or revolving in a cylindrical fashion around the 3-D object in question (looking-in/looking-at perspective). See: curvilinear perspective, cylindrical perspective, circular perspective, panoramic perspective, cylinder of vision perspective, hemisphere of vision, spherical perspective, Andrew Flocon, Dick Termes, termesphere, David Chelsea, sphere of revolution perspective, circle of revolution perspective.	
Cylinder of Vision Perspective **<< NEW Term >>** Visual Perspective (2nd type)	**Cylinder of Vision Perspective: Synonym for Circle of Vision Perspective.** Perspective system producing a complete cylinder-of-vision (looking-out/looking-around perspective). See: curvilinear perspective, cylindrical perspective, circular perspective, panoramic perspective, cylinder of revolution perspective, hemisphere of vision, spherical perspective, Andrew Flocon, Dick Termes, termesphere, David Chelsea, sphere of vision perspective, circle of vision perspective.	

TERM	DEFINITION
Cylindrical Equal Area Projection	In cartography, the normal cylindrical equal-area projection is a family of normal cylindrical, equal-area map projections.
Cylindrical Geometry	Geometry employed to produce a cylindrical perspective view/image.
Cylindrical Perspective ([A: 1, 2], B) **<< NEW / REFINED Term >>** Visual Perspective (2) Graphical Perspective Curved / Cylindrical Perspective Cyclorama Volume Display Volume Screen	**A: Cylindrical Perspective: Concave Screen / Display.** See: Volume Screen / Display (1,2,3,4). Any method of perspective that employs a cylindrical picture plane to form images of a spatial reality, or else being a method that in one way or another, employs a cylinder of vision, or a cylinder of revolution, to observe/represent and object or spatial reality, or else being one that creates a distorted cylindrical image in the lateral object plane but with the vertical plane parallel to the picture plane left unchanged/undistorted. Also refers to a large, concave, horizontal filming backdrop that surrounds foreground actors and staged content, allowing for the creation of distant scenic backgrounds. **1. Central / Multi-view / Cylindrical Perspective** A type of cylindrical perspective whereby the view is formed by looking in one cardinal direction, before rotating the viewpoint to another cardinal direction using a circular motion (or cylindrical motion); whereby 'conjoined' but actually separate cylindrical vistas can be explored. See patchwork perspective. **2. Unfolding / Curvilinear / Cylindrical Perspective** A type of cylindrical perspective whereby the view is formed by observing a view/image of a total cylindrical perspective scene such as one formed by looking through a glass ball, before then moving the viewpoint to another cardinal direction, and by moving the ball (and your own viewpoint) in a circular (or cylindrical motion); whilst looking at the image formed by the glass ball, whereby a smoothly infolding curvilinear and 'cylindrical' vista is produced. See curvilinear, spherical, glass and metal ball perspectives. **B: Cylindrical Perspective: Convex Screen / Display.** See: Volume Screen / Display (1,2,3,4). Refers to a large, convex, horizontal filming backdrop, shaped to enable digital object-like elements to project into the physical space of the foreground actors and staged content.
Cylindrical Picture or Diorama Concave Screen Visual Perspective (2nd type) Graphical Perspective	Cylindrical pictures for dioramas often feature panoramic, 360-degree scenes designed to wrap around a cylindrical enclosure (a physical space structure), creating an immersive, continuous background. These are images designed for humans and/or cameras to be located inside and/or to move about inside, and to look around at a circular or cylindrical panorama. They are frequently used for television and cinema, panorama dioramas, scenic backgrounds, or abstract geometric displays. Relates to a 360-degree cylindrical projection designed to create an all-encompassing view. See: diorama, cylindrical perspective, cinema perspective, cycloramacyc, spherical perspective, panoramic perspective, synthetic perspective, simulated and forced and accelerated perspective.
Cylindrical Picture Perspective or Diorama	Synonym for: a Cylindrical perspective (1) drawing. See: Cylindrical perspective (1, 2), diorama, cylinder of revolution perspective, cylinder of vision perspective, circle of revolution perspective, circle of vision perspective.
Cylindrical Planes	Perspectivists have explored the characteristics of various types of projection planes. A simple cylindrical projection plane allows the projection of perspectival images onto either the inner or the outer surface of such a cylinder.
Cymograph	An instrument for obtaining drawings from the mouldings of Gothic architecture.

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Alan S. Radley is scientific director of the Perspective Research Centre. Alan holds a Ph.D. in physics from University College London (University of London), where he worked as a post-doctoral fellow and lecturer in astronomy, at the University of London Observatory (1991-1996), plus worked as an optical designer for the Gemini Telescope Observatory in Hawaii. He was a research fellow at the Maastricht McLuhan Institute (2002-2020), and a scientist at NASA/ESA. Alan serves on several scientific committees for the International Association of Interactive Communication, and he is a member of the Editorial Advisory Board for Blue Herons Editions. Plus, he is a member of the scientific and organising committee(s) for the international Alaipo conferences and the CCGIDIS Communicability Symposia.

Alan's writings are spread across 50 publications, including 10 books; 2 treatises/monographs; 6 refereed chapters in books; 20 articles, 6 vision statements, plus he holds a granted patent for the '*Hologram Mirror*". Alan's book '*The Science of Cybersecurity*' was shortlisted for the *United Kingdom National Cybersecurity Book Awards* in 2022. Alan holds a Fellowship of the *Royal Society of Arts*.

Kim H. Veltman

Kim H. Veltman [1948-2020] was an author and consultant known for his contributions in the fields of '*Linear Perspective and the Visual Dimensions of Science and Art*', *Leonardo da Vinci Studies*, *The Implications of New Media for Scholarship, Culture and Society*, and the *History of the Alphabet.* Kim was scientific director of VMMI (Virtual Maastricht McLuhan Institute); and taught at the Universities of London, Toronto, Maastricht, Gottingen, Rome, Carleton, and York; was director of the Perspective Unit, McLuhan Program, Toronto (1990-1996), and director of the Maastricht McLuhan Institute (1998-2004).

The Perspective Research Centre (PRC) maintains the official archive of Professor Kim Veltman's lifetime publications. This incredible knowledge bank comprises 2.9 million words on perspective, Leonardo da Vinci, old and new media, and the history of the alphabet. Kim's writings are spread across over 400 publications, including 20 books, 4 major treatises, 82 chapters in books, 24 papers in refereed journals, 84 articles, 16 reviews, and 10 vision statements.

PRC Vision Statement (see introduction)

The **PRC Vision Statement** details our evolving vision for an *Institute of Perspective.* During the years 1975-1992, Kim Veltman produced several earlier editions of this document [1,2,3,4,5]; which explain Kim's plans for a *Perspective Institute*, which he founded and ran as the Perspective Unit at the University of Toronto (1990-1996), the Maastricht McLuhan Institute (1998-2004), and the Virtual Maastricht McLuhan Institute (2004 - 2020) [1,2,3,4,5].

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The Art and Science of Perspective

The Art and Science of Perspective book series is a source of deep insight on perspective. It covers **natural perspective** (how we see things) and **artificial perspective** (how we represent that concept in media).

Essential for ‘vision-based’ professionals: artists, photographers, filmmakers, architects, lighting designers, CAD engineers, digital content creators, 3-D/CGI/AI modellers, SFX/VFX and game designers, live/virtual/hybrid film production specialists.