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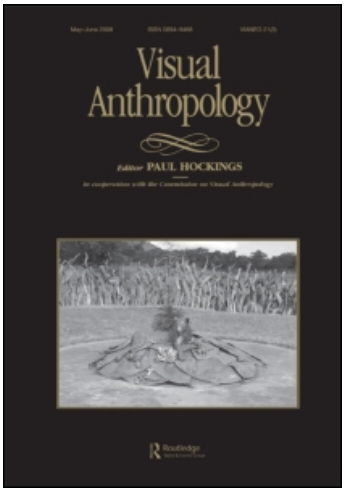

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Systems of Representation: Towards the Integration of Digital Photography into the Practice of Creating Visual Images

Terence Wright

This paper aims to set the foundations for an integration of digital photography into the broader framework of visual representation. The current climate seems to be marked by a preoccupation with contrasting the digital with the analog image. An alternative cross-cultural approach is proposed, employing "systems of representation" characterized by the wide range of strategies for communicating through the visual image that can be found in the anthropology of art. These take into account the optical principles of depiction and their cultural determinants. The paper aims to place the practice of the digital generation and manipulation of photographs at a point of convergence with a variety of other means of transcribing the three-dimensional world onto a two-dimensional flat surface.

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INTRODUCTION

In this paper I want to argue that the introduction of digital manipulation to photography, rather than creating a rupture from existing practices in visual representation (for example, bringing about the "death of photography" [Robins 1995: 29]) in practice has brought about a more gradual shift of emphasis. This is most clear if digital photography is considered in the broader framework of visual representation. Indeed digital imagery only appears to have brought about the "radical and permanent displacement of photography" [Mitchell 1992: 19] from the relatively limited viewpoint of an evolutionary approach to the history of art and a developmental view of culture. The alternative position, taking a wider global overview of the generation of visual imagery, would mean that digital manipulation would not be limited to occupying a disruptive position in the trajectory of Western art. I intend to show that the broader perspective that encompasses "world art" points to computer-manipulated photography achieving

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a greater potential through its integration, rather than its opposition, to existing visual practices: a gradual incorporation, rather than the heralded revolution in image-making.

Alongside other issues concerning the impact of technology on traditional cultural practices, technological change in visual representation is not only inseparable from economic, social and environmental issues, but results in "visual syncretism". In such cases visual representation can be viewed, not as static, but as adaptive systems responding to changes that occur in the fields of technology and existing representational practices. For example, the work of Gutman [1982] on Indian photography, which entails the compression of space and unique forms of composition; and that of Sprague [1978] which has aimed to show how certain African photographs are "coded in Yoruba" and containing information "about their cultural values and their view of the world".

DIGITAL PHOTOGRAPHY

In the field of art criticism, since 1915, the artist's expressionist agenda has been supplanted by formalist and structuralist theory which has increased the potential to locate any particular visual image within a general field of relational systems. According to the Russian Formalist critics [Lemon and Reiss 1965], images in poetry have never really changed, what has changed is the form of the poem. And if we are to apply this view to photography we might suggest that, despite technical innovations in photographic equipment and materials, the subject matter of photographs (and that of pictorial representation in general) has changed relatively little. We always have relied on (and continue to rely on) the camera to produce portraits, landscapes, images of war, etc. [Eastlake 1857: 442]. Nonetheless, the style of these images has changed over the years, and the photographer's approach to subject-matter has shifted with the tide of social and cultural change, as well as with the introduction of technical innovation.

Photography's latest technical development has been the introduction of digital imagery. The manipulation of the visual array of the photograph, that the "new technology" affords, has broken down the distinction between the "mechanical" representation and that brought about by "human agency": the *photographic* and the *chirographic*—to use psychologist James Gibson's [1979: 272] term—becomes blurred: there is no longer a clear separation of the image "captured" by the camera, from the "progressive trace" [Gibson *op. cit.*] drawn by the hand. In addition, for the present and the immediate future, we find ourselves in a situation where most viewers are likely to be unfamiliar with the procedures involved in processing of digital photographs. So Alfred Gell's [1992: 50] proposal that the photographer only gains prestige when "the nature of his photographs is such as to make one start to have difficulties conceptualizing the process which made them achievable with the familiar apparatus of photography" will not necessarily hold true for digital photography. For the moment, at least, the spectator's attitude to the digital image is likely to remain indeterminate or undefined.

Rather than considering "pure" digital photography in contrast to "pure" analog photography, the most interesting area of innovation currently is where

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the two practices converge. In taking a retrospective view of technical innovation in photography, we can see that it is rarely the case that a new process has immediately supplanted another. A process is introduced (or marketed) and taken up by a few individuals who see the potential and are prepared to take the risk. There can then follow a rapid expansion characterised by everyone "jumping on the bandwagon", followed by a very gradual tailing off, which may have been caused by the introduction of the next innovation. This process of technological change and innovation has been illustrated by Kubler's notion of the "battle-ship-shaped" curves [Kubler 1962], which describe how one social phenomenon runs concurrently with, and then takes over from, another.

In the early years of photography, the Daguerreotype, introduced in the early 1840s, spread rapidly over the next fifteen years or so, but had then contracted towards 1860. In the meantime the collodion (wet-plate) process had been introduced and was well established and in extensive use from around 1855 to the early 1880s, falling out of mainstream practice towards the turn of the century, as it became increasingly superseded by 1875's gelatin plate, and so on. For example, in the United States, S. Rush Seibert recalled the introduction of collodion photography, in tandem with the simultaneous practice and gradual decline of the former Daguerreotype process. Collodion "was immediately made a success and Daguerreotypes were laid aside in many establishments, although I continued to make them at intervals between 1840 and 1874" [Busey 1900: 93]. The change from the Daguerreotype process to that of the collodion involved a move from the once-produced unique image to the multiple reproducibility possible from a negative.

It has been suggested that the digital image's most radical departure from photography as we knew it lies in the rejection of the negative, yet the retention of extensive reproduction. In the case of photographs taken with digital cameras, there is no "original" image and all subsequent copies (unless deliberately altered) will be identical to the first.

> Scholars can often trace back through a family tree of editions or manuscripts to recover an original, a definitive version, but the lineage of an image file is usually untraceable, and there may be no way to determine whether it is a freshly captured, unmanipulated record or a mutation of a mutation that has passed through many unknown hands. [Mitchell 1992: 50]

Nonetheless the issue of the "original" art object regarding the manuscript has been discussed by Wollheim [1968: 22]. He questions whether the original artwork is the production of the opera, say, or—in the case of a novel—James Joyce's manuscript. He goes on to question how much we can change the production before it ceases to be the same opera or the "original" idea. Or should we assume that we base our judgement on the initial concept of the writer? Wollheim points out that in literature, music and the performing arts reference to the "original" version is not significant. It is only in the visual arts that the loss of the original (for example, the physical commodity of Leonardo's painting *The Mona Lisa*) results in a "lost work". So, similarly, the lack of an original in digital imagery may result in a shift of emphasis from the art-object to the art-concept, focusing attention on the underlying principles of creating the visual image as well as its social and cognitive functions.

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REALISM AND REPRESENTATION

Human beings have been communicating and representing their world by means of visual images for the last 35,000 years. The fact that so many pictures (tens of thousands) have survived from the Paleolithic period suggests that the activities of painting and drawing were widespread. By 10,000 BC, the activity of creating depictions had developed independently in locations as far apart as Australia, Africa, the Near East and Europe. In all these cases, we can safely assume that the images produced had some sort of communicative function, which in itself implies that visual images were understood by the members of the cultures that produced them, yet from a contemporary viewpoint our own understanding of this work is limited. The early cave paintings may have been formative attempts at creating a realistic record, perhaps used as simulations for "virtual reality" hunting exercises,[1] or have functioned in broader educational roles aiding recognition and recall. They could have had magical significance intended to increase the productivity of the hunt where they may have operated as totemic religious icons. Or perhaps they were able to liven-up day-to-day life [Ucko and Rosenfeld 1967].

Although the exact purposes of these images remain obscure, pictures in general, with their changing functions over the span of history, have formed an integral part of human culture. Among other uses, images have been employed as conveyors of information, symbols of devotion and sites of social interaction, or have provided means of discovering aspects of physical as well as psychological worlds. As Anthony Forge [1966: 23] suggests, we should "regard art and 'visual communication' as something more than a decorative icing on the heavy cake of social, economic and linguistic structures." From today's point of view, visual images have retained their status as playing a central role in contemporary life. In their symbolic role, as road signs, they guide us through the urban environment or, as video images, they can offer us an apocalyptic new realism by transmitting a cruise missile eye view as it reaches its target [Ritchin 1991].

During the time-span from the Upper Paleolithic to the present day, we have seen a wide range of styles, principles and criteria involved in the production and reception of these images. Traditionally, art historians[2] have regarded early artistic endeavor as amounting to crude attempts at transcribing a three-dimensional world onto a flat, two-dimensional surface. According to this view, artistic representation has "evolved" in its accuracy and complexity to result in a gradually developing record of the ways that society and the environment were viewed by those cultures. Not only did late Nineteenth Century theorists make much of superficial similarities to the images of the so-called "primitive" cultures of today, but also in support of theories of "recapitulation", Paleolithic art was identified with the paintings and drawings of children. This view, with its roots in Nineteenth Century evolutionism, believed that the development of visual depiction culminated in the pinnacle of realism characterised by systems of mechanical reproduction such as photography, movie film and today's experiments in virtual reality. Layton [1991: 3] describes this as the notion of "a single grand movement towards the art of the Renaissance or industrial society".

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The popular notion that seeing is believing had always afforded special status to the visual image. So when the technology, in the form of photography, was developed, this was considered not only to provide a record of vision, but the fact that it was able to produce the image as a permanent tangible object accounted for the extent of the medium's social and cultural impact. The chemical fixing of the image enabled the capture of what was considered to be a natural phenomenon: the visual array projected in the *camera obscura*. In short, it "reproduced with a perfection unattainable by the ordinary methods of drawing and painting, equal to nature itself...".[3] The invention of photography during the early Nineteenth Century offered the promise of a truthful visual record that (it was assumed) did not rely upon human intervention. Photography not only produced images that were based on the rationale of linear perspective, characteristic of Western visual representation, but the camera was considered to function by the same principles as the human eye. Throughout the history of visual representation, questions have been raised concerning the supposed accuracy (or otherwise) of the visual image, as well as its status in society. Ideas concerned with how we perceive the world and how this affects the status of its pictorial representations have been central concerns from the time of Plato to the present-day technical revolution of the new media communications. Theories of vision and representation have pursued interdependent trajectories, influencing each other throughout the history of Western culture. Indeed, Wartofsky [1980], has maintained that the beliefs derived from representational systems are central to determining a culture's theory of visual perception.

In many cases, where visual imagery is used to help realise concepts—in such fields as architecture, engineering and graphic communication—the type of visualisation provided by the camera is not appropriate and at worst can be totally misleading. The artist and designer have a range of representational strategies to fulfil the requirements of the task in hand. However, the use of a visual "system" does not depend upon function alone. There may be social, cultural, philosophical or religious criteria that can play an important role in determining the outcome of a representation. This is not limited to "style" alone, but can have a deep-seated basis in a culture's values and codes of behavior. All these can determine the scope and limitations of representational practice, as well as the choice of options available to the "artist".

The photographic image was held to be an achievement of a sophisticated culture and was thought able to produce "automatically" the type of image that artists had struggled throughout the centuries to acquire the manual, visual and conceptual skills to create. In this developmental scheme of things, every form of picture-making that had gone before, including the visual arts of "other" cultures, amounted to more or less approximate attempts at gaining the representational heights gained by the Western world. According to some Nineteenth Century theorists, just as children learned how to draw, starting with "primitive" scribbling and developing into sophisticated adult representations, so the representations of "others" were seen as mirrors of cultural and racial development. For example, the Victorian psychologist Sully [1895: 385] proclaimed, "it is ... incontestable that a number of characteristic traits in children's drawings

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are reflected in those of untutored savages". From this viewpoint, Western art demonstrated the development of the "correct" ways of viewing the world. In summary, the general regard the West has had for "other" cultures is reflected in the ways that Western scholarship has regarded the imagery of those cultures.

In contrast to this view, modern scholarship has been increasingly looking to visual representation as an activity totally integrated into the fabric of culture. As Morphy [1989: 1] has pointed out, this "sophisticated analytic approach coincided with changes in attitude to contemporary indigenous societies and the realisation of the complexities of their conceptual systems". From our contemporary viewpoint, upon taking a sideways glance at "other" (non-Western) cultures, we not only find that the production of visual representations is a universal activity, but despite the proliferation of photography and other lens-based media, there too exists a vast range of ways and means for transcribing aspects of experience as two-dimensional representations. Nevertheless, despite this long history and widespread practice of visual representation, relatively little is known about how visual images are actually able to communicate.

Until recently, the issue appeared fairly straightforward in that mainstream visual communication has been concerned with the pursuit of uncomplicated theories of "realism". Although this trend has continued through such developments as photography, movie film, television, holography and contemporary initiatives in "virtual reality"; innovations in computer technology have given rise to new forms of visual representation. At the very same time, the medium of television continues on a course of rapid global expansion, establishing the electronic camera in a central role within the "universal" medium of communication. The digital age has also led to an increased emphasis on the visual, over the traditional, written forms of communication. This dramatic renewal of interest emphasises an urgency to obtain a greater understanding of how visual images communicate, as well as their scope and potential to adapt to future technological and cultural change.

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SYSTEMS OF REPRESENTATION

In the foregoing section, reference is made to such terms as "depiction" and "visual representation and communication" in favor of using the term "art". This paper proposes a shift of emphasis away from art historical studies of visual imagery to a wider theory and history of "visual representation", which can include a broader spectrum of Western categories of architectural and engineering drawings, film and photographs, art and design, as well as a global diversity of picture-making traditions and new schema emerging with today's "digital culture". The "system of representation" also suggests that forms of visual image-making can be regarded as systematic—in that identifiable principles and criteria are involved in their production—and, in their cultural contexts, they serve social and cognitive functions. They can act as sites for human interaction as well as providing the means for understanding our environmental, political and cultural worlds.

Moreover, for many "traditional" cultures the concept of "art" does not exist. For example, in Australian Aboriginal culture, the activity of making pictures

forms an integral part of religious ritual and other day-to-day activities. The existence of "art" (as a specialism) and "artists" (as its specialists) is very much a Western preoccupation. And Flores [1985: 35] maintains that our experience of the "High Art" of Western culture fosters the creation of artificial divisions between the "representational" activities of other cultures. Many non-literate cultures recognise little distinction between "art" and "craft", and the Western notion of the pursuit of creating an object that is "beautiful", in contrast to making the "functional" object, has equally little relevance. And if we look to the performing arts for a comparison, we find that anthropologists have encountered great difficulty in differentiating between "performance", "ritual" and the enactment of "myth". In the case of visual representation, Küchler [1987: 238] describes the problem of using the Western term "art" for those visual representations which form part of a broader ceremonial activity: "The art is known under the indigenous term as *malangan*. It is a collective term for sculptures and dances as well as for the mortuary ceremony and ceremonial exchange". One solution to such dilemmas is Silver's [1979] conception of *ethnoart*, which attempts to adopt and employ those terms and concepts used by a particular culture. But even as far as Western artistic output is concerned, theorists such as Kubler [1962] have suggested that we might turn our attention to a "History of Things", whereby all manufactured objects can be regarded as "art". For our purposes this would present too broad a brush, for the purpose of this enquiry is to examine a phenomenon which essentially concerns visual representation in two dimensions.

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A central concern of visual representation is that the usual purpose of images is to "re-present" something other than themselves: some other "reality". For Munn [1973], artistic production is guided by structural principles which reflect cultural patterns. In these instances, visual images are able to reflect and promote the abstract social structures and concerns of a particular culture. Here the approach of Lévi-Strauss is extremely pertinent. He recognises little distinction between the *behavioral* and the *ideational*, which means that the performance of social and ritual activities (behavioral) is deeply entwined with myth and symbolism (ideational). So whether the activity is dance or painting—what we might call the *formal* aspects of behavior—the immediate observable structures cannot be regarded in isolation from the context of *expression* and the underlying *symbolism*—the deeper cultural or generative structures.

The problem of finding the appropriate terminology can be compounded by the lack of any universal or cross-cultural criteria for the interpretation and evaluation of artworks, whereby the Western avant-garde approach with its revisionist agenda runs in strong contrast to the relative conservatism of its ethnic counterparts. Indeed, the terms "innovation" and "creativity" assume very different roles in different cultures. Furthermore, over the past hundred and twenty years, the practice of making images, particularly under the heading of "art", has made it its business deliberately to revise and challenge its own traditions of practice. Weitz [1956: 439] characterises the process as "a decision on someone's part to extend or to close the old or invent a new concept (for example, 'It's not a sculpture, it's a mobile.')."

While we may live in a culture that has, for the last five hundred years at least, pursued verisimilitude, other cultural traditions have not been so concerned

with the representation of an "external" reality. For example, the Abelam of New Guinea have created carvings which do "look like" animals and birds, yet there seems to be little preoccupation with representational issues, other than how the carving operates within self-contained traditions of practice. The principles and criteria here are purely *formal*, so in response to questions concerning representational meaning or significance: "... the answers to questions are always in the form—'It is the way to do it', or 'This is the way our ancestors did it' or 'This is the most powerful (supernatural) way to do it'." [Forge 1966: 23] Similar questions concerning realism and formalism have come to play central roles in contemporary representation. Meanwhile, Firth finds in traditional Tikopian culture a contrast between the *naturalistic* and the *abstract* where "the bird of naturalistic form was of less ritual weight than its abstract presentation, the 'sacred creature'. The image of the bird in geometrical projection carried more emotional loading than the more literal presentation of it" [Firth 1992: 27].

Other systems involve multi-referential meaning whereby any one particular element of an image can signify any number of meanings. This may be open to the misinterpretation of a developmental view of art wherein artists of other cultures and periods have striven, with only varying degrees of success, to produce the sort of image that is produced by the camera. However, as has been noted by Boas [1927: 221–50], the "split representations" of animals produced by the North-West Coast Indians are not failures in perspective, but operate by a very different "system". The artist must include the numerous symbolic features of the animal which contain details of totemic groupings and information regarding individuals' social rank and status [Layton 1991: 153].

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COMPUTER IMAGERY AND VISUALISATION

The advent of the digital image has led to a greater need to understand not only how visual imagery provides information about human culture, but also how it places renewed emphasis upon the functioning of the human mind in the perception of the environment and its visual images. Digital processing provides new models of visual perception and challenges the veracity of the visual image. As human culture has increased in its complexity, it is becoming more and more evident that a one-size-fits-all mode of representation is less and less of a viable option. Visual representation is not only inextricably linked to cultural criteria, but abides by its own principles and internal logic. For example, we should regard Mediaeval art as, "not a childish or irrational way of recording visual experience, for our eye does not dwell on a single point, but moves, and we move and a procession of objects passes before it" [Clark 1949: 29]. And while we may strive towards greater realism, aiming for exact reproductions or creations of virtual realities, our concepts and criteria for verisimilitude have always been governed by cultural requirements and aspirations.[4]

There is a need to address the importance of cultural differences in media representations, in particular the variety of approaches to the psychology and anthropology of visual communication that have occurred over the past fifty

years. Traditionally, in the psychology of visual perception, studies have been polarised between unproblematic realism and conventionalism, neither of these directly addressing the scope and limitations of visual representation. Similarly, anthropological studies, seeing visual representation as having little relevance to "social facts", took theoretical approaches to visual images which were identified with those of material culture. These studies became restricted by diffusionist assumptions to dwelling on issues of post-production cataloging. At the same time, the institutions and practices of the Fine Arts have categorised and marginalised the esthetic schemes of "other" cultures as "Ethnic Arts" or "Primitive Art" [Hiller 1991]. However influential they have proved for Western artists, they are frequently regarded as the product of basic craft skills and as "primitive" in nature: critical evaluation in this area might be described as having been limited to "Primitive Formalism". Since the 1960s not only have indigenous art-forms attained new importance and self-consciousness for minority groups, but also, with the widening of access to the media, cultural traditions, styles and influences are becoming increasingly significant [Graburn 1976].

CASTING LIGHT

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Photography provides a useful "embarkation point" from which to address the significant issues arising from the broad range of schemes and systems of visual representation that exist throughout the world's cultures. Yet if photography has not entirely achieved the status of the "universal language" as propounded by photographer August Sander [1933], "Even the most isolated Bushman could understand a photograph of the heavens", it might be considered to be a universal system of representation. We normally expect a photograph to offer us an accurate and straightforward two-dimensional representational image that has a fairly close correspondence to the ways we perceive events in the world. Furthermore, it is often considered that the mechanical nature of the camera accounts for the "automatic" transcription of the three-dimensional world into pictorial form. Our identification of the scope and limitations of photographs can provide the theoretical foundations for addressing other, less familiar, systems of representation.

Photography is based on a projection system, whereby the light rays emitted by an object and scene are cast onto a two-dimensional surface: a principle which was observed by Aristotle as far back as 320 BC [Ross 1927; Eder 1945: 36]. However, the casting of light has played important roles in human history. It was not only central to some of the principles that governed the construction of ancient earthworks such as Stonehenge, but the shadows cast by objects on a flat surface—the origin of the *orthographic* projection—has been a basic source of picture-making since the Paleolithic. This relatively simple form of image-making, which does not rely upon the camera, has the advantage of not being subject to some of the problems that arise from photographic hardware: for example, lens distortions and foreshortening. Images produced by this means are not restricted by the notion of a frame, but are bounded only by the expanse of an irregular picture surface: a cave wall, for instance. In addition, the *camera*

obscura is "architecturally dependent" in that the phenomenon is most likely to be observed only by people who dwell in geometrically consistent, flat-surfaced buildings. Although, apparently during an eclipse, images of the sun can be cast onto the ground through the foliage of trees [Minnaert 1993]. Nevertheless, it is one thing to observe a "natural optical phenomenon", it is quite another for a culture to decide to incorporate it into a system of visual representation, let alone give it a central role. "Other" cultures have adopted systems of representation that employ different criteria. Japanese painting, for example, has employed multi-view points and the *oblique* projection system. Other representational strategies, such as cave art, emphasise other pictorial criteria, for instance that the image has no definable boundaries nor anything resembling a frame. So we can consider the tradition of representing the world through the boundary of a rectangle as being a peculiarly Western urban phenomenon: "Chinese painters like Chou Ch'en never considered that they should portray nature as if it were seen through a window, and they never felt bound to the consistency of the fixed viewpoint demanded of their Western counterparts" [Edgerton 1980: 187].

However, although orthographic projection involves a one-to-one mapping producing an image that does not vary in size or shape from the object it represents, the system does pose a number of restrictions upon the artist—that it is only through recording the sitter's profile that a recognisable portrait can be obtained and it is usual for the "Egyptian style" to be adopted for a clear depiction of the full figure. For the sake of argument in the *orthographic* system of representation, the sun's rays, upon striking an object on the Earth, can be considered as parallel. This means that, irrespective of the distance of the object from the picture surface, the depicted object will always be projected as the same size as the original. However, for the moment, there are two points of central importance to this system: only to an extremely limited degree is it possible to place objects in pictorial space, and the representation itself has no central viewing point and exists without having any integral concern for the viewer. This contrasts with the role of *linear perspective* systems in creating dramatic illusions, such as Andrea Pozzo's painted ceiling in Sant' Ignazio in Rome, discussed at length by Pirenne [1970].

At face value, it would seem that a type of "technological determinism" is responsible for the formation of pictures, whereby it is a culture's theory of vision that determines its modes of visual representation. And we can see there is indeed a close analogy between Plato's ideas regarding the nature of the world and the prevailing canons of visual representation. In his case, he was expounding his philosophical analogy of shadows cast on the wall of the cave at a point of transition in visual imagery from systems based on *orthographic* projection to those of *oblique* projection. Two thousand years later, Kepler's theory of vision, as well as the visual arts of the Sixteenth and Seventeenth Centuries, were closely associated with Descartes' philosophical standpoint. Furthermore, much of our contemporary computer technology, by means of virtual reality head-sets for instance, is devoted to simulating our current understanding of perceptual input. And this image was considered to be a very close approximation to that which we actually see. The chemical fixing of the image enabled the capture of what might be considered a natural phenomenon: the *camera obscura's* image.

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However, the important point for photography is that a theory of pictorial representation evolved which had a firm basis in the current understanding of the optical and physical mechanisms of vision. In our present age of computer technology we have inherited this tradition of developing representational systems that aim to replicate our current understanding of visual processes. A significant change in perceptual theory occurred in the 1950s in the work of the psychologist James J. Gibson. During World War II, it was Gibson's encounter with the problem of landing aircraft on moving carriers that led to his rethinking of visual perception. Indeed, such an approach to perception, derived from flight simulation, has taken on additional contemporary relevance in the creation of virtual environments [Reingold 1991: 143–44]. The development of Gibson's theory is most clearly described in his *Ecological Approach to Visual Perception* [1979]. The existing theories of perception did not provide an adequate account of how organisms could find their way around their environments. In particular it is Gibson's concept of the active exploratory perceiver that is most relevant to notions of computer interactivity.

CONCLUSION

This paper has suggested that the assimilation of digital imagery into existing practices of visual representation has shifted the emphasis away from the notion of "traditional" media: photography, painting, drawing, etc., to a broader consideration of systems of representation. These are characterised by the range of picture-making systems, together with their integration into the particular social and cognitive roles, that are found in visual representations functioning in "other" cultures and different historical periods. In this context, photography offers a relatively limited range of projection systems for transcribing three-dimensional space. Rather than limiting photography's ability to record a "truthful" image, computer manipulation has the potential to broaden the repertoire of the photographic system and to enrich photography's scope and ability to describe the visual world. The dichotomy of photographic "truth or lies" does not arise—photographs have always been subject to mis-representations—or "infelicities", as the ex-newspaper editor Harold Evans [1978: 227] rather coyly has described them.

In 1992 William Mitchell pronounced, "from the moment of its sesquicentennial in 1989 photography was dead" [1992: 20]. This statement was no doubt intended to echo Delaroche's 1839 statement at the announcement of the invention of photography "from today painting is dead". If there are any parallels to be drawn, or lessons to be learned, over the century and a half, the statement is incorrect. Painting did not die in 1839, nor did photography die in 1989. Nonetheless, painting was never to be quite the same again—and, like painting, we find our whole conceptual outlook through the medium of photography has been irrevocably changed. Photography too will no doubt seek new applications and a modified role. The encroachment made on professional practice by the digital image mean that photography can no longer be regarded as a "window on the world", but then it never really was.

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NOTES

1. E.H. Gombrich [1950: 23]: "these primitive hunters thought that if they only made a picture of their prey—and perhaps belaboured it with their spears or stone axes—the real animals would also succumb to their power."
2. Gombrich, for example, [1950: 20] suggests, "All that is needed is the will to be absolutely honest with ourselves and see whether we, too, do not retain something of the 'primitive' in us."
3. Quote from Gay-Lussac's report to the Chamber of Peers, 30 July 1839, from Eder [1945: 242].
4. For example, Kühn [1923] has suggested that illusionism in the arts results from social systems based upon exploitation and consumption.

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