

**E. H. Gombrich, *Illusion and Art* R. Gregory and E.H. Gombrich (ed),
Illusion in Nature and Art, London, 1973. [Trapp no.1973C.1]**

If, in Whitehead's famous words, the history of philosophy is a series of footnotes to Plato, this essay may be described as a footnote to the memorable passage in the Republic in which Plato prepares the ground for the banishment from the ideal State of all the arts which pander to the 'lower reaches of the soul':

'Of what are you speaking?' 'Of this: The same magnitude, I presume, viewed from near and from far does not appear equal.' 'Why, no.' 'And the same things appear bent and straight to those who view them in water and out, or concave and convex owing to similar errors of vision about colours, and there is obviously every confusion of this sort in our souls. And so scene-painting in its exploitation of this weakness of our nature falls nothing short of witchcraft, and so do jugglery and many other such contrivances.' 'True.' 'And have not measuring and numbering and weighing proved to be most gracious aids to prevent the domination in our soul of the apparently greater or less or more or heavier, and to give the control to that which has reckoned and numbered or even weighed?' 'Certainly.' 'But this surely would be the function of the part of the soul that reasons and calculates.' 'Why, yes, of that.' 'And often when this has measured and declares that certain things are larger or that some are smaller than the others or equal, there is at the same time an appearance of the contrary.' 'Yes.' 'And did we not say that it is impossible for the same thing at one time to hold contradictory opinions about the same thing?' 'And we were right in affirming that.' 'The part of the soul, then, that opines in contradiction of measurement could not be the same with that which confirms it.' 'Why, no.' 'But, further, that which puts its trust in measurement and reckoning must be the best part of the soul.' 'Necessarily.' 'This, then, was what I wished to have agreed upon when I said that poetry, and in general the mimetic art . . . associates with the part of us that is remote from intelligence . . . an inferior thing cohabiting with an inferior and engendering inferior offspring.' 'It seems so.'

(*Republic* X, 602-3; Tr. Paul Shorey (Loeb).)

It is likely that Plato's diagnosis was influenced by developments in ancient art which demonstrated for the first time in human history the power of painting to deceive the eye, notably in scene painting. In ancient Greece and Rome this power continued to be the subject of countless comments and anecdotes. It is significant, in the light of Plato's assessment, that the capacity of paintings to deceive animals is so frequently singled out as a test of their excellence. Sparrows came to pick at the grapes painted by Zeuxis, a stallion attempted to mate with a mare painted by Apelles, the painted picture of a snake silenced birds and so on.[29] This emphasis on animal reactions could only be grist to the mill of those critics who spurned the claims of illusion. There is a charming little dialogue by Goethe, 'On Truth and Verisimilitude in Works of Art', in which he dismisses all the talk about deceiving the eye as 'sparrow aesthetics'. By now Platonism has been victorious all along the line and it seems that even an interest in the problems of illusion carries the taint of vulgarity. To take the problem back into the study of painting seems like discussing ventriloquism in the study of dramatic art.

I shall argue here that Plato was right in his diagnosis that illusion has something to do with 'the lower reaches of the soul', but I shall also argue — if indeed this point still has to be argued — that these lower reaches are the subject of very legitimate interest to psychologists and philosophers. Whether or not ventriloquism has anything to do with art, the compulsion to attribute the words we hear to the mouthing dummy remains intriguing and instructive. I should like to make this point at the outset because I cannot help suspecting that the new opponents of the concept of illusion in art are unconsciously influenced by the Platonic tradition. I am referring to those contemporary philosophers

of art who, like R. Wollheim,[41,42] Nelson Goodman [21] and M. Polanyi [31] have in their various ways denied what one might call paradoxically the reality of illusion in front of a painting. I cannot here enter into all the subtleties of their argumentation, but I fully agree that in looking at a seascape hanging on the wall of a museum we are never tricked into mistaking the painting for a window opening out on to the real sea. If this were the only legitimate meaning of the term 'illusion' the matter could be regarded as closed and the problem dismissed. I do not think that this can be done, but I must acknowledge that these philosophical opponents of illusion have been joined by one of the leading students of perception, J.J. Gibson, who has expressed his conviction that the visual perception of reality can never be mediated by painting.[5] Gibson's doubts are explained by the emphasis he places in his theory of visual perception on the effects of movement and on the importance of 'gradients' of texture for the visual information we pick up from the environment and which could never be fully simulated in a painting.[4] His objections are certainly the most weighty so far put forward, and have to be taken into account, though a more detailed response to his argument will be published elsewhere.[18]

I should perhaps confess that I feel both gratified and puzzled by the attention which my discussion of illusion has been accorded, for it had never been the central issue of *Art and Illusion*. The title of the lectures on which that book is based was 'The Visible World and the Language of Art' which approximates more nearly to a description of its topic. It so happens, however, that my publishers found this rather a mouthful, and since they also wanted to retain the word Art in the title I drew up a lengthy list of simple alternatives from which the final title was picked by a friend. We never dreamed that this title would convey to some that I considered illusion, or even deception, the main aim of art. In art-historical writing the term illusionism has no such connotations. It was introduced by Franz Wickhoff in 1895 in his famous publication of the Vienna Genesis, an early Christian manuscript, to characterize the deft style of brushwork which had survived from Hellenistic times. The idea that anyone should have confused the illustrations of the manuscript with reality obviously did not enter his mind. What he wanted to convey, quite rightly, was the difference between this style and other, less illusionistic, methods. Far from being an all-or-nothing affair, illusion in these contexts is always a matter of degree. But since the issue has been raised and the debate has been joined, I must welcome the opportunity of making my views on illusion more explicit in an essay devoted to restatements and further speculations.

For this purpose the problem of the seascape on the wall appears to me too complex to tackle at once. It represents a three dimensional and changing view by flat and immobile pigments. As such it cannot be an imitation. The matter is of course different when it comes to imitating a three-dimensional object in three dimensions or a two-dimensional object in two. I always remind those who doubt this possibility of the existence of forged bank notes. Philosophically this problem of a faithful 'facsimile' is hardly very interesting. Granted that there may always be methods of distinguishing the imitation from the original, for instance under ultra violet light or by other methods of analysis, agreement should not be difficult on the point that a facsimile can be sufficiently accurate to deceive the naked eye. But whether the deceptive appearance also deceives us depends of course on a variety of extraneous circumstances. If the British Museum were to exhibit a facsimile of Shakespeare's signature as the original, most of us would be under the illusion that we had seen the real thing. The same facsimile in a book on handwriting would deceive nobody. Mediaeval worshippers of relics were certainly under the illusion that the bones they saw or touched were those of saints. We obviously must distinguish between an accurate imitation, an illusion and a false belief.

His Masters Voice

There is a branch of modern technology where these distinctions can be easily exemplified. I am

referring to the reproduction of sounds rather than of sights. Without asking for the blessing of philosophers and psychologists, the gramophone industry has set out to create the perfect illusion of listening to a concert. The listener for whom it caters is not in the position to compare the original performance with the reproduction. What he wants is to have the feeling that the performance might have sounded that way. It probably did not; artists have taken to making a composite recording from various performances which are spliced together to achieve a flawless version. Theoretically it is even possible that the equipment slightly distorts the pitch by playing somewhat faster than the performers. None of this need affect the impression at which the Hi-Fi enthusiast is likely to aim, that what comes out of the loudspeaker gives him the illusion of being actually close to the musicians. In this context nobody doubts that this illusion is really a matter of degree — witness the terms in which stereo equipment and other devices are advertised as enhancing the illusion. Not that this illusion is a delusion. We do not believe that the London Philharmonic Orchestra is actually sitting in or behind the black boxes. What we say is, 'If you close your eyes you might actually believe that you are in the concert hall.' We do not have to ask here why closing the eyes is supposed to enhance the illusion. It obviously does not change the auditory impression, but it cuts out the visual impressions which tell us that we are not in a concert hall. In other words we deliberately switch off some of the means we have at our disposal to check the testimony of our ears. We do not want to employ all the resources of critical reasoning because we wish to surrender to our imagination and fancy ourselves in the presence of the great performer. This is what Coleridge so beautifully described as 'the willing suspension of disbelief' — and what Plato despised as a sacrifice of the higher faculties in favour of the lower reaches of the soul. Perhaps the illusion merchants actually agree with him — for is not the most famous trademark of any gramophone firm the picture of the dog listening to 'His Master's Voice'? The picture makes the same claim for illusion by appealing to the reaction of an animal that the ancients made for masterpieces of painting. It so happens that neither of these claims is as unbelievable as they were both once thought to be. Animals certainly can be deceived by recorded voices, and they also react to representations. There is experimental material demonstrating that pigeons can be taught to respond to the presence or absence of human beings in photographs. 'They were trained to peck one disc if there was any sign of a human being in the photograph, and another if there was no sign. It was found that the most fragmentary, and presumably unfamiliar, aspects of the human being . . . were sufficient to cause the birds to give a positive response'.^[35] Similar results have been achieved with monkeys.

Professor W.H. Thorpe who drew attention to these facts in a recent paper has been kind enough to place the following more personal observation at my disposal. It suggests that the Stories of animals responding to paintings need not be mythical:

'On 1 September 1952 my family and I were staying at the Moorings Hotel, Burnham Overy Staithe, Norfolk. We had with us a Shetland Sheep Dog bitch named 'Tessa', then three years old. On this day she apparently saw for the first time an oil painting of Mr Phillips senior, hanging on the dining room wall. She was sitting on the floor about 10 or 12 feet from the picture when she looked up at it with ears cocked and growled several times. There was no one at that end of the room at all except myself and my daughter Margaret. We were sitting at a table by her side. It was perfectly evident that she was growling at the picture, as she stopped directly I distracted her attention but started again as soon as she looked at it again. Margaret picked her up and carried her towards the picture and she growled again in Margaret's arms a number of times. She also growled again several times when she was put back on the floor. We then left the room. There was no reaction at dinner time that evening but the room was then crowded and noisy. The picture is an oil painting (half-length figure portrait). The sitter is leaning slightly forward, on folded arms, looking straight out into the room in a rather striking manner. It measures approximately two-and-a-half by one-and-a-half feet and the head itself

is about 9 ins. by 5 ins. Tessa had been in the room many times during the previous two weeks but until two days before we had always sat at a table the other end of the room and she would probably not have seen it at all easily or clearly. Moreover she normally sat right under the table at meals. This also probably explains why she had not responded the previous day. As we have no large-scale portraits in our house she had perhaps never seen a portrait before; though she might have had a chance to see portraits life, or near life, size at Icomb Manor, near Stow-on-the-Wold, Gloucestershire, on 29-31 July previously. I do not think she has had any other chance during her life as I know all the houses she has ever been in. In any case she would probably not react in a strange house where she feels somewhat intimidated; not until she has got sufficiently used to a place to treat it as home does she feel secure enough to express her rather unusual and particular dislike of strange men. By the time she responded to this picture she had been at the 'Moorings' long enough to show most of the usual signs of treating it as her home. There was no question of personal recognition of the portrait as Mr Phillips had died many years previously.'

It is not very likely that the painter of the portrait of Mr Phillips senior deserves to be hailed as another Apelles, and this, perhaps, justifies the disdain with which aestheticians have regarded the stories of animal reactions. But the student of illusion cannot afford this unconcern; the interest of these reactions lies in the light they may throw on the relation between illusion and awareness. We do not generally attribute awareness to animals; in any case we would not think that the dog was conscious of a deceptive appearance. She simply reacted to a configuration that aroused in her the same response as strangers generally did. We may call it an inappropriate reaction, but some would call it an illusion only if it could be accessible to conscious probing. I believe indeed that this is the basic problem of illusion. The responses that motivated the dog to react to the painting as if it were a real person may also be potentially present in us.[16] True, they are overlaid by that critical reason that Plato located in the higher reaches of the soul, but Plato, if anyone, knew that the dominance of these higher reaches is insecure. Reason is also slower than are automatic responses. Hence we can observe ourselves reacting to an imitation as if it were the real thing. It is this experience of discrepancy between the various systems of response, the various 'reaches of the soul' to which the student of illusion must turn his attention.

Simulation and stimulation

It may be useful to follow Plato and to start a discussion of illusion by considering the lowest layers, what he would have called the vegetative soul. Clearly any organism must be 'programmed' to react to internal and external stimuli in a specific way which allows it to adapt to diverse conditions. Science has been hard at work decoding these 'messages' which cause the organism to 'take action' and even to achieve certain effects by the simulation of false reports. Thus the 'pill' may be said to act by sending out a false chemical message to the effect that pregnancy has occurred after which ovulation is inhibited. While these and many similar effects are not directly 'monitored' by the conscious mind other forms of Simulation notoriously carry over into mental states. Not that these stages should be confused with a veridical perception of the trigger action. Black coffee after a heavy meal — to mention no more noxious drugs — gives us the illusion of easing the digestion by numbing the vegetative nerves which are labouring with this task and preventing them from sending groans to our brain. We feel relieved, but are not.

Plato would certainly not have objected to discussing drugs in conjunction with the illusion of art. It was a commonplace of ancient criticism that what mattered in art were the 'effects' and these were as close to the action of drugs as they were to that of magic.[13] Orators and poets, musicians and even painters were celebrated as 'spell binders' who were able to arouse or to calm the emotions. Here,

too, the 'animal experiment' was never far from the critic's mind. Orpheus who could attract and charm the wild beasts was the model artist.

What must interest us in this time-honoured approach is precisely the insight that stimulation can, but need not, rely on the imitation of the trigger. There are plants and animals which are found to have an 'internal clock' regulating growth and behaviour to the length of daylight throughout the seasons.[38] These can certainly be 'deceived' by simulating the identical effect with artificial light, that is to say by *mimesis*, but there are other biological reactions which yield to a much wider spectrum of stimulations. We know that Nature herself — that is evolutionary pressure — has evolved such dummy keys by which one species ensures its survival at the expense of another and it is much to be welcomed that this important aspect of illusion is discussed in this book by Professor Hinton. What these astounding phenomena teach the Student of art is precisely that there is a limit to perceptual relativism. What looks like a leaf to modern European must also have looked like a leaf to predators in fairly distant geological epochs.[10] Likeness is not only in the beholder's eye. But sometimes it can be. Following the lead of Konrad Lorenz, ethologists have systematically varied their dummies to find out what minimum features are needed to stimulate or 'release' a particular reaction. It appears that there are two variables here to be considered — the internal state of the organism, its disposition to respond in a particular way, and the character of the trigger. The strange experiment of 'imprinting' shows how far objective likeness can be dispensed with in certain situations. The duckling that is 'set' to follow its mother will also follow any other moving object, such as a brown cardboard box, and once it has been made to react in this way it will apparently remain under the illusion for the rest of its existence that the cardboard box is its mother. There are situations, it seems, where such triumphs as that of Apelles can easily be achieved.

Readers of *Art and Illusion* [7] will not be surprised to find me appealing to these observations for I have emphasized their importance in summing up some of its results:

The history of art . . . may be described as the forging of master keys for opening the mysterious locks of our senses to which only nature herself originally held the key. They are complex locks which respond only when various screws are first set in readiness and when a number of bolts are shifted at the same time. Like the burglar who tries to break a safe, the artist has no direct access to the inner mechanism. He can only feel his way with sensitive fingers, probing and adjusting his hook or wire when something gives way. Of course, once the door springs open, once the key is shaped, it is easy to repeat the performance. The next person needs no special insight — no more, that is, than is needed to copy his predecessor's master key.

There are inventions in the history of art that have something of the character of such an open-sesame. Foreshortening may be one of them in the way it produces the impression of depth; others are the tonal system of modelling, highlights for texture, or the clues to expression discovered by humorous art. The question is not whether nature 'really looks' like these pictorial devices but whether pictures with such features suggest a reading in terms of natural objects. Admittedly the degree to which they do depends to some extent on what we called 'mental set'. We respond differently when we are 'keyed up' by expectation, by need, and by cultural habituation. All these factors may affect the preliminary setting of the lock but not its opening, which still depends on turning the right key.

Response to meaning: the magic of eyes

It will be noticed that this argument makes no sharp distinction between emotional arousal and perceptual reactions. The 'clues to expression' discovered by humorous art are treated on a par with the suggestion of texture by means of highlights. I believe that this approach can be justified, but it

may still be in need of explanation and elaboration. I should like therefore to take an example in which the two types of reaction are particularly closely allied, the perception and representation of eyes.

It is clear from the outset that real eyes cannot be simulated in images. Seeing eyes are in constant motion, pupils expand and contract, their colour tends to change with the light, their moisture varies, not to speak of the lids and surrounds that will incessantly transform the 'look' of the eye.

Without this influence the 'art' of make-up would never have developed.[15] The setting transforms the appearance of the eye, though exactly how it will transform it is impossible to predict in advance. It is experience, tradition and trial and error which show the make-up expert how to create 'the gentle look'. We know it when we see it, because the springs of our response have been touched in the right way, but it is the meaning we perceive, not the means.

So dominant is this immediate reaction, that it comes as a mortifying discovery how hard it is to answer specific questions about the shape and appearance of the human eye. Of course this difficulty will not be experienced by ophthalmologists or by artists who were trained in the traditional way, but most of us will hesitate when we are asked to draw a horizontal section through the head, across the root of the nose, and indicating the exact shape of the eye sockets. It then turns out that we have a schematic image in our mind of their Position when seen from en face and another, less accurate one, of the profile, but it is difficult for most people to visualize exactly the transition from one view to another, though they see it continually. I confess that I have to touch the two corners of my eyes to become fully aware of their relation in space.

This tendency of ours to look for meaning rather than to take in the real appearance of the world has been a constant theme of art educators who want to change our attitude. I would not deny for a moment that it can be an exciting and liberating experience to discover the true look of things by learning to draw or by studying art, but what I am disposed to question is the assumption that scanning for meaning is just a form of mental laziness. We could not function without this vital principle which Bartlett called 'the effort after meaning'.

I believe this principle to be part of our biological inheritance. Whether or not our response to eyes is inborn — as I would suspect — or learned through something like early 'imprinting', there is an obvious survival value in recognizing the eyes, and even the direction of the gaze, of our Fellow creatures. It is useful to know when and how we are being looked at if we want to respond adequately to the threat or invitation of another creature. Professor Hinton's chapter shows that this advantage has also led other organisms to react to the standard configuration of two eyes which may act as a warning signal of the presence of a lurking predator.[28] This, at least, would explain the frequency with which certain moths have become marked with 'eyes' on the wings, a marking that appears to deter birds from approaching them. When the markings are artificially obliterated the moths are more frequently eaten by predators.[10, 37]

Not even those of us who are not behaviourists would ever want to say that the markings of the wings have produced an illusion in the birds, if by illusion we mean a state of consciousness, a false belief. Very likely the bird is stimulated to react without the possibility of conscious reflection. But the point is just that reaction precedes reflection, both phylogenetically as psychologically. What distinguishes us from the animal is not the absence of automatic responses, but the capacity to probe them and to experiment with them.

I have appealed to this method in my book *The Story of Art* [6] where I asked the reader to scrawl an eyeless face on a piece of paper and to watch the experience of relief when two dots at last enable it to look at us. When I wrote the book I did not yet know the full weight of anthropological evidence which shows the strength and immediacy of this type of reaction. In Ceylon the act of endowing a Buddha statue with eyes is surrounded by strict taboos, because in painting in the eyes the craftsman brings the image to life. The effect is regarded with such awe that not even the craftsman himself is allowed to look while this miraculous transformation takes place. He paints them over his shoulder while looking into a mirror, and nobody else is allowed to watch the ceremony. On his return from the sacred act the craftsman must be purged, and if he omits these precautions he will be exposed to supernatural sanctions. Richard F. Gombrich, to whom I owe this account, [19] stresses the paradox inherent in the situation. Any Buddhist knows that the Buddha has entered the Nirvana and has been thus liberated from the wheel of existence. Rationally, therefore, the Buddha image can be no more than a mere reminder of the great teacher. But man is not merely rational, and so he will react affectively to the image as if it could look through its eyes. The ritual testifies to the strength of an illusion that is explicitly ruled out by the cognitive doctrine which it serves.[20]

Yet, the illusion is not one of visual reality, it is one of meaning: the eyes appear to give the image sight. But is not this exactly the same reaction we have when looking at our fellow humans? We see them looking. Though we may know rationally that there is no difference in outward appearance between a seeing eye and a blind one and that even a glass eye can reasonably simulate this appearance, I contend it would be false to experience to say that any eye looks like a vitreous sphere. The task of the artist therefore is not necessarily to fashion a facsimile eye. It is to find a way of stimulating the response to a living gaze.

Different styles have adopted very different means of coping with this problem, which may be compounded by the very taboos I have mentioned. It would not be without interest to investigate in the light of this problem the variety of ways the human eye has been rendered in the history of art.

There is ample evidence in the history of sculpture for the difficulties craftsmen experienced in correctly shaping a face in the round. The eye sockets are frequently set into a flattened face, though squeezed profiles also occur. As far as the shape of the eye is concerned, there is a whole spectrum of possibilities, from the schematic dot to the artificial eye of a wax dummy. What may strike the historian of art as odd is how far some of the conventions adopted in certain periods or by various artists were at variance with real appearance. The Giottoesque tradition favoured slanted eyes which almost look mongoloid; Poussin so emphasised the rim round the eyes that his figures often acquire the stony stare of the classical statues he so admired. It is impossible for us to tell how such deviations affected the artist's contemporaries who were not used to alternative solutions. Using the formulation I have quoted above, it might be said that we have acquired a different 'mental set' through 'cultural habituation' and no longer respond spontaneously to these renderings. It is because we do not so respond that we see these eyes less as eyes than as slightly odd shapes on the canvas.

But here, as always, there is no need to draw a relativistic conclusion from this variety. There is little doubt in this case that the discovery that a glint can be given to the eye and make it shine enhanced the appeal of the image. Not that a great painter, a Rembrandt, a Renoir, needed to make an exact copy of the eye to achieve this effect. On the contrary, the true masters of illusionism knew of ever fresh ways to trigger our responses, precisely in the way I tried to describe in the simile of the lock and key. The most astounding of these devices is the one employed by the eighteenth-century sculptor Houdon. Marble, of course, is even less capable of imitating the appearance of a real eye than are pigments, and so he had recourse to the daring trick of making a protruding piece of stone

stand for the light in the eye. Much as I have always admired Houdon's splendidly lifelike heads, I did not see this device till it was pointed out to me. The more a master succeeds in convincing us that the image looks at us, the less likely we are to realise what is actually there. He has transformed the image into a living presence.

We might say that the eyes look like real eyes, though real eyes do not look at all like his representation. I am aware of the fact that logically this proposition is absurd. If a equals b , b must also equal a . But I have argued elsewhere that this symmetrical relationship does not describe what we experience as likeness in art. I have trailed my coat and proposed the formulation that the world does not look like a picture, but a picture can look like the world. [7, 14] The catch, of course, is the word 'look'. I have argued that we are less aware of the look of things than of our response. If it is really part of our biological heritage that certain perceptual configurations can 'trigger' specific reactions, it is clear that these reactions are adjusted to our survival in the real world, not to our contemplation of pictures. If I am right that in this respect, too, we are closer to the animal than our pride would want us to be, this might suggest that like the animals we do not know and do not have to be aware of what the world looks like. The person who has to be — so it would seem at first — is the artist who wants to contrive a configuration to which we react as if it were an aspect of the world. I have argued in *Art and Illusion* that even this conclusion need not hold; that even the artist has to grope his way by trial and error till he discovers the configuration that produces the desired response.

This response need not be visual — but clearly it can be. We may easily believe that we see more of the eye on the canvas than is present in the artist's brushstrokes. In other words the response to meaning guides our projection, and we think we see shapes and colours which are not actually there.

The emergence of prediction

We come here to the nub of the problem, the real point at issue in the discussion about illusion to which I have referred at the outset. When and how can artifice trigger not only response of the kind I have discussed at some length, but something akin to a visual hallucination? I do not claim any particular aesthetic merit for this capacity as such, for as I have also stressed in *Art and Illusion* phantom percepts are frequently set up by such conjuring tricks as the act of pretending to thread a needle and to sew with it, which may induce in the suggestible the appearance of a phantom thread. Descending lower still, there was a trick of 'strip tease' in which the taboo against nudity on the stage was apparently circumvented by switching off the light at the last moment and letting the imagination take over. The sight which is conjured up is best described as a shape we see because we have every reason to believe it is there. It would be a mistake to believe that this reaction is confined to special states of excitement or hallucination. The paradigm for such a phantom percept is in fact the appearance of shadow lettering which makes us complete the whole letters from the strong indications which start us off. I can here refer to Professor Gregory's chapter which explores the role which hypotheses play in our perception. Like myself, Gregory links illusion with the hypotheses formed by the organism; they may be described as the consequence of unrefuted perceptual hypotheses.

I am not sure that I succeeded in *Art and Illusion* in explaining the way I see the connection between the automatism that can be described in terms of trigger actions and the explanation of certain illusions in terms of perceptual hypotheses. Welcome as is this opportunity to spell out what was perhaps only implied in my previous account, it must inevitably involve me in further speculations of a rather sweeping nature. They have to concern no more and no less than the problem of freedom and necessity. Not that I need depart much from tradition. The ladder of evolution has always been seen as a ladder towards freedom, or at least flexibility. Not even the convinced determinist doubts that the

plant is more rigid in its responses than human beings. The higher organisms can learn more readily from experience than the lower animals. A fly will buzz against a window pane and never accept its mistake. Birds will posture in front of a mirror, and so will kittens, but the latter will soon lose interest as if they had learned to discount the illusion. Bruner[3] has recently used this reaction as a gauge of evolutionary advance. The macaque seems only able to attack or threaten its mirror image or to ignore it. Chimpanzees can recognize their mirror image and guide self-directed behaviour by it (e.g. by touching a spot on the forehead seen in the mirror). We are not exempt from being deceived by mirrors, but we can also systematically test a mirror image for its reality — witness the marvellous sequence in a Marx brothers film where Groucho applies such tests to his double on the other side of the door. What is more surprising still, perhaps, than this ability to test for reality is the variety of ways we can learn to control and to utilize the illusion. The actor who postures before the mirror can try out the effect of his expressions as if he were watching another person. Engravers, dentists, and even car drivers must be able to switch their innervations and movements, the whole feedback mechanism in relation to the reversed image, without thereby losing the capacity to react to impressions outside the mirror in the appropriate way. They learn a willing suspension of disbelief that may still not be fully understood.

Strict behaviourism has linked any capacity to learn with the models of automatic trigger actions, by introducing the idea of the 'conditioned reflex', the notorious dinner bell that made Pavlov's dog salivate because it had frequently heard it before being fed. There is plenty of experimental evidence testifying to the possibility of such conditioning, but we are still entitled to ask how and why organisms became amenable, to conditioning. The answer must be in terms of survival chances. The inborn response to specified stimuli will reduce the danger of mistakes by making it most unlikely that the response will be released by accident. (Elaborate simulation of stimuli by nature or by human cunning is not a contingency that evolution can guard against.) But the same rigidity will also prevent an organism from ever learning from experience. To do so it must become flexible, more flexible indeed than is postulated by the idea of conditioning. Pavlov's dog was confined in an apparatus, but had it not been, hunger would clearly have made it search its environment for food. Who is to draw the line in such a situation between the scents and sights that would have triggered an inborn reaction of pursuit and others that have been learned? Should we not rather picture the organism as scanning the world for meaningful configurations — meaningful, that is, in relation to its chances of survival? Danger has to be avoided, food and mates have to be found, the brood has to be protected, and each of these needs in its turn necessitates complex responses to an infinite variety of situations. When the organism is 'keyed up', not only the goal itself elicits strong reactions, but anything that may be said to point to the presence of the goal. It should be clear that this widening of the waveband to which the organism can respond has both advantages and disadvantages for its survival chances. Being hyper-alerted, it is more likely to detect the goal, but it is also more prone to jump to false conclusions. Scanning the world for meaning, it is confronted with the necessity to interpret the evidence. I know that some philosophers and psychologists are suspicious of the terms 'conclusion' and 'interpretation' in relation to reaction below the threshold of awareness. But unless we concede the possibility of the animal making some kind of inference from evidence, we cannot envisage evolution ever getting on to the ladder that leads from the lower reaches of the soul to critical reason. An organism that lacks the flexibility of making mistakes through misjudging the evidence must also lack the potentiality of learning. It is clear that in the condition of search the possibility of anticipating events must sometimes make the difference between life and death. A capacity for anticipatory reactions must therefore be one of the greatest assets evolution can bestow on an organism. The best type of anticipation would be conscious prophecy, genuine prediction of coming events, but since this desirable gift is not to be had on this earth, the organism has to be content with the next best endowment, the gift of guessing or gambling. Granted that a false guess may be lethal, in the absence of any guessing there could be

no lucky hits either. The situation has rightly been compared with that of the scientist who must test and probe nature and can only do so in the light of a hypothesis. It is true that Francis Bacon specifically condemned what he called the *anticipatio mentis*, the prejudice that, as he thought, would cloud the scientist's capacity for unbiased observation. I have referred in *Art and Illusion* to the opposite point of view, K.R. Popper's conviction that all acquisition of knowledge 'from the amoeba to Einstein' demands a process of trial and error, which proceeds through 'conjectures and refutations'. [32, 33] The elimination of false guesses does not, by itself, stand in need of conscious thought. All higher animals can learn from their mistakes.

If it thus turns out that the readiness to gamble, to anticipate on insufficient evidence, is a precious asset rather than a liability in any search or quest, we can attribute to the lower reaches of the soul something of the qualities of a detective. Once the hunt is on, the slightest clue can become important for a tentative anticipation, a hypothesis which could lead to the desired goal. We do not know how these anticipations are represented to the organism — very likely in terms of innervations and other nervous states of readiness, which would include the salivation of Pavlov's dog. Could they also lead to perceptual anticipations? Does a dog to whom we throw a stick not only tense its muscles but actually see it leave our hands for a fraction of a second even if we trick him and do not throw? It may be difficult to establish the existence of such phantom images among the percepts of animals, though Gregory has told me that there is some evidence that they may indeed exist. One thing is certain — any 'prognostic' mechanism of perception would be of immense survival value. This value, alas, can best be illustrated by the 'predictors' which have been built into anti-aircraft guns and other weapons to compute the likely position of a moving target at the moment of impact. One could easily imagine such an aiming device being equipped with a predictive image towards which a pointer had to be moved. Be that as it may, it is obvious that such a pre-image would be the easiest way for the anticipation to be represented to the organism. A perceptual system that is capable of showing both the present and the predicted state in a changing situation could be said to achieve for events in time what binocular vision achieves for objects in space. Nor would the tracking of a moving target be the only function that would benefit from such a perceptual predictor. Self-movement always produces changes in the environment which demand predictive assessment, and so do eye movements. Any shift in focus entails a situation in which we can and must confirm or refute an expectation — however fleeting. The stimulus that reaches us from the margin of the field of vision may lead to an anticipation of what we shall find on inspection. It is true that confirmation never enters our awareness, and even refutation but rarely. We have no need to remind ourselves of the expectations that were fulfilled. Prediction and actuality merge in our awareness, just as the two retinal images fuse in binocular vision. Where our anticipation is belied by events we may suffer a shock of surprise, but we have other things to attend to than our disappointed expectations. More often than not they are blotted out by the quantities of incoming information which set up fresh expectations in their turn. The existence of prognostic perception would thus be impossible to prove, were it not for situations where the predictive phantom does become available to introspection. They occur, as we have seen, when the erasure mechanism fails in the absence of contradictory percepts or when the phantom becomes too strong to yield to the pressures of refutation.

The most dramatic instance of this kind I know is the gruesome account given to me by a former soldier who was hit on the head by a shrapnel during the war: he saw his own head rolling on the ground, before he passed out. It is only his critical reason that tells him that he hallucinated.

It may seem a harsh transition to turn from such extremes to our normal experience of art, but our problem is precisely to what extent art may elicit phantom perceptions. A recent paper on the great mime Marcel Marceau [34] is significantly called 'Notes on the Creation of the Perceptual Object'.

Pretending to interact with things of the physical world — the bars of a cage in which he is imprisoned, the mantelpiece on which he is leaning with his elbows or the ball he is bouncing — Marcel Marceau creates, in the author's words, 'for the spectator percepts, and does this in the absence of the physical supports that we normally regard as the sources of, or distal stimuli for, such percepts. He makes us see objects on the empty stage'. This is the type of illusion exemplified by the trick of the needle and thread, but a thread is an elusive percept at the best of times, and so we more easily believe that we see what is not there. Do we really 'see' the objects Marcel Marceau appears to manipulate, or do we only 'imagine' them? A philosophical critic would certainly ask this question, but can it ever be completely answered? People may differ in the intensity of their response and in their willingness to go along with the illusion. As far as I can judge my own reactions, it seems to me that the phantoms I see on the stage during a performance of this kind resemble marginally perceived objects. These are the objects on the fringe of our visual field which we expect to come into focus if we turned towards them. Introspection suggests to me that I focus on the body of the mime, but I experience the fleeting expectation that, were I to focus elsewhere, the objects with which he pretends to interact would come into view.

If this account could be substantiated it would also explain the reason why this experience can so easily be strengthened by offering some rudimentary support to the expectation. It is impossible to be sure whether an object on the margin of vision is a stick or a gun. It may even be impossible to specify the exact moment when we stop projecting our expectation of what it is, and really see it. Our reaction, as we have seen, does not wait for such a cool examination. We start projecting as soon as we are aroused by context and anticipation, though we may subsequently revise our reaction when we have had time to sort out the illusion from the perception.

I hope there was some justification, therefore, in my comparing our response to painted highlights to trigger actions, while yet insisting that the pigment must be correctly interpreted if it is to have this effect of causing an illusion. It is this interpretation which will be affected by what I described as expectation, need, or cultural habituation. We search for the meaning and take the hint; in other words, we correctly interpret the white patch as a gleam in the eye because it is found to fit the hypothetical meaning. It reinforces rather than erases the anticipatory phantom.

I believe this account to be well in line with Gregory's theories, though his chapter shows how much more complex the situation must look to the psychologist who studies the variety of mechanisms involved in the generation of illusion. It remains a matter of speculation and debate which of these various mechanisms might be subsumed under such a more general biological hypothesis. Some of them might be interpreted as functions or malfunctions of reactions serving the same aim on different levels. Thus the 'waterfall illusion', which makes us see our visual impressions streak upwards after we have stared at downward movement for too long, can be described as the consequence of an assumption that the frame of reference is constantly shifting downwards, though this type of 'assumption' is certainly lodged in a different part of the brain from the type of expectation that causes the phantom contours of letters.

Association and the power of words

Any trespasser into an intellectual field not his own may find to his cost that his retreat is barred. Once he has committed himself to certain surmises or speculations, he must be prepared to explain how these might be squared with the observations or assumptions of others, and soon he finds himself in the uneasy position of the heretic tilting at orthodoxy. True, the orthodoxy with which my account is in danger of colliding is a rather superannuated and battered one — I mean the empiricist theory of the association of ideas. For those who accept this theory wholesale, the problems of illusions are

deceptively simple. Whether we read a book or look at a picture, we will have associations which will arise in our 'imagination'. The theory would not have enjoyed so long a run if it had not been found to offer a superficial explanation of our whole mental life, but some of its weaknesses have long been pointed out, most emphatically perhaps by Bradley, who called it 'mere nonsense'.^[40] There is indeed a hidden assumption here which creates serious difficulties: if there are to be associations of ideas there must be 'ideas', simple entities that can form into chains or complexes. In the original version of the theory, these entities were the residues of 'sensations', the simplest traces of sensory stimuli. It was these which combined into percepts of objects and further into the associated images that floated into our consciousness. To see an orange, as we have been told in countless variations, is first to have the sensations of colour and shape, which are associated with the memories of tactile sensations forming the percept of the orange, which evokes associations of its smell and taste. Maybe these will drag further images out of our memory into consciousness — the sight of a garden in Sicily or the name of Nell Gwyn. The word 'orange' in its turn is also associated with the fruit — its meaning being merely a form of association which brings up the image into the mind. But the very distinction between sensation and perception which belongs to this simple picture of the mind has been challenged, most recently by J.J. Gibson.^[4] Whatever may be going on when we see an orange, we are not simply putting together a number of elementary sensations.

I believe the main philosophical weakness of the theory of sensations and associations sprang from the belief in the efficacy of introspection. Unlike the animal, man was supposed to have privileged access to his own mental experiences. If I have stressed the link of both perception and illusion with the 'lower reaches of the soul', it is precisely because I have come to doubt the validity of introspection. But in concentrating on the biological point of view I was not out to 'debunk' what is specifically human, the use of language and other systems of symbols. In common with other students of language I do not think that a purely associationist theory of language can ever be successful, but the functions of language that warrant this conclusion are largely outside the purview of this chapter. Language can certainly be used to evoke expectations, and therefore illusions. We do not know whether the dog may experience a phantom image when the stick is thrown, or when the word of command is uttered, but we do know that humans can so succumb to the suggestion of words. It is my feeling that the images which may ordinarily accompany the perception of speech are more effortlessly described as expectations or anticipations than as residual memories. When we were children we were unlikely to discuss oranges in the abstract. If one was mentioned, it was probably in a context in which the fruit would also be produced. It is true that as grown-ups we live in a rich web of possible contexts which are far removed from action and actuality. The orange may really be a signal for me to reminisce about Sicily or to talk about Nell Gwyn. True this sounds a strained interpretation, but only because word association tests are so often conducted in artificial isolation. Normally our associations are not random; they are guided by our aims and momentary interests. They are the signs that we are approaching our goal, whether in thought or in action; in other words they are meaningful. The main advantage of such a shift of emphasis from the past to the future, from casual traces to purposeful aids, would lie precisely in the possibility of discarding the elusive notions of 'ideas' and 'sensations' that form into chains.

What emerge into consciousness are aspects of the vaguely anticipated context.

Extreme situations such as suggestion under hypnosis may best exemplify the power of words to mediate an illusion through anticipation. There is an unforgettable episode of this kind in the ninth chapter of Rudyard Kipling's *Kim*, when Lurgan Sahib, the member of the Secret Service, is testing the young hero of the story for his ability to resist suggestion by first impressing him with a conjuring trick and then predicting a miracle. He had spirited a water jug across the table and asked Kim to throw it back. The jar breaks.

Lurgan Sahib laid one hand gently on the nape of his neck, stroked it twice or thrice, and whispered: 'Look! It shall come to life again, piece by piece. First the big piece shall join itself to two others on the right and the left — on the right and the left. Look!'

To save his life Kim could not have turned his head. The light touch held him as in a vice, and his blood tingled pleasantly through him. There was one large piece of the jar where there had been three, and above them the shadowy outline of the entire vessel. He could see the veranda through it, but it was thickening and darkening with each beat of his pulse . . .

'Look! It is coming into shape,' said Lurgan Sahib.

So far Kim had been thinking in Hindi but a tremor came on him, and with an effort like that of a swimmer before sharks, who hurls himself half out of the water, his mind leaped up from the darkness that was swallowing it and took refuge in — the multiplication-table in English!

'Look! It is coming into shape,' whispered Lurgan Sahib.

The jar has been smashed — yes, smashed — not the native word, he would not think of that — but smashed — into fifty pieces, and twice three was six, and thrice three was nine, and four times three was twelve. He clung desperately to the repetition. The shadow-outline of the jar cleared like a mist after rubbing eyes. There were the broken shards; there was the spilt water drying in the sun, and through the cracks of the veranda showed, all ribbed, the white house — well below — and thrice twelve was thirty-six.

What Plato called the part of the soul which 'puts its trust in measurement and reckoning' had triumphed over the lower reaches'. Did Kipling remember the passage from the *Republic*?

The shadowy outline of the vessel exactly corresponds to the phantom percepts which were the subject of the previous section. There they were evoked by actions, expectations and images. Here they are aroused by words. It is easy to understand how the child could be tempted to surrender to their suggestion, but what of the reader of Kipling's story? Will he also visualize the jug and the veranda? People differ in these matters. But one thing is sure — once we are absorbed in a story we shut out other impressions, much as the Hi-fi enthusiast who closes his eyes. Only when we want to resist the pull of the illusion, when what we read becomes too unpleasant, we take recourse to the equivalent of Kim's multiplication-table and tell ourselves that after all we need not submit to words on paper.

There is a theory of the mind which links its capacity to produce illusions — artistic or otherwise — with the quest for satisfactions which real life too often denies us. According to Freud our whole psychic life might be described in terms of a conflict between what he calls the pleasure principle and the reality principle. The first rules the 'lower reaches of the soul', the latter the higher ones. The pleasures of illusion are generally bought at the expense of reality testing. Freud, of course, operated with an associationist psychology which strongly influenced his model of the mind. In other respects our interpretation would not clash with his account of the dream.

During sleep the search that goes on in the 'lower reaches of the soul' is not restrained by critical reason, and almost any internal or external stimuli can trigger anticipatory phantoms. It is different when we are awake and are compelled to erase those phantoms that do not square with our critical tests. Not that there is an absolutely strict borderline here between the delusion of dreaming and the veridical perceptions of our active life. Sometimes a phantom of critical reason sneaks into our dreams to perplex us. I remember being puzzled in a dream by the discovery that I could walk in the air, and deciding to test whether I was dreaming. I reasoned that I should focus on the facades of the houses past which I was flying to see whether their details would come into prominence. They did. I clearly saw the actual brickwork and was convinced that my experience must therefore be real.

Whether or not this dream was prompted by my interest in the very problems to which this essay is directed is a different matter. At any rate it is not surprising that the idea of life being a dream has always been popular with introspective people. It is notorious that this belief can never be disproved.

Illusion and the hierarchy of beliefs

It is clear from what has been said, that the study of illusion would always have to be supplemented by an investigation of the resources we employ for spotting our own illusions. Such an investigation would take us far beyond the scope of this chapter. What is relevant here is mainly that we can no longer equate illusion with mistaken beliefs. It is at this point, perhaps, that our footnotes to Plato would have to become critical, because it is the tradition stemming from him that is responsible for this equation. Plato saw the distinction between truth and error largely as a moral problem. In his most famous image, in the *Phaedrus* (246B and 253D, E), he likened the parts of the soul to two unequal horses, one heavy, insolent and recalcitrant, the other noble, good and obedient, which must both be kept in step by the skilled charioteer. It is the distinction between reason and instinct, imperfectly controlled by man that survives in Freud's concept of the 'id', the 'ego' and the 'superego'. But it is clear from the biological point of view that— if we want to stay with Plato's image — the good horse alone could not pull the chariot at all. *Mutatis mutandis* this criticism applies also to Plato's verdict on the senses. Basic for his whole theory of knowledge is the polarity between mere opinion (*doxa*), which is due to the fallible senses, and knowledge (*epistêmê*), the product of reason. He was certainly right in stressing the fallibility of our senses, but we have seen that it is not really the senses which matter here. Imagine if the demiurge had endowed us instead with a perfect registration apparatus of infinite capacity, instantly producing an internal representation of our whole environment down to the finest detail. Imagine even for arguments sake that such a complete inventory of the environment could be drawn up every second or so, to give us unimpeachable knowledge of every object in our world. But imagine also that he had failed to equip us with the power of extrapolation, the power of framing hypotheses about the future so that, *per impossibile*, we would know in crossing a road where every car is, but not its direction or speed. We would obviously not survive long. We have seen indeed that what the organism needs is something very different, an adjustment to future situations — events, that is, which are not yet presented but must be anticipated.

I believe that not only the doctrine of association but also the schema of stimulus and response has somewhat obscured the prognostic character of perception. The response is not so much to the stimulus as such — any stimulus — but to its meaning as a warning signal or a promise. We blink when there is a danger of something getting into our eyes, and this reflex serves us in good stead even if it is sometimes triggered by a false warning. The response of salivation prepares the dog for digesting food, just as the fear reaction increases the adrenalin content of our blood and provides extra energy for flight. Whether the senses convey to us signals for arousal or for reassurance, the messages from the environment are related to the organism's need. It must get into a state of readiness to cope with coming situations rather than with the passing present. True, we could not survive if we misinterpreted the signs and portents too often, but the truth we seek with our senses is not the static and eternal truth that interested Plato, but the correct assessment of the developing situation with which we interact.

I believe with Popper [33] that epistemology can teach us much about psychology. He has shown that there is a continuity between the procedures of science in framing and testing hypotheses and the methods used by organisms in finding their way through the world. Plato's dichotomy between opinion and knowledge is untenable. The lower reaches of the soul are not to be regarded as the sources of noxious disturbances. Whether we compare them to a wild horse, or to a rash gambler, the fact remains that life goes on into an unknowable future. There is no antithesis between reflex and

reflection, but a continuous spectrum extending from the one to the other, or rather a hierarchy of systems which interact on many levels. The lower system of impulse and anticipation offers material for the higher centres in a chain of processes that extends from unconscious reaction to conscious scrutiny and beyond to the refined methods of testing developed by science. Let us grant again that Plato was right in his diagnosis that art exploits our first, our uncritical reactions. It is precisely because we are less concerned with what is than with what might be, that we find it easy to enter into the illusion of a painted scenery or of the action of the play. We allow ourselves to be aroused by martial music and to be soothed by a lullaby because these affect us in any case. And much to Plato's concern we have set aside a domain, even an institution, called 'art' in which we seek such arousal — of 'fear and pity', of thrills and 'kicks' — in the safe knowledge that these are mere exercises, without 'consequence'.

We have developed another institution, called 'science' in which we systematically submit our reactions and responses to the scrutiny of reason. It is reason that tells us in Plato's words that is impossible . . . at one time to hold contradictory opinions about the same thing'. Contrasting the fallible report of our eyes with the results of measurements, Plato rightly concluded that if the two prove inconsistent one of them must be due for revision. The illustration remains instructive because we have meanwhile learned that these measurements themselves do not result in the final certainty of *epistêmê*. Spurred by the inconsistencies obtained in the measurement of the speed of light, Einstein proposed that our measuring rods cannot be considered stable in relation to an 'absolute space'. Their rigidity is an illusion.

Scientists know this, and yet they continue to use measuring rods 'as if' they were stable in contexts where relativity theory makes no difference. They decide to ignore the further level of the hierarchy of hypotheses while they get on with the job. In other words even scientists sometimes act as if they could hold 'contradictory opinions about the same thing'. For those of us who study the problem of illusion in its wider context this is a salutary reminder.

For here we can again apply Popper's principle of continuity between all processes of cognition, and recognise that life would be impossible if we always wanted to test our perceptions against all levels of belief. Even where such tests are possible, they take time and energy away from more urgent tasks, that is from the task of adjusting to the future. I happen to have little sympathy with the champions of instinct and intuition who decry reason as the enemy of life, but so much is true in their contention that an extreme of critical awareness would ultimately paralyse our actions. We must always 'run ahead of the evidence', as Gregory puts it; we always fill in from our imagination what we anticipate to be there. The 'effort after meaning' must always be selective. We must learn to ignore as well as to supplement. It is this dual activity that makes discussions about the relation between perception and illusion so tricky.

One thing is sure. It no longer makes sense to start this discussion from a separation between what is 'given' — the so-called sense data — and what is merely imagined. 'Hoeffding long ago demonstrated logically that memory is involved in almost all perception, for except under highly unusual conditions, we do not simply see but recognize what we see'.^[25] But neither this nor any other perceptual process is inherently infallible. We should not speak of re-cognition, but of classification in terms influenced by previous experience, in other words of interpretation.

It may be useful here to distinguish between errors which can only be found out in the course of events, and others which we recognise as false perceptions. There are many 'sense data' which contradict our firmly held convictions and which we therefore classify as illusions without much

attending to them. This applies to after-images, the double vision of objects close by when we focus on the distance, and all the major and minor pathologies that may afflict our eyesight without influencing our hypotheses about the world. They may be compared to irrelevant reports from the front which the intelligence officer discards without even passing them on to higher quarters. What is more interesting and more intriguing is the propensity of these higher quarters to ask the senses to re-write their reports if they happen not to fit in with their expectations. Gregory here speaks of 'scaling downwards from perceptual hypotheses'. It is the range of phenomena we mean when we say that 'seeing depends on knowledge'. What we should say is that seeing often varies with belief. Like so many perceptual mechanisms, this mutual adjustment is not normally open to introspection, but it is not in conflict with the prognostic purpose of perception that must interest the student of illusion. The situation-report, on which the higher quarters intend to base their decision may be pictured like a map, onto which certain assumptions are entered. There may be arrows indicating the expected movement of regiments, and these arrows should not and could not be redrawn on the report that one individual soldier was seen walking in another direction. The point at which the whole picture must be revised is hard to establish a priori, but clearly a certain amount of dogmatism is as useful to the commander as an excess may be fatal.

If we put on pink spectacles, the report of our eyes will clash with our hypotheses of the world, and if I am in the right mood, I may enjoy the sight of a rose-coloured world, without falling into any errors. But for practical purposes I learn to disregard the biased evidence, and achieve an alteration of the messages to the extent that the normal colours may be restored and the cognitive map is perfectly re-established. If I take off the glasses, the contrary bias will appear and the world will take on the complementary hue of green — at least for a short while. Which of these three experiences should be called an 'illusion'? Frankly, I cannot attach much importance to this question. The phenomenon which Gregory discusses under the heading of 'perceptual calibration' seems to me much more interesting than the mere question of linguistic usage.

There certainly are situations in which usage equates perceptual errors with illusion. The question then remains, to what extent the illusion depends on the error. Imagine a car driver who takes some shadows on the road for an obstacle and swerves into a ditch. Clambering out and investigating the spot, he recognises his mistake, but he may still be able to recapture his illusion. Nor need this be due simply to memory. His companion may say, 'I can imagine how you could make this mistake'. In other words he can make himself 'see' the shadows as a potential obstacle. To what extent he will succeed may depend on a large number of variables, the degree to which he is a visualiser, his willingness to identify with the driver and his ability to 'suspend his disbelief'. Much has been written since Wittgenstein on what we mean by 'seeing as', but it is likely that there are any number of degrees in this elusive experience.

It is certainly important here not to equate the experience in front of pictorial representations uncritically with that of a three dimensional sight. It is easier to see the notorious ambiguous inkblot either 'as' a rabbit or duck [7] than it would be to make such a voluntary switch between real rabbits and ducks. The element of 'interpretation' is more to the fore in relation to symbolic material than it is in a life situation, but even in this latter case we can observe how our involuntary or assumed beliefs will influence our perception. In an earlier paper [12] I have quoted a vivid account by Professor N. Tinbergen of the way he was influenced by his expectations to misperceive rigid pack ice as a turbulent sea.

Both the degree and the limits of this effect present fascinating problems for study. Here the development of the scientific world picture offers an interesting test case. We now 'know' that the

stars are scattered over immense distances in outer space, but how far does this knowledge affect the illusion of the night sky as a starry vault?[18] It still persists, though very likely our visual experience is no longer quite the same as that of an ancient Greek, who believed in the reality of the enveloping sphere. Does even the moon look quite the same to us as it did to the poets of yore since we have seen the astronauts cavorting on its surface on our television screens?

It may not be quite too late to try to answer some of these questions through anthropological field-work, along some of the lines discussed in Deregowski's chapter, though it is certainly far from easy to formulate the right questions. Perhaps a preliminary question may be suggested. Do all cultures make the same radical distinction between 'appearance' and 'reality' which ours has inherited from Plato? Are their hierarchies the same? In other words, do they necessarily accept the demand that contradictions must be ironed out and that all perceptions that clash with beliefs must force us either to change our views of the 'objective world' or declare the perception to have been a subjective experience — an illusion? Even in our rationalist culture we don't often live up to this logical precept. We try to evade it, especially when our emotions are involved.

It is not surprising that this should be so, because most of the beliefs which may here come into play concern probabilities, and all of them are based on hearsay rather than first-hand experience. Take the true story told to me by an elderly friend who drove one morning through the peaceful lanes of Wiltshire when he suddenly saw the shape of an elephant lumbering through the morning mists. He certainly 'rubbed his eyes' to be sure he was not asleep (a doubtful test, as we know), because elephants are sufficiently rare in Wiltshire to make this sight surprising. The observation of a circus tent parked on the meadows restored consistency to the scene and made my friend rightly adopt the hypothesis that the elephant was not a subjective but an objective experience. What if he had seen a ghost or a dragon? Here the reaction will obviously depend on the tradition of the perceiver's culture. When we cried as children and complained that there was a terrible dragon under the bed we were probably reassured: 'Nonsense, darling! You must have had a bad dream. There are no dragons.' 'Promise?' 'Promise!' But, strictly speaking, it was rash to make this promise, for the non-existence of dragons cannot be proved. Small wonder that our assurance may break down when we find ourselves in a dark forest at night and see what looks like a dragon. Take no chances. Act first, think later. Reaction precedes reflection. Whether or not we may have to revise our beliefs is after all *cura posterior*. Better pray and run.

I do not want to insinuate that every reader of this chapter would necessarily react in this way. It is sufficient to acknowledge that the 'cognitive systems' of a culture frequently clash with the actions its members are seen to perform.[20] An example of this kind was discussed in the previous section. Cognitively the Buddha is believed to have entered Nirvana, but affectively he is still invoked, and his image is treated as a numinous object that can be given eyes to see.

Not that our own culture is less productive of similar contradictions. There can be few people who would formulate it as their belief that the touching of wood after certain utterances will prevent unseen powers from manifesting their envy. But they do say 'touch wood' all the same. The Italian idiom *Non è vero, ma ci credo* (It is not true, but I believe it) sums up the situation.

Here we must certainly agree with Freud that we are born with emotional needs that demand an outlet even at the price of intellectual consistency. It is the assumption of such consistency that has vitiated the discussions about illusion in art. But art is not the only type of experience which demonstrates our willingness to embrace illusions. How, for instance, should we describe the relation of people in our culture to their pets? We all know the old spinster who is convinced her dog understands her every

word. We can also guess at the emotional need that underlies her actions. It is easy for her to refrain from critical tests, because they are in any case hard to come by. Undoubtedly the dog does understand some of her utterances and will respond to her voice and her signs of affection. Where is the line between objective truth and subjective illusion? Are we even right in characterizing her fond illusion as a delusion? She is not mental. 'Somewhere' she knows perfectly well that there are limits to what she can tell the dog, but do we not even talk to ourselves at times?

One of the most searching books on this elusive borderline between belief and 'make-belief' takes its starting point not from art but from that 'willing suspension of disbelief' we call play. I am referring to Johan Huizinga's *Homo Ludens*, [26] which I have discussed elsewhere. [17] What characterizes play is the element of social compact, the exclusion of the 'spoilsport' whose uttered disbelief will 'break the illusion'. In the game the consistency test with the outside world is deliberately dispensed with, it creates an enclosure in which the 'hypothesis' that we are cops and robbers is applied to the best of our ability. There is no delusion, but plenty of illusion, for in the heat of the game the outside world may sink beyond our awareness. Maybe the robbers will even begin to look different from the cops, once we have entered into the spirit of the thing.

What links play with art is precisely the way in which external consistency is traded against internal coherence. It is this 'inner logic' that distinguishes the world of 'make believe' in games and fantasies from the dream. W.H. Auden [2] has described how he submitted his daydreams of a mining enterprise to the most rigorous tests of technical consistency. He has shown that for him this creation of a self-consistent enclave was the way to poetry.

The demand for internal cohesion, for freedom from contradictions is of course a commonplace of criticism. I believe that those who are interested in the illusions of art might do worse than study the opposite effect and ask what happens when the illusion is broken? What kind of experience is likely to disrupt it?

Clearly, here as always, much depends on our expectations, our knowledge of the convention of a given genre that permits us to enter into the game and to concentrate on it — an excellent word for the mental operation we have to perform. Watching a Japanese Kabuki play where the under-life-size puppets are operated by hooded players on the stage, we soon submit to the 'illusion' and adjust to the extent that the irruption of the puppet master's hand may cause a shock because of its gigantic scale.

It is well known that it is not always easy in the theatre to prevent the public from taking any event as part of the show, and Pirandello and his followers have exploited these uncertainties to unsettle our hierarchies of beliefs. We obviously must distinguish between the consistency of the work of art and the consistency of the illusion: entering into a story — whether on the stage or in a book — we do not mind being presented with a world that does not answer our normal reality tests. But we want to know the confines of that world. We are mildly disturbed if the author of a novel breaks in to ask us whether he should let his hero live or die. But when we read a narrative such as Agatha Christie's thriller *The Murder of Roger Akroyd* and discover that the story into which we entered in good faith was really concocted by the criminal to deceive us, our head begins to spin round. Only after the silent compact with the narrator has thus been broken do we discover the existence of this compact, the frame within which we accept the illusion.

Illusionistic painting

Maybe we are now at last equipped to return to the starting point of this debate, the degree of illusion

evoked by a seascape on the museum wall. Those philosophers who claim that there is no difference in principle between the shapes we see on an illusionistic canvas and other conventional forms of notation may be granted the fact that any symbolic system could appeal to our imagination and transport us into an illusionary world.

It is quite true that if I am shown a map of my native city and asked to trace my daily way to school the shape and names of the streets may affect me emotionally. I may even find that my imagination is stirred and that sights I had almost forgotten arise before the eyes of my mind. But of my mind only. My daydreaming would not interfere with my perception of the map or cause me to imagine shapes which on examination would prove to be illusory.

There are styles in art which are essentially map-like. They offer us an enumeration of what — for want of a better word — I still would like to call 'conceptual images', pictographs which tell a story or give an inventory of stage props. Many a mediaeval picture of the sea would fall into this category. To read it may not differ much from reading a poem about the sea. But the historian of art also knows that at a given moment such diagrammatic pictures were rejected as inadequate, precisely because they fell so far short of the claims that had been made for the power of painting to create an illusion.[10, 11] Slowly but surely those devices were developed which I have described as keys to the lock of our perception. Not that this fresh dimension would stunt the appeal to the imagination. A Dutch seascape may also cause me to dream and to imagine in a fleeting reverie that I hear the rush of the wind or sense the breeze. Why else should Fuseli have quipped that the sight of Constable's landscapes made him open his umbrella? Needless to say, however, he was not acting under the influence of an illusion. The visual illusion can only be said to take over where the beholder's reaction fuses with the picture and so transforms it that it becomes increasingly hard to specify exactly what is really there on the canvas.

Once more it seems to me a mistake to start this examination by asking whether I see painted distance as distant. It is more prudent to begin with the question as to whether certain tones or lines are actually given or merely imagined. For here, as always, perception will tend to 'run ahead of the evidence'. The problem, then, is in what direction it will run. It is here that the perception of meaning plays such a vital part. Take what we call the illusion of movement in a painting. Nobody thinks that the sailing boat is actually racing out of the frame, but there are experiments to suggest that if we understand its direction and speed we will anticipate its shift to some extent[27,9]. The configuration will be tense with a directional thrust which can be measured in the tachystoscope.

Gestalt psychologists have investigated the phenomenon of 'closure', the tendency to ignore the gap in the circle exposed to the view for a moment. Here, too, similar experiments might be devised for representational pictures. My hypothesis would be that the 'filling in' would again be determined by the interpretation of what is represented. Everyday experience, even in looking at a blurred photograph, supports this assumption. In my submission we can even go further here. For I would contend that the filling in, the phantom percept, if we so want to call it, will not follow the lines on the surface as it does in the phenomenon of closure, but will obey the laws of three dimensional representation. If I look at a painting of the calm sea convincingly showing the ripples of the waves, the reflections of boats and the sheen of light, I will fill in the surface of the water that is not actually represented in paint and will fill it in as a horizontal expanse, not as a vertical patch of pigment on the panel. The question of 'depth' or 'space', in other words, is bound up with that imagined orientation. To say that I have no illusion of depth is really to say that I only know intellectually that the ripples are not meant to be on top of each other but signify an extension into the distance.

Now this contention has in fact been experimentally tested and refuted. It has been refuted precisely because the 'tendency to run ahead of the evidence' can be shown to have the same kind of effect on the appearance of objects represented in pictures as it has on those in three-dimensional space. Our 'expectation' that a small object in the distance would prove to be larger than it appears to be at the moment, once we approach it, notoriously makes us see distant objects as larger than their retinal size would allow us to infer. This is the so-called 'constancy' phenomenon. The term has been criticized because, as Dr Thouless has stressed [36] phenomenal size appears to be a compromise between retinal size and inferred size. Personally I am not very happy with the concept of phenomenal size altogether, because in real life situations it proves to be a very elusive entity.[7, 18] It is different with paintings.[7, 10, 14, 22] We can measure the represented size and the apparent size by a variety of methods [1] and see that patches of paint which are objectively equal in extension 'appear' to be very different in size if they stand for a distant sail or for a pebble on the beach in the foreground. More evidence for the illusion of depth comes from the shift in apparent orientation following a change of viewing point.[14] The 'constancies' mask the perspectival distortions of the picture plane and make us read them as movement in space.

If illusion was not a dirty word in visual research, we would by now know as much of these effects as Hi-Fi engineers presumably know about auditory perception. What, for instance, is the exact effect of stereoscopic devices on these illusory transformations? What is the relative importance of facsimile fidelity and of context? There is obviously a spectrum in the 'imitation of reality'. At one extreme we would find the panoramas beloved of the nineteenth century, in which real bushes and pebbles were placed in front of the curving canvas to give the visitor as complete an illusion as possible of being transported to an imaginary scene, be it a battle (as in the panorama of the Berg Isel still shown in Innsbruck) or a seascape (as in the Mesdag Museum in The Hague). Here the visitor can look around on all sides without encountering blatant contradictions, but it is well known that the very fidelity of detail may enhance the clash with the absence of movement and life. At the other end of the spectrum we would have to place those media which exclude surface fidelity, be they monochrome sculptures or line drawings. What happens here to the observed effects on the constancies of size and orientations?

To some extent these phenomena are independent of the medium: they occur in line drawings as well as in naturalistic paintings. The question would be to what extent. Gibson, of course, is quite right in stressing the relative character of naturalism when it comes to representing an open air scene.[5] Pigments can never fully simulate those textural gradients which he has shown to be of such importance to our perception of depth, nor can painting offer us the resources of binocular vision. The field is wide open for experiments to probe and explain the degree to which these apparent handicaps can be overcome in mobilising our response and projection. One of these experiments is easy to perform. We need only look at our seascape through a tube, thus cutting out the frame and any surrounding features. The result can be dramatic, so much so that I know of a medical student who, having discovered this effect for himself, wanted tubes to be on sale or loan at picture galleries to facilitate the enjoyment of paintings. Artists and critics are unlikely to adopt this device, but psychologists should not ignore its heuristic value. Obviously the tube masks the contradictory percepts of the frame and the wall and obviates in this respect the need for the all-round panorama. Even more important, it cuts out binocular disparity which normally enables us to perceive the orientation and location of the canvas, and this alone eliminates more contradictory percepts. It becomes genuinely difficult in this situation to estimate our distance from the painting. True, it may not always be easy to estimate our distance from a blank wall either, when we look at it through a tube, but the point is precisely that where our perception is unsettled, as it is in this case, illusion more

easily takes over. We fill the void of our uncertainty with the information we are fed by the pictures, and since it coheres in our field of vision we begin to enter into the game.

Here, moreover, is the moment to recall the fact mentioned at the outset, that the production of a perfect facsimile of a flat object is not, by itself, beyond the resources of art. There are passages in many naturalistic paintings which come close to such a facsimile, be it of a curtain, a book cover or a leaf. Isolating such passages will naturally enhance their *trompe l'oeil* effect, but it will also make us more ready to give credit to the surround — the same effect that is served by the real foreground features of the panorama. The smaller the visual field the more likely will this effect obtain, though here again we would need controlled experiments to examine the variables that come into play.

One thing might be predicted. In low-fidelity media the tube experiment would reveal more complex relationships. Looking at a painting as meticulously detailed as a Van Eyck even the smallest area of a painted damask, or even of a lawn, would mobilise our projection. Looking at a line drawing we would obviously have to see enough to be able to make sense of the configuration before the effects of illusion could take over. It is precisely in this way that we could therefore study the devices evolved by art to suggest convincing readings without any recourse to facsimile. We would find that it is in the exploitation of our response to gradients that the graphic arts have found such a compelling trick. The invention of hatching enables the draughtsman or engraver to indicate form and depth by variations of density. If we narrow our tube, the moment will surely come when we see the medium rather than the message. There will be senseless lines rather than a representation. What happens when we then return to the unimpeded view? To what extent can we retain our awareness of the means and see the representation at the same time? Perhaps the word 'seeing' is too imprecise here to settle this much-discussed question.[29] What can be investigated is the tendency so to ignore contradictory clues that the percept in front of us is transformed. I contend (to repeat) that there is a difference between the appearance of a piece of paper showing the map of a city and one showing a view of a city. In the first case there is 'ground', in the other 'background'. The degree of this transformation must depend on many variables — cultural conditioning, emotional involvement and therefore the nature of the subject matter. Some of these variables I discussed in the section dealing with the rendering of eyes. It is probably less easy to see an eye in a drawing as a mere scrawl on the surface of the paper than it is to see a fold in a sleeve in this way. But as soon as the representation clicks and we obey its instruction the object that we recognise will also be felt to be potentially mobile. It will tend to be surrounded by a fluctuating halo of imaginary space. Unless my introspection deceives me, the extent of this halo on a plain background will roughly coincide with the area of focussed vision. We can fix it more firmly by drawing a frame round the object. Provided we take in the framing line and the image at one glance the drawing surface is likely to recede from our awareness.

It is for this reason that I am not quite happy with the suggestion made by Gregory [2] that representations should be classified as 'impossible objects' — objects, that is which give us contradictory impressions at the same time. Once more it may be worth reverting to our tube. Viewing a drawing of an 'impossible object', such as the notorious tuning-fork through a narrow opening, we see indeed a coherent configuration which suggests a hypothesis of what might come into view when we move the tube elsewhere.[12] These assumptions will be belied by another view, which will suggest a different reading, inconsistent with the first. But here there is no uncertainty, no way of ironing out these disturbing contradictions except by adopting the correct hypothesis that what we see is not a turning-fork of impossible shape but a very possible drawing on paper.

The situation may be a little more complex in the case of a real object, such as the barber-pole illusion. Looking at the turning pole through our tube, we have no means of knowing that there is not a

real ribbon rising and rising. Seeing the whole we must revise our interpretation, but since the correct hypothesis is a little harder to grasp, the illusion of the rising ribbon may persist against our better knowledge.

One may grant that there is something of this experience in the viewing of certain representations when our attention becomes divided. The Victorian literature on decoration is full of warnings against the use of illusionistic three dimensional pictures on fabrics or china, lest the conflict of looking at the jug and at the landscape may be felt to be disturbing. But I do not believe that such a conflict is frequently experienced. Few of us find it troublesome to look at a cereal package with lettering and pictures. There is nothing paradoxical about them, and neither is there, I would suggest, in a painting on the wall.

It is here that we may concede a point to the 'conventionalists' who compare the inspection of paintings with the reading of any other notation. What the two activities have in common is surely the effort after meaning to which I have devoted so much space in this essay. This effort involves the 'mental set' of readiness for anticipation; it implies fitting the percept at least provisionally into an imaginary sequence to which we become keyed to attend.[24, 8]

All looking — not only looking at pictures — involves a sequential process that has something in common with reading. True, we can sweep our focus more readily round the room than we can pick up the letters, words and meanings of this page, but both activities are essentially constructive processes that happen over time.[30]

Photographs of eye movements in inspecting paintings confirm that trying to understand a representation involves a test of consistency. As such, it is a sequential process with a logic of its own. The focus of attention shifts from points of high information content to those areas where the postulated interpretation is likely to be confirmed or refuted. The road towards illusionism is the road towards visual consistency, the non-refutation of any assumption the representation evokes. The road away from illusion in twentieth century art led through the cunning inconsistencies and ambiguities of Cubism which deny us the resolution of a coherent reading — except that of the canvas.[7]

A number of experiments might be devised to test the sequential nature of these activities and its influence on our perceptions. They might make use of ambiguous figures, new and old, but put them into a slightly novel context. Take the example of eyes for a last time. There are humorous drawings which show an eye that is common to two faces. We can make the one a happy and the other a melancholy face. Clearly, in focussing on the alternate faces the double eye changes its character and mood, reinforced by the fact that once it is a left eye with eyebrows raised to the centre, and then a right eye with the eyebrows drooping in the other direction. It is the direction through which we come at these drawings that may determine our reading.

It might be worth while to investigate some of the familiar ambiguous figures and other illusions known to psychologists to see how a given reading can be suggested or enforced. Rubin's vase easily becomes a vase when we add flowers and just as easily two faces when we give them ears outside the frame. Mask either, and the other reading is ensured. Put the 'Indian or Eskimo' figure into appropriate contexts, and you may also eliminate the other reading.

It is from here that I should like to return to our central problem, the double perception of paintings, the one demanding concentration within the frame, the other a different sequence that takes in the wall and the surround. The effect of these sequences could also be tested by making use of those

constancy illusions that occur within paintings. Take the shapes of objectively equal size which appear to grow as they are placed farther back in a perspective schema. How far would the phenomenon persist if we repeated the shapes outside the frame and turned it into a motif of the wall-paper? In that case, I suggest, the effect would be influenced by the sequence of fixation points. The illusion should diminish if we read the shapes across the picture and concentrated on the repeat pattern.

Those who ask about our 'beliefs' in front of paintings are certainly asking the wrong question. Illusions are not false beliefs, though false beliefs may be caused by illusions. What may make a painting like a distant view through a window is not the fact that the two can be as indistinguishable as is a facsimile from the original: it is the similarity between the mental activities both can arouse, the search for meaning, the testing for consistency, expressed in the movements of the eye and, more important, in the movements of the mind.

This result does not seem to square too badly with the main findings of Deregowski's chapter about the reactions of naive subjects to representations, though the interpretation of these findings may well be in need of further refinement. For anyone who has never seen a snapshot, an illustration or a painting it cannot be obvious how to deal with this unfamiliar object. But if the picture coheres in the manner described above so as to confirm and refute predictions it should not be hard to transfer the skill of perceiving a scene to the reading of the representation.

This hypothesis seems to me strengthened by the effect of moving pictures. Where there is a sequence imposed upon us within the frame which carries the confirmation and refutations we employ in real-life situations, it becomes indeed almost impossible to read the picture and attend to the alternative system in which the screen is an object like any other in the room. The cinema, of course, enhances the illusion by darkening the room, and television viewers may do the same, but even without this additional aid to illusion it seems to me very hard to remain aware of the projecting surface. Even if the show will not involve us emotionally, it is next to impossible to 'concentrate' on the screen to the extent that we merely see expanding and contracting shapes rather than people and objects approaching and receding. I, for one, have never succeeded in so suppressing my responses and anticipations. Not, to repeat, that this compels me to say that the cinema or television so overwhelms my critical faculty that I become deluded; but my experience is shot through with illusions which remain uncorrected. One of them — as Gregory has reminded me — is actually the same as the despised ventriloquist illusion. I hear the voice of people coming out of their moving mouths and shift direction as they change their place on the screen, but this is merely due to the unrefuted expectation that speech and lip movements are connected.

It would be interesting to investigate further the hypothesis here presented, that the illusion of representations rest on the degree to which they arouse our mental and physical activity, much of which lies outside the reach of introspection. Perhaps we could take our doubting Thomases to one of the simulators used for training drivers and pilots, where the screen shows a moving picture of the road or landscape through which they are supposed to be moving while they have to make such predictions and take such actions as the situation would demand, steering clear of sudden obstacles or correcting the tilt of the plane by pressing levers and reading instruments. Not that even this creation of a highly consistent interlocking system would necessarily blot out their knowledge of where they are and what they are doing, but they would have less and less time to spare for the confirmation of their disbelief.

I should like to make it clear that I do not propose to subject my philosophical critics to this ordeal in order to demonstrate to them that all art aspires to the condition of simulators. It does not. My point is rather that they might be hard put to if they wanted to describe their reactions in what is called 'ordinary language'. Language, I believe, developed as a social tool to communicate ordinary experiences, hypotheses about the world out there and our normal reaction to typical events. It fails notoriously when we want to convey the elusive states of subjective reactions and automatic responses. Art, I have tried to show, plays on these responses, which lie largely outside our awareness. Plato, indeed, wanted to see it banished from the state precisely because it strengthened those responses of the 'lower reaches of the soul' which he wanted to submit to the dominance of reason. To him illusion was tantamount to delusion. He saw art in terms of a drug that enslaved the mind by numbing our critical sense. No wonder the tradition of classical aesthetics has tried to rescue art from this charge by insisting on the 'aesthetic distance' that keeps the mind in control. There is much value in this tradition, but I believe that no verbal formula can do justice to the complex interplay between reflex and reflection, involvement and detachment that we so inadequately sum up in the term 'illusion'.

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242
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The reader should consult the original text for its generous illustrations, which were part of a travelling exhibition.