VARIOUS WAYS OF SEEING AN UFO

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THE TIMES of 27 October 1989 published a photograph of an UFO over Xemxija Bay. The accompanying story only reported from where and how the picture had been taken. According to *The Times*, the photographer stood at San Martin, and: 'The moment the photographer pressed the trigger, he spotted something flashing in the sky through the viewfinder. When he removed the camera from in front of his eyes, all he could see was a speck which seemed to have disintegrated into thin air.'

With commendable reticence the editors did not try to give any sort of interpretation for this purported phenomenon. To them the lozenge-shaped object was apparently exactly what the abbreviation stands for: an Unidentified Flying Object, no more, no less.

Identified?

A sceptical-minded Maltese suggested to me that it simply concerned a print that had been lifted from a negative that had been tampered with beforehand. Maybe a little too sceptical, or a sceptic with clairvoyant powers? For, when I enquired at the photographic section of *The Times* in Valetta, it turned out that the negative in question does not repose in their files but was taken home by the (unknown?) tourist who shot the picture.

But let us give the tourist the benefit of the doubt and not impute him with devious motives.

That, however, brings us to the question: was something actually photographed, hovering over Xemxija Bay? In that case it is likely that others would have observed the object too, and at the same time. After all, some scaling shows that an UFO in that position must have been more than 100 metres in diameter! To the best of my knowledge no such reports exist.

Could a blemish in the film emulsion or a nick in the film negative account for the picture? In the absence of the negative, no pronouncement is possible, if then. Nor would a speck of dirt on the lens of the camera provide a solution. It does not result in such an image on the negative and, contrary to our intuition, it can no more be observed through the viewfinder than a faulty negative can. And here lies the puzzle: the concurrence of photographically recording something and personally observing something. But the camera and the observer registered something *different*, however. The

camera recorded 'something flashing', which does not tell us whether the dark brown blob on the photograph was the flash of the object or the object itself by the way. Immediately thereafter, if we are to take his word for it, the observer said he saw 'a speck which had disintegrated into thin air'. If we do not wish to construe this too literally as having seen nothing at all, we should ask ourselves: can we be fooled by our own visual perception? And the answer is: yes, we can.

Visual perception: the eye

The trouble starts with the eye itself. Even the best of eyes is a far from ideal an instrument for 'recording a picture'. Evolutionally our eye fills in a gap in our perception of the world around us, namely information that comes to us in the form of light-impulses. The implementation gives the impression of having been realized efficiently but rather haphazardly. The need to be able to focus on objects near and far called for an arrangement whereby either a single lens could be altered in shape, or for the distance between lens and retina to be variable.

The choice fell, at least for humans, on the first alternative. It required a stable medium to keep the distance between lens and retina fixed. The eye therefore is filled with vitreous humour. This jelly-like substance contains debris, consisting of detached dead cells, and which are responsible for throwing shadows on the retina. If we look at a clear sky we can observe these 'floaters' which follow the movements of our eyes.

They are by no means the only shadows. It may come as a surprise to some that the blood-vessels that feed the light-sensitive cells in our retina are situated in front of these same cells. Knowing that, it should come as less of a surprise that we also can see red blood-corpuscles circulating in these arteries; they appear as darting pinpoints.

Some constructional economies

Ideally, to record all relevant visual information in detail, the retina should contain an almost infinite number of closely-packed light-sensitive cells, each individually corresponding to a neuron in the visual cortex. Matters are complicated by the fact that one and the same individual light-sensitive cell cannot react to both a faint stimulus and to a difference in wave-lengths, meaning colour. We are, therefore, equipped with two different kinds of light-sensitive cells, the rods and the cones, each with their own particular task. In other words, night-observations that report colours are suspect.

To accommodate such a huge number of corresponding neurons would require a head the size of a melon just for the visual cortex only. The solution given by evolution is very simple.

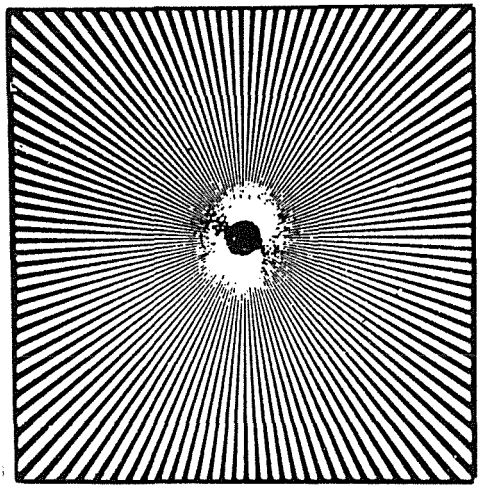

Figure 1

Only a small central part of the retina contains closely-packed light-sensitive cells. This is the part used for detailed observation. Detailed is a relative notion. It suffices for reading fine print, but if we look at figure 1 we are overwhelmed by detail, resulting in a kind of cloudy movement. Some people even start to perceive pastel-shades, and that in a black-and-white picture!

Around the central part of the retina the cells are spaced much wider, resulting in a far less detailed picture. In other words: periphally we know that there is 'something', not 'what' it is. Try for example to 'read' what is written on the page next to this one without moving the eyes. It is even very hard to do so as ingrained habit makes us shift our eyes to capture detail.

In addition the information emanating from these wider-spaced cells is bundled in small groups to one nerve-fibre per group. This has the added advantage that the total nerve-bundle leaving the eye from somewhere in the retina is comparatively limited to diameter. It is an advantage because this area cannot contain light-sensitive cells, thus forming a 'blind spot'; even so this blind spot is responsible for a gap in our visual field equivalent to the image of 50 times the size of the moon. In practice this does not normally handicap us because one eye compensates for the other.

Sensitivity

How do light-sensitive cells perform their function? Roughly speaking, they react to a light-stimulus by means of a chemical alteration. It is this alteration that in its turn evokes an electrical potential for transmission to the brain. No change in stimulation means that no further electrical impulses are generated, and that we would cease 'seeing' stationary objects. To retain an image our eyes move slightly but continuously throwing the image on

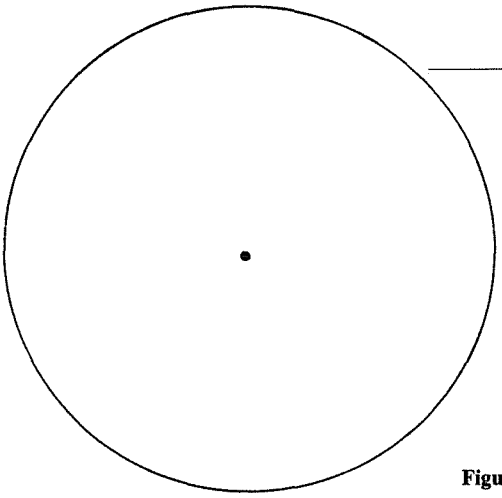

Figure 2

'fresh' parts of the retina all the time and enabling the 'used' cells to recuperate. When we do not, an image can disappear.

Stare, for example, at the dot in the centre of the circle of figure 2, and admire the disappearing act of the circle itself, helped along by the fact that the image of the circle falls outside the central area of the retina: the slight involuntary eye movements are too small to engage fresh cells.

We are not conscious of these eye-movements. Nor of the fact that they become larger when not checked by reference to a total visual field. In complete darkness we lack this kind of reference, resulting in a stationary pinpoint of light which seems to 'move' erratically, the so-called Troxler effect. This pinpoint may be very small indeed. The eye is so sensitive that it can see a candleflame at a distance of more than 10 kilometres.

If, however, a light-sensitive cell is stimulated, the surrounding cells become less responsive. This aids in adding 'artificial' contrast to an image that contains too little contrast in itself. Think, for example, of trying to perceive something in the shade of a tree without this mechanism at one's disposal. It makes us see contours that are not given in reality, the so-called Mach bands. You can 'see' them in figure 3 as a glaring light and an extra dark broad line in the white and black areas respectively. In the dawn of X-ray diagnosis it gave rise to a flood of faulty diagnoses. That we 'see' an extra bright triangle in figure 4, the so-called washing-powder-illusion, is rather paradoxical.

Over-stimulation of the light-sensitive cells results in an extended recovery-time; this, and maybe some sort of nerve- and/or brain-function, gives rise to an after-image. If you direct your gaze at this moment to a neutral dark background, the image of the page persists for a while. In other words, great contrast has the same effect as over-stimulation. The

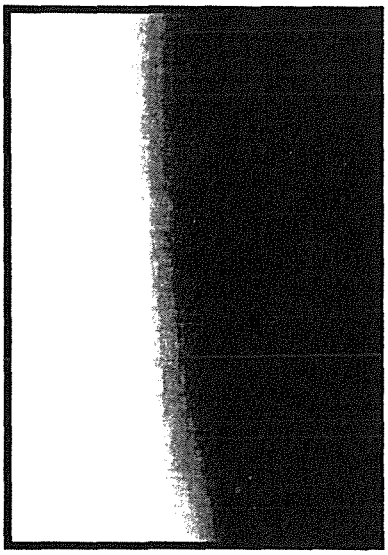

Figure 3

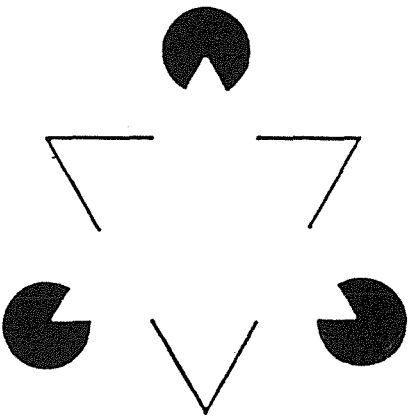

Figure 4

amazing thing is that the after-image of a brightly coloured object appears in its complementary colour. When somebody reports having seen an aura, he may well have been confused by an after-image . . .

Visual perception: the optic nerve

By now we have made a first tentative step away from the eye as such to the brain and the tentacles of the brain: the nerves. Here again we encounter an anomaly. When the originating stimulus is fainter, nerve-impulses travel slower than the usual 30 metres per second and take longer before being recorded in the brain. When we observe a moving object with both eyes, one of which is covered by dark sun-glasses, we sometimes see two identical objects chasing each other. Another and easier way of observing a manifestation of this phenomenon is to stand at the end of a street the moment the street lighting is switched on. It looks as if the street lamps are switched on one after the other, away from us. An observer at the other end of the street will see exactly the same thing from *his* perspective, however.

Visual perception: the cortex

What is the cortex to make of this jumble of disjointed and sometimes misleading information it is presented with? That the neurons in the visual cortex do correspond topographically to the cells in the retina is of little help. Unless we assume the existence of a small little man in the brain, a homunculus, that sees for us. And who does the seeing for this homunculus? Another even smaller homunculus? And where does this end?

As we have seen, a little pre-processing takes place in the eye itself, but

this is not enough by far. It is up to the visual cortex to present us with a *stable* and *reliable* picture of the world around us. It is hardly surprising that things tend to go awry occasionally.

Stability at the cost of reliability?

One of the factors that contribute to a stable image is size constancy. When we hold our hand at 30 cm from our eye and then move it away from us to 60 cm, subjectively nothing changes. Objectively, however, the image on the retina is halved in size. 'Something' tells us that we are observing the same hand and the mental image remains unchanged. As we perform this action without consciously attending to it, this 'something' may be either of two things: proprioception or stereo-vision.

Proprioceptors are pressure-sensitive cells in our joints and tissue that keep us posted as to the relative position of the various parts of our body. Stereo-vision, properly speaking, takes place only up to about 3 metres as it apparently depends primarily on comparison of the slightly different images our two eyes receive. But it may well be a combination of proprioception and stereo-vision that is responsible for the apparent stability. This could be an example of how we sometimes confirm the veracity of the information derived from one sense-modality by having it checked out by another: when seeing velvet, it is hard to resist stroking it.

And if confirmation is not forthcoming, we get pretty confused. Fold a strip of paper as shown in figure 5 and fix your gaze, closing one eye, on the central raised rib of the W. That the strip suddenly tilts to stand upright like a screen is one thing, though rather disconcerting. But now experience some real unease by holding the strip by the outer flaps, slightly rotating it . . .

Similarly, when we are viewing people in a classroom, they do not range from giants to dwarfs, though the size of their images on the retina can go through this whole range. Apparently we are taking into account the actual distances, and compensating for it. But clues to actual distance are derived from the surroundings. When we disregard these clues, for example through

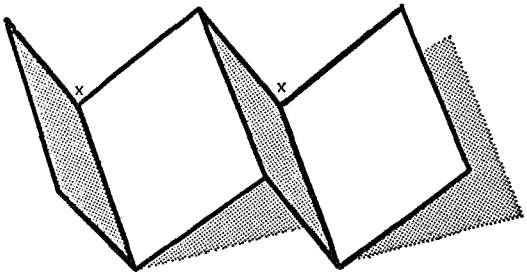

Figure 5

fatigue or through attending to inner imagery, an object or a person can suddenly diminish in size. Or rather we perceive this was a retreating into the background, showing how closely size and distance are interrelated for us.

The same mechanism is responsible for the fact that we get the illusion of the setting sun being larger-than-life by using the horizon as a yardstick: we tend to enlarge objects artificially when we 'know' that they are far away. The illusion disappears when we 'remove' the horizon by looking at the sun through a pin-hole in a piece of cardboard, or when we take a photograph.

In other words, failing a yardstick, we are inept at estimating distances. As a consequence we are, under those kinds of conditions, also ill-equipped for estimating the velocity of objects; if they move in line with the direction of our gaze, we cannot even tell whether they are approaching or moving away from us. Take a look at the stars. Are they standing still, approaching us, or increasing their distance? Knowing that the universe expands makes no difference.

Size-constancy is not as constant as the name conveys, however. At close quarters, say in the living-room, size-constancy makes that we do not see parallel lines converging. But, when looking at a landscape, we need this convergence as a clue to depth-vision. Vertically, however, size-constancy does not work at all, and why should it: as humans we deal with a horizontal world only. You can easily convince yourself of this by placing yourself at the end of a bookcase. The shelves at eye-level do not converge, but, looking upwards, the vertical supports do.

i + 1 = 1

Distinction has, therefore, been made between depth-vision and stereo-vision. Depth can be observed with one eye, stereo-vision depends on using two eyes simultaneously. Two images are combined into one. The use of both eyes does not mean that we use them both to the same extent. One eye is dominant. We all are aware of dominance in the use of hands. In the case of the eye we are not; in fact, most people even do not know that it exists. It is demonstrated easily enough: with both eyes open, point with outstretched arm at an object in the distance. Close one eye at a time, keeping the other one open. When the finger 'jumps', the non-dominant eye is open. Instead of your own finger you could have used any object near at hand.

Besides size-constancy and the exigencies of depth-vision there are many other anomalies resulting from cortical activity that need not concern us here. They have one thing in common, however: there actually is a stimulus

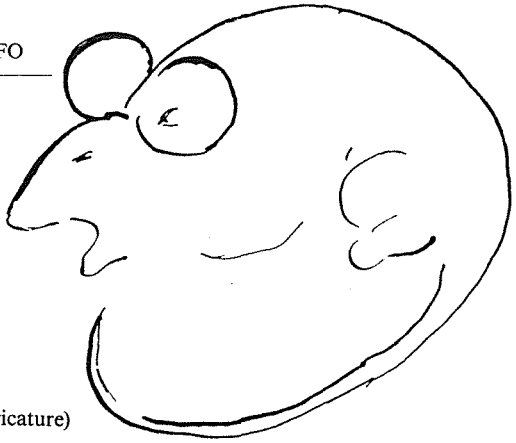

Figure 6 (caricature)

outside us that gives rise to perception. Notwithstanding the occasional anomaly, we are presented with a fairly *stable* and reasonably *reliable* image of the world.

Meaning, at any price

Things become decidedly weird when we go beyond the visual cortex to the rest of our cognitive apparatus. It tries to attach *meaning* to our perception. Meaning not as metaphysical speculation (that too, by the way), but meaning as a first step towards that ideal: 'making sense of'.

We are not as rational as we think we are.

See what you believe

The well-known psychologist Odent once performed the following experiment. He showed an audience a film of two cars approaching each other on a road too narrow to accommodate both. The result was an accident. After the show half the audience was asked to fill in a questionnaire, containing the question: 'At which speed did the cars *hit* each other?' The other half of the audience received a questionnaire that asked: 'At which speed did the cars *collide*?' The slightly different wording resulted in the first half of the audience estimating 50 kilometres per hour on the average, the other half 70 kilometres per hour.

Both were wrong. To avoid any damage, the film had been taken at very low speed; but it had been projected at normal speed. In spite of that, the half of the audience that had been whispered 'collision' in their ear, was unanimous that it had seen broken glass lying in the road after the accident. Logical, isn't it? When cars collide, their headlamps shatter.

To me the most remarkable part of the story is that it was exactly the genial but very myopic Odent (see caricature), who hit on the idea of using vision to investigate how easy it is to instil belief and the consequences of

such belief. Supplying the misinformation beforehand is equally effective.

Did *you* fall for it? The (non-existent) Odent's initial was R. And now try the story on somebody else, emphasizing R. Odent (= rat), and show the same caricature.

See what you want

In 1903, shortly after the discovery of X-rays, professor René Blondlot discovered some mysterious rays that emanated from almost any material with the exception of dead wood. These rays, which he dubbed N-rays after his place of residence, Nancy in France, could only be observed through a spectroscope which contained a prism of aluminium instead of glass. Within a short span of time, N-rays were observed by numerous other scientists, with the French Academy publishing more than one hundred papers on the subject.

The American physicist Wood, however, had never been able to replicate the experiment successfully. He therefore paid a personal visit to Blondlot's laboratory and during a demonstration of this phenomenon, removed the crucial aluminium prism from the apparatus at a moment when Blondlot's attention was diverted. Blondlot blissly continued the experiment, still reporting N-rays.

This was the first-known case of theory-laden observation; it was to be followed by many others. As a sceptic once remarked: 'Scientists believe in observation. They are better in believing than in observing'. It should make one wary of submitting to a lie-detector test.

See what you know

The ancient Greek conceived of the universe as a balloon-like firmament to which the stars were attached. To their eyes the brightest stars were simply the largest.

We, knowing that the stars are not at the same distance away from us, explain the brighter stars as being so because they are nearer to us.

Yet, astronomers see the stars in still another way: the brightest stars are simply the brightest. They know that the nearest star is hardly visible to the naked eye, and they have no idea which star is the largest.

In other words, our perception is sometimes shaped by our conception of the world. The ancient Greeks also presumed that the setting sun sank into the sea. They even heard it hiss. Proving that even the checking out of the evidence from one sense-modality by another sense-modality is no safeguard against this paradigm-laden perception.

Nor is knowledge of the objective state of affairs a fool-proof means of perceiving correctly. Even after having measured the two line-segments in

Figure 7

the Müller-Lyer illusion of figure 7 and having ascertained that they are of equal length does not make us see them as such. How to account for these anomalies is at present the subject of heated discussions in philosophical and psychological circles. In the context of this article I have therefore confined myself to the relevant phenomenology. To go into the influence of drugs, illness, fatigue, and other such factors which may cause amongst others hallucinations would lead us too far afield.

Do you see what I mean?

Knowledge of visual anomalies does not aid in perceiving the world more correctly. It may help however at arriving at a parsimonious explanation of the UFO phenomenon in general.

For the Xemxija UFO I opt for the following scenario. From the apparent foreshortening in the photographic image we can infer that a telephoto lens was used. From the enclosed angle one then arrives at a focal length of 85 mm minimum. Mister Tourist sets the range-finder on infinity, points his camera to the north and sees Xemxija Bay through his viewfinder, very much enlarged because of the effect of the telephoto lens. Nearby (the exact distance cannot be determined; there also is a discrepancy in the story about the subsequent enlargement, but it is of no account!) an insect flies past. The sun, shining over the photographer's left shoulder (it was 3.30 p.m.), shimmers on the insect's wings. This was subsequently reported as flashing. The insect is not identified as such by the tourist, as the image in the viewfinder, utilizing an open diaphragm, is very unsharp.

Now the camera is removed from the eye. Gone is the enlarging effect of the telephoto lens. The insect promptly shrinks to the insignificant size of . . . an insect. It would hardly be noticeable, if noticed at all, being an integral part of the immediate surroundings. Nor does size-constancy come into play. The object may even have 'jumped' by the photographer suddenly re-engaging his dominant eye. Like 'a speck which seemd to have disintegrated into thin air'?

This particular wording makes me suspect that the tourist was not even an UFO-buff, as it does not tally with the usual lore of UFOlogists, who tend to see what they believe. He may have been genuinely puzzled. I hope that the reader is, by now, less so. And that he has noticed one aspect I have not accounted for: the shape of the 'insect'. It could well have been a blurry image. Though a camera adjusts the diaphragm for prevailing light-conditions

when the button is pressed (it was 3.30 p.m.), which at the same time increases the range over which objects are in focus, even f16 leaves anything within 5 metres still very much out of focus. Here again only the actual negative can provide an answer.

Should anybody after all this still have incontrovertible proof of the existence of 'real' UFOs, I would be most interested to hear from him. Better still, send me a specimen. Though I would prefer a specimen of an insect with a vague disk-shape.

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