Seeing and Noticing: an Optical Perspective on Competitive Intelligence[1]

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Executive Summary

It's all about noticing: 'the first step of any intelligence process is not to *scan*, but to *notice*.' Baumard's (1994) comment is the starting point of a wide ranging look at different concepts and metaphors taken from the field of vision and optics, and how these can contribute to one's business information and intelligence activities. We *see* in order to be able to acquire knowledge about this world, and undertake competitive intelligence, or CI, for much the same reason – to acquire knowledge about our competitive environment. We may even regard CI as a form of *Seeing Eye*, by whose means we try to extract intelligence and understanding from what we perceive in viewing our business environment. Yet the term *Seeing Eye* is itself problematic, since it is not so much *our eyes* that see, but rather *our brains*. Far from 'seeing is believing', what we *believe* can seriously affect what we *see*. We shall show that 'there is more to seeing than meets the eyeball', and that looking *too hard*, getting *too close*, and being *too focused* is often counterproductive, both optically, and in CI.

Key Words

Seeing, noticing, attention, analogy, optical metaphors

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Introduction

Seeing and noticing are two vital components of any process of scanning the business environment (Aguilar, 1967; Neubauer, Lutt & Garvin, 1996; Choo, 1999), itself an important part of performing business and competitive intelligence. "The first step of any intelligence process is not to *scan*, but to *notice*" (Baumard, 1994). The aim here is to show how different concepts taken from the field of optics can contribute to one's business information and intelligence scanning activities, rather than to present a specific methodology. This paper also shows how looking *too hard*, getting *too close*, and being *too focused* can often be counterproductive.

A large portion of our brain's activity deals with our sense of vision (Zeki, 1999) and, indeed, many vision-related terms have entered daily usage, reflecting their importance in our attempts to make sense of the world around us. For example, consider the following vision-related phrases common in everyday language: we may have a viewpoint; focus on, illuminate or shed light on a problem; see a solution; look in depth; reflect on something; seek to mirror reality; adopt a new perspective, and so on.

Zeki (1999) answers the question "what is the visual brain for?" with what he himself disarmingly calls a "simple and profound" comment, namely that "we see in order to be able to acquire knowledge about this world." We undertake competitive intelligence, or CI, for much the same reason – to acquire knowledge about our competitive environment. One can perhaps even regard CI as a form of *Seeing Eye*, by whose means we try to extract intelligence and understanding from what we perceive in viewing our business environment. Yet the term S*eeing Eye* is itself problematic, since it is not our *eyes* that see, but, rather, our *brains*. As Hanson (1961), put it, "there is more to seeing than meets the eyeball."

Light as a Carrier of Energy and Information

Some basic aspects of light and human vision are considered below, and several analogies are drawn with the practice of business information and CI. Just as the flow of light and heat energy from the sun permitted the development of life on earth, so does the flow of energy give structure to the ecosystem and supports its continued survival. Similarly, the *flow* of information *through* an organization essentially gives it structure (Morgan, 1997). Organizations can be transparent or opaque to an outside observer, and they interact with their environments in different ways. It is these interactions that we attempt to observe and make sense of in our CI work, by looking at the flow of information within and across organizational boundaries.[3] Fuld has pointed out that 'when money changes hands so does information'[4], but the interactions of an organization with its surroundings that are of interest to us are not limited only to the conduct of business and the exchange of money. They may include recruitment or cutbacks, local involvement with the community, building and real estate changes, environmental violations and so on.

Our Own Visual System

Some general information about visual systems is required to better understand how we perceive the world. Our eyes are capable of sensing light: we sense *brightness*, and can detect differences in contrast. Also, of course, we sense *movement*, and, indeed, in our peripheral vision, we sense movement and changes much better than we do colour or detail. We tend to notice large changes while tending to ignore static or slowly changing situations, though, remarkably, even this is not always the case (Mack & Rock, 2000). Whenever we see a region of one color bordering a region of a different color, we interpret this as an *edge*. And, even though illumination conditions prevailing during the course of a day are constantly changing, we tend to see objects as having the same colour throughout this time. That is, we have a tendency to seek 'constancies' in our observed world. Zeki (1999) wrote "the only knowledge that is worth acquiring is knowledge about the enduring and characteristic properties of the world . . . but the information reaching us from that external world is never constant." So too when observing business situations, we tend to seek out constancies, seeing those signals that have the greatest contrast most clearly, and we may easily gloss over weaker signals, or those that are changing subtly

in front of our very eyes. Far from 'seeing is believing', what we *believe* seriously affects what we *see*.

We don't actually *see* light, rather we see the information *carried* by light about the last object it was reflected or scattered from. Our eyes sense this and form inverted images on our retinas, but it is really our *brains* that see, not our eyes (Zeki, 1999). *Vision* is mainly about knowledge not information, and 80% of our vision is generated internally in our brains (Nørretranders, 1999). Yet much of this knowledge is "tacit and escapes our individual or collective awareness" (Baumard, 1999), just as our ability to detect change out of the corner of our eye is often tacit or subconscious far exceeding our general peripheral vision. This harks back to a primeval need for survival, when it was sufficient to *detect* and *be aware of* potential danger so as to escape it – to have had to wait until one could see clearly enough to *identify* the danger would usually have been too late.

Parallels Between CI and Our Visual System

Drawing parallels from some of the specific characteristics of the *human* visual system can help us understand how best to implement a CI process in our organizations:

Response Time

The eye's integration time has evolved to match the reaction time of the body - the integration time, or the time during which information is stored, is about 0.1 second. Perhaps surprisingly, this matches the body's reaction time – for example, the time it takes us to notice, react and withdraw our hand after touching a hotplate.

Similarly, the response time of a CI unit should match the dynamics of the market and business environment the organization is in. A sluggish CI unit is useless in a rapidly changing marketplace, and a faster-reacting unit is pointless in a more conservative or stable market.

Different Detectors for Different Environments

Our eyes use different detectors for changing environments – our retinas contain two types of detectors, cones and rods:

- *Cones* - provide our high-resolution color vision, their spectral response matching that of the sun's spectrum during the day.
- *Rods* - are used mainly in the low light levels encountered in the evening and at night, when our eyes may become dark-adapted.[5] So it is not surprising that their spectral response matches the (somewhat bluer) shifted colors of the evening twilight sky. Rods are essentially color blind since as we stated above, sensitivity to shapes in the dark is far more important than the ability to determine color.

Similarly, our CI units must be on the lookout for changes in our business environment, and additionally be capable of adapting to them. But just as it takes us time to become dark-adapted, so too can it take time for organizations to organize in response to changing conditions.

Focused vs. Peripheral Vision

We are capable of looking at both specifics and trends - our cones provide us with our highest-detail colour vision, which we use for normal visual activities such as driving or reading. But, in fact, for these everyday activities we use only a very small and limited viewing area (angularly, about the size of our thumbnail when our hand is outstretched) called the fovea, which lies close to the eye's optical axis.

It is a measure of the success of our brains in 'filling in gaps' that we are fooled into thinking (and indeed are fairly certain of the fact) that we see equally clearly over our entire field of view. Our rods, on the other hand, are distributed over almost the whole retina, and it is they that provide us with contextual and positioning cues, signaling changes in our periphery, albeit at lower resolution than our cones, essentially 'telling' our eyes where to look (with our high-quality foveal cone vision).

In a CI context, we can draw the analogy that we typically need both *focused* intelligence and a wider more *laid back* view. Our intelligence activities should mimic our visual system, allowing both a lower resolution tracking of trends[6] and a much higher resolution focus on detail. In some military intelligence services, there are those tasked with concentrating on

long-term developments, while others work to notice more immediate changes in the scanned environment.

Dynamic Range of Vision

Our eyes routinely cover a huge dynamic range from almost single photons up to full sunlight, and so our retinas include a sophisticated Automatic Gain Control mechanism (since the changes are far more than those accounted for simply by the familiar changes in the size of our pupils). Normally, there is no shortage of photons falling on to our retinas to trigger nerves, but the ability to amplify *small* signals can often be critical. Under very dark conditions our rods are capable of amplifying a single photon to trigger a nerve pulse if need be.

There is a clear analogy here with how we might wish to run our organizational CI units. We are normally bombarded by information, and there may be no shortage of signals to interpret. However, we often seek weak signs of change, and these may not be so easily noticed. There may be situations where *one* event is noticed by only *one* person. Our CI processes should be so constructed that even in such a case, such an event *can* or *should* be able to lever an entire organization into action, and this, despite the natural tendency of organizations to suppress data (Wildavsky, 1983).

What We See and What We Don't

Whenever we seek information, view a business scene or environment, or simply take a photograph, we are implicitly *freezing out* information due to the limits or field of view that we impose. What we choose not to notice is excluded. The choice may be explicit or tacit, and we may be conscious of it or choose not to be, but a choice is made, nevertheless (Elkins, 1997).

In observing our surroundings, remember that we are inherently incapable of seeing the world objectively. This is true whether optically, psychologically or philosophically. Baumard (1999) points out that "the phenomena we observe usually reflect only ourselves – our results tell us far more about our method than they do of the phenomenon which has solicited the observation – hence the importance of the choice of perspective and not adopting too narrow a field of view."

We Cannot See the Whole Picture

To further illustrate that what we see depends on *us*, and not on the world outside, consider walking along the seashore as the sun is setting (or rising), or when the moon is visible. We may be conscious of the swathe of light reflected in the sea, and some of us may even have noticed that this appears to follow us as we walk. But why should this be so?

'When the sun begins to go down ... it becomes a shining sword in the water ... each has his own reflection, which has that direction only for him, and moves with him. All this is happening not on the sea, not in the sun ... but inside my head.'

- Calvino, 1983

Optically, the explanation is of course that we see only those rays that are at an angle that we *can* see. A friend walking alongside us sees *their own* 'sword', lying on the surface of the sea in the same plane as that containing them and the sun or moon. Dawkins (2000) uses rainbows to make the same point: as we drive along a road while viewing a rainbow, we actually see a succession of *different* rainbows - but we nevertheless interpret these as one 'constant' rainbow. At the very least, this should induce in us a measure of humility: we *do not* and *cannot* see the world as it is, but rather (only) as *our* eyes enable us to see it. We cannot see *the whole picture*. Others will of necessity see a *different* view, illuminated differently.

Vision is Active

Far from being a passive process, vision is an *active* and two-way process, not merely one where light enters our eyes from outside. We see what we notice, and to notice, we have to look at the object of interest. But *looking* is not in itself sufficient. The ancient Greeks were, it turns out, correct in claiming that something must flow *outwards* from our eyes in order for us to see. They thought that it was the light itself, streaming out from our eyes to illuminate the object looked at (Zajonc, 1993). We now know this to

be incorrect. What has to flow outwards is *attention*. Looking without attention is a guarantee of blindness.[7] We may *see*, but if we fail to *notice*, we are essentially blind (Mack & Rock, 2000).

We're Blind to Our Own Blind Spots

Each of our eyes has its own blind spot about 6° x 8° in size, or about the size of an orange held at arm's length. This blind spot is where the optic nerve leaves the retina of each eye for the brain. In comparison, the full moon in the night sky subtends an angle of only 0.5°. Despite the large angular size of our blind spots we are usually quite unaware of them (just as we are usually quite unaware of the obstruction our nose causes to our field of view), since our eyes are in constant saccadic motion, and because the brain does an excellent job of filling in the missing gaps. Yet this can cause some startling effects (familiar to devotees of optical illusions). If we neutralize these involuntary saccadic (or micro-) movements, we quickly stop seeing clearly - after only a few seconds. It is the *changes* that enable us to see.

Staring Will Get You Nowhere

Changing one's perspective in CI is no less important. Staring constantly in one direction will get us nowhere. When we stare too long and too hard at our competitors it should come as no surprise that we cease to notice subtle, or even not-so-subtle, changes in their business posture or behavior. Gilad (1993) has written forcefully about the dangers of Business Blindspots that can befall large and supposedly well-run companies. It is in the nature of blind spots that we ourselves are blind to their existence. As Goleman (1996) put it, "there is what we notice, and what we don't even notice that we don't notice." And one of R.D. Laing's famous "Knots" (Laing, 1972) also summarizes this well.[8] Sometimes though, we choose actively *not* to notice[9], such as when we enter an elevator and consciously avoid eye contact with our fellow passengers.[10] When the astronomer Percival Lowell detected straight canal-like structures while searching for water on the surface of the planet Mars, he ascribed these to a seemingly intelligent cause. However, as Carl Sagan has observed, "we are not always aware of what we see and are usually blind to our own blind spots. The regularity of the canals was a clear sign to Lowell that they were intelligent in origin. The only question is . . . on which side of the telescope was the intelligence?" (Nørretranders, 1999). It is we, the observers, who impose the intelligence on what we observe, and this is as true in CI as it is in astronomy.

But even when we do know, rationally, that it is our *brain* that sees, we are unable to bypass or 'switch off' its interpretations, and so we may often see things that are not actually there. On the other hand, we are all familiar with examples where having once spotted hidden features in a scene, which only a moment before we had failed to notice, we are then quite incapable of no longer *not* seeing them. These effects hold true not only with optical illusions, but whenever we view the world and try and make sense of what we observe.

Signals or Noise?

To see clearly and distinguish details in an object, we require sufficient contrast. If objects appear to be washed out (for example, by haze when looking far into the distance), we lose contrast, and with it the ability to distinguish detail. To paraphrase Bateson, we seek *the difference that makes a difference*. But we must also recognize that one person's signal may be another's noise. What is critical to one observer may be irrelevant to another and go unnoticed by a third.

What then can we do when faced with a (business or photographed) scene in which details cannot be made out clearly, that is, when there is insufficient contrast? There are a number of options: one can adopt a different perspective, illuminate the scene (or the problem) from a different angle, or in an office environment (literally or metaphorically) step back from one's terminal (Weick, 1991) and walk around (as Kierkegaard suggested)[11] to get this different perspective. In many cases, simply talking to colleagues may provide this different angle. In CI as in the current Knowledge Management literature, it is a truism that 80% of what one needs to know is often to be found within one's own organization – the only question is where and how to go about finding it.

It is natural to use context to help us judge the importance of what we view. But context is without

bounds: "everything has its context, which has *its* context . . . and so on *ad infinitum*" (Scharfstein, 1991) and may itself also cause us to err.[12] On the other hand, *ignoring* context is "equivalent to driving with *tunnel vision*, it is limited and allows sufferers to see where they want to go, but little else . . . this central focus inevitably pushes aside all the fuzzy stuff that lies around the edges - context, background, history, common knowledge, social resources. But this . . . is not as irrelevant as it may seem, and can provide valuable balance and perspective" (Brown & Duguid, 1999). We must thus be cautious of the influence of context in CI, while at the same time recognizing its importance.

We Can't Switch Off What We *Know* to be Incorrect

Sometimes (as in the Kanisza square or triangle illusion), we *know* we are seeing *artifacts* (in this case a seemingly clearly defined square or triangle, which does not actually exist, except in our brains) but are unable to *switch off* the process (Hoffman, 1998). In the well-known 'daughter and mother-in-law' illusion, we flip from young to old, seeing either a young woman, or an old hag, yet are incapable of seeing both simultaneously. There are business intelligence practitioners who use this kind of ambiguity deliberately: one small French CI company keeps conflicting and often disparate options open for as long as possible as a significant part of their way of viewing events (Baumard, 1999). They do this consciously, avoiding too much analysis too early so as not to impose patterns on what they observe. This intuitive approach to observing their environment allows them to compete successfully against much larger, seemingly more structured CI companies.

We can see this flip effect as mirroring the physical nature of light. Modern physics teaches that light is either waves or photons, depending on how we look at it. Experiments to show the wave-like nature of light do not reveal its particle-like nature, and vice versa. We can draw an analogy from this to how we view our business environment, and try to constantly alternate between looking at trends (waves) and details (photons). Learning to live with this ambiguity (Baumard, 1999) is not always simple, but is often helpful. In business intelligence as in modern physics, if one looks for one aspect, one doesn't (and *can't*) see the other. As an exercise, try stepping back for a certain period of time from the inundation of daily news bulletins to follow the news on a weekly basis instead. One's perspective changes immediately - there is less 'noise' due to the latest or most recent news broadcast, random peaks of media attention subside, and this allows one to notice some of the underlying and of necessity, slower fluctuations or trends more clearly.

Don't Always Seek the Right Answer or Look Too Closely

'I looked, but didn't find anything' is fast becoming a commonly heard complaint, not least from those seeking information on the internet. In many cases, when searching for information, people tend to focus too specifically on what they need, seeking an almost mythical *right* answer. An example by the well-known cartoonist Gary Larson illustrates the dangers inherent in this approach. He shows a castaway on a desert island, jumping up and down and waving his hands, having drawn the word "HELF" in large letters on the sand. A pilot flying overhead in a rescue plane radios the message "Wait! Wait! . . . Oh, OK, cancel that, I guess it says 'HELF'", signaling the plane to fly past, leaving the castaway behind. If you are 'programmed' to look for HELP, then you too will fly on and miss the information you seek! Here too, a little humility is in order: not everyone spells HELP the way *you* do,[13] not everyone publishes his or her information in the form you seek. For example, news items may *not* include the *keywords* you think you need - either in the title, or even in the article itself, and yet still may be of considerable importance.[14]

Just Looking

Sometimes simply 'looking around' can help. 'The way forward is . . . not to look *ahead*, but to look *around*' (Brown & Duguid, 1999). Optically, they may have a point: our vision improves slightly off to one side of the eye's optical axis, with soldiers who use field glasses often being taught to exploit this phenomenon, known as *averted vision*. In CI too, one must learn to cultivate averted vision, and should some-

times deliberately 'look off to one side', and not focus too strongly on one's main target. This often allows us to recognize 'the importance of serendipitous news - that we didn't set out to find' (Brown & Duguid, 1999). Hewlett Packard's concept of MBWA - Management By Walking Around (Peters & Waterman, 1982) should perhaps become SBWA - *Searching* By *Wandering* Around.

But we need to not only look off to one side, but also to zoom in and out. Often this can be helped along by using a *relaxed eye*, [15] and allowing one's thoughts to float (Adams 1986). It is also a curious fact in optics that one can only be sure one is *in* focus by moving *out* of focus.[16] So to be sure of seeing a situation properly, we *must* move back and forth and deliberately change our viewpoint. Only by doing this can we be sure that we are well focused on the matter in hand. As an example, when 'looking' at a company, we should consciously 'back off' or 'zoom out' to look at the wider market, and so on.

The Dangers of Monomania

Being *too* focused can also lead us to fall into the trap of *monomania*, the over-reliance on *one* specific figure of merit, used by Hopkins (1982) to describe the dangers of defining the performance of an optical system by only one parameter. But monomania can also apply to business and CI.[17] In practice, we should be aware that relying only on *one source,* adopting only *one* search *philosophy* or engine, is unwise, and never sufficient. Different viewpoints and perspectives[18] should be sought deliberately so as to crosscheck information, just as our two eyes use parallax to allow us to triangulate depth information.

Sitting too close to a computer screen or TV, or looking into or through an optical system with too large a magnification, one mainly sees the pixels or video raster. This so-called *empty magnification* prevents us from seeing the desired image[19] and can cause both a sense of discomfort and fatigue. In CI, we need to know when to step back, and when to zoom in or out, *adaptively*, and *iteratively*. *Too narrow* a view is discomforting, like the effect of tunnel vision encountered when looking out through a long narrow tube. Consider a company known to keep a deliberately low profile about some of its activities. Focusing on those, and investing time and effort to look specifically at or for these, may simply waste resources. In such a case it could be more efficient and useful to step back and look, for example, at interviews that the company's CEO had given on *other seemingly unrelated* subjects. This can often reveal much about what *is* of interest to us - through what is said explicitly, what is merely hinted at, and what is glossed over or ignored.

Seeing and Noticing, Mapping, and Integrating

Sherlock Holmes made it his business to "know what other people don't know" (Doyle, 1892a/1993).[20] Here we can rephrase this slightly: he made it his business to *'notice what other people don't notice'*. We too, should be constantly on the lookout for incongruities such as 'the dog that didn't bark' (Doyle, 1892b/1993)[21] where the clue lay in *what* was *missing*. The dog was *expected* to bark but didn't, and this anomaly led Holmes to solve the mystery. All too often the key to what we seek is the news item or press statement that *didn't* appear, the announcement that was *delayed*, the long-awaited product *glossed over* for some reason in the usual industry surveys, and so on.

Any analysis of a business or competitive issue is in a sense a *mapping* of our external environment. And this inevitably involves classifying our surroundings (Bowker & Star, 2000). But we can legitimately ask 'whether mapping with *more* detail is necessarily *better?'* since maps (and memory) work by what they *leave out*.[22] Efficient communication relies not on just how much is said, but also on how much can be left unsaid. So too does intelligence gathering - where the basis of an account is the information that is *discounted*. To borrow an idea from *The Economist*, we must often 'simplify and exaggerate'.[23] Any useful description *discards* information, and time and effort must be invested to do this.[24] *Forgetting* requires work.[25]

In addition, by focusing too much on the *certain*, we may often obscure the *almost certain*. We can bridge intelligence gaps by looking both at what *is* known and what is *not* known, but these may not always match. When analyzing business situations, or military conflicts[26], one should look both *top-down* at the overall picture but also work *bottom-up* from the

details. Both should be done, working *adaptively* (that is, influenced by the nature of the problem in hand), and *iteratively* (in and out several times in cyclic fashion), all the while being careful to integrate the results intelligently. For example, a recent U.S. Commission (1998) dealt with Iraq and the issue of a potentially hostile state developing weapons of mass destruction. The Commission described how it focused on what was known *still to be done* by the Iraqis, and not only on what was known *to have already been done*. By putting the two together and integrating the collected intelligence, they were able to notice where there were logical gaps, and so were able to specifically identify the Iraqi efforts to deceive and misinform.

CI and the Art of Lens Design

The practice of CI is similar to optical and lens design activities (and many other design and optimization processes as well), in that one specifies a goal, assesses the current situation to see how far it differs from the goal, and instigates a set of operations that aim to reduce those differences. In CI, the constraints of the situation can themselves often give us information - such as for example blank spaces in news documents that indicate traces of censorship.[27]

In CI, as in any design process, pragmatism is called for. One should always aim for what is *good enough*. Not *absolute truth*, but *effective performance*, not what's *right*, but what *works; satisficing* (March & Simon, 1958) not *optimizing*. Finally, and as is true also in so many other design processes, one continues to collect and analyze intelligence until either the time or the money run out!

Conclusion

CI is so dependent on our senses, and in particular on our sense of vision, that it should come as no surprise that optics - and vision-related ideas and metaphors can help shed new light on a one's CI activities. What may have been less obvious is that looking *too hard*, getting *too close*, and being *too focused* can be counterproductive, and so ways to circumvent these problems have been suggested.

Related areas of Cognitive Psychology - how we pay attention, and how we exhibit inattentional as well as unintentional blindness; Neurobiology and Art - how our brains see, how we look and frame what we observe; and Information Science - how we classify and map the world around us, and how we *include,* and thereby *exclude,* subjects of interest, have also been touched on. Each of these areas has much to teach us. In this way we can begin to 'see with new eyes'[28], and so become more intelligent CI practitioners and better noticers.

Notes

1. This paper is an expanded version of that presented originally at the SCIP (Society of Competitive Intelligence Professionals) Fifth Annual European Conference in London, UK in October 2000.

2. Israel Aircraft Industries is a leader in the development of UAVs (Unmanned Aerial Vehicles), pilotless planes that carry cameras or optical sensors of different kinds to collect IMINT (image intelligence). These are used worldwide to monitor pipelines, traffic, or borders, or view events (such as forest fires or environmental leaks and spills), where sending in pilots or observers would represent an unnecessary risk. UAVs can scan the environment or be directed by ground-based operators to view specific areas. Some colleagues refer to the dove that Noah sent out of the ark to spy out dry land as the first UAV, but here we can see it as the first *Search Engine*, returning at last with *one hit* – an olive branch. As *information,* this was merely a branch, but for the *receiver* of the information, Noah, who invested it with understanding, it was a clear sign that the floodwaters were receding. Charles Ives, the American composer, has noted in a similar vein that 'the music is in the musician not in the music'.

3. Can one see without being seen? Could *The Invisible Man* described by H.G. Wells (1967) see? Optically, the answer must be no. For our eyes to

function properly, there must be a difference in refractive index between them and the surrounding medium. This is why we see so poorly when swimming under water, unless we wear goggles which give our eyes back the necessary air layer in front that they require to see clearly. For *The Invisible Man* to see, his eyes must have a discontinuity in refractive index with their environment. There must be a degree of 'impedance mismatching' (to borrow an electronics term), and this is sufficient for him to be 'seen' by an external observer. Since any organization of necessity interacts with its surroundings, there will always be discontinuities, boundaries and flows, and these can be detected and observed.

4. See The Fuld WarRoom (http://www.fuld.com/ciStrategieswarRoom.html) a set of multimedia course materials on Competitive Intelligence.

5. This rarely happens in urban environments as there is simply too much ambient light around, but dark cellars, power cuts, or camping trips can still provide suitable conditions for dark adaptation.

6. Trudgian, J. (2001). Associated with Williams Inferential Scanning, a US- and UK-based company offering environmental scanning services and trend identification.

7. There is 'no *conscious* perception without attention . . . it seems to many people as if we see nearly everything in our field of view . . . but we all suffer from looking without seeing, or seeing what isn't there . . . (Mack & Rock, 2000)

8. The range of what we think and do
   is limited by what we fail to notice.
   and because we fail to notice
   that we fail to notice
   there is little we can do
   to change
   until we notice
   how failing to notice
   shapes our thoughts and deeds
   - R.D. Laing in *Knots*

9. At the Battle of Copenhagen, on 1st April, 1801, Vice-Admiral Horatio Nelson chose *no*t to notice the signal to disengage from the enemy, by (literally) turning a blind eye, and so saw no ships.

10. As an aside, one may ask, "How is it that we know where *not* to look?"

11. "it is solved by walking" (letter to Jette) " . . . do not lose your desire to walk; every day I walk myself into a state of well-being and away from every illness. I have walked myself into my best thoughts . . . " Kierkegaard, S. (1847). In *Solvitur ambulando.*

12. A common optical illusion shows two circles, one surrounded by six small circles, the other surrounded by six larger circles. Although both central circles are exactly the same size, the one surrounded by the *smaller* circles appears to us to be larger than its neighbor. We judge the size of the central circles incorrectly if we allow its immediate surroundings to overly influence us.

13. In one trivial but enlightening case, I sought information on US plans for its Armed Forces in the new millennium, a program called (so I believed) *Army 21*, only to find, to my embarrassment and after some effort, that, although the Canadians, Australians, and Swiss do indeed have such programs, the US calls *its* program *Army XXI*.

14. Headlines do not of course always reflect the content of the articles that follow (sic).

15. The 'relaxed eye', focused anywhere from 1 meter to infinity, is most often observed in conference audiences just after lunch. . .

16. Should this be doubted, consider the (now) ubiquitous CD player, the lens systems of which have a built-in auto-focus system, which operate by constantly moving out of and back into focus.

17. Referring to the practice of over-reliance on single parameters such as 'number of workers', GDP, or ROI, without taking into account that the real world is a multi-parameter environment, necessarily much more complex than the simplification implied in the use of 'one number'.

18. Hamel (1996) wrote that 'Perspective is worth 50 IQ points', yet IQ is itself a classic example of monomania. Those who judge the level of an organization's CI activity by the number of its SCIP members surely fall into the same trap.

19. The artist Roy Lichtenstein deliberately exploits this effect by pixellating his half-tone prints of Rouen Cathedral and enlarging them to extremes: if we get too close all we see is pixels. On the other hand, when one sees Monet's expanses of water lilies, it seems far from clear (to the author at least) how he could have painted them without constantly moving back from the canvas to view his results.

20. 'I can see nothing,' said I handing it (a hat) back to my friend. 'On the contrary, Watson, you can see *everything*. You fail, however, to reason from what you see,' says Holmes admonishing Watson.

21. 'Is there any point to which you would wish to draw my attention?" "To the curious incident of the dog in the night.' '*The dog did nothing in the night-time*.' 'That was the curious incident,' remarked Sherlock Holmes.

22. 'A map can only fulfill its primary functions . . . if it is different from what it represents . . . far from being a blemish or a defect . . . this is absolutely requisite if it is to be a map at all' (Danto, 1968)

23. G. Crowther, a former editor of the *The Economist* during the 1950s, gave this advice to writers.

24. This may not seem much to do with optics or CI - but lies at the heart of modern physics, coming from studies of infrared radiation by Planck and others at the beginning of the 20th century. Maxwell's Demon was a fictional device that could supposedly separate out fast from slow-moving molecules and so *do work.* This would have violated the Second Law of Thermodynamics, and so fails. This is not only because the act of *looking* at the molecules would itself interfere with them (the Heisenberg Principle) and would require work to be done. It fails because to observe a new molecule, the Demon must of necessity *forget* what went before (Nørretranders, 1999), and this *forgetting* requires work as well.

25. Just as a modern CCD (Charge Coupled Device) camera needs time to deplete its cells before it can form a new image, and this time is often the limiting factor on camera performance.

26. Such as the recent Kosovo conflict, where the US and NATO were subsequently seen to have exaggerated their successes, having been misled on several occasions by what turned out to be remarkably simple decoys.

27. The images of conquered Pharaohs in the pyramids often had their faces blanked out by their victors. But since this was done precisely and within the lines of the original drawings, we have been left with a clearer image of the defeated kings than we would have had no defacing taken place.

28. Marcel Proust: 'the act of discovery consists not in finding new lands, *but in seeing with new eyes*.'

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