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## Disorderly Signposts

*business success • socially responsible capitalism • leadership and change • excitement of entropy • signposts to chapters*

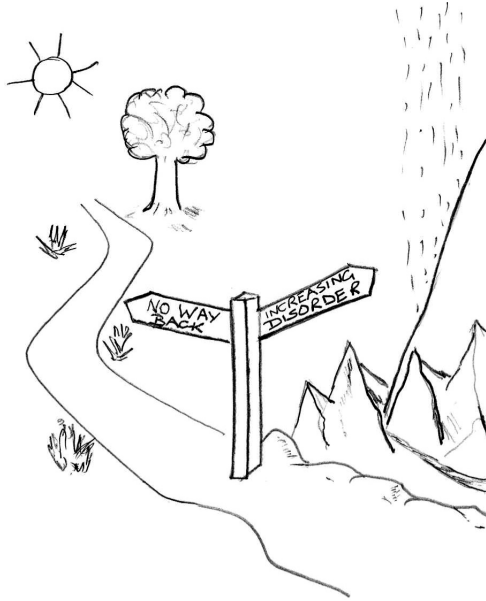
Entropy is the degree of disorder or chaos that exists or is created. We might take a more detailed look at degrees of disorder later but for the moment this should suffice. So, in a book about disorder you might have hoped that we would have got on top of the job and have presented a signposting chapter clearly and logically. But entropy is powerful stuff and will not have ‘neatly’ and ‘orderly’ as bedfellows. So we compromise. The signposting chapter is in one place but the reference to chapters is not sequential.

Let us be clear from the start. This is not a rigorous scientific book. It is not intended to be and some readers will have spotted that from the first sentence because the definition of entropy is not rigorous. We are not trying to write a textbook. Rather, we are trying to explain some scientific rules in a simple and clear way and then make connections. We have found that these connections have made us more able to manage our relationships, our business, and our life more successfully. We hope you have the same experience.

Science, as we have mentioned already, is too important just to be left to the scientists.

We have also mentioned that the ideas that we relate to business are equally applicable in other situations and in other organisations such as government departments or charities. Whilst the aims of these other

organisations may not be as focused on profit, money management, which at the simplest level is a matter of matching activity to cost, is often a common prime driver.



And they call this useful signposting?

So, this is Chapter 1, the signposting chapter. It is followed by Chapter 2 (surprisingly, you may think, in a book about disorder), which is entitled ‘Planck’s Inspiration’ and which touches on the broad areas of nature, science, philosophy and business. Our guiding principle in this context has been to ‘keep it simple’ and we have tried to summarise where we have got to and remind our readers of what has been said on a fairly regular basis.

We keep talking about managing businesses more successfully, so perhaps we should explain at the outset what we feel to be relevant. We suggest three themes, the first being ‘socially responsible capitalism’, which provides long-term stability for employment and profit. However, entropy (disorder) exists and, as we shall find out later, it increases in all real processes and works against stability.

So, we must learn to manage and control change, which is the essence of this book in layman’s terms. Since entropy militates against stability and since socially responsible capitalism is a blend of sometimes competing objectives, it is easy to see why success can be elusive. In this book, we will be suggesting that vector analysis is useful in looking at competing objectives—in the same way that it is useful in determining how to sail

across a river to a point on the opposite bank when the current flows in one direction and the wind blows in another.

Secondly, we argue for a collective determination to embrace change. We say ‘collective’ in the sense that all the people in the organisation must be involved. This means that change should be ‘bottom-up’, or at least ‘bottom on board’. This is not a cynical view but the realpolitik of bringing about effective change in an organisation.

Finally, we explore the courage to ask the hard questions. It takes courage from top management to ask fundamental questions about the business in an open way. There is a risk that it might look indecisive but, for a successful business, you need both leadership and the involvement of the rest—or, better, the fuller-blooded version of empowerment. The trick of course is to ask the right questions and to make sure that they are not too hard! Maybe universities should consider teaching a course to students entitled ‘The Setting of Examination Questions’; for the skills learned here would have broad applicability.



We suspect that readers of this book will be scanning the pages for answers and instead will find analysis. We will answer in our defence in two ways. First, we suggest that answers alone are often quite useless.

There are, for example, numerous ‘answers’ in your local garden centre. By this, we mean that if your lawn has lifeless and brown patches, then the answer is a dangerous-looking spiky tool that you can buy. However, even though you have ‘the answer’, the problem is not solved until you learn to use the tool and apply that learning to your lawn. Secondly, we will say that in a surprising number of cases, analysis is the answer—learning how to discover and formulate the question is the fast route to the answer and we hope that some of the ideas in this book assist your analysis.

Entropy is familiar to engineers and physicists and is used in thermodynamics and increasingly in other sectors of science such as statistics. Our objective in this book is to employ some of the rules describing the behaviour of natural phenomena, the laws of science, to produce successful business strategies. We focus the science on issues associated with energy and its conservation and consumption (for example, Chapter 5); whilst the business issues being addressed are those concerned with creativity, innovation and direction (see Chapter 8).

We shall also seek to ask: ‘Is entropy a good thing?’ If you are managing a company, a division, a factory, a department, or just a small team, do you want to create entropy or find ways of reducing it? And, having decided which, how do you go about it? Long-suffering NCOs in the armed forces have a favourite saying reserved for those unfortunate officer recruits who fail to perform adequately: ‘I would only follow you out of curiosity to see where you are going.’ In management and at all levels, we must do better than these unfortunate recruits and ensure our staff know the direction in which the business is going and how their efforts will contribute to corporate goals. Chapter 7, entitled ‘Managing Disorder’, is about managing change and about techniques for good management.

We mentioned at the beginning that entropy is the degree of disorder. We have already asked some questions. Perhaps by now some further questions have come to mind, probably in a disordered fashion. If we shuffle them in to a logical order, we will reduce their entropy and expend some energy or effort at the same time. If next week we ask you to list your questions, then you will probably have forgotten some of them, and almost certainly you will have forgotten the logical order. This is entropy at work. It is always increasing and continuous effort is needed to keep it in check. You could expend more energy and write your list down, which would arrest the decay into disorder, but eventually the piece of paper would be lost and entropy would have gained the upper hand. We discuss these ideas of mental entropy in Chapter 10.

Our central theme is one of managing disorder and we introduce the concept of the entropy vector. Entropy itself is an engineering concept

that arose from the study and development of steam engines during the 19th century. These engines brought about an industrial revolution and with it a spiralling demand for more power at lower cost. A hundred and fifty years ago entropy helped engineers to explain why they could not produce engines that were a hundred per cent efficient.



Some might regard it as engineers giving themselves an excuse for failing to design better machines. But, it is such a good excuse that they are still using it today! Over the decades, physicists have jumped on the bandwagon and used it to explain the state of the universe. Even the information technologists have begun to use it and today it plays a prominent role in information theory. We will touch on all these topics but the application of the entropy vector in business management is our main concern and the ideas of an entropy vector are dealt with in more detail in Chapter 4, entitled 'The Entropy Vector'.

Because there is a scientific basis to this book, we will introduce, as appropriate, the links to the scientists and philosophers who have led the thinking. Change requires time to be effective and Zeno, with his paradox of an arrow, will begin a thought process that brings us right up to modern quantum dynamics. But more of this in Chapter 6 ('Time and Entropy') and again in Chapter 10.

In discussing the origins of entropy in the 19th century, the names of Carnot, Kelvin and Clausius will occur. If we stick with Clausius's

attempts to look at fundamental laws of the universe using the concepts of energy and entropy, what questions arise and what answers can we give?

Clausius tells us that the total energy in the universe is constant and the entropy in the universe tends to increase towards a maximum value. We give an outline of what the thermodynamicists tell us in Chapter 2 and develop it further in Chapter 5, 'Energy and Entropy'. The 'Notes and quotes' at the end of Chapter 2 refer the interested reader to a rigorous mathematical analysis of the subject; it is not the intention of this book to get into detailed maths. Incidentally, notes and quotes occur at the end of most chapters. We give explanations for some of our sources and point to some of the books that have excited us.

Looking at the general economic picture, whilst inflation rates rise and fall there seems to be an overall upward trend. Is inflation a manifestation of entropy? This bears closer examination. A theoretical economic argument reveals that both inflation and deflation are self-correcting, i.e. part of a reversible system. But, in the real world, people and politics interfere and we end up with a real rather than ideal process, and in real processes, entropy is generated and is an indication of disorder. What kind of disorder might we come across in business? Inefficient production, strikes, unemployment, bankruptcy, irrelevant R&D? This idea is discussed further, initially in Chapter 3 and later in Chapter 11, 'Entropy Trade-offs'.

So, looking at an individual industrial process or an individual company, is the objective to reduce entropy production to a minimum? Does low entropy creation imply efficiency? Clearly, this can only be part of the story. If we expend no energy at all, the entropy creation will be low, the efficiency may be theoretically high but the output will be nil. Similarly, we could conceive of a system where an enormous amount of energy was applied for the given work output to ensure that the entropy creation was minimised. The search is for low entropy creation, low energy input and high work output, and you can join that search in Chapter 4, 'The Entropy Vector'.

Even now, the analysis is incomplete. In some parts of a company there may be a need for high entropy activity—unconstrained creativity is an example. In the 1996 UK Innovation Lecture, William Coyne, Vice President of Research for 3M Corporation, said: 'We are managing in chaos . . . our competition never knows what we are going to come up with next. The fact is neither do we.'

3M could argue cogently against reducing the entropy of their research labs. However, it seems clear that the chaos that 3M claim to enjoy is of no value without their well-established, well-organised, well-constrained (i.e. low entropy) review and development procedures. More of creativity and innovation in Chapter 8.

Business is not without risk and we are not suggesting that there is a way to avoid it. Rather, we are suggesting that there are some preferred modes to deal with it and some important choices to be made as to which risks are taken. For risk and entropy, see Chapter 9.

We are close to a working axiom: You get the most useful output for any given energy input if you can keep an eye on what is happening to the rate of entropy creation. In short, you need to try and harness and control the entropy vector. We have already referred you to the chapter so entitled (Chapter 4, if you have forgotten) but many of the other chapters develop the idea. After all, this is a book about connecting and we try to connect. Often.

And in a disorderly way. Go on, have a look at some of the other chapters. This one is finished.