Formations of Terror

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By

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For the fearful, the oppressed and those lost in anxiety.
No condition of life is everlasting.

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PREFACE

> "Why is there a fault line, an edge, between the world that we see and the world that physicists know really exists beneath its surface?"
>
> (Al-Khalili & McFadden 2014 page 34)

I am not a lover of the use of peculiar, 'deep' and/ or apparently out of place/ head-scratching quotations at the start of chapters but the relevance of this quote will, I hope, become apparent very quickly.

This is a book about understanding fear using systems methods to look below the surface. In this book I suggest that human beings are 'edge dwellers', living constantly on the edge of possible oblivion and unknown changes and by and large we are pretty good at it.

I try to make some sense of our experience of the edge and, more importantly, our understanding of the fear of the edge. I am trying to understand fear and to do this I am to some extent and to one degree or another attempting to do research. As a life-long user of what can be called "systems approaches" (dealt with in some detail in Chapter 5) I am convinced that the researcher is always and essentially part of what is being researched. In our research we cannot avoid affecting (and of course being affected by) our object of study. I am studying fear and if I am to understand fear I need to take into account that I may be a producer of fear in others and also that I may well be a victim, affected by fear. We touch and are affected by what we study. A more physical example of how researchers affect their study may be useful.

It's obvious (right?) that a social scientist is also part of society? That a psychologist is human and brings human thoughts into their work? But this goes further and deeper. Even the 'hard' sciences are affected by us, the doers of the science.

I remember as an undergraduate spending a couple of days during a long slow summer studying river flow dynamics. We had a number of items in our learning itinerary but key to our research was to understand the variable flow rates of the river across its profile, that is to say the

different rates of flow in the core/ centre of the river as opposed to the rate on the periphery/ bank side, and other points in the river. In a more philosophical moment during a lecture our professor went to some considerable pains to tell the class that a researcher cannot measure a thing without interfering with it and thus altering the object of measurement. This was in the late 1970's and a long time before scholars such as Lanza and Berman would begin to take the consequences of innovations in physics to draw our attention to the impact of consciousness on matter (Lanza & Berman 2010). At the time I recall thinking this was a pretty irrelevant thing to be telling us. I mean sure a sociologist might influence a focus group but how could I impact in a meaningful or material way on the river I am studying? I am going to put a float in the river with a propeller on the end. This will lie on the surface of the water and the propeller will pick up the flow and spin and this in turn will alert me to how fast the river current is flowing. But how will this impact the river? Well hardly at all. But arrogance and ignorance are contained in these words. The 'hardly' is the interesting part of my denial and is key to the importance of my reflection. 'Hardly' implies a little but how much is a little? I am conceding the point that my measurement will have an impact but I have no idea how much. I minimise and dismiss the issue by saying 'hardly at all'. Truth is, I have no idea. I don't have a clue beyond the assumption that my impact will be very small and that it will make little if any material difference to the river. But I cannot know this because I cannot know what the river flow would be if my float were not there. I cannot compare and contrast my measured and unmeasured flow although some pretty amazing mathematics would allow me to make a reasonable guesstimate.

Now, you may think that this is a pretty irrelevant thing to worry about. You may share my early-twenties mindset that the effect of my measuring device can have little if any impact on the river I am trying to study but now, in my late fifties I don't share this relaxed response. When I move and act in the world, as a researcher or just as another human being, I affect the objects of my actions and this in turn impacts on other things and I have no idea what impact will emerge. The butterfly effect seems appropriate but oblique and hard to tie down[1]. It is an intriguing suggestion of depth within depth rather than a means to gauge what the depth means. Back to the river. I assume my impact is minimal because my means of measurement is so small and the river so large but I do not

[1] The idea first coined by Edward Lorenz that the movement of a butterfly's wings might have deterministic effect on the nature of a storm weeks later.

know this in a measurable way. Take this a step further, to the quantum world and it gets very perplexing. I am no physicist but Jim Al-Khalili and Johnjoe McFadden are and they write:

> "down in the microscopic quantum world, particles can behave in these strange ways, like doing two things at once, being able to pass through walls, or possessing spooky connections, only when no one is looking. Once they are observed, or measured in some way, they lose their weirdness and behave like the classical objects that we see around us' (page 28).

I am not qualified to comment on the scientific veracity of this statement from Jim and Johnjoe but if I accept it then my measurement has a deeper issue: I affect what I measure but quite often I do not know the extent of the effect and, at a micro level, when I undertake measurement the stuff I measure may act differently when I am not measuring. Well, that's the implication as I see it (for the fuller and much more erudite version of the argument around consciousness and reality I recommend reading Lanza & Berman 2010).

I thought my measurement of the river was straightforward but suddenly my river becomes very perplexing to me.

But back then, 30 or so years ago, I acted like 99.9% of other researchers, I kept calm and carried on. The intellectual oddness and perplexity of measurement remains but in the end I have a job to do and actually I am not comparing the river against the unmeasured river, I am comparing it against other people's measurements of the river and their measurement of other rivers. My science is not really to understand the nature of the river in a totally accurate way. No, my objective is to apply tools that are agreed to be accurate and to compare my results with those of others who have already used the tools.

It seems to me that this rather begs the question are we prepared to question the nature of our tools? What if the effect they have on the river is more than we supposed? Maybe our global impact on our world is more (or less) than we suppose? It may be that the 'normal' way of doing science is robust for measuring change but does it allow us to understand surprises outside the frame of business as usual? J B S Haldane is noted to have said (and I make no apology here for quoting him in the original as he wrote it):

> "I have no doubt that in reality the future will be vastly more surprising than anything I can imagine. Now my own suspicion is that the Universe is

> not only queerer than we suppose, but queerer than we can suppose." (Haldane 1927 page 286).

Haldane has a point but that was not my concern back then as I stood in waders in the river. My issue was to swallow any assumptions that might perturb me, remain ignorant of intellectual oddities and do my research in the same manner as others had done research before me. I would compare my results with the results of others who had done similar things. I would apply the methods that they had previously applied and compare my work to the work that they had already done.

In this process the river tends to disappear and strangely my measurement becomes more closely linked to the reported measurement of others than to the river being measured. But it worked.

Thirty years later I can see that despite my ignorance about worries in measurement and "queerness" the world did not end, I gained a pass for my assignment and my results are now long lost in the vast and echoing halls of undergraduate projects completed and moldering to dust.

But I remember my Professor's injunction about the poorly understood nature and impact of measurement and it has stayed with me throughout my career.

Back to 'the edge'. This book is not about measuring river flows it is about understanding fear and fear can never be a purely objective field of study. I am not trying to measure fear but if I am to be able to say anything useful about fear I will be relating it to different appreciations of fear, different intensities of fear and different experiences of fear in different contexts. Much of our fear is below the surface of our conscious appreciation. In pondering the nature of fear I will be engaged in implicit measurement because I will be comparing and contrasting different views and experiences of fear. In comparing and contrasting there is assessment and also forms of measurement. In measuring fear, I will be experiencing it, often second hand, and allowing fear 'in'. Allow me to make sure that the import of this is put across. In allowing fear in I am opening my mind, my cognition, to the causes and results of fearful things. I know that I get scared and I know that when I am suffering from fear I do not act as I would if I was not afraid and this confuses me. All of this probably has implications for my assessment of fear, but I don't know, I am guessing, as I cannot run my research twice. Once with me in it and experiencing the fear of others and once without me being so involved. Clearly I cannot do this, it is nonsense.

Nevertheless I find this nonsense very interesting. If the scientist/ rational observer affects the river flowing, or a leaf photosynthesizing, or a stakeholder group forming, or a field of maize growing then when I research fear do I affect the fear I observe? It is obvious (and probably true!) to say that every human being alive has felt fear at some point in their lives but I think it is useful to state the obvious now and then. I am writing about fear and I have felt fear of one sort or another on many if not most of the days of my life. If we are honest we can probably all say something similar. Exactly what I mean by fear and how I can understand it is a large part of the content of this book but before I come to that I want to set out some of the obvious assumptions on which my assessment of fear is based. I need to set them out early on because they probably affect my study, the content and conclusions of this book and my arguments throughout.

1. I am and have been fearful.
2. I fear many things including the research I was involved with to write this book.
3. My expertise in fear is partial, there is always more to know.
4. But fear gets in the way of knowing. It is an impairment to the learning process as it tends to mess with the cognitive process.

[I need to be aware of the last statement and keep it in mind as I write this book]

5. I am assuming that there is one thing called fear.
6. I fear that this may not be the case.
7. I think that our experience and understanding of fear will be changed by this book.
8. I recognize that this is arrogant of me, and this is worrying.
9. This rather takes me back to point 1 above.

One last thing…

Well, two last things. A lot of what you will read is conversational in tone. This is deliberate and accurate. I have had a lot of conversations over the last two years and I think it most honest and most representative of the story that will emerge if I keep to this. I hope you won't find this too annoying or too much of a departure from the business as usual, distant and aloof tone of much academic writing.

Secondly, this book represents something of a systemic thought experiment and if the process and conclusions I come to surprise you as

much as they have surprised me in their writing then I shall be delighted and pleased to hear from you.

Simon Bell, December 2016.
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CHAPTER ONE

SYSTEMS AND FEAR: HOW THIS BOOK EMERGED

"I think the absence of love is fear".
David Hockney.
[*From 'Hockney'. Documentary directed by Randall Wright, Distributor: Picturehouse Entertainment. Release date (UK) 2014.*]

1.1 The Personal perspective of fear

An academic friend asked me about my motivation for writing this book. In a moment of lucidity, I said something like the following (although it was not as succinct or tidy):

> "I think I have had three significant epiphanies in my professional life. I have been working as an academic and a practitioner for 30 years or so. When I started out I was an international development specialist with an interest in systems thinking working with information technology. In the light of my practice and following reading the thoughts and ideas of the socio-technical systems thinkers I rapidly figured out that the technology was rarely the issue, what really messed up systems were the social and psychological issues in organisations and communities. I also figured out that the Geographic Information Systems or GISs that I was working on were less important than the environment that they monitored so in-expertly. Epiphany 1. So I turned to the environment and was given my chance to test my new mind-set working around the Mediterranean on a number of coastal management research projects. My focus on the environment, like my earlier focus on technology, led me to ponder other variables in the research context, my bewitchment and befuddlement with the motivations and decisions of people in community surfaced. Epiphany 2. The focus on the motivations and perceptions of people, or the multiple and often confused and conflicting perceptions of people became more intense. I moved from my research in the Mediterranean to working for a psychodynamic research agency in London and focused more acutely on the psychological issues that underlay social decision-making. Epiphany 3.

> In all my work I came to realize that some level of anxiety and fear was often a driver of activity and decision-making. From the arid lands of North West Africa to the decision-making offices of the UK Health service, fear was actually key to what we did. I think it was then that I decided I needed, at some point in my life, to give fear the attention it deserved and to try to make systemic sense of it."

A lot of people have suffered acute and chronic fear in their lives, probably the vast majority of us, probably you. I do not want us to forget this state of fear and for this reason you will find that I have liberally sprinkled the book with vignettes of fear. I want to ground the thinking here in the personal and at times overwhelming reality of fear. For many people fear is daily, personal and painful.

My Fear #1. Academic fear

James is a success. He is intelligent, in his early 50's, married with two children and holds down a senior academic post at a very good University in the UK. His wife works part time now as both children are attending universities and there is time to focus on making additional money. Income is greater than expenditure and there is a pension pot building up nicely. James is good at his job. Not crazy good but good enough to be safe and, as I have already said - a success. How do we judge or measure success in academia? Well it is a bit of a movable feast. Early on, back in the 1990's when the sector was just learning about ideas like 'impact' and 'performance' measurement, success was judged by pretty random measures in line with teaching, research and administration. But that was before metrics took off and higher education became a business. James sometimes thinks back to those days with a degree of nostalgia. Of course the system was open to abuse. Academics could and did have a very nice life. Lots of time for reading books, doing unpaid research and travelling to distance places on nebulous and unclear 'visiting professor' tickets. All of that changed over the 2000's. The ratcheting up of the assessment of academics has progressed from Research Assessment Exercise (RAE) to Research Effectiveness Framework (REF) and what seemed impossible, absurd at first, the comparative measurement of the qualities of the work of academics. The 'impossible' happened, committees of compliant academics figuring out league tables of value. This took some doing but once the sector applied its vast talents to the exercise it proved remarkably versatile and creative at the task. The lengthy process of assessing comparative value meant that every academic output was weighed in scales. In this measured world getting journal papers published is 'worth' more than writing books. Getting published in some journals is worth

more than getting published in others (this is figured out by reference to another metric called the journal 'impact factor' and quite how that is measured is the subject of a book in its own right). Chapters in books are worth very little. Conference papers are worth almost nothing and non-refereed articles (articles in journals where the submitted article is not subject to the review of peers) are worth less than nothing, so James is told to avoid at all costs! This is Metrics Measurement Land and in this strange and multiply assessed country money too is graded. Some money is worth more than other money. Research Grants are good but research grants from the Research Councils (e.g. the ESRC (Economic and Social Research Council and the NERC (Natural Environment Research Council) are 'very good'. Money from the European Union is OK but not so good as RC money. Money from non-governmental organisations like the Gates Foundation is 'so so' but money from consultancy agencies is really not worth having even if you have a lot of it. In the land of metrics measurement some apparently good things are, counter-intuitively, to be avoided. James has a story that he talks through with himself and others when they listen. He tells himself that he is in a jungle and he is learning to identify the 'big beasts' that can hurt him. He is learning to distinguish between a harmless grass snake and a poisonous viper. In the jungle essential administrative duties are to be avoided at all costs (as these take time that could be allocated to RC research grant writing or 'good' journal article writing) and tend to be given to a second-class set of academics now emerging. A teacher/ worker support colony created to attend to the superior 'research active' academics. Teaching is important but an encumbrance, time for reading and thinking is strictly to be done in ones own time and not interfere with the day job. Things have changed a lot since the 1990's.

James has seen the system change and has learned to survive. As of now James is not really aware of it but lives with a degree of background fear most of the time. Things have been worse. His old university was a managerialist nightmare of constant mini-evaluation, rule by algorithm (yearly quotas of 'good' publication and successful research grants required) and overt bullying heavily disguised as assessment. He is now at a kinder place but there is still the background pressure to achieve. He does not think of it as fear. Rather, if he were to reflect upon it he might think of it as being habituated to pressure and measurement. Part of his success is that he is reasonably good at giving the 'system' what it wants. He makes 'OK' money and he publishes in 'OK' journals. He is 'OK' in the eyes of his line-manager (a term unknown in academia when he

started in the 1970's) but he knows that he could do better. His success is tinged with a constant awareness that he is not ever 'safe'. The jungle is in constant change and is full of new traps and new predators that emerge to threaten him. His colleagues are also his competition. To be successful, prominent and to bray ones success is vital. If success is not current it is best to hide in the long grass. He is beset with worries, real and (much worse) imagined. His research may fail, his papers may not publish, his university management may change and become like that at his old university. He lives with a constant and gnawing background of fear. He has learned to hide his failure, not to trust his colleagues, to be ever vigilant and to watch for every opportunity to succeed. And this is also part of his success. He does it rather well.

[To learn more of the fear and anxiety oppressing the academic world and the depression and suicides that can follow from it, I suggest taking a look at the paper on anxiety in universities at https://www.academia .edu/19714927/Producing_Anxiety_in_the_Neoliberal_University].

Fearful beginnings

Before you suggest it, the 'James' of the vignette is not me but I share many of his anxieties. At the time of writing I hold the position of a Professor in a UK University. Professors in Universities tend to have a public persona as being professionals and 'achievers'. Surely they are clever, sure of themselves (arrogant?) and un-emotional, creatures of mind and rationalism? Well that is how I saw them when I was an undergraduate. Professors are not the kind of people who you might expect to confess to feelings of fear and anxiety. But this is not the case, as the true story vignette above indicates, fear is as common to those in academia as it is to grown-ups in all diverse fields of life and work. And the fear we feel in our adult lives is just the latest manifestation of a life-long affliction.

A confession. I needed to write this book because the formations of terror have been in my mind since I was a small boy and that boy has never gone away, and would like to understand why he was so frightened. As a child and young man it was fear rather than ambition or heroism that was the metre of my life. I was scared to be late, scared to be fat, scared to be stupid. When I was a young person the UK had an odious apartheid education system which was designed to segregate the early, clever child

from the so called late or never developer[1]. The system was called the 11 plus and the exam that was its ugly manifestation was taken, as you will see at the age of 11. This youthful intellectual apartheid was intended to allow a minority of early "clevers" to learn in the rarefied environment of the 'Grammar School', whilst the majority (around 60%) intended for other things went to the derisively labelled 'Secondary Modern'. At age 11, dim as I was, it was very clear to me that I was in danger and might be considered good only for the slow lane. Following the exam there would be success and adulation to the Grammar School cohort, opprobrium and a life in manual labour to the Secondary Moderners. Needless to say I failed the 11 plus and went to a Secondary Modern School where my middle class background marked me for special treatment. So, fear makes another appearance. At my school I was scared to appear to be middle class, scared to be useless, scared to be alone, scared to be at school but scared to truant. I was scared of just about everything. Boys were bigger than me, girls were frightening if beautiful and frightening if not. Early sexual encounters were deeply worrying and in the struggle from childhood to puberty and teenage spottiness I had few if any internal means to comprehend or manage my reality. I truly know a very good visceral definition of fear and vulnerability and it was the thirteen-year-old me at the bus stop, waiting for the connector bus and hoping it would come before I was humiliated and beaten up yet again by three or four members of the local red-neck family of bullies in front of the amused watching group of girls. The formations of fear have tracked me over my life but I know now that my journey was not alone, even if most other people appeared much more confident and untroubled.

If I can summarise the need for this book, I need to write this book because fear is everywhere, we tend not to address it and yet it influences us in immeasurable ways and therefore there is a clear need to gain some kind of understanding of it.

I recognise that in explaining my reasons for writing this book I have presented myself as the victim but I am also aware of the perfidy of the history. I was bullied and fearful but this also led me to bully in turn. I learned the power of fear and used it to my supposed advantage at times. Those who know fear are also the imposers of fear on others. Fear is personal and its use can be habit forming. Confession over.

[1] Incredible to my mind, in 2016 the UK Government is considering re-introducing selection at 11. Another generation of failed children is likely to emerge.

1.2 Wider perspectives on fear

Is this personal and historic justification adequate as a reason to write? I don't think so. My reason has to be amplified by the importance of fear in all our lives. My boy-hood experience is not unique. I have lost count of the number of conversations I have had over the last ten years with highly successful people about the misery of high school. How any of us managed to survive to adulthood remains a cryptic secret and how we manage to present as reasonably well adjusted and rounded adults I find mysterious, but maybe a mystery that also has a solution, it would seem that the most important thing I learned at school was that important things were rarely learned at school.

At a low level, often obscured by presenting frontages of confidence, I note symptoms of fear in those around me. Fear occupies some of the time of most people just about every day. It is in the news, projected in the movies, amplified in literature and shared between friends. It can be the quiet cause of a background sense of unease or it can be more significant. At extremes fear galvanises our hectic action and stills us to inertia; encourages us to shout and silences our screams. In this sense, as a ubiquitous presence, it is an uber phenomenon creating effects and counter-effects, causing action and the fruit of action taken. Fear is very important but like all intangible or invisible things it is easy to forget how it feels when you are not being affected. It is surprising to me to hear people trying to help frightened people by saying things like "be reasonable" or "calm down" or "try to gather yourself, things are OK." As if comments like this are going to work for someone who probably has a very good reason to calmly and rationally be totally terrified of the things, the non-phantasy things, which are bearing down on him or her.

To study social, psychological or cultural phenomena with others in context is sometimes known as Action Research. To study fear it is an advantage to have recent and personal knowledge of how fear feels. This personal experience should help in the process of understanding the experience for others and to note the various personal variations in experience. Contrastingly, to write about fear as if from an objective distance strikes me as being of less value. The objectivity that may be gained by a form of disembodied curiosity is lost by a detachment from the realities of the experience. Fundamentally fear is important because it is personal.

Following the horror of the ISIS terror attacks in Paris in November 2015, Zoe Williams wrote in the UK Guardian:

> "Admit to fear: it is more than a requirement of honesty. It is the precondition for solidarity, since as much fanfare as you make about standing shoulder to shoulder with the people of France, it is only when you make a frank account of your own feelings that you can begin to empathise. Stepping inside the skin of another is an impossible task if you're having first to clamber over the barriers of a constructed, unreflective courage that you don't really feel."
> (https:/www.theguardian.com/commentisfree/2015/nov/16/fear-terror-victims).

To summarise, I am a life-long experiencer and learner from fear, I see fear all around me at various levels of intensity and I believe that I need to be aware of and in communion with a state of fear (if hopefully not actually terrified) to have empathy for its victims.

I don't want to use vignettes of fear like a kind of terror pornography but I will continue to use examples of fear throughout this book because I want to maintain a remembrance in the reader of the kinds, types and intensities and results and outcomes of fear to keep this constant. I do not believe that this book can work without this.

My Fear #2 Refugee fear

Jana's Story

I was a teacher of Arabic in Aleppo. The war was awful. We could hear bombs, but never saw them.

Then our house was hit and destroyed. Luckily we were out. It was a shock. You have a house, with decorations, your things, and then you have nothing. We had to leave. Everything in the street was destroyed.

It was not safe for Ahmed. I am a Sunni, and Ahmed, because of his father, is a Shia. There was a time when it didn't matter. Shia married to Sunni, Sunni married to Christian. But now people came to the house trying to take Ahmed away.

We left at night. It took three days, walking most of the way, hiding at night, walking again. There was nothing left for us. My mother is still there. It is not safe. But she is 70. Where could she go?

We were in Lebanon for two years. I made sure Ahmed went to school and he started learning English. Then we learnt we would come to the UK. It was a big surprise.

It is a good feeling being in the UK, but it is hard. I am alone with the baby, alone taking care of Ahmed. The first day after the baby was born, I went to my English class, with the baby!

I want to teach again, with refugees or in a school. But now with the baby it will take some years."

(http://www.refugee-action.org.uk/jana-ahmed/)

1.3 'Systems' and fear

This is not just a book about fear; it is chiefly a book about the holistic understanding of fear. About learning to understand fear and about methods that I hope will help the reader to push back against it, not to allow it to dominate life and infect decisions with its taint.

The methods I will describe are examples of the kind of 'clear thinking' approach which was suggested (but with little detail of 'how') by the Economist magazine in November 2015 (Economist 2015). To achieve clear thinking this book is about systems ideas. My project and what I hope will be the contribution of this book is to gain a clearer understanding of fear by means of a systems methods approach. When I talk about systems methods I am referring to the various and multiple tools, techniques, frameworks and approaches which have their origins in what is variously called cybernetics, general systems theory, complexity theory, learning systems or systems approaches (for a much longer discussion about these terms see Ramage & Shipp 2009). I will have a lot more to say about systems approaches but it is useful if I briefly explain what I mean by systems approaches at the outset as it is contested and confusing, and develop this theme later in the book.

Systems approaches provide ways to think about complex situations. But the word 'system' is one that has been used and applied in a wide variety of manners and ways and this can cause confusion. For example, in discussing how the Systems approach provides insight and addition to our thinking I will often refer to the work of Daniel Kahneman (Kahneman 2011). Kahneman talks about two 'Systems' that all human beings employ considering the experienced world. I want to talk more about Kahneman's

'System 1 and System 2' later in this book but I need to make it clear that Kahneman's 'Systems' are labels he applies to describe the automatic (e.g. our instinctive understanding of phenomena) and effortful (e.g. rational and calculating understanding) ways of apprehending the world, they do not refer to a deeper and more expansive Systems *approach* to understanding the world. The word System is of such generic use in our world (e.g. economic systems, global systems, heating systems, etc.) any specific use of it needs to be carefully explained.

At this point I want to consider a potential dualism in our pondering and problem structuring. Like Kahneman I think we can essentially segregate the way we think about the world into two and these two are not mutually exclusive but they are distinct. On the one hand there is the reductive approach of conventional science and on the other the systemic. The way we think has implications for the way we respond to fear.

Reductionism as an approach to the acquisition and representation of knowledge is much better known and some would argue understood (and easier to spell) than systemisism. Without going into the tortured arguments of exponents and detractors I think most would agree that reductive approaches represent our conventional, rational way of figuring out issues in the world. It can be summarised as the reducing of complexity to smaller components in order to understand the bits. Of course there are criticisms and some of them go back a fair way, for example Tolstoy noted in War and Peace:

> "Human science fragments everything in order to understand it, kills everything in order to examine it."

Harsh maybe but there is some truth in Leo's comment. Reduction is concerned with knowing things by taking them apart, by reducing them to their parts and by exploring how these parts work. Reduction is a great way to find the essence of how a thing works. It might be thought of as essential thinking. Looking for the meaning of things in isolation. By adopting a reductive mind-set we can isolate phenomena, assess controlled variables and deepen our understanding of confusingly complicated wholes that appear too complex to be understandable any other way. Mathematics could be said to be the ideal reductive method, a means to isolate and explain units of phenomena by reducing them from phenomena and representing them as abstract and disembodied quantities. And reduction could be said to be natural and reflective of greater wholes. There is an underlying maths to the world.

> "The astonishing fact is that similarly mathematics applies so well to planets and to clocks. It needn't have been this way. We didn't impose it on the Universe. That's the way the Universe is. If this is reductionism, so be it." - Carl Sagan, (Sagan 1996, page 258).

What Sagan attested Max Tegmark in his inspiring book: 'Our Mathematical Universe" amplified:

> "our physical world not only is described by mathematics, but that it is mathematics, making us self-aware parts of a giant mathematical object." (Tegmark, M, pages 2 - 3)

Reductive ways of thinking are great for taking things apart and reducing them to their component parts. Pieces can then be re-assembled. But, a problem in a complex natural or social world emerges when parts are hard to reduce (like a human being or even a group), when parts become confused, when relations between parts change and interpretations of meaning are diverse. In such circumstances reductive approaches can be inadequate. More than this, they can be fear inducing as the reductive approach can, by focusing on the details, miss large and frightening implications of wholes. Each of the parts of a system (e.g. a weather system) may be fine, but when the parts are combined their interaction can result in catastrophic floods or droughts. It is the high level implications of the parts in relationship which reduction has trouble with.

Systemisism, on the other hand, is often seen, I think erroneously, to be the reverse of reductionism, or even some kind of a *cure* for reductionism. But is this the case? One of the legendary founders of the systems discipline, an academic with the wonderfully memorable name of Ludwig Von Bertalanffy is credited with making headway in establishing the empiric study of systems.

> "Before the 1940s the terms "system" and "systems thinking" had been used by several scientists, but it was Bertalanffy's concepts of an open system and a general systems theory that established systems thinking as a major scientific movement." Fritjof Capra (Capra 1996, page 46).

Systems approaches or systemisism is the understanding of complex wholes as wholes by means of a focus on relationships. Systemic approaches are concerned with the relationships between things, the lines of connection which are discernible in combinations and which help to define the resulting whole. The domain is not un-complex with a variety of savants and gurus claiming greater and more arcane conceptualisations of the systems idea, definitions scan from the mundane to the occult. To add