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CHAPTER EIGHT

On the Premises of Observation

The Delusion of Objectivity

The first part of this book was a mere foray into *delusion*. Now we must look in more detail into how delusions come about, recognizing them as the systemic encapsulation and extension of frames. We can never communicate such very personalized and private non-linear delusions to others, only the linear frames that cognition pulls out of them. The frames themselves are not singular entities, but compound constructions. They are a fusing of not only an individual's self-reference to things observed in the world via delusions, but also the highly complex and sophisticated frames assembled by others from their observations and then communicated: what we can call theories for lack of a better word.

The authors claim that these linear frames, and their precedent and consequent systemic delusions, are the basis by which we humans infer meaning; in other words, delusion is both a prerequisite and a consequence of cognition. Thus cognition is not understanding, merely a consistency underpinning useful descriptions, which then factors in to build yet more frames and delusions; and out pops the amazing fact that thought can trigger thought. Hopefully, the descriptions written down in this book will trigger the cognition of each reader to form appropriate personal descriptions, and thereby to appreciate the notion of delusion, although with the proviso that being non-linear, each delusion may be labelled as a delusion, but it will never, it can never, be fully understood. For delusions are the unknowable way we think about the world, the basis of understanding; however, a tool used for describing can never totally describe itself. All that is possible is a useful refinement of ignorance. In that refinement, the intrinsic linearity makes frames more approachable and communicable, but never knowable.

Cognition itself is presented here as just one of many recursive and ultimately self-referential systems of chicken and egg¹ delusions and processes that inhabit the systemic appreciation of the world endorsed in this book; a world that is observed as a system of delusions.

One such delusion already addressed in Chapter 3 is causality. Causality is not in the 'real world' of phenomena, but is a personal delusion for imposing meaning on relationships between events necessarily happening in that world. Thus meaning doesn't uncover any causes there, no matter what the

intellect tells us. Causality is a prescribed fundamental component of the way we think about reality; a prerequisite, a building block of meaning/logic, not a truth uncovered by thought. There is no *why* in the way the world works; 'why' is solely in the head of an observer, and its function is to stimulate further distinctions that acquire new descriptions. It is the first step of any delusion-based cognitive system that is able to question itself about the validity of its own validity. Although even that is a misunderstanding. The descriptions that are the by-product of cognition cannot be elevated to an explanation that surpasses the limits of cognition itself. Any answer to the question 'why?' must be a delusion. When we think we are explaining 'why?' we are merely communicating a description that answers 'how?'. One that is formulated as a sequence of events within the self-referential delusions of causality. We can describe 'how' an apple falls by using the scientific concept of gravity, but 'why' it should do so stays as elusive as ever.

On a more mundane level, but by the same principle, one of the authors was called in to his local high street bank to find out why its computer system had him entered as a fourteen-year-old girl. He and a bank employee managed to work out 'how' and in what way the database entry had been changed, but 'why' it had come to be altered remained hidden in a conspiracy of paradoxes. Of course, what we are 'explaining' here is a cosmic joke: why there can be no 'why?', itself a paradox. A paradox that strikes at the very heart of causality: every answering of 'why?' will inevitably contain other unanswered 'why?'s: the chicken and egg dilemma again. We are back with the child's incessant asking 'why? why? why?', and its exasperated parent's terminating response of 'that's why', forcing the child back onto constructions made up of accepted and acceptable shared-delusions.

What is necessarily so in the world just happens to enable a consistency between each delusion and the world it describes, which in turn permits us to answer questions like 'how?' by modelling the world via delusional frames. However, that consistency too doesn't need to be in the world; all that is required is for our cognition to be taken in by the smoke and mirrors of delusion, and then for us to ignore any inconsistencies and paradoxes.

From this sceptical axiomatic position, the authors cut through the perpetually recursive self-reference in cognition. Naturally they too must resort to theory, although they always view theory as an imposition of choice from among their personal collection of shared frames, not as some truth implicit in the world. Thus they chose to introduce the notion of system to describe various processes within the world observed via cognition. System

is the cornerstone of the analysis that the authors are undertaking in this book. This justifies their treatment of cognition itself as a self-referential and ever-expanding system of taken-for-granted delusions. And indeed, delusions too appear systemic in their dynamic behaviour.

However, all of these concepts involve a sleight of hand on the authors' part. For convenience, thus far they have skated over the detail that with every delusion, being systemic, someone, some person, still needs to be deluded. Cognition occurs in the head of a distinct and unique individual, and that individual first needs to sense/observe the world in order to act in it. In each particular instance of an observation, the observer, the person doing the observing of the world through processing data from his senses, needs to observe and collect data, to choose to distinguish between that data from that world, before the necessary delusion (and hence before cognition of that situation) can even begin.

In this regard, the specificity of the *thing* being observed remains ambiguous, as it is rarely one thing alone that can be considered by any one observer. Any thing being observed has an environment from which it is cut off in order to be observed. Cognition is the mechanism through which this artificial separation occurs; it is the mechanism through which *a thing being observed* becomes the *system* that is observed, and the mechanism through which the system is distinguished from an environment. However, as the definition of any system is an observer-relative act, there is always the possibility that the thing being observed constitutes an agglomeration of individual elements that is viewed, whether constructed in an instant or over an extended period of time. For analytic simplification, and without jeopardizing the generalization of their observations as authors, the characteristics of observation are analysed in the sections that follow. At the same time, it is useful for the reader to remember that while definitions can be drawn differently, which is a problem that is prone to endless debate, the definitions in themselves are less important than the relations that are developed between the elements.

Added to this we also finally confront head-on Luhmann's enigmatic assertion that 'the world is observable because it is unobservable'. Working on the reasonable presumption that observation is possible, in the next few chapters we produce a *reductio ad absurdum* argument to show that 'real observation' would lead to the condition that Luhmann calls hyper-complexity: the impotence of layer upon layer upon layer of orders of observation. We will see that cognition somehow manages to deny this absurdity, and collapses it all down into a false objectivity, the result of

which we will label 'self-stokhastik observation' (of which, more later). Thus we delude ourselves into believing that what we do observe is an accurate representation of the world itself, and this we use to advantage.

The Impossible Dream

To help clarify the situation, an overview of some of the material in this and the following chapters is now presented to assist the reader with a partial roadmap. Consider A observing a *scene* B, which can be a component of a larger scene, or can itself contain other scenes. B is a complex agglomeration of things that it is indicated to be a single thing, one entity (that is labelled as B) as a way of reducing the complexity that is already present in that scene. What the authors mean by *scene*, just as with delusion, is left deliberately vague. It covers anything from a highly complex and unstable social situation to more consistent scientific experiments, such as studying the humble hydrogen atom (see below).

For the time being the authors ask the reader to consider the scene using vision as a metaphor for observation, and to worry about the details later: see the postscript following Chapter 9. Just think of the *scene* itself as being complex, and what A is observing therein is internalized according to his cognition, as a delusional system that emerges dynamically from the observational interaction that he has with B. The overall process is encapsulated in the symbolic representation $S(A \rightarrow B)$. Deconstructing this representation, $A \rightarrow B$ denotes the unity of the observation; it is meant to indicate that the observation is a consequence of an interaction between A and B. The system S emerges from the observation and is the way A perceives the unity of himself observing B. The small unidirectional arrow from A to B implies that an observational relationship is being established, but that this relationship is observationally initiated by A, which is why A appears before (to the left of) B. The dots below the solid arrow lead back from B to A and imply that there is feedback from B to A, which aids A to continue his observation of B, from which there is more feedback, and on and on. This feedback is necessarily established with the initiation of the relationship between A and B, and is fundamental to A's dynamic construction of S as an emergent system. Obviously, without such feedback, S could not exist as a dynamic system. Once the system has emerged from A's observation, then it is subsumed into A's memory and added as another of his systemic delusions.

Of course, B itself will have components, and also be a component of larger *scenes*, and in building up the system S, at any moment A can shift his focus between B and its components, or the larger *scenes*. Each change

will involve new distinctions; and new residual categories, new paradoxes, all the implications of which are ignored in the self-referential fine-tuning of the system's definition within A's cognition. In effect, each change will involve new systems and sub-systems, or even supersystems that contain S as a sub-system. Thus the term '*scene* B' stands for a cognized aggregation of systemic concepts that will be further differentiated, thus providing A with a range of different possibilities for what may actually comprise B. The authors appreciate that there are a number of epistemological and ontological issues that need to be resolved here. These are discussed later. What remains of importance for the moment is to clarify conceptually some of the mechanisms under which observation can be established.

Consider Figure 8.1, with A observing B. Observer A chooses a perspective in which he projects his delusions onto B, and thereby, via feedback, dynamically observes B. As A initiates the observation and establishes the observational interaction, a system emerges from the interaction within A's cognition, and this is absorbed into A's memory and delusions. This emergent system we call $S(A \rightleftharpoons B)$, that is, the system S that emerges in A's perception after the observer A repeatedly projects his delusions, receives feedback from B and recognizes within his observation that he observes something, a *scene*, which for the moment we call B.

Figure 8.1 A schema for observation

In projecting his delusions, which guide his observation of B, A is actually choosing what he is describing as B. For even the target scene B is itself the result of an act of choice by A. Each component of the scene is also uniquely chosen by the projections of the observer; it is sampled using past experience, for otherwise the totality of detail in the scene would swamp the observer. Thus no two observers can access exactly the same scene, because no two purposes, no two delusions, no two projections are identical, and hence no two observer choices are identical.

Despite observation being isolated within individuals, communities have nevertheless developed the shared-delusion (the authors call it the impossible dream) that members can communicate perceptions (in that they can convey the system S for each observation to others in the form of a frame), and thereby each member can observe the *same scene*, and subsequently share information about it. In the world of science we shall see that in the main this delusion is not too problematic; however, in societal situations this is quite another matter. In all cases there is always the problem that any other observer C, when considering the same scene B, will actually be observing a personalized and slightly different one, which we can call B', and will be interpreting this similar B' as a system $S(C \rightarrow B')$, and so C's perception will be something subtly but quite different.

In chasing the impossible dream, A wishes to communicate a widely understood objective description of what he has observed/perceived to others in his community of choice. He must first encapsulate the essence of the observation $S(A \rightarrow B)$ by simplifying it (forcing it into a linear form), and represent that simplification using one (or more) of the shared notations available to him and his community: for example using mathematics, language, painting and photography. By *objective* here, we mean another observer C would believe he was considering exactly the same B (namely that B and B' are identical), that he was perceiving the same system as A, namely that $S(C \rightarrow B')$ is identical to $S(A \rightarrow B)$, and that when communicating it himself, C was transmitting exactly the same description as would A.

In the event that A is attempting his transmission of his perception of the unity of his observation of B, namely the system $S(A \rightarrow B)$, A has to step outside that perception/unity to create from among his many delusions and memory an instance, a frame $F_{A \rightarrow B}$ or series of frames: for example this could be an expression of a theory, a single book, all the books on science, a mathematical formula, a poem, a realist or surrealist painting, a photograph, a movie, just a word or even a hand gesture. By frame $F_{A \rightarrow B}$ we refer to a

particular depiction of regularities within the coupling of A's delusions with $S(A \rightarrow B)$. With the expression of the frame using some common notation, all of those involved believe that the regularities have been successfully externalized. Depending on the complexity of the system, a frame can vary from a highly involved set of communications like a book (indeed this book, because here the present authors are describing the process that they are undertaking) to something as simple as a formula, or even a single word, or sound, or a gesture. Each frame will exist in conjunction with a whole set of other frames, so that the observer can construct more and more complex configurations.

Before a community accepts a frame, it must first prove itself appropriate and reasonable by undergoing various tests, and by being accepted by the reasoning of others. Alternatively, it could be rejected or ignored. Alongside various empirical examinations, the frame will also be confronted by a liberal mix of popular sentiment, political power and social biases, as well as each individual's vague feelings about validity. Each culture can be seen as an agglomeration of frames, both explicit and implicit that has come to be accepted over time: a community of shared-delusions that has stood the test of time. Education within a culture is then a rite of passage, where novices continually re-member themselves to the community by accepting such a socially agreed collection of frames and instances of common notations.

The scientific community is no different, although it is somewhat more formal in its procedures for accepting frames, although it too is awash with political power games. Science insists that each frame must be formulated in such a way as to be empirically falsifiable. Each candidate frame will remain a mere hypothesis, which will be rejected whenever a legitimated test contradicts it. If a particular frame undergoes a sufficient number of instances of tests and survives, the frame will finally gain acceptance in the community, although what is meant by sufficient will always be a moveable feast.

For such sharing and testing to take place the observer has to externalize regularities in his observation; and, using a notation, fix them in a frame that he believes will stay unchanged, exactly as he made it, and where it denies the surrounding paradoxes and reinforces his interpretation of the observation. Thus the frame forms a pragmatic sink for the noise surrounding the observer's senses, delivering a springboard for opportunistic action. Order coalesces around this frame, thereby making his interpretation convincing both to the observer himself and to others.

Thus a frame has an added bonus of reflection, in that it can help the cognitive observer A to concentrate on B, and thereby focus on what it is about B that will be observed. What is being observed in B feeds back and helps A both to identify further frames, suitable for observing either B or other entities in the scene, and dynamically to re-construct the meaning supposedly held in the frames themselves. Because each frame is expressed in a common notation,² another observer C assumes he can both observe that 'same' scene and 'understand' what A is observing in that scene from a so-called second-order observation (C observing A observing B). This C builds from memories of his own previous observations, and which he further assumes are based on the same distinctions that he (C) would have made in the situation of a first-order observation.

That C can put himself in A's shoes is quite a delusion. However, the best C can actually do is to re-construct from $F_{A \rightarrow B}$ a vague and necessarily distorted shadow of A's observation, and absorb this into his memory and delusions. This will alter C's present perception of the scene B', leading to a new choice of scene B'' and a new first-order observation (we are being somewhat disingenuous here, because for each observer the perception of any scene will be in a perpetual state of flux). The ultimate objective dream for the community is for B, B' and B'' and all the other dashed Bs to be identical, and with the systemic descriptions independent of the observer. In such a scenario, the dream of objectivity projects a collapsing of all the emergent systems from these interactions. Hence systems $S(A \rightarrow B)$, $S(C \rightarrow B')$, $S(C \rightarrow B'')$ all collapse into a seemingly objective entity S_B , with the observer being suddenly abstracted away: the delusion that everyone observes the world exactly as it is, whereas all they have is an agglomeration of frames synthesized from the frames of others and their own 'self-stochastic observations' (see later). However, even A's observation is not uniquely preconfigured. A's mood will impact on his internal choices of delusion, of his personal frames, and the frames of others, thereby affecting his choices in observing B, and subsequently the construction both of any new delusions and of frames used to communicate any other observation.

However, no delusion can be expressed completely as frames, hovering as it does deep in the subconscious. Nevertheless, those delusions that we believe are accessible and communicable as frames will coalesce into the toolkit of appropriate frames, enabling the delusion that every member C of the community observes B', not as his own unique system $S(C \rightarrow B')$, but as the same shared observer-independent system S_B .

It is this shared-delusion that enables us to make our way in a social world. From this perspective, the social world of a scientific theory is then a particular restricted collection of shared-delusions/systems and frames. The frames are themselves of various degrees of sophistication. Consider the frame that could be used to capture the delusion of gravity. That frame could be simple text commenting on the *fact* that things tend to fall, or it could involve Newton's Laws, or even Einstein's insights. It could be argued that all three are stages of an evolution of a shared frame that describes a particular empirical observation, and with each level of sophistication a new raft of utilities opens up: for example Newton's laws enabled the science of gunnery.

However, whatever its level of sophistication, gravity remains an entity that can be framed in different ways. And through frames, all we see are shadows on the wall of Plato's cave, the cave of our senses. We delude ourselves into believing that they are an exact emulation of what is happening outside in the sunlight, but there can be no going out into the light. For better or worse, we are trapped inside with these shadows that are mere frames bouncing self-referentially around the wall in the cave of our consciousness and cognition.

The metaphor of Plato's cave is readily apparent in the case of gravity. By taking a so-called objective perspective in attempting to deconstruct the property of gravity itself, a number of frame representations are possible, not only Newton's Law, or Einstein's as noted above, but also from among a number of other new and radical descriptions. A most recent theoretical development is the concept of unparticles (Georgi, 2007), which leads on to an entirely different kind of matter: one that exudes an ungravity force. Regardless of how many different ways that gravity may be framed, the fact that more than one is possible means that an important issue circumscribes the attempt to define gravity itself. The simultaneous existence of different frames that may represent the same property (gravity in this example) introduces an important complication. The very existence of these different frames must deny any notion of an objective perspective; but objectivity is supposed causally to deliver a single-truth-encapsulating frame.

Ontologically, this creates a problem that has severe epistemological consequences: what sort of reality exists that allows for the concurrent production of similar yet different frames to represent gravity? Surely the very possibility of drawing different distinctions for the so-called concept of gravity negates the intrinsic objectivity that the frames are supposed to

encapsulate. So how then are we to make sense of all these differences? How is this paradox, which is created by differentiations, to be resolved? How is ungravity through unparticles even possible?

By simplification through denial, of course. For unless these paradoxes are suppressed, a consensus on what we may refer to as gravity cannot be achieved, and consequently practical implications on the objective property of gravity cannot be examined. What the authors find genuinely bizarre is that even in the most *natural* of all scientific disciplines, namely physics, totally artificial and thus unnatural linear expectations become incorporated into the discipline itself without raising a single quizzical eyebrow, just so that the paradoxes in theories may be suppressed. However, these paradoxes remain, and go on to influence the way the theory and the discipline evolve. For example, multiple universes (in quantum theory; indeed the notion of quantum theory itself) and the ununiverse (in unparticle physics) constitute two such examples where the physics stretches far beyond any normal expectations. The discipline then contrives theoretical descriptions from some very strange circumstances, at the very least alien to normal everyday experience, and feeds them back into itself as a discipline, in order that empirical data can acquire an apparently theoretical explanation.

Simply by questioning this process, as recommended by Feyerabend, for example by insisting that 'the emperor has no clothes', the unavoidable paradoxes rise to the surface and the communal amnesia is uncovered. Yet if we were to ask the scientific community empirical questions such as: 'how can you prove that multiple universes exist?' or 'can you show us an ununiverse?' then these questions would be met with disdain. This is unsurprising since the disdainful community is utilizing, as axioms, the presuppositions embedded in the questions, thereby accepting them without question as the foundation for attributing the status of being objectively true to any findings they derive from the original artificial, *unnatural*, and linear assumptions. To what extent reality is objectively captured in this process, or is re-constructed by the interplay of unnatural/natural (linear/non-linear) assumptions, remains equally problematic.

Observation and Cognition

In a so-called first-order observation, cognition is always and already active; and supported by memory it may even be the compulsion concentrating the observation. This is yet another chicken and egg situation: but which came first, the chicken or the egg¹? Observation or cognition? The answer

is neither, and both: because for the thinking observer, the processes of observation are structurally coupled to those of cognition. Observation and cognition for an individual will have co-evolved since and possibly before birth (Kandel, 2006), thereby assisting in the continuous expansion of memory and delusions. Every occurrence, for which participatory action is required of the observer, is dependent on all the observations, cognitive interpretations and memories that have gone before for that individual, all building and being built on delusion. Of course, that potential for and the natures of observation, cognition, memory and delusion will have also co-evolved in that individual's progenitors, and have been passed on as both genetic and social inheritance.

For within this perpetual feedback, societies become possible as systems of conglomerates of different observers, each with the apparent capacities both to observe as a group and to communicate within that group. However, these possibilities are realized only when each individual within the group is self-deluded, in that he/she shares with others the common systems that result from observation and cognition: this delusion is fed by the reality of shared notations. This potential co-evolves along with systems of communication between individuals. That is just as well, for how else could the reader take in the authors' delusions being expressed in this book?

The authors did allude to this situation in Chapter 7 on system, where they made it clear that notions such as system and boundary were not actually in the world, but in the head of an observer who is imposing the system in the first place. However, in all their descriptions, that observer was quietly abstracted away, being simultaneously there, but not there; the situation collapsed to a state where the observer was excluded; where thinking about something, even thinking about observation, is excluded from descriptions; and yet it is all in the mind of someone. This constitutes an order-less observation (a place where objectivity emerges from reflection) that may act as a simulation of different observational orders, and in a pretence of objectivity, the observer becomes removed from involvement, so that it appears that no observation is actually involved.

This raises a very intriguing possibility. What if thought is itself a self-referential by-product of observation, collapsed down to an order-less observation, a result of the evolution of the structural coupling of observation and cognition? What if cognition came into existence initially as a mechanism coupled with primordial observation to handle the complexity, overload and noise of the multiple levels of such observation? Only later did it become

conflated with thought, when the coupling evolved and emerged to become sophisticated enough to reflect on order-less observations.

The Individual Matters

Of course, the observer can never be completely abstracted away. The observer matters, because all inference starts with memory and a set of pre-constructed cognitive experiences in the mind of an observer. That observer is a singular individual, although he does imagine himself observing other observers: second-order observation; not forgetting even higher-order observation, of observers observing observers, *ad infinitum*. This inevitably ends in a cacophony of different and multiple orders of observation: a complex system of observations. However, ultimately everything must be reduced to a very singular observer: the 'I' that is you, whether in this specific case as the reader of this book or in general as the thinker considering a particular situation.

Indeed, the 'I', the reader, is making a first-order observation while reading the book. But in imagining the ideas written down by the authors (the delusion of sharing the authors' delusions), the 'I' is observing a description of the observations (a frame) made and communicated by the authors: namely that 'I' is making a second-order observation of the first-order observations of the authors. But are they really first-order observations of the authors, because these observations too may be descriptions from among their experiences, including references to other authors? Furthermore, those others referred to have had their own experiences, and they also have referred to the experiences of yet more others. What started out as a simple first-order observation has resulted in an explosion of different levels of observation that, left unchecked, would lead to impotence. Cognition, for ease of reckoning, must ultimately ignore the various orders; a necessity imposed by the structural coupling of cognition and observation. Needing to act, the 'I' collapses them down into the delusion of either an order-less, or rather a self-unconscious first-order observation that masquerades as objectivity, and in doing so imagines a 'real world' into existence. Thus every observer is forced to collapse all the different possibilities into an ultimate first-order observation precariously perched upon the objectivity of thought-induced order-less observation; this, in effect, is the function of any observer.

The 'I' operates in this complex world by inventing such objective (!) perspectives within cognition. With each perspective, the 'I' fabricates two different observers into existence: the perspective itself, an imaginary

disembodied objective observer of the world, and the self-realization of 'I' observing the scene of the perspective, although this is achieved as a reflection, and not a first-order observation. However, in doing so, the 'I' is inventing two different worlds of meaning, all adding to the complexity of orders of observation, but which, within cognition, again collapses, for ease and convenience of reckoning. Indeed without the delusion of objectivity, observation/cognition would be impossible, with the would-be observer drowning in a maelstrom of an overload of sense data.

All attempts at constructing meaning require the trigger of an initial observation, and so it is impossible to abstract the observer away. But this is also exactly what theory is attempting. The various orders of observation are collapsed: sometimes into imaginary order-less observations, which are claimed to see all, but which this book will show to be paradoxical; sometimes into the nothingness of the absolute and the objective, the so-called real world where there is no observer, no observation, but where there is still cognition of the situation; another paradox. Does this really matter? Very much so!

The False Objectivity of Theory

Every time a theory is imposed on the result of observations, in a necessary attempt to cut through the complexity with simplifying assumptions that masquerade as objectivity, that theory, indeed every theory, must collapse the multitude of orders of observation down to the order-less nothingness of a false objectivity, so that the thinker can decide, and act sensibly by imposing linearity on what is a non-linear natural situation. All theory is artificial, is unnatural, is error; all truth refined ignorance and absurdity, contrived to have this utility. However, re-establish the many levels of observation, and the tidiness and certainty that theory brings will soon disappear along with the simplicity, in a downpour of confusion, but a confusion that is a representation closer to what is actually going on.

This complexity, error and absurdity can be illustrated with a classic example from the rarefied world of high finance. Aided and abetted by computer technology, this delusion of the objectivity of theory has turned the world's financial markets into a huge global casino. It started with 'the chartists' who claimed to predict stock movements by pattern matching, as if the market was some recurring dendrochronology. Then the 'Masters of the Universe' arrived, brandishing their much more sophisticated mathematical models. Developed by the likes of Nobel Laureates Robert Merton and Myron

Scholes, these methods were then exploited to beat the markets. Accordingly, hedge funds leveraged already huge amounts of money into astronomical sums, which were then placed as bets. Failing to recognize the irony, both Wall Street and the City of London believed in a mathematical guarantee of 'riskless risk' that would profit from all market movement, whether prices went up or down. From their perspective, the market they were observing was an application of Game Theory. In that theory, the high rollers who laid huge 'buys' and/or 'sells' could distort the odds in their favour, so they could fleece the small-timers without being exposed to hazard. John Maynard Keynes's warning that 'markets can remain irrational longer than you can remain solvent' fell on deaf ears.

With the vast sums involved, even very small percentage gains turned into a tidy profit. Indeed the modellers did win big in the 1980s and 1990s, which is why the banks were happy to lend them ever-increasing sums of money. Then in the summer of 1998 Long Term Capital Management (LTCM), which had leveraged its \$4.5 billion into a \$1.25 trillion bet, suddenly lost 44% of its capital, and bank's exposure to the leveraging created huge instabilities. Only swift action by the US Federal Reserve Bank avoided global financial Armageddon (Dunbar, 2000).

What happened? Those who were originally incurring losses with LTCM did not have the luxury of a false objectivity; they were in the game not as speculators, but for life-and-death commercial reasons. Meanwhile, the paradoxes and conflicting orders of observation were conspiring. Inadvertently, LTCM had thereby turned Game Theory into a singularity; a denial of any variety in the system that is the market. Even Game Theory itself warns there is no guaranteed strategy. In August 1998 Russia defaulted on its bonds: an example of the systemic reality that variety cannot be denied indefinitely. Risk is never riskless; it can never be riskless. And Game Theory, at least in its systemic description, is merely a system of contradictory forces. More problematically, Game Theory has a major flaw, in that it assumes an objective game with rules; it presumes linearity despite ample historical evidence showing human gaming to be non-linear; one of cheating and of breaking the rules, not paying up, operating outside the game, and of playing a different game ... which is what happened in this case.

It seems that neither the chartists nor the 'Masters of the Universe' had ever heard of Goodhart's Law: 'any observed statistical regularity will tend to collapse once pressure is placed on it for control purposes', and they certainly failed to recognize the problematic nature of observation. Underlying all

the self-assured mathematics of hedge funds is a manipulation of observed regularities. But once the sums involved had become so massive, the gamblers had changed a bet into an attempt to control the system. However, there can be no permanent control. Collapse was inevitable.

The same was true of collateralized loan obligations, the instruments at the bottom of the sub-prime mortgage shambles of 2007/8, and it will be true for all the other financial instruments based on the rocket science of mathematical over-sophistication. The subsequent Credit Crunch and meltdown of Fannie Mae, banks like Lehman Brothers, and eventually the markets themselves can all be foreseen as Goodhart's Law in operation.

With these two examples from the world of high finance this book has reached that point where the authors can no longer ignore their initial sleight of hand mentioned at the start of this chapter. The time has come at last to confront, in detail, the notion of observation (and cognition), in particular when the results of observation are communicated to others.

Observation

And so back again to observation itself. To observe something in a scene (and subsequently to perceive the unity of that observation as a system and absorb it into the observer's delusions), that thing must be distinguished, separated from its surroundings, excluded from everything but itself, so that it may be reflected upon and incorporated by cognition into the system that represents the overall scene. This unavoidable and artificial distinction created by the observer has two important consequences. Firstly, in performing the operations needed for a distinction, by necessity the totality of everything else is not observed; the complement of the thing to be observed is left unobserved. It cannot be observed. However, once the distinction has been made, the totality of that complement constitutes a residual category, which is assumed/presumed to be there, but invisible, and the implied paradoxes from the truncated structural couplings are ignored.

Secondly, by identifying what thing is to be observed (the scene, or a component of the scene), that thing may constitute a complex entity in itself and therefore the very process of observing that thing involves observing part of its underlying complexity and the sub-things that constitute it. The very implications for observation in the latter case imply that the observer has, in observing, to oscillate between the thing identified for observation and both its constituent elements and the context in which it is sitting. This oscillation is based upon internal differences that succumb to the same principle: that

the moment something is observed, something else is left unobserved. Because of this foundational principle in observation, it becomes evident that the observer is struggling to manage all the distinctions and consequent paradoxes created by the necessity of observing. Connections within that entity are severed by the very act of the observer interfering. How it becomes possible to observe a complex entity, and to cope with all these distinctions created between the constituent elements, when each of these leaves the others unobserved as a precondition for observation, itself remains a paradox. That this complex idea is vague and difficult to grasp is perfectly sensible; because in the above description we are jumping to-and-fro across the interface between distinguished individual entities (and their concomitant paradoxes), and all the other distinguished entities (and their paradoxes) that go to build up a systemic description of a scene. It is only to be expected that such a description will come in and out of focus and that delusions must by necessity remain vague and unapproachable by cognition.

Once the initial observation of a scene has been made, the observer has artificially isolated the observed system from its environment, but with which the system is structurally coupled. The circumstances under which the observer isolates the observed system from its environment create interconnected observational restrictions: the observed system may also act as an observing system itself, thereby observing predetermined aspects of its environment, and with which it too has become structurally coupled, while at the same time leaving other elements within that environment unobservable, as a necessity for cutting down on the complexity of its own constitution.

And here lies the dilemma. In order to observe the whole, everything invisible must be made visible, but then nothing is distinguished from anything else, from everything else; nothing is different, and everything is different.

As Luhmann puts it:

But in order to observe, an observer needs to 'perform' operations. Distinctions need to be drawn – and by drawing them, respective other sides are excluded, these exclusions being not reflected upon during observing. To put it shortly: we are dealing with a permanent production of blind spots. In order to see that which a first-order observer does not see, a second-order observer is needed who may observe how the first-order observer constructs his reality, but who, by doing so, produces blind spots just the same way – and so forth (Luhmann, 2002b).

Thus, the observer cannot observe his act of observation (as the eye cannot see itself seeing, or any other sense, sense itself operating). The observer 'knows' that he can observe, but ultimately 'observing' and 'observing that observation' are quite different. In the former, a distinction is being made; in the latter both that distinction and what it is distinguished from must be subsumed into a new distinction. However, in the latter case what that observer must do is to infer/observe another observer, a perspective, a proxy caught in the act of observing. Such a cognitive inference is a second-order observation, building on memories and assuming the same distinctions as the first-order observer would have made.

Here we must highlight this phenomenon of cognitive inference and the notion of order, and not just slide them into the discussion without comment. To the authors these concepts are central to the workings of human cognition, and yet they introduce all sorts of problems. For, as will be discussed later, there is a weakness in using the word *order* when analysing observation. As we shall see, higher-order observations introduce all sorts of non-linear complexity into observation, and so we must assume that objectivity is the epitome of a denial of such orders: a situation where the implied non-linear complexity of observations collapses into linearity. What is being discovered from an observation (the perceived epistemic certainty of objectivity) has to be detached from the multiplicity of all other orders of observations that came together in that discovery.

What Luhmann is saying is that observation is not, cannot be, what we think it is. He has uncovered the fallacy in all linear interpretation, by pointing at the non-linear nature of 'real observation'. Instead, human observation is conditional, but those conditions are necessarily unobservable, unappreciable, hidden in paradox, beyond observation, beyond cognition, beyond logic; these conditions are actually necessary preconditions of observation, cognition, memory and logic, but they must be denied for observation to operate.

If one tries to observe both sides of the distinction one uses at the same time, one sees a paradox – that is to say, an entity without connective value. The different is the same, the same is different. So what? First of all, this means that all knowledge and all action have to be founded on paradoxes and not on principles; on the self-referential unity of the positive and the negative – that is, on an ontologically unqualifiable world. And if one splits the world into two parts, marked and unmarked,

to be able to observe something, the unity becomes unobservable. The paradox is the visible indicator of invisibility. And since it represents the unity of the distinction required for the operation called observation, the operation itself remains invisible (Luhmann, 2002b).

Here Luhmann uncovers a most powerful ontological delusion, a drive to qualify the 'ontologically unqualifiable world': the notion of the system and its complement, the thing being observed separated from everything else. Observation requires that we, as observing/cognitive beings, must distinguish and categorize the distinctions informed by memory; we indulge in the fallacy that we can separate each thing from its 'everything else', and treat that complement as a residual category. It is with this separation and categorization that we build up the memories that feed back into observation and cognition. So observation is, by its very nature, non-holistic, artificial, unnatural. 'The world is observable because it is unobservable.' 'The condition of its possibility is its impossibility.'

Cognition requires both the observation of each categorical thing and at the same time the non-observation of the unbroken links that remain between it and its residual category. Meaning is based on the error/absurdity of compounding separation upon separation, a mountain of things categorized and distinguished from their residual categories and stored in memory. In the observed world, each thing and its complement can only exist as complements; they are otherwise non-referential. All reference between them is cut, as the distinctions needed by observation (cognition and memory) must separate utterly, with all connections severed.

They are cut because a connection would require a simultaneous observation of a separate everything else, which in itself necessitates further observation. This would discharge the original observation, thereby renouncing the choices made from it, other than leaving them in memory. In one fell swoop, Luhmann's uncovering of the linear nature of observation/cognition, in what is a non-linear world, has supplied the authors with what proves to be the theoretical justification for their rejection of any unified Theory of Everything.

However, observation is something we humans engage in, whether we want to or not. Wherever there is life and cognition, observation becomes a constitutive element and specifically in the case of humanity, that is of paramount interest to this book. Thereby, observation is intrinsically related to each human life form's very existence and survival. Non-observation for

humanity would mean that there would be no mechanism for filtering the data on changes in our environment. Consequently, the human cognitive system would either behave arbitrarily or remain static, and blindly face untold dangers, not being able to conceive of its own cognition conceiving itself acting in the world.

Therefore, a necessary precondition for each individual human system's survival is the ability to profile its environment, and to position itself within that environment in order to create beneficial connections for itself. An examination of the premises of observation is therefore crucial because being able to observe is critical, not only for sustaining human life (and our individual survival within each of our respective environments), but also (and of particular interest to the authors as students of Information Systems) for the development of artificial constructs (non-human actors) like computerized algorithms that become equipped with an observational capacity infused by the will of humans.

Can Machines Think?

Almost immediately, this assertion raises the question of whether machines can observe; and by implication of the above theory, can machines think? The authors' answer is dependent on the difference between how we treat observation within the human realm and how we treat observation within the realm of machines. Inasmuch as observation is reflexively related to cognition, then machines can never observe, for they have neither the cognition nor the intelligence that comes with it. Intelligence in this regard is not logical, but biological. The evolution of such intelligence may very well be a product of both logical and biological operations, but never a purely logical one. It is the spontaneity in the generation of distinctions that ultimately directs observation, and becomes the guiding factor in an emergent cognition (such as that of humanity) over its evolution, and which differentiates thinking from a purely reductionist approach to constructing a 'cognition'. Since machines are restricted to carrying out simulations of logical operations, their operations are totally describable and can in no way be called delusional, then how can they possibly observe; and why should we treat their so-called observation as anything more than mere data collection linked to a set of pre-programmed actions?

Nevertheless, there is one particular reason for assuming that algorithms do have some observational capacities, but only in the world of computation. This is because that world is one of excessive scale, information overload

and induced complexity that cannot be observed by humanity, only by machine; and that machine has been constructed as a proxy observer specifically to deal with situations in which humans cannot cope. However, such observation by algorithms is devoid of all spontaneity and cognition (and system generation) and so is not in any way what this book would call observation.

The difference in how the term observation comes to mean different things within the two distinct domains of man and machine can now be better articulated and considered. While humans possess a spontaneity in the generating of distinctions (though limited by sense-making restrictions and cultural biases), machines cannot spontaneously generate distinctions without a computational and engineered platform that will guide the process. Computers may, of course, adjust, distort and manipulate the distinctions, but the rules for such adjusting, distorting and manipulating (ultimately for data collection, and for a pre-defined purpose) are pre-engineered constructs.

Ultimately machines cannot think purposefully because theirs is a world of detail, a detail that cannot be made invisible; and the ability to make detail invisible is a basic necessity for thought. Their non-cognition implies an artificial un-intelligence, and this is precisely the machines' strength. Without non-cognition and un-intelligence, the machine operations that this book now characterizes as (hyper-)linear and automated would have been impossible. This is not to be taken as a patronizing assertion, or indeed as a celebration of the superiority of human-kind. Humans view machines to be intelligent because machines are un-intelligent. Machines thrive on linearity, automation and scale in ways humanity, because of the way we observe and cognize, could never do. Machines streamline the logical predetermined paths that are pre-programmed to perform certain functions or operations. The inability of humans to perform large-scale automated operations extremely quickly (say trillions of calculations per second) profoundly distorts our concept of intelligence, so that we are prone to believe that machines can be eventually infused with a self-determined purpose. Consequently the mundane automation of tasks is elevated to something beyond mere processing.

The authors can accept that, at the level of the interaction between man and machine, observations by both humans and machines together create scientific constructs that stand as important steps for the creation of more scientific constructs, and consequently more and different observations. However, this book will mostly use the term observation in the context

whereby humans generate distinctions, some of which may indeed be encapsulated within a technological form.

Self-stokhastik

That observation is taken to be the built-in (born-with) mechanism with which any cognitive life form expands its own cognition means that this book is describing the process whereby a self-referential³ cognitive system generates cognition out of cognition (and observation). Following on from the previous description of self-reference, and applying it to cognitive systems, this means that each such system will refer to both itself and its cognition as a requirement for both sustaining that cognition and progressing the outcomes (learning processes). Such a process will be referred to here as ‘self-stokhastik’. The word ‘stokhastik’ derives from the Greek word ΣΤΟΧΑΣΤΙΚός, which means ‘to ponder and aim at’. This peculiar variant of spelling the word is used deliberately, rather than its more usual anglicized form ‘stochastic’, because the authors stress that their usage has nothing to do with stochastic probabilistic models in statistics, where the adjective refers to entities that may be analysed statistically, but whose individual behaviours may not be predicted accurately. To the authors, a self-stokhastik process is one that is self-aware, self-contemplating and aimed at delivering meaning; in other words, it is a process of divination, exactly as introduced way back in Chapter 2.

Every self-stokhastik process operates both to enhance the cognitive functions of the life form itself in a self-referential manner (and always through observation) and to sustain the cognitive processes that continuously form and reform its identity. As the authors have already established in Chapter 3, from their fundamental epistemological basis of delusion, and for which they gave a series of arguments, it swiftly becomes evident that any self-stokhastik process employed by a cognitive life form will conform to the premises/principles of observation, which are in turn informed by delusions and memory. By premises/principles the authors mean here the foundations of observation, the set of rules upon which observation is based, like the creation of a distinction. Delusions in this regard sustain an encapsulation of the paradoxes that are unavoidable in any observing system; they create a black-box that allows for an observation to occur, all the while confining its consequential paradoxes, and submitting them to an invisibility without which the observation would have been impossible to begin with.

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