

ON CREATIVE AND ANALYTICAL METHODS

The Cartesian or the Holmsian Method?

As Cairns-Smith writes in relation to the puzzle of the origins of life on earth, 'Faced with a really difficult-looking problem should one follow the advice of Descartes or of Holmes?'¹

In his **Discourse on Method**, Descartes outlined his four methodological rules as follows. 'The first rule was to accept as true nothing that I did not know to be evidently so...' This is the famous method of doubt. Question everything, found your logic on a firmly established foundation. The second 'was to divide each difficulty I should examine into as many parts as possible, and as would be required the better to solve it.' The third rule 'was to conduct my thoughts in an orderly fashion, starting with what was simplest and easiest to know, and rising little by little to the knowledge of the most complex, even supposing an order where there is no natural precedence among the objects of knowledge.' His fourth rule was 'to make so complete an enumeration of the links in an argument, and to pass them all so thoroughly under review, that I could be sure I had missed nothing.'²

The Cartesian method is very powerful and as Cairns-Smith notes, it is 'on the whole' the one which modern science uses. Yet 'the methodical step-by-step strategy does not always work. First steps can be particularly tricky and you have to know in which direction to go.'³ Consequently Cairns-Smith believes that 'There are times when you need the advice not of Descartes, but of Sherlock Holmes.'⁴ By this he means that rather than starting with the easy bits first, one should 'seek out those features in a case that

¹Curiously, I had made the same contrast between the methods of these two about a year before reading Cairns-Smith, *Seven Clues*, p.ix.

²Descartes, *Discourse on Method*, p.36.

³Cairns-Smith, *Seven Clues*, ix.

⁴Cairns-Smith, *Seven Clues*, ix.

were seemingly incomprehensible - "singular" features...'⁵ As Cairns-Smith proceeds to show by a number of Holmsian quotations, there are other techniques which are also helpful.

Reasoning backwards.

It looks as if there is a basic difference between two types of discipline. In physics and some of the physical sciences one proceeds along a chain of reasoning as follows:

$$A > B > C > D$$

One starts with one fact and then sees where this leads. This makes the Cartesian method suitable. One works from the **known**, forwards to the unknown by a method of experiment. What does one have to do to A to make it into B, or to create B. How much does one have to heat a metal to make it into another metal etc. How strong does a container have to be to stop steam escaping? This class of methods leads to direct physical experiments.

The class of problems that faces workers in the biological or social sciences is entirely different. One starts at the **end** of the chain and works **backwards** to the causes. One has the huge variety and complexity of the natural world as Darwin or Wallace saw it, but what caused it? One has various 'miracles', such as the butterflies wing or life on earth. What could have caused it? It is the same problem in history. One has a 'mystery' such as the French Revolution, the Industrial Revolution, the Fall of Rome. What caused it? Likewise in anthropology, one has the mystery of a kinship system or artistic system. What could have caused it? This kind of backwards reasoning is identical to that practiced in all kinds of detective work - where one has a crime and one has to walk backwards down a chain in order to solve it. I hope later to illustrate the techniques from other sources, but as a preliminary sketch, I shall use Conan Doyle's account of Sherlock Holmes' methods.

Doyle recognized the analogy between detection and biological, in this case medical, research. As one of Holmes' rivals said when commenting on Holmes, '"He is an amateur of crime, as I am of disease. For him the villain, for me the microbe."' (The Adventure of the Dying Detective).⁶ The process of reasoning, a mixture of

⁵Cairns-Smith, Seven Clues, ix.

⁶Doyle, Works, p.833

intuition, guesswork and 'facts' in identical. We therefore need to examine the nature of analytic reasoning in relation to the complex chains of causation in both cases. One difficulty is that in working back from effects to causes we move along often complex links which are neither self-evident to the historian or to those who live in the society itself.

Doyle realized that this was because of the necessity for backwards reasoning, or analytic reasoning. The classic description of the method is in 'A Study in Scarlet'. Holmes explains to Watson that "this was a case in which you were given the result and had to find everything else for yourself." (A Study in Scarlet).⁷ In other words it was a 'why' question. "And now came the great question as to the reason why." (A Study in Scarlet).⁸ In order to solve such a type of problem, a special form of logic was required. "In solving a problem of this sort, the grand thing is to be able to reason backwards. That is a very useful accomplishment, and a very easy one, but people do not practice it much. In the every-day affairs of life it is more useful to reason forwards, and so the other comes to be neglected. There are fifty who can reason synthetically for one who can reason analytically." (A Study in Scarlet).⁹ Holmes continues, "Most people, if you describe a train of events to them, will tell you what the result would be. They can put those events together in their minds, and argue from them that something will come to pass. There are a few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result. This power is what I mean which I talk of reasoning backwards, of analytically." (A Study in Scarlet).¹⁰ Later Holmes alludes to the method explicitly once or twice again. He used it in 'The Sign of Four' and notes that "The only point in the case which deserved mention was the curious analytical reasoning from effects to causes, by which I succeeded in unravelling it." (The Sign of Four).¹¹ Much later on Watson is told that a case "is one where,

⁷Doyle, Sherlock Holmes, p.61

⁸Doyle, Sherlock Holmes, p.61

⁹Doyle, Sherlock Holmes, p.61

¹⁰Doyle, Sherlock Holmes, p.61

¹¹Doyle, Sherlock Holmes, p.65

as in the investigations which you have chronicled under the names of the 'Study in Scarlet' and of the 'Sign of Four', we have been compelled to reason backward from effects to causes." '(The Adventure of the Cardboard Box).¹²

Thus in this type of investigation, which is characteristic of much work in history, biology and anthropology, the process is as follows.

A < B < C < D < Effect

One moves backwards or analytically through a set of possible causes.

Links, chains and threads.

The metaphors which Holmes often uses to explain how one does this are revealing. One is a thread, or a series of threads, which lead one through the maize of facts. One has to hold onto the thread and gropes one's way to its end. A second metaphor is of a chain, with links in it. One moves carefully along this link by link. Let us look at these two metaphors as he uses them.

The threads and tangled skeins are described thus. The first thing is to find a loose end of mental thread along which to proceed. "It is a tangled skein, you understand, and I am looking for a loose end. One possible loose end lies in the question: Why does Professor Presbury's faithful wolf-hound, Roy, endeavour to bite him?" '(The Adventure of the Creeping Man).¹³ On another occasion, 'We returned from our visit to The Haven with the hope that one free end of this tangled skein was already in our hands.' (The Adventure of the Lion's Mane).¹⁴ Once one has a loose end or start of a thread of ideas, there is hope. "The end is dark to me also, but I have hold of one idea which may lead us far." '(The Adventure of the Bruce-Partington Plans).¹⁵ It is even better if one can find several separate threads,, for if one gives

¹²Doyle, Sherlock Holmes, p.313

¹³Doyle, Sherlock Holmes, p.100

¹⁴Doyle, Sherlock Holmes, p.1088

¹⁵Doyle, Sherlick Holmes, p.771

way, then another may lead one to the solution. "...we hold several threads in our hands, and the odds are that one or other of them guides us to the truth. We may waste time in following the wrong one, but sooner or later we must come upon the right." (The Hound of the Baskervilles).¹⁶ The final aim is to untangle the threads and one will then find the solution at the end. 'The whole inexplicable tangle seemed to straighten out before me. I wondered, as I always did, how it had not been obvious to me before.' (The Tiger of San Pedro).¹⁷

The metaphor of the thread gives a picture of a movement along a continuous object. Slightly more accurate is the metaphor of a chain with links, for this gives the idea of a set of overlapping and linked observations and inferences, which is constructed by Holmes, rather as one makes a Christmas decorative chain. The idea is to construct this chain in the mind, link by link, and then to see whether it corresponds to an actual chain that occurred and would explain whatever mystery it is one is trying to solve. The procedure requires the movement along a linked chain. "Let us take link by link." (The Singular Experience of Mr. John Scott Eccles).¹⁸ These links are half found, half created by thought. "Dorak - a curious name. Slavonic, I imagine. Well, it is an important link in the chain." (The Adventure of the Creeping Man).¹⁹ One has been found, the hunt is the next. "So at last we get a link, you see. And the next link? Well, we must go now and look for that." (The Adventure of the Three Garridebs).²⁰ It is very like a treasure hunt, each clue solved pointing forward to another. The move from one to the other is not purely guesswork, but a logical inference from the previous one. "No, no; I never guess. It is a shocking habit - destructive to the logical faculty. What seems strange to you is only because you do follow my train of thought or observe the small facts upon which large inferences may depend." (The Sign of Four).²¹ Even better than one

¹⁶Doyle, Sherlock Holmes, p.759

¹⁷Doyle, Sherlock Holmes, p.759

¹⁸Doyle, Sherlock Holmes, p.751

¹⁹Doyle, Sherlock Holmes, p.1006

²⁰Doyle, Sherlock Holmes, p.1035

²¹Doyle, Sherlock Holmes, p.67

chain of links, is, as with threads, to have several that one is following simultaneously. "Now we will take another line of reasoning. When you follow two separate chains of thought, Watson, you will find some point of intersection which should approximate to the truth. We will start now, not from the lady, but from the coffin, and argue backwards. That incident proves, I fear, beyond all doubt that the lady is dead." (The Disappearance of Lady Frances Carfax).²² The best single description of the method, which shows how similar it is to biological research, and how each link solved helps, through experience, to make it easier to solve further clues, is given as follows. "The ideal reasoner", he remarked, "would, when he has once been shown a single fact in all its bearings, deduce from it not only all the chain of events which led up to it, but also all the results which would follow from it. As Cuvier could correctly describe a whole animal by the contemplation of a single bone, so the observer who has thoroughly understood one link in a series of incidents, should be able to accurately state all the other ones, both before and after." (Five Orange Pipe).²³ Thus an experienced researcher can often move quickly to fill in the whole picture from a part, or, continuing with our chain metaphor, to move quickly from link to link when just given one or two. The aim is to achieve a complete and satisfying chain which replicates what actually happened. 'Every link is now in its place and the chain is complete.' (The Problem of Thor Bridge).²⁴

Thus in essence the method is one of a series of inferences back from an effect or event, to the real and unique cause of that event. It sounds easy, but in fact it is extremely complex. Just it give two examples of the complexity, we may consider the following. The first is a medical problem. Supposing one is faced by the fact of a dead infant in a North Eastern Brazilian town, as was Sheper-Hughes. What 'caused' thus? The answer seems to lie in 'the environment'. But where?

The problem is that 'the environment' covers so much ground. We are told that 'Virchow invented the best and shortest definition of disease ever written: "Life under altered conditions". By

²²Doyle, Sherlock Holmes, p.822

²³Doyle, Sherlock Holmes, pp.181-2

²⁴Doyle, Sherlock Holmes, p.997

altered conditions he meant changes in diet, trade, travel, housing, clothes and water - in short, the total environment.²⁵ Even this list does not exhaust the 'environment', and it is likely that there will be many small, complex, but significant sets of environmental factors which were important, but are easy to overlook. The difficulty is well illustrated by a contemporary example of the possible causes of disease in a town in north-eastern Brazil. 'On the Alto do Cruzeiro the threads to infants and small children in the environment seem to come from everywhere; the polluted and overly "treated" public faucet water, the gritty dirt under little bare feet, the insects in the air, the sluggish and insidious snails along the muddy banks of the river, the ticks on domestic animals, the "kissing bugs" (i.e. Chagas' disease) burrowed into the mud walls of huts, the worms in the pit latrine, the mad dogs roaming the garbage pits of the Alto, the spoiled milk left out overnight, the salted and sun-dried meat covered with maggots in a dish under the roof beam, the tuberculin fruit vendor in the public market, the wheezing, pneumatic child next door.'²⁶ How would one decide what was most and least significant in such an 'environment'?

The problem can be looked at in a purely mathematical way. Supposing one had a chain with seven links from start to end. Each of these links branched into four possible alternatives. If one starts at the beginning and tries all the permutations, there are some 21,844 permutations. In real life, there are probably more than four possible alternatives. How can one overcome the enormous problems. One method, as we have seen, is to start at both ends of the chain if possible. In the above example that would reduce the permutations to 168. The saving in comparisons is also great. But such a method is usually not available. That is the whole point - one can only move from one end, except in terms of a thought experiment.²⁷

Thus the very considerable problems facing Holmes or any historian or biologist are obvious. They have to find a series of true links, discard false links and gradually build up the whole chain. How does Holmes do this?

²⁵Nikiforuk, Fourth, p.11

²⁶Scheper-Hughes, Without Weeping, p.361

²⁷For the mathematics etc. see Campbell, Blind Variation, p.394 note 4.

Separation of essential and inessential.

The first thing is to recognize that the separation of essential and inessential is one of the central processes. The metaphor here changes from links and threads, to one of paths through undergrowths of distracting data. "It is of the highest importance in the art of detection to be able to recognise out of a number of facts which are incidental and which vital. Otherwise your energy and attention must be dissipated instead of being concentrated." (The Adventure of the Reigate Square).²⁸ The usual problem is that one is overwhelmed with too many possibilities. "The principal difficulty in your case", remarked Holmes, in his didactic fashion, "lay in the fact of there being too much evidence. What was vital was overlaid and hidden by what was irrelevant. Of all the fact which were presented to us, we had to pick just those which we deemed to be essential, and then piece them together in their order, so as to reconstruct this very remarkable chain of events." (The Adventure of the Naval Treaty).²⁹ There may be too many clues and too many possible hypotheses. A certain case was one "where the art of the reasoner should be used rather for the sifting of details than for the acquiring of fresh evidence. The tragedy has been so uncommon, so complete, and of such personal importance to so many people that we are suffering from a plethora of surmise, conjecture, and hypothesis." (The Adventure of Silver Blaze).³⁰ The goal of successful detection is obvious. A certain case 'is remarkable only for the fact that amid a perfect jungle of possibilities we, with our worthy collaborator the inspector, have kept our close hold on the essentials and so been guided along the crooked and winding path." (The Tiger of San Pedro).³¹ But how does one do it? It is basically a matter of mental discipline, going through all the data again and again, very like the process of sifting a grain, picking at all the essentials, the grit and grass, until nothing is left except the essential. It is an art of paring down, pruning, cutting away in one's mind. One should not proceed precipitately. "Before we start to investigate that, let us try to realize what we **do** know so as to make the most of it, and to

²⁸Doyle, Sherlock Holmes, p.373

²⁹Doyle, Sherlock Holmes, p.431

³⁰Doyle, Sherlock Holmes, p.291

³¹Doyle, Sherlock Holmes, p.764

separate the essential from the accidental." '(The Adventure of the Solitary Cyclist).³² One should think deeply until something really striking emerges from the mass of unnecessary details. "Having gathered these facts, Watson, I smoked several pipes over them, trying to separate those which were crucial from others which were merely incidental, There could be no question that the most distinctive and suggestive point in the case was the singular disappearance of the door key." '(The Adventure of the Reigate Square).³³

The Elimination of the impossible.

In the process of paring down or sifting, one obvious technique is to carefully pick out all the impossibilities and put them on one side. What is left is thus much reduced and will be the area where the solution will be found. The first thing is to consider **all** the possibilities, a complete inventory, however unlikely at first sight. "One should always look for a possible alternative and provide against it. It is the first rule of criminal investigation." '(The Adventure of Black Peter).³⁴ One should not be too quick to exclude alternatives, attracted by a short cut. 'My friend seemed struck by this remark. "I don't mean to deny that the evidence in some ways very strongly in favour of your theory," said he. "I only wish to point out that there are other theories possible." '(The Adventure of the Norwood Builder).³⁵ One should start with a complete list, including some wild hypotheses, and then narrow down. Having assembled all the evidence. "I now proceeded, using my familiar method of logical analysis, to narrow down the possible solutions." '(The Adventure of the Blanched Soldier).³⁶ It is a method of exclusion of the impossible. Holmes describes the method on several occasions. It is first alluded to in 'A Study in Scarlet'. "Again, I argued that it had been forced upon him from the hatred and fear expressed upon his face. By the

³²Doyle, Sherlock Holmes, p.622

³³Doyle, Sherlock Holmes, p.381

³⁴Doyle, Sherlock Holmes, p.640

³⁵Doyle, Sherlock Holmes, p.574

³⁶Doyle, Sherlock Holmes, p.1078

method of exclusion, I had arrived at this result, for no other hypothesis would meet the facts."'(A Study in Scarlet).³⁷ Again, in another early case he noted one should "Eliminate all other factors, and the one which remains must be the truth."'(The Sign of Four).³⁸ It has become a principal method. "How often have I said to you that when you have eliminated the impossible, whatever remains, **however impossible**, must be the truth? We know that he did not come through the door, the window, or the chimney. We also know that he could not have been concealed in the room, as there is no concealment possible. Whence, then, did he come?"'(The Sign of Four).³⁹ It becomes a central maxim. "It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbably, must be the truth. Now, I knew that it was not you who had brought it down, so there only remained your niece and the maids."'(The Adventure of the Beryl Coronet).⁴⁰ Since the explanation is usually very unexpected, not to say improbably, and this is why it has alluded normal (police) reasoning, the method of exclusion gives Holmes the confidence to pursue the surprising,, unexpected and, at first sight, improbable. When Watson interjects in sceptical disbelief "It seems most improbable", Holmes replies, "We must fall back upon the old axiom that when all other contingencies fail, whatever remains, however improbable, must be the truth. Here all other contingencies **have** failed."'(The Adventure of the Bruce-Partington Plans).⁴¹

The sifting process eliminates a good deal. Yet, as Holmes recognizes, it sill often leaves several possibilities. The detection process, as Holmes explains it, "starts upon the supposition that when you have eliminated all which is impossible, then whatever remains, however improbable, must be the truth. It may well be that several explanations remain, in which case one tries test after test until one of other of them has a convincing amount of support. We will now apply this principle to the case in

³⁷Doyle, Sherlock Holmes, p.61

³⁸Doyle, Sherlock Holmes, p.66

³⁹Doyle, Sherlock Holmes, p.80

⁴⁰Doyle, Sherlock Holmes, p.270

⁴¹Doyle, Sherlock Holmes, p.776

point." '(The Adventure of the Blanched Soldier).⁴² Thus one is often left with a reduce set of alternatives from each link, but the problem is only simplified, not usually resolved, by the process of elimination of the impossible. How to proceed?

Testing of hypotheses and the fit of hypothesis and data.

It is difficult to capture this activity because it consists of a circular process of interaction between conjective and data. The data permeates the conjecture, but equally the conjecture generates the data. They both happen at the same time. On the basis of a number of 'facts', Holmes generates a number of **possible** links in the chain, or just one link, which might cover the fact as known. "I have devised seven separate explanations, each of which would cover the facts as far as we know them. But which of these is correct can only be determined by the fresh information which we shall no doubt find waiting for us." '(The Adventure of the Copper Beeches).⁴³ The multiplicity of conjectures is reduced by further data, this provides a discipline on what at first have to be guesses, many of them wrong. "Yes," he said, in answer to my remark, "you have seen me miss my mark before, Watson, I have an instinct for such things, and yet it has sometimes played me false. It seemed a certainty when first it flashed across my mind in the cell at Winchester, but one drawback of an active mind is that one can always conceive alternative explanations which would make our scent a false one. And yet - and yet - Well Watson, we can but try." '(The Problem of Thor Bridge).⁴⁴ At first one works on the basis of possibilities, probabilities, hunches and intuitions. "Ah! my dear Watson, there we come into those realms of conjecture where the most logical mind may be at fault. Each may form his own hypothesis upon the present evidence, and yours is as likely to be correct as mine." '(The Adventure of the Empty House).⁴⁵ It is not exactly blind guesswork, though this is what it looks like. "We are coming now rather into the region of guess work," said Dr. Mortimer. To which Holmes replied, "Say, rather, into the region

⁴²Doyle, Sherlock Holmes, p.1082

⁴³Doyle, Sherlock Holmes, p.278

⁴⁴Doyle, Sherlock Holmes, p.996

⁴⁵Doyle, Sherlock Holmes, p.

where we balance probabilities and choose the most likely. It is the scientific use of the imagination, but we have always some material basis on which to start our speculations." (The Hound of the Baskervilles).⁴⁶ We only receive a few hints as to how the hypotheses are generated. One method seems to have been an attempt to imaginatively re-construct the thought pattern of the persons being investigated. "You know my methods in such cases, Watson: I put myself in the man's place, and having first gauged his intelligence, I try to imagine how I should myself have proceeded under the same circumstances." (The Adventure of the Musgrave Ritual).⁴⁷ This is an imaginative and intuitive process. "See the value of imagination," said Holmes. "It is the one quality which Gregory lacks. We imagined what might have happened, acted upon the supposition, and find ourselves justified. Let us proceed." (The Adventure of Silver Blaze).⁴⁸ One has an hypothesis, and then sees if it works, whether subsequent data fits with it - data which is often generated only because one has already begun to build up a causal chain. For example Holmes explained how "There are no better instruments than discharged servants with a grievance, and I was lucky enough to find one. I call it lucky, but it would not have come my way had I not been looking out for it." (The Tiger of San Pedro).⁴⁹ "It has been a case for intellectual deduction, but when this original intellectual deduction is confirmed point by point by quite a number of independent incidents, then the subjective becomes objective and we can say confidently that we have reached our goal. I had, in fact, reached it before we left Baker Street, and the rest has merely been observation and confirmation." (The Adventure of the Sussex Vampire).⁵⁰ Holmes frequently alludes to this confirming method. "My whole examination served to turn my conjecture into a certainty." (The Adventure of the Noble Bachelor).⁵¹ Or again, "If the fresh facts which come to our

⁴⁶Doyle, Sherlock Holmes, p.468

⁴⁷Doyle, Sherlock Holmes, p.363

⁴⁸Doyle, Sherlock Holmes, p.300

⁴⁹Doyle, Sherlock Holmes, p.759

⁵⁰Doyle, Sherlock Holmes, p.1024

⁵¹Doyle, Sherlock Holmes, p.250

knowledge all fit themselves into the scheme, then our hypothesis may gradually become a solution." "But what is our hypothesis?" (The Singular Experience of Mr. John Scott Eccles).⁵² The initial links or conjectures help to place later observations. "Now, let us calmly define our position, Watson," he continued, as we skirted the cliffs together. "Let us get a firm grip of the very little which we **do** know, so that when fresh facts arise we may be ready to fit them into their places." (The Adventure of the Devil's Foot).⁵³ On the other hand, it is essential that one be prepared to break links if later evidence shows they were wrong. One also has to be constantly aware that 'facts' are constructed by theories and can alter as one alters one's position in relation to them. "Circumstantial evidence is a very tricky thing," answered Holmes, thoughtfully. "It may seem to point very straight to one thing, but if you shift your own point of view a little, you may find it pointing in an equally uncompromising manner to something entirely different." (The Boscombe Valley Mystery).⁵⁴ Equally, one has to have confidence in one's conjectures and not let them too quickly be overturned by seeming information. (??) "I should have more faith," he said: "I ought to know by this time that when a fact appears to be opposed to a long train of deductions, it invariably proves to be capable of bearing some other interpretation." (A Study in Scarlet).⁵⁵

The need for data.

The secret is a balance between conjecture and data. Too much data and one is swamped. Too little data and the mind wildly speculates.⁵⁶ The lack of sufficient and high quality data is frequently alluded to by Holmes. "Data! data! data!" he cried impatiently. "I can't make bricks without clay!" (The Adventure of the Copper Beeches).⁵⁷ The danger is that one will theorize too

⁵²Doyle, Sherlock Holmes, p.751

⁵³Doyle, Sherlock Holmes, p.789

⁵⁴Doyle, Sherlock Holmes, p.161

⁵⁵Doyle, Sherlock Holmes, p.35

⁵⁶cf same remark from Marc Bloch.

⁵⁷Doyle, Sherlock Holmes, p.277

soon and without the control exercised by data. "No data yet," he answered. "It is a capital mistake to theorize before you have all the evidence. It biases the judgment." (A Study in Scarlet).⁵⁸ Later he suggests sufficiency, rather than completeness. "I had," said he, "come to an entirely erroneous conclusion, which shows, my dear Watson, how dangerous it always is to reason from insufficient data." (The Adventure of the Speckled Band).⁵⁹ The danger of distortion is well brought out when Holmes remarks "I have no data yet. It is a capital mistake to theorise before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts." (A Scandal in Bohemia).⁶⁰ Indeed, "The temptation to form premature theories upon insufficient data is the bane of our profession." (The Valley of Fear).⁶¹ Elsewhere he describes what seems to happen. "To let the brain work without sufficient material is like racing an engine. It racks itself to pieces. The sea air, sunshine, and patience, Watson - all else will come." (The Adventure of the Devil's Foot).⁶² One often has to exercise patience, awaiting better and fuller data. "Meanwhile, we shall put the case aside until more accurate data are available, and devote the rest of our morning to the pursuit of neolithic man." (The Adventure of the Devil's Foot).⁶³ On other occasions, like a hunter and his prey, Holmes pursues the data which will either prove or disprove his theories. One of the most interesting aspects of Holmes' account is of the way in which, very similarly to the biologists, Pasteur, Koch and others, he developed more precise and dependable data upon which to speculate.

⁵⁸Doyle, Sherlock Holmes, p.220

⁵⁹Doyle, Sherlock Holmes, p.228

⁶⁰Doyle, Sherlock Holmes, p.852

⁶¹Doyle, Sherlock Holmes, p.789

⁶²Doyle, Sherlock Holmes, p.7898

⁶³Doyle, Sherlock Holmes, p.789

The method of minute detail.

Much of the progress in biology, including medicine, as well as in the fields⁶⁴ in the second half of the nineteenth century came out of a combination of obsessive attention to minute details, with an improved technology, the microscope, which allowed analysts to see and explore a new world. Much of Holmes' work is centrally in this tradition.

Often Holmes put things under glass to examine them in more detail. 'Then with an expression of interest he laid down his cigarette and, carrying the cane to the window, he looked over it again with a convex lens.'(The Hound of the Baskervilles).⁶⁵ On another occasion, 'Sherlock Holmes had been bending for a long time over a low-power microscope. Now he straightened himself up and looked round at me in triumph.'(The Adventure of Shoscombe Old Place).⁶⁶ He measured as well as examined minutely. 'As he spoke, he whipped a tape measure and a large round magnifying glass from his pocket.'(A Study in Scarlet).⁶⁷ He even used the new powerful magnifying technology of photography as it emerged. "I have seen them. So has the doctor." "But I have examined them very carefully with a lens. They have peculiarities." "What are they, Mr. Holmes?" I stepped to my bureau and brought out an enlarged photograph. "This is my method in such cases," I explained.'(The Adventure of the Lion's Mane).⁶⁸ These were the tools that enabled him to see. But even more important was his realization, like the realization of Agazziz, Darwin, Koch, Pasteur and others, that minute examination of detail was very productive - and above all the details which at first sight seemed less interesting.

Holmes often lectured Watson on the importance of details. "Never trust to general impressions, my boy, but concentrate

⁶⁴Such as art critic criticism - cf Ginsburg.

⁶⁵Doyle, Sherlock Holmes, p.450

⁶⁶Doyle, Sherlock Holmes, p.1115

⁶⁷Doyle, Sherlock Holmes, p.22

⁶⁸Doyle, Sherlock Holmes, p.1090

yourself upon details." '(A Case of Identity).⁶⁹ He tells Watson, "You know my method. It is founded upon the observance of trifles." '(The Boscombe Valley Mystery).⁷⁰ If he takes up a case, he must examine everything minutely. "If I take it up I must understand every detail," said he. "Take time to consider. The smallest point may be the most essential." '(The Adventure of the Red Circle).⁷¹ It is this rigorous attention to detail, to actually see the tiniest clues, that is important. Others see, but do not notice or register. Holmes concentrates and thereby magnifies and makes explicit the implicit and hence literally invisible. Watson marvels, "You see everything," to which Holmes replies, "I see no more than you, but I have trained myself to notice what I see." '(The Adventure of the Blanched Soldier).⁷² Thus an invisible Kingdom which surrounds people becomes visible. "By George, it's marvellous!" cried Hopkins, in an ecstasy of admiration. "To think that I had all that evidence in my hand and never knew it." '(The Adventure of the Golden Pince-Nez).⁷³ Watson thought Holmes could see the invisible. "Not invisible, but unnoticed, Watson. You did not know where to look, and so you missed all that was important. I can never bring you to realise the importance of sleeves, the suggestiveness of thumbnails, or the great issues that may hang from a bootlace." '(A Case of Identity)⁷⁴

The most important point is Holmes' recognition of the importance of the **minutiae** of everyday life. A number of passages find him at his most boastful when complimented by Watson on some feat of detection - a small example of the method which, in **extenso**, was the one that solved many of his crimes.

The first major case, 'A Study in Scarlet', contains several

⁶⁹Doyle, Sherlock Holmes, p.153

⁷⁰Doyle, Sherlock Holmes, p.171

⁷¹Doyle, Sherlock Holmes, p.800

⁷²Doyle, Sherlock Holmes, p.1072

⁷³Doyle, Sherlock Holmes, p.688

⁷⁴Doyle, Sherlock Holmes, p.153

descriptions. Holmes can quickly identify a man's occupation from external, minute, signs. "By a man's finger-nails, by his coat-sleeve, by his boot, by his trouser-knees, by the callosities of his forefinger and thumb, by his expression, by his shirt-cuffs - by each of these things a man's calling is plainly revealed. That all united should fail to enlighten the competent inquirer in any case is almost inconceivable." (A Study in Scarlet).⁷⁵ This was a social skill which many mastered in the highly mobile but class-ridden society of the late Victorian England. But Holmes carried it further than most, on the basis of sustained study. "I flatter myself that I can distinguish at a glance the ash of any known brand either of cigar or of tobacco. It is just in such details that the skilled detective differs from the Gregson and Lestrade type." (A Study in Scarlet).⁷⁶ Later, when Watson remarks that "You have an extraordinary genius for minutiae," Holmes replies that "I appreciate their importance. Here is my monograph upon the tracing of footsteps, with some remarks upon the uses of plaster of Paris as a preserver of impressed. Here, too, is a curious little work upon the influence of trade upon the form of the hand, with lithotypes of the hands of slaters, sailors, cork-cutters, compositors, weavers, and diamond-polishers." (The Sign of Four).⁷⁷ Parts of the human body are of particular interest. Not just the hand, but also the ear. "As a medical man, you are aware, Watson, that there is no part of the body which varies so much as the human ear. Each ear is as a rule quite distinctive, and differs from all other ones. In last year's **Anthropological Journal** you will find two short monographs from my pen upon the subject. I had therefore examined the ears in the box with the eyes of an expert, and had carefully noted their anatomical peculiarities. Imagine my surprise then, when on looking at Miss Cushing, I perceived that her ear corresponded exactly with the female ear which I had just inspected. The matter was entirely beyond coincidence." (The Adventure of the Cardboard Box).⁷⁸

Strangeness of the normal.

⁷⁵Doyle, Sherlock Holmes, p.17

⁷⁶Doyle, Sherlock Holmes, p.24

⁷⁷Doyle, Sherlock Holmes, p.65

⁷⁸Doyle, Sherlock Holmes, p.314

As Holmes noted, the important thing was to be aware that very small 'trifles', very obvious things, such as an ear or boot-lace, can provide clues. They need to be **noticed**. But they have become so much part of everyday life that they have become invisible. As the Chinese proverb puts it, it would be unlikely that it would be a fish that discovered water, or a bird air. What Holmes does is to create a method whereby the commonplace and too obvious becomes singular, odd, and worthy of very minute examination. Things which a million people would see and their glance would shine across it are **seen**. As Holmes states, "'The world is full of obvious things which nobody by any chance ever observes.'" (The Hound of the Baskervilles).⁷⁹ Or again, "'It is just these very simple things which are extremely liable to be over-looked.'" (The Sign of Four).⁸⁰ Obvious things deceive one into mistaken assumptions or into merely ignoring them. "'I am afraid", said I, "that the facts are so obvious that you will find little credit to be gained out of this case. There is nothing more deceptive than an obvious fact," he answered, laughing.' (The Boscombe Valley Mystery).⁸¹ What needed to be done was to turn the obvious into something unobvious, worthy of attention, the natural into something unnatural or needing explanation. "'Depend upon it there is nothing so unnatural as the commonplace.'" (A Case of Identity)⁸² This was especially necessary because it was the featureless, 'normal', 'commonplace' crimes that were the most baffling. If there was anything really obviously special or singular about a crime, the easier it was to get a hook attached to it and climb it. It was the smooth surface of everyday and normal events which made it so difficult to climb. Only minute examination, as Agazziz had shown in geology, would reveal the tiny cracks into which a practiced detective like Holmes could insert his mind.

If an incident was very strange, solutions were not too difficult. Holmes had explained that 'what is out of the common is usually a guide rather than a hindrance.'" (A Study in Scarlet).⁸³

⁷⁹Doyle, Sherlock Holmes, p.464

⁸⁰Doyle, Sherlock Holmes, p.97

⁸¹Doyle, Sherlock Holmes, p.161

⁸²Doyle, Sherlock Holmes, p.147

⁸³Doyle, Sherlock Holmes, p.61

Or again, he noted that, "the more **outré** and grotesque an incident is the more carefully it deserves to be examined, and the very point which appears to complicate a case is, when duly considered and scientifically handled, the one which is most likely to elucidate it." (The Hound of the Baskervilles).⁸⁴ It is the crime lacking anything special that is the difficult one to solve. "Singularity is almost invariably a clue. The more featureless and commonplace a crime is, the more difficult is it to bring it home." (The Boscombe Valley Mystery).⁸⁵ There is thus a mistaken tendency among ordinary people to confound strangeness with mystery. "It is a mistake to confound strangeness with mystery. The most commonplace crime is often the most mysterious, because it presents no new or special features from which deductions may be drawn. This murder would have been infinitely more difficult to unravel had the body of the victim been simply found lying in the roadway without any of those **outré** and sensational accompaniments which have rendered it remarkable. These strange details, far from making the case more difficult, have really had the effect of making it less so." (A Study in Scarlet).⁸⁶

Absences and silences.

When faced with the hard and apparently unremarkable slab of everyday life and searching for clues, how was Holmes to find the tiny cracks which separated the completely normal, unimportant and genuinely irrelevant, from those tiny variations which **looked** normal to most observers, but were the **tiny** departures from the normal course of things which provided the trained detective with the purchase to start moving, like a trained rock climber, up the sheer rock face? Many of these clues were trebly invisible to the naked eye. They were often tiny - so small that one had to pause, literally or metaphorically with glass over them, to see them at all. Secondly they were so **obvious**, in such direct a line of vision, that they blended with the background. Thirdly, they were often **absences**, silences, negative clues, things that **did not** exist, rather than existing. They were tiny departures which consisted of things that did **not** happen, when they should have, or

⁸⁴Doyle, Sherlock Holmes, p.549

⁸⁵Doyle, Sherlock Holmes, p.160

⁸⁶Doyle, Sherlock Holmes, p.36

were absent when they should have been present. The discovery of these absences and silences is one of Holmes' most interesting pieces of detection.

The most famous example of this technique, where a tiny deviation, in this case between an expected, noise and its absence, is in the case of 'Silver Blaze'. Holmes refers to "the curious incident of the dog in the night-time." "The dog did nothing in the night-time." That was the curious incident," remarked Sherlock Holmes. '(The Adventure of Silver Blaze).⁸⁷ Later he elaborates on this. "Before deciding that question I had grasped the significance of the silence of the dog, for one true inference invariably suggests others. The Simpson incident had shown me that a dog was kept in the stables, and yet, though someone had been in and had fetched out a horse, he had not barked enough to arouse the two lads in the loft. Obviously the midnight visitor was someone whom the dog knew well."' (The Adventure of Silver Blaze).⁸⁸

In another case, rather than the absence of noise, a literal silence, there is an absence of an expected symmetry. The conversation turns in 'The Valley of Fear' to one of the objects in the room, Holmes asks what it is. "Mr. Douglas's dumb-bells," said Ames. "Dumb-bell - there's only one. Where's the other?" "I don't know, Mr. Holmes. There may have been only one. I have not noticed them for months." "One dumb-bell..." Holmes said, seriously, but his remarks were interrupted by a sharp knock at the door. '(The Valley of Fear).⁸⁹ Holmes does not give up the line of thought there and later explains to Watson how this lack of symmetry, this tiny unexpected deviation of an absence, was the vital clue. Watson is amazed to hear that the dumb-bell was the clue. "Dear me, Watson, is it possible that you have not penetrated the fact that the case hangs upon the missing dumb-bell? Well, well, you need not be downcast, for, between ourselves, I don't think that either Inspector Mac or the excellent local practitioner has grasped the overwhelming importance of this incident. One dumb-bell, Watson! Consider an athlete with one dumb-bell. Picture to yourself the unilateral development - the imminent danger of a spinal curvature. Shocking, Watson; shocking!" '(The Valley of Fear).⁹⁰ If the other could be

⁸⁷Doyle, Sherlock Holmes, p.303

⁸⁸Doyle, Sherlock Holmes, p.305

⁸⁹Doyle, Sherlock Holmes, p.866

found, a vital link in the chain would be revealed.

A third case of an absence which provides the central link is when a passenger who has supposedly been murdered and pushed off a train is found not to have a ticket. "We could not explain the absence of a ticket. This would explain it. Everything fits together." (The Adventure of the Bruce-Partington Plans).⁹¹ Sometimes it is just the fact that there is nothing there at all. "You found something compromising?" "Absolutely nothing. That was what amazed me." (The Valley of Fear).⁹²

Usually the crime is solved because of a cumulation of these tiny clues, present or absent. Holmes has a strong model of what one would normally expect. Tiny deviations from this begin to mount up. In one case a list of these ends, "it is unusually for them to be content with a limited plunder when there is much more within their reach; and finally I should say that it was very unusual for such men to leave a bottle half empty. How do all these unusualls strike you, Watson?" "Their cumulative effect is certainly considerable, and yet each of them is quite possible in itself." (The Adventure of the Abbey Grange).⁹³ The difficulty, as noted here, is that one is dealing with probabilities. The deviations are so small that they could easily be explained away as more or less probably or the result of chance or coincidence or accident. when do the 'accidents' of chances amount to something really significant? When something is found, it is easy to dismiss it. "Surely it must be a mere coincidence." "Curious, Miss Dunbar, very curious. Why should it appear at the very time of the tragedy and why at the very place?" (The Problem of Thor Bridge).⁹⁴ Another temptation, if several unusual things can be located, is to concentrate on the more sensational and later one, when it is really more useful to start earlier in the chain. "Because we have in this case one singular incident coming close to the heels of another singular incident. The police are making

⁹⁰Doyle, Sherlock Holmes, p.880

⁹¹Doyle, Sherlock Holmes, p.850

⁹²Doyle, Sherlock Holmes, p.850

⁹³Doyle, Sherlock Holmes, p.719

⁹⁴Doyle, Sherlock Holmes, p.994

the mistake of concentrating their attention upon the second, because it happens to be the one which is actually criminal. But it is evident to me that the logical way to approach the case is to begin by trying to throw some light upon the first incident - the curious will, so suddenly made, and to so unexpected an heir. It may do something so simplify what followed." '(The Adventure of the Norwood Builder).⁹⁵ Yet these tiny absences, silences, deviations from the normal lie just at the edge of the normal world. It is very difficult, even for Holmes, to capture them. There are so many possibilities. The classic process, as in mathematical and other research, is to know there is a clue there somewhere and then, suddenly, to see it. "My night was haunted by the thought that somewhere a clue, a strange sentence, a curious observation, had come under my notice and had been too easily dismissed. Then, suddenly, in the grey of the morning, the words came back to me." '(The Disappearance of Lady Frances Carfax).⁹⁶

Explicit techniques to improve chances of success.

Dealing with complex logical chains of inference and the search for tiny clues, Holmes used a number of techniques which were necessary, if not sufficient, causes of his success.

One was a form of broad or lateral thinking. There is obviously a danger of **myopia** in the hunt for details. One becomes so obsessed with the tree that one cannot see the forest, where the best clues may lie. Width of knowledge is essential. "All knowledge comes useful to the detective," remarked Holmes. "Even the trivial fact that in the year 1865 a picture by Greuze, entitled 'La Jeune Fille a l'agneau' fetched one million two hundred thousand francs - more than forty thousand pounds - at the Portalis sale, may start a train of reflection in your mind." '(The Valley of Fear).⁹⁷ Or again, when playing with the detectives by reading them an old history book, he remarks that 'there are various associations of interest connected with this ancient house, to which the police detective replies, "I don't doubt it, Mr. Holmes, but that is no business of ours." "it not? Is it not? Breadth of view my dear Mr. Mac, is one of the essentials of our profession. The inter-play of ideas and the oblique uses of

⁹⁵Doyle, Sherlock Holmes, p.575

⁹⁶Doyle, Sherlock Holmes, p.825

⁹⁷Doyle, Sherlock Holmes, p.849

knowledge are often of extraordinary interest."'(The Valley of Fear).⁹⁸

The difficulty is that is 'all knowledge can be useful', how is one to find and bring in that useful knowledge when it is needed? Holmes ponders on the problem of combining width with relevance. To 'carry the art' of detection to its 'highest pitch', he explains, "it is necessary that the reasoner should be able to utilise all the facts which have come to his knowledge, and this in itself implies, as you will readily see, a possession of all knowledge, which, even in these days of free education and encyclopaedias, is a somewhat rare accomplishment. It is not so impossible, however, that a man should possess all knowledge which is likely to be useful to him in his work, and this I have endeavoured in my case to do. If I remember rightly, you on one occasion, in the early days of our friendship, defined my limits in a very precise fashion."'(The Five Orange Pips).⁹⁹

Holmes is here referring to an earlier passage where he explains his mental archiving principles. One of these is not to stuff the mental archive with irrelevant information. Holmes has a view of the mind as something like a glass, which when it becomes full, begins to shed its old content as the new is poured in. "Depend upon it there comes a time when for every addition of knowledge you forget something that you knew before."'(A Study in Scarlet).¹⁰⁰ Given this view what does one do? The first thing is to control the amount that goes into the brain attic. "You see," he explained, "I consider that a man's brain originally is like a little empty attic, and you have to stock it with such furniture as you choose. A fool takes in all the lumber of every sort that he comes across, so that the knowledge which might be useful to him gets crowded out, or at best is jumbled up with a lot of other things, so that he has a difficulty in laying his hands upon it. Now the skillful workman is very careful indeed as to what he takes into his brain-attic. He will have nothing but the tools which may help him in doing his work, but of these he has a large assortment, and all in the most perfect order. It is a mistake to think that that little room has elastic walls and can distend to any extent."'(A Study in Scarlet).¹⁰¹ What is essential to make the

⁹⁸Doyle, Sherlock Holmes, p.886

⁹⁹Doyle, Sherlock Holmes, p.181/82

¹⁰⁰Doyle, Sherlock Holmes, p.15

¹⁰¹Doyle, Sherlock Holmes, p.15

work-place more effective is that it should be filled with the useful. Holmes clearly thought that past solutions to problems would be one of the useful things, past workings so to speak. 'He had a horror of destroying documents, especially those which were connected with his past cases, and yet it was only once in every year or two that he would muster energy to docket and arrange them.'(The Adventure of the Musgrave Ritual)/.¹⁰² The problem for his landlady and visitors was considerable. 'Thus month after month his papers accumulated, until every corner of the room was stacked with bundles of manuscripts which were on no account to be burned, and which could not be put away save by their owner.'(The Adventure of the Musgrave Ritual).¹⁰³ This material was valuable because, as Poincare explains, analogies with other cases often provided the best clues. '"Read it up - you really should. There is nothing new under the sun. It has all been done before."'(A Study in Scarlet).¹⁰⁴ Thus it was often possible, on the base of memory, to short-circuit the difficult process of chain-making. '"As a rule, when I have heard some slight indication of the course of events I am able to guide myself by the thousands of other similar cases which occur to my memory."'(The Red-Headed League).¹⁰⁵ But as the documentation increased, Holmes encountered the usual problem that even with an excellent and well-organized memory or brain attic, he needed help to find what he knew was present. In other words he needed an indexing system or retrieval system. In leisure moments he is to be found filing and cross-indexing his documents, an activity he clearly found irksome. 'Sherlock Holmes sad moodily at one side of the fireplace cross-indexing his records of crime.'(The Five Orange Pipe).¹⁰⁶ Only occasionally do we get glimpses of this system in action, however. Watson's ignorance needed correcting. '"But, then, if I remember alright, you had not heard the name of Professor James Moriarty, who had one of the great brains of the century. Just give me down my index of biographies from the shelf."'(The

¹⁰²Doyle, Sherlock Holmes, p.354

¹⁰³Doyle, Sherlock Holmes, p.354

¹⁰⁴Doyle, Sherlock Holmes, p.21

¹⁰⁵Doyle, Sherlock Holmes, p.133

¹⁰⁶Doyle, Sherlock Holmes, p.765

Adventure of the Empty House).¹⁰⁷ On another, Watson explained how 'I leaned back and took down the great index volume to which he referred. Holmes balanced it on his knee and his eyes moved slowly and lovingly over the record of old cases, mixed with the accumulated information of a lifetime.'(The Adventure of the Sussex Vampire).¹⁰⁸

Thus Holmes relied on a combination of techniques. Another was the familiar use of alternating very deep concentration and attention, based on data, with periods of changed activity. When thinking, sometimes stimulated or soothed by his opinion and violin playing, Holmes retreated into his mental attic and needed to be completely shut away. 'I knew that seclusion and solitude were very necessary for my friend in those hours of intense mental concentration during which he weighed every particle of evidence constructed alternative theories, balanced one against the other, and made up his mind as to which points were essential and which immaterial.'(The Hound of the Baskervilles).¹⁰⁹ This made him abstracted and unsociable at times, like Newton. 'My friend, who loved above all things precision and concentration of thought, resented anything which distracted his attention from the matter in hand.'(The Adventure of the Solitary Cyclist).¹¹⁰ But at other times he realized that he could get no further and needed to occupy his mind with something entirely difference. '"Well, I gave my mind a thorough rest by plunging into a chemical analysis. One of our greatest statesmen has said that a change of work is the best rest. So it is."'(The Sign of Four).

The common sense method.

Thus Holmes had created a method for solving difficult problems. Holmes himself admitted that his 'simple art' was 'but systematized common sense.'(Adventures of the Blanched Soldier)¹¹¹f

¹⁰⁷Doyle, Sherlock Holmes, p.565

¹⁰⁸Doyle, Sherlock Holmes, ,p.1015

¹⁰⁹Doyle, Sherlock Holmes, p.599

¹¹⁰Doyle, Sherlock Holmes, p.599

¹¹¹Doyle, Sherlock Holmes, p.1082

In this respect it was just like Descartes description of how by certain simple and elementary rules of method it was possible to solve otherwise impossible problems. Like Descartes, likewise, part of the art lay in breaking the problem into small pieces, a set of small logical inferences, moving carefully from cranny to cranny. Holmes described the process thus. "You see, my dear Watson" - he propped his test-tube in the rack and began to lecture with the air of a professor addressing his class - "it is not really difficult to construct a series of inferences, each dependent upon its predecessor and each simple in itself. If, after doing so, one simply knocks out all the central inferences and presents one's audience with the starting-point and the conclusion, one may produce a startling, though possibly a meretricious, effect. Now, it was not really difficult, by an inspection of the groove between your left forefinger and thumb, to feel sure that you did **not** propose to invest your small capital in the goldfields." (The Adventure of the Dancing Men).¹¹² It was by joining the links in the chain that something large was achieved. "Each fact is suggestive in itself. Together they have a cumulative force." (The Adventure of the Bruce-Partington Plans).¹¹³ Like Descartes also, nothing could be taken for granted. It was a method of doubt. "Well, It is conjectured to be so. I shall take nothing for granted until I have the opportunity of looking personally into it." (The Boscombe Valley Mystery).¹¹⁴ The major difference, as stated before, is that while Descartes argued from the start, forwards, Holmes proceeded from the end, backwards.

Conclusion.

At a later date I hope to fill out this account with some further accounts taken from other detective sources, and from more serious academic studies of similar themes in the field of creativity, originality, problem solving, as well as first-hand accounts by scientists, historians and others on how they actually work. This would, in particular, focus on their methods of indexing and retrieval systems, in other ways the problems of arranging the mental attic which Holmes touched on. Accounts by Acton, Darwin and others would illuminate this.

¹¹²Doyle, Sherlock Holmes, p.583

¹¹³Doyle, Sherlock Holmes, p.771

¹¹⁴Doyle, Sherlock Holmes, p.160