

## Chapter 2

### College

Tina had really enjoyed high school, but her plethora of activities—social events, sports, social media and boyfriends, meant that she did not achieve the academic results she was capable of. And since her competitive society only rewarded its very best high-school students with a place at a top university, she had to settle for enrolling in an Arts degree, with majors in psychology and public policymaking, at a second-level but still very good university.

Not that this worried her. She knew that unlike some of her friends she had avoided being forced to attend an elite university in order to study for a prestigious profession, like medicine, law or veterinary science, simply because she had obtained high grades. Enrolling at a slightly less prestigious institution in a lower key course was much more her cup of tea. She was studying things that were of genuine interest to her and she was free to pursue her chosen path,

In fact, she began to wonder whether her society was functioning properly. “We enrol the cream of each year’s high-school students into courses which teach them to fix dogs and cats”, she would lament, and in view of the increasingly complex problems that the modern world was facing, this certainly did seem ridiculous. Surely any society’s brightest and best should be encouraged to tackle more pressing problems, such as environmental preservation, fair trade, global injustice and world peace (Diamond 2002, 2006).

This thought reminded Tina of the American diplomat John Adams’ declaration that people of his generation should study:

politics and war

so that their children can study:

mathematics, philosophy, geography, agriculture and commerce,

after which their grandchildren will have a chance to study:

painting, poetry, music, architecture and fine arts (INT4).

Perhaps her society was still too much mired in the second, utilitarian stage. Nevertheless, she herself was determined to dip into stage three, particularly if this proved to be advantageous in her quest for better plan-score forecasting.

For Tina, plan prediction was something in which she had recently become even more interested. After all, she was a social animal, and anyone who is good at anticipating other people's plans is well on the way to becoming socially competent. She even realised that skill at plan prediction would probably bring more success in her interactions with the opposite sex and so increase her chances of finding a high-quality life partner. But she did not articulate this to anyone else, or even to herself, with any conviction.

Right now, she was more interested in taking to university like a duck takes to water. Because her mother had raised her within an academic environment, she was more confident than most of the other incoming students, and so she found herself enjoying life immensely by joining many clubs and societies. She was even sufficiently independent to reject the supposedly safe, but actually chaotic and distracting life of a student in a hall of residence. Instead, she secured digs at a suburban, share house with three older students.

Marie, of course, would have preferred Tina to remain living at home, but because Tina's university was in an outer suburb far from their house, this would have meant long hours of travel to and from classes. Moreover, the share house had a large yard which the landlord had converted completely to lawn for easy maintenance, and this area was overlooked by a glassed-in sunroom that was a quiet and particularly cosy studying spot during the winter.

Two of Tina's new housemates were still trying to finish off their degrees even though they had been studying for some years and working at odd jobs to pay tuition fees. The third was already working full time. None were all that interested in learning; they were party girls first and foremost, and although Tina had an equally strong zest for life she was, at least for now, much better organized than they were. Unlike them, she frequently found the time to curl up with an interesting book in the sunroom. She was younger, newer to the tertiary environment and probably, more innately curious.

Even so, Tina never had time to become an absolutely model student because she had taken up the time-consuming sport of triathlon. She found that training for this arduous event was both absorbing and satisfying and, even though her part-time job as a waitress prevented her from practicing it sufficiently to bring her performance up to the elite level, it kept her strong and vigorous—at least by student standards.

As time passed Tina became more and more interested in the academic aspects of better plan-score forecasting. She explored the subject as deeply as possible by delving into the several libraries which were strewn around her wonderfully landscaped campus. She also asked her housemates about the different things that she was learning at university.

Conversations with her co-lodgers would usually take place late at night around the kitchen table of their humble house—after Tina had finished studying for the evening and one of them had just returned from a night out. On such occasions, counter intuitively, it frequently became apparent that her friends still liked to intellectualize about all manner of topics with their enthusiastic, young friend.

Tina also noted that even those subjects in which she was officially enrolled, but which seemed less relevant, would sometimes actually deliver interesting and potentially helpful insights. For example, the lecturer in her first-year public policy class, a mature woman who had once worked as a senior government bureaucrat, said something that really resonated. “Everyone has a natural tendency to be seduced by current malpractice”, she had droned, “and this can be extremely frustrating to newcomers”.

The teacher’s point was that all universities have, and probably always will churn out graduates who have their heads full of genuinely exciting ideas about how to do things more effectively in the real world—better plans. Yet whenever any typical graduate joins a large organization, he or she frequently finds that people who are already there are very unwilling to accept suggestions for improved practice, even when such suggestions are clearly superior to current procedures.

The reason, the lecturer explained, is that before any young Turk even arrives, somebody higher up has probably supported another person’s agenda, and now it is payback time. Long-term employees are always calling in favours, on the basis of past concessions, by insisting that their workmates support those practices which they themselves want implemented. Even if such practices are grossly inappropriate, it is simply a fact of life that the last thing that any politically savvy employee wants is to have their status eroded by everyone rejecting their plan in favour of some half baked, ultra fashionable suggestion being sprouted by some newly employed whiz kid.

Tina found herself telling her mother about this when she was next at home for Sunday lunch, and Marie asserted that she could well understand how this would be very disheartening for the young and the restless. But then she gently suggested that a strong case could also be made for this being how society’s large institutions should, in fact, operate. Bureaucracies should, as a matter of course, delay the adoption of ideas until after a suitable gestation period. During this time the majority of people may, or may not come to accept the new idea. If they do not, society will have avoided being rushed towards premature implementation of a new but hare-brained plan.

Indeed, Marie explained that there have been many instances where this kind of institutionalized obstruction would have been preferable to adopting a very revolutionary strategy. For example, in 1917 Russia implemented their plan for a “dictatorship by the proletariat” as suggested by the wealthy German philosopher, Karl Marx. The ensuing suffering by the proletariat itself was so bad that this plan was eventually overturned in 1989. Excited adoption of this creative but untried idea had hardly been the high point of Russian history, at least for ordinary people.

Tina had to concede, therefore, that in some circumstances measured conservatism can be preferable to over-enthusiastic, creative glibness, and the great conservative rump of society keeps reminding everyone of this. She realized that people’s innate conservatism and their desire to perpetuate the status quo looms large in plan-score forecasting. Yet conservatism was abhorrent to Tina at this stage of her life. She was young, ambitious and curious, and she found this aspect of human nature to be most unsettling.

Accordingly, she decided to explore the nature of people’s underlying attitudes more deeply. She was intrigued by what her first-year lecturers, and her psychology textbooks, said were people’s goals, or motives. After all, she had learned very early on in her childhood that people prefer those plans that best address their underlying needs.

## 2.1 Basic Needs

Tina read that, as far back as 1943, the Austrian psychologist Abraham Maslow had suggested that there are five basic human needs (Maslow 1943):

1. Physiology—breathing, food, water, sex, sleep;
2. Safety—security of body, employment, resources, morality, family, health and property;
3. Love/belonging—friendship, family, intimacy;
4. Esteem—confidence, achievement, respect from others, and
5. Self-actualization—morality, creativity, spontaneity, problem solving, lack of prejudice and acceptance of facts,

To Tina, this all seemed eminently plausible, and in many ways it resembled William Glasser’s “Choice Theory” which states that humans have one physical need: Survival (food, shelter, clothing, safety), and four psychological needs:

1. Love,
2. Power,
3. Freedom and,
4. Fun (INT5).

Whichever, she had little doubt that most people will prefer those plans which best satisfy either Maslow’s or some similar set of basic needs.

Yet her boyfriend at the time disagreed. He was a backpacker who had already managed to see many of the poorer parts of the world on a budget, and he pointed out in no uncertain terms that while in privileged countries a major issue might be, say, how to best design a new water fountain for the city square, across poverty stricken parts of Africa and Asia the issue would simply be how to obtain water. His point was that many people’s needs are at the physiology and safety stage—nothing else matters to them, and the higher level needs, like love, esteem and self-actualization are luxuries considered only by people living in the first world.

Tina questioned her psychology lecturer about this and, sure enough, he conceded that Maslow’s basic needs listed above are in decreasing order of necessity. The first ones are essential for our continued existence; if they are not satisfied then we will all die. So it is only after they have been met that we will be healthy and safe enough to be interested in the more luxurious needs. This is why when a population’s first-level, basic needs are not met, government authorities declare a state of

emergency until they are, only aspiring to higher-level attainments, including activities like plan-score forecasting, once all the threats to basic survival have been dealt with.

This came as something of a revelation for Tina. For her, facilities to alleviate hunger and thirst and to secure shelter and safety had always just been there. She now realized that this was why she had far greater interest in examining Maslow's fifth-level, self-actualization considerations—morality, creativity, spontaneity and so on. She began to speculate whether, in the developed world, people's plan preferences can be predicted simply by assuming that most individuals will prefer plans that are moral, creative, spontaneous and so forth.

If so, this would be a neat way to forecast people's plan scores across the whole gamut of planning problems. It would scarcely matter whether we are predicting whether people will prefer their nation to have a business-oriented, a "green" or a socialist future; or anticipating whether people will prefer to send their children to a private or a state school; or guessing whether they want to holiday in Barcelona, Brisbane or Bogota. We could simply assume that most people will always opt for that plan which is the most moral, creative and spontaneous.

Tina was disappointed to realize, however, that measuring which plan is more moral, creative or spontaneous is extremely problematic. Maslow's criteria seemed to be either too inexact, too abstract or too complex for precise measurement—they seemed too qualitative.

Accordingly, Tina started looking for more quantitative measures. She used the library and the internet to dig a little deeper into what the discipline of psychology has come up with in terms of a more exact specification of people's needs, and after a remarkably short time she discovered Fisbein and Ajzen's book *Theory of Reasoned Action* (1975).

This stipulated that people will usually prefer any action (plan) which is:

1. Positive—in terms of consequences
2. Approved—by significant others (=“the subjective norm”),

and Tina then read that although psychologists had at first thought that this theory was plausible enough, they had later begun to reject it because experiments kept revealing a gap between people's predicted and observed behaviour.

Ajzen's response was to postulate a third set of considerations—perceived behavioural control. This means that if a plan incorporates a degree of control over one's situation, one is more likely to prefer it. So his modified theory became known as *Self Efficacy Theory* and eventually Ajzen further formalized it into his *Theory of Planned Behaviour* (1988).

The latter states that people's preferences depend on their:

1. Behavioural beliefs—consequences of plans
2. Normative beliefs—expectations of others
3. Control beliefs—factors that facilitate and impede plans.

Tina became quite enthused when she learned that this theory can actually be expressed as a mathematical formula that even she was able to understand (maths

had never been her strong suit). Even though the formula did not make the theory more precise, it seemed to make it more exact and credible

$$\text{Behavioural Intention} = W1 \cdot B[b + e] + W2 \cdot N[n + m] + W3 \cdot C[c + p] \quad (2.1)$$

where,  $B$ —Attitude toward Behaviour;  $b$ —strength of each belief;  $e$ —evaluation of outcome;  $N$ —Social Norm;  $n$ —strength of each normative belief;  $m$ —motivation to comply;  $C$ —Perceived Behavioural Control;  $c$ —strength of each control belief;  $p$ —perceived power of control factor, and  $W1, W2, \dots$  = empirically derived weights.

Although this theory was subsequently maligned in the literature for not accommodating several other influences acting upon humans' plan-choosing behaviour, such as context, ethics, role playing, attitudes towards authority, propensity for co-operation and past experiences, Tina reasoned that such a criticism could actually be levelled against any theory whatever.

There will always be extra considerations that send the most logical plan predictions awry, and so to Tina, Ajzen's theory was as good as any other guide to plan-choice behaviour. Even though any particular individual's plans will be influenced by threat, fear, mood, negative feelings or enthusiasm, we can still obtain, from Ajzen's theory, an inkling of how different sorts of people will score plans.

Yet in her heart, Tina realized that on its own, this theory was not enough. It was not sufficiently operational to help her very much in her quest to forecast, precisely, how people will score each plan. One can hardly deduce how well someone will rate a plan by asking them how well or otherwise it conforms to their behavioural, normative and control beliefs. Most people will simply not understand what they are being asked.

While it may be possible to use elaborate laboratory experiments to deduce people's implicit responses to such questions, the enduring problem remains that most people are incapable of articulating a clear response. This makes the theory inappropriate for use in real-world practice. So Tina had come up short in her quest for a reliable and concrete method for forecasting people's plan scores.

Nevertheless, she realized that there is no shortage of self-designated experts who claim to be able to forecast people's plan scores quite accurately. Such gurus pander, of course, to the tendency of many people who, when faced with the complicatedness of modern society, take refuge in authority. After all, if the experts really can tell us which plans will score highly in the minds of different sorts of people, then life becomes much simpler and easier for everyone. However, one of Tina's housemates, the one who was working full time as a personal assistant to the executive director of a retail chain, advised that there are many problems with listening to so-called experts.

## 2.2 Sniper

This housemate had once trained as a social worker and so she had a keen understanding of ordinary people's hopes and fears. She was fond of Tina, and so she tended to take her under her wing, sometimes even to dinner parties thrown by her friends in the up-market suburbs where, inevitably, people would be impressed by Tina's maturity. And to Tina, her housemate seemed very much like her second-year, public policy lecturer—an older lady with a quick wit and a streak of irreverence which had always appealed.

One day this lecturer introduced David Canter's fascinating book about how mass murderers and rapists think (2003). Canter argues that whenever a serial killer is on the loose, television stations bring out their "talking heads" in the form of academic and other so-called crime experts. Such people then declare what sort of person they think the killer is, and predict what he will do next—offenders are nearly always male.

But alas, such detailed and seemingly authoritative predictions are invariably wrong. Not that this changes anything. After the current hysteria dies down, the experts' misguided predictions are promptly forgotten, and as soon as the next crime occurs they are recommissioned to be wrong all over again. Tina had always suspected this, and here was a writer confirming her suspicions.

Canter describes the example of the Washington DC sniper who, along the freeways just north of the US capital, killed 10 people at random and wounded 11 others in 2002. People were so traumatized that most were afraid to go out in case they were unlucky enough to become the next randomly selected target. Meanwhile, the media was under pressure to fill newspapers, to take up broadcasting time and to meet tight deadlines while still appearing to be doing something constructive. So it demanded insights and explanations, and the alleged experts were only too willing to volunteer them.

Depending upon who was speaking, experts confidently asserted that the shootings were the work of Al Qaeda terrorists, or performed as homage to the "Son of Sam" murders 25 years before, or a re-enactment of the storyline of the television police programme *Homicide*, or the work of computer nerds who had been influenced by shoot-them-up games. One so-called expert even suggested that the killings were the work of Satan because the map of the murder locations formed the shape of an upside down cross. Most commentators also stated that if and when the sniper was caught, he would certainly go down in a hail of police bullets that would finally terminate his crazed hyperactivity.

Self declared "profilers" were even more specific. Completely without evidence most of them asserted that the sniper was white, disenfranchised, disrespectful and bent upon revenge against society. Many stressed that the sniper was a Washington local, and others declared that he was single, and aged between 20 and 30, again, without any evidence. Moreover, because the killer was so exacting in his attacks, he would never ever let slip any information that would result in his capture.

Well, in actual fact there was not one but two snipers, and their skins, according to Canter, could never be seen as white in any sort of light. John Muhammad and John Lee Malvo were not locals either, they operated out of a car in which they lived; and one was originally from Alabama while the other was from Jamaica. Also, rather than being 20–30 years old, Muhammad was 40 something and Malvo was a teenager.

It gets worse. The pair was eventually tracked down because they could stop bragging about an earlier shooting that they had carried out in Alabama, and they were arrested when a SWAT team, complete with helicopters and overhead searchlights smashed car windows at 3 am while the murderers slept in a fast food restaurant's car park. They offered no resistance whatever, almost sleeping throughout the entire exercise. So much for expert predictions.

Yet Tina was equally intrigued by something else—the way in which different sections of the community had decided to respond to this frightening crime spree. The media busily went about assembling talking heads for television shows and newspaper columns, which is a cheap way of making it seem as if they are actually doing something about an un-nerving problem. By contrast, sending out many reporters to gauge what citizens thought about the situation, or actually helping the police to track down the killers, would have taken far more effort and possibly still not have achieved anything. In other words, media barons preferred the plan which cost them the least, and they did not worry about their plan's effectiveness.

But here's the rub: the average person supported this. The reason was because they were very frightened. Citizens strongly believed that someone should do something quickly—something to make it seem as if the situation was under control. Hearing from self-proclaimed experts on the media fulfilled such a need.

Yet surely the plan that ordinary people would have preferred was for the criminals be hunted down and arrested forthwith. Had most people been asked whether they wanted a media circus or effective policing, the overwhelming majority would surely have preferred effective policing. But people's favourite plans remained well hidden—clouded by fear.

This lesson was not missed by Tina. She realized that although it is difficult, and perhaps impossible to find a reasonably accurate, fast and practical method for forecasting people's plan scores, sometimes plans can be driven by such basic and primal emotions as fear. Yet this seemed to only happen in extreme situations, like when there were two unidentified snipers terrorizing a city. Normally, one would expect people's plan scoring to be more rational and unemotional, so Tina was not yet willing to give up her search for an operational, plan-prediction method.

## 2.3 Crime Rate

As the years passed, Tina developed into a confident and self-assured young lady whose freckled skin and wavy red had given way to a peaches and cream complexion topped by straight and fashionably blow-dried locks. She was quite popular and enjoyed having a wide circle of friends, some of whom were studying



economics. So she learnt quite a lot about such students during coffee-fuelled conversations at the university's cafe.

Tina was interested in such gatherings because she had heard that economists argue a lot amongst themselves. Someone even told her the old joke that if all of the world's economists were laid along the ground head to foot, the resulting line would extend two times around the circumference of the earth but would never reach a conclusion.

Another person told her a story about how former US President Franklin D. Roosevelt had become completely fed up with his economic advisors always wanting to have a bet each way. They would say to him that on the one hand he might opt for plan A, but on the other hand plan B could be better, and on the third hand perhaps he should prefer plan C. Consequently, when asked what he wanted for Christmas, he replied, "a one-handed economist".

Yet Tina also realized that economists are probably no better or worse than many other types of so-called professional experts. It is just that the "science" of their discipline is often not up to the task of indicating, unambiguously, what the best plan is. Moreover, most ordinary people have an opinion about most traditional economic issues—unemployment, inflation, trade imbalance and so forth, and so out there in the community great disillusionment ensues whenever an economic advisor prescribes a plan that does not mirror people's judgements. And because other economic experts disagree enough to put forward the opposite point of view, the discipline's reputation plummets still further.

Yet the economics students who Tina knew seemed to agree on two things. First, they disliked economic theory and accounting, because both require a disciplined approach which often leads to boredom amongst people their age. Second, they enjoyed reading the work of a very well-known economist by the name of Levitt.

This was because his books were easier going, even though he did not necessarily write about monetary phenomena. Levitt actually writes about incentives, and once she read some of his work, Tina was hooked. She thought his work was absolute gold, and she read about it eagerly, especially Levitt's well known books *Freakonomics* (2006) and *Super Freakonomics* (2009).

Some of Levitt's research describes how, during the 1980s, the United States' crime rate was rising so sharply that many of the media's gurus forecast future chaos. They pronounced that crime would inevitably envelop and completely overwhelm the nation, and even President Clinton publicly urged that measures should be taken to protect Americans from looming disaster. Since the rate of violent crime within all US states and cities had increased by 80 % in the 15 years up until 1989, by the end of the century it would surely be out of control. This would make places like New York completely unliveable. It seemed that the whole nation should brace itself for Armageddon.

But what happened? Nothing. The crime rate fell steeply during the 1990s and it did not stop falling until it reached levels that were last reached 40 years previously. All manner of claims were then trotted out to explain this, a prime example being New York's much vaunted "zero tolerance" policing policy for which Major Giuliani took much of the credit.

But Levitt quoted a few home truths to refute such spin. First, the New York crime rate began to drop in 1990 and it had fallen 20 % already by 1993, whereas both Giuliani and New York's police commissioner Bratton were not appointed until early 1994. Second, between 1991 and 2001 the New York Police Department went on a hiring binge to expand its police force by 45 %. Third, crime was down everywhere in the 1990s, even in cities which did not implement a zero tolerance policy.

The lesson here is that the truth can be so distorted by powerful vested interests, commercial lobbies or ex-lord mayors manipulating the media for their own ends. That is, laypersons are usually unable to judge how much an expert has been tainted by their own public relations machinery.

Indeed, Tina was reminded of a well-known nutritionist who once flew into her home city. He had loudly proclaimed that anyone trapped for a weekend inside a particular brand of fast food restaurant would find themselves eating a well-balanced diet of the kind recommended by eminent nutritionists such as himself. Being a growing teenager who loved fast food, Tina believed him—until she realized who had paid his air fare: that's right, the fast food chain.

Getting back to the fall in the US crime rate, Levitt had a novel explanation for it—the Supreme Court's ruling, in January, 1973, that abortion would henceforth be legal everywhere in the US. This prompted the nation's number of abortions to rocket upwards to 750,000 by 1974, and the annual US rate reached 1.6 million by 1980 before levelling off at around one for every 2.25 live births.

Levitt asks his readers to consider who was committing the crime in the 1980s, and he then answers his own question by saying it was, overwhelmingly, those who were born to poor parents and into poor circumstances. Such offsprings were frequently unwanted, unloved, neglected and desperate. But because parents from 1973 onwards had a choice whether or not to bring so many of them into the world, 17–20 years later many crimes were just not committed. The people who would have committed them had never been born.

Although Tina saw this as a very insightful and plausible explanation of what had happened, she was aghast to learn how many commentators viciously attacked Levitt's reasoning by pouring scorn upon his argument. Many, however, were from the pro-life, anti-abortion movement, and to any committed pro-lifer it seemed a huge tragedy that Levitt explained a welcome trend—a drop in crime, using something as abhorrent as legalized abortion.

So it became politically correct amongst those of a certain persuasion to reject the judgement of Levitt who, on the face of it, appeared to have outperformed all of the other experts. Moreover, in terms of plan-score forecasting Tina realized that pro-lifers would never favour any plan to keep crime rates low by making abortion easy to obtain. Their prejudice got in the way. Supporting abortion was simply so unpalatable that any other anti-crime plan was preferable.

In short, whereas people sometimes reject an expert's view because the expert may have been tainted by self-promotion and/or vested interests, they can also do this because they themselves have been tainted—the expert's views are, to them, simply unacceptable; end of story. Even the addition of field experiments to the

Freakonomics repertoire hardly strikes a blow against such pre-judgements. (Gneezy and List 2015).

The casualty is either a trashing of the expert's reputation or a masking of people's true, plan preferences by their preconceptions. This further illustrates what a complicated task plan-score forecasting is. So Tina decided to take the opportunity to understand planning more deeply by delving into its evolutionary, biological origins.

## 2.4 Primeval Life

So she picked the brains of Silvia, an obliging young molecular biologist whom she had met at the triathlon club. Together they would train, sometimes for several hours, either running around road circuits at night or cycling in the countryside on Sunday mornings. Silvia was quite willing to impart her considerable knowledge to Tina, and the latter appreciated this because she was now studying third-year psychology, along with some philosophy, and she had begun to wonder when, during human history, planning first came into existence.

Silvia told her that at the dawn of time, life on earth consisted of one-cell organisms floating around aimlessly in the primeval soup, and although such organisms responded to the demands of nature in a non-directed manner, they certainly did not weigh up alternative plans. "So", said Silvia, "planning did not emerge until animals evolved sufficiently to achieve awareness".

Tina was taken aback by this. Her philosophy class had taught her that there are at least two flaws within the sentence that Silvia had just uttered. First, creationists maintain that the theory of evolution is unproven, which it is. Second, even if evolutionary theory is correct, can we really say that semi-conscious organisms do not plan anything? So Tina set about resolving each of these issues in her own mind.

She began by reasoning that the "evolution versus creationism" controversy will probably never be resolved. Anyone's attitude depends upon their life's experiences, beliefs, desires and blind faith. Nevertheless, she decided to unilaterally assume that the theory of evolution is true, not because it necessarily is, but because it seemed convenient for her purposes.

It might help her speculate about how earthly life became progressively more complex in order to survive within an increasingly complicated environment. This could be useful for better appreciating how forecasting people's plan scores can be conceptualized at a number of levels of sophistication. That is, Tina used the theory of evolution as an organizational device.

Second, the one-celled organisms basically functioned in a binary "all or nothing" sort of way—if they sensed that something nearby was food they absorbed it; and if it was not food they did not absorb it. Such a process was surely automatic. It was grounded in a simple, reflex action. No organism sought to take control over its own destiny by evaluating different possible actions (plans).

Yet some would say that these organisms actually “decided” either to absorb something or to not absorb it. It may have been an extremely unsophisticated, simple, natural and automatic reflex, but it is true that some sort of decision was made. Nevertheless, Tina resolved to her own satisfaction that sophisticated plan evaluation had not occurred. Food was either present or it was not, and so the organism’s behaviour followed as a matter of course rather than as a consequence of its weighing up of alternative plans.

Tina was feeling so secure in this belief that she defended it with vigour in a second-term tutorial paper that she had to write and present to the class. She always enjoyed this particular tutorial because it was held high up on the eleventh floor of a building whose ample windows offered a spectacular view of the city and its deep-water port in the distance. During the winter it was extremely pleasant to be discussing esoteric concepts while the wind outside rattled the glass windows.

But what she disliked was the presence of a pale and nondescript undergraduate, philosophy enthusiast who seemed to delight in questioning every idea that anyone ever put forward. And sure enough, he immediately took Tina to task. He somewhat unkindly pointed out that her arguments were absolutely riddled with ontological sins, chiefly because she had taken a “Newtonian/positivist” approach.

Following Morcol (2002), he stated that relying upon positivism can be dangerous because it unthinkingly makes three, very questionable assumptions:

1. entities and events have clear boundaries,
2. entities and events are connected to each other, and
3. future events are completely predictable.

The obnoxious student then gleefully pointed out that Tina had implicitly made all three of these assumptions even though they may have been untrue.

First, she had suggested that there are only two types of substance, food and non-food, which is demonstrably false. Whether or not something is food depends upon its chemical composition, molecular structure and the presence or absence of particular proteins in certain combinations. That is, the boundaries between food and non-food are not binary (assumption 1)—they are “fuzzy”.

Second, there is a chance that the amoeba evaluated the food’s composition and wondered whether, given its own current composition, it should leave the food alone for now, or absorb the food now in order to passively store relevant proteins for future use, or assimilate some particles of the (partial) food and expel the rest or whatever. Her assumed connection between the entity (food) and the event (consumption) could not actually be observed or proven (assumption 2).

Third, the amoeba’s behaviour was not predictable (assumption 3). Its seemingly simple behaviour was actually, at the molecular level, too complicated for us “mere humans” to observe or understand.

Strictly speaking, of course, the student was correct on all counts, and so the tutor, despite being annoyed by his confrontational manner, was unable to defend the crestfallen Tina very effectively. So later that night Tina found herself describing her catastrophic tutorial experience to another of her housemates—an

older girl who was studying postgraduate philosophy and politics and who had also once been the president of the student dramatic society.

This housemate actually agreed with the young philosophy student, but she was far less brutal. She politely explained that the difference between food and non-food is qualitative, as are all our observations and interpretations of humans' behaviour. In fact, she repeated Mori's (1980) point that whenever we eat some beef we do not know exactly when the beef becomes part of us.

Is it part of us once we have swallowed it? Does it become part of our body only after the meat's fibres have been broken down in our stomach? Or perhaps it becomes part of us only after the meat's proteins have been absorbed into our blood stream, or after the molecules have become part of our muscles, or what? It is impossible to determine when food becomes non-food.

Similarly, it is impossible to observe whether or not there is a connection between stimulus and response. Did the amoeba absorb the food because it was present or because other, unobservable, atomic-level triggers were operating? Because we don't know, it is impossible to interpret, at least at the scale of human observation, the actions of the amoeba. The amoeba's behaviour is not strictly deterministic. The whole system has qualitative gradations of sophistication which make it impossible to establish exactly where automatic behaviour stops and purposive action, based upon true planning, starts.

Tina decided, therefore, that she would simply have to decree, quite arbitrarily, whereabouts along behaviour's evolutionary, sophistication continuum animals began responding to alternative plans. She started by declaring that, at least according to ordinary human observers, the behaviour of the amoeba in the primeval soup was not sophisticated enough to constitute evidence of planned activity. The amoeba simply drifted around at the mercy of the elements and absorbed food "automatically".

But did this conclusion apply later on, after the organism evolved to the point of developing fins? The latter gave it "agency", or control over its position, allowing it to decide to go either towards or away from food. Was such behaviour now sufficiently sophisticated to merit the label of planning?

She eventually answered "No" to this question also. The organism simply moved towards food sources "blindly", being guided by magnetic fields, convection currents or chains of chemicals. It was not exhibiting "conscious" agency. It was not aware of its environment and the alternative plans available within it. The chemical chains might have forced its fins to start moving, yet it did not consciously "know" this, except instinctively.

Tina believed that consciousness was a necessary prerequisite for planning, and so she eventually realized that she would have to explore the essential nature of consciousness itself if ever she was going to truly understand what planning is. Tina was certainly now quite the philosopher.

Indeed, she had by now scaled back her triathlon training in favour of spending more time in coffee shops and bars where she could speculate with others about intellectual matters. She took to wearing more unconventional clothes, often black, and her whole persona took on a more alternate and less wholesome flavour. She

was still the same Tina underneath, but her outward appearance had become more like that of an older and wiser seeker of fundamental truths.

## 2.5 Consciousness

In her search for the nature of consciousness Tina was helped by Damasio's (1999) argument that it comes in three levels:

1. "proto self",
2. "core self", and
3. "autobiographical self".

Proto self-consciousness exists whenever a collection of neural circuits, representing the state of the organism, is present. This very rudimentary form of consciousness actually exists within collections of animals, such as ant colonies and bee hives. Although individual animals work on the basis of just a few rules, their collective behaviour seems to have an adaptive capacity that looks very much like sophisticated planning.

For example, whenever an ant colony is damaged, the ants marshal to defend and rebuild it. Whenever a source of nectar is located, a bee hive immediately re-organizes itself to re-assemble at the site, and whenever danger threatens, or food is seen, a flock of birds just seems to know what action to take.

But Tina did not think that such subtle behaviour constituted planning either. Individual ants, bees and birds act in an instinctive and stylized fashion, so how could one ever say that the individuals, or even the collective as a whole, planned? Moreover, the colony's automatic actions sometimes fail to cope with unexpected events because the colony has no contingency plan.

By contrast, an intelligent bear knows how to eat the honey from a bee hive even when it is in danger of being attacked by the bees—it knows that it can adopt the contingency plan of diving into a river, or whatever. Likewise, a fox who sets a trap for its quarry knows that if the latter runs off in an unexpected direction s/he will need to have blocked the various other exits beforehand.

In other words, the difference between ant colonies and large animals might pivot on the latter's ability to self-simulate—intelligent animals not only understand the external environment but they also see themselves as part of it. This is part of Damasio's "core self" consciousness. Animals are able to see the environment, themselves within it and where their prey is likely to go. Tina concluded that core self-consciousness must be a prerequisite for planning, but do animals with core self-consciousness really exhibit genuine plan preferences?

She thought not, because such animals' behaviour still lacks a specific, key ingredient—memory. One can hardly plan if one cannot remember what happened the last time a similar plan was implemented. So although we might convince ourselves that a bear remembers how jumping into a river averts the bees' attack,

such behaviour might still be instinctive. If the animal cannot actually remember past occasions, then it cannot be said to have made conscious, contingency plans.

Granted, whenever a dog rejects strangers but recognizes someone from its own household, or whenever a homing pigeon finds its way back to its cage or whenever a chimpanzee recalls symbols to converse in sign language, these animals seem to be remembering. But perhaps such recall is based upon signals they receive rather than some kind of articulated, conscious memory. We will never know, because such animals cannot tell us.

This brought Tina back to her housemate's qualitative versus quantitative distinction and, together on several occasions, they traced its implications over several cups of coffee. The housemate did not actually have a lot of time for Tina's quest for accurate plan-score forecasting in particular, or for quantitative social science in general. She was more of a devotee of Konner's book, *The tangled wing* (2002).

This wonderful book argues strongly that people's deepest motivations are far less often discovered by social scientists than they are by poets, artists and dramatists. The latter have a far more penetrative understanding of the human condition. In fact, it is often the hubris of social science-based planning which causes a new plan to be announced with considerable fanfare and political spin, only to then fail because it failed to predicate itself upon a deep understanding of human behaviour.

Yet the housemate quietly encouraged Tina to think this out for and in an effort to do so she read people like Sheldrake (2012) who argues that social science might be trapped into a hardened but false view of reality, one in which abstract things, like consciousness and "vitalism", are assumed away. Indeed, such a proposition appears to be at least partially supported by recent breakthroughs in quantum mechanics.

Cautiously, therefore, Tina eventually stated that she felt plan-scoring only occurred once organisms were sufficiently sophisticated to have memories and some means of articulating them. In other words, truly conscious planning only appeared once life on earth had evolved to a level that enabled communication of memories—Damasio's "autobiographical self" consciousness.

Once organisms verbalized their memories of the past, and their predictions for the future, they attained a form of extended consciousness that incorporates an ability to generate a sense of individual perspective, ownership and agency over a large compass of knowledge. And since it is only humans who can talk in a sophisticated enough way to articulate memories and forecasts, humans are the only species that can actually make genuine plans. Animals may seem to do this, but without an ability to describe their actions, in terms of what they remember about past experiences and what they envisage for the future, we can never be sure.

For instance, a pack of hyenas that corners and eats its prey has probably not undertaken any serious planning. The animals have cooperated and communicated with one another, using howls and grunts, to make sure that their quarry remains effectively surrounded, but such behaviour does not necessarily constitute sophisticated decision-making. The latter is only achieved once communication reaches a qualitative level of subtlety that allows discussion of various past experiences

resulting from previously attempted plans. Such discussion enables contingencies to be put into place for neutralizing the effect of unanticipated events.

So at last Tina had satisfied herself that true planning only appeared on this planet once humans could communicate with one another sufficiently well to hunt cooperatively. They could articulate and discuss alternatives, such as who would dig a pit, who would cover it with branches and who would drive the animals in the direction of the cliff. Planning's time came once humans walked the earth in cooperating, communicating groups. Planning was needed for defence against threats emanating from a hostile and complicated environment.

So by the end of her student days, Tina had certainly broadened her outlook. She now had a deep understanding of people's basic needs, hopes and fears, and she appreciated how their plans can be distorted by both shady experts and their own prejudices. Her hard-won appreciation of how planning emerged on this planet only after people could memorise and articulate their past experiences within a mental model of which they themselves were a part, would one day be put to good use. Right now, however, such insights did not enable her to accurately predict people's plan scores, but Tina's generalized anticipation of how people will probably respond to different plans was already quite impressive.

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Norman had been very fortunate in the school he attended. It had made him a strong and curious student with big-picture perceptions, and he was eventually rewarded with a government scholarship to study anything he wanted at the central university in the national capital. He demurred from studying medicine for reasons which he was fairly guarded about, and he rejected law because he was more interested in getting along with people than in mediating their disputes. So he enrolled for engineering plus a diploma of management. This brought great joy of his father William, even though it would ultimately transpire that Norman's training would be unlike that of most other engineers.

On moving to the capital Norman at first pined for his village and family, but he soon realized that his stipend was sufficient for him to greatly enjoy life in the big city. He moved into a beautiful student hall of residence located right in the middle of the university campus, which in turn was located in the best part of the city and resplendent with trees, gardens, lakes and security guards. It seemed light years away from his childhood, and it all came as quite a culture shock. But this did not stop him from throwing himself into a whirl of activities.

Nevertheless, he was disciplined enough to keep his extracurricular activities well under control and so, once again, he became a solidly performing student. In college he had access to extra library facilities and to an expert tutor who complemented his mostly talented class teachers, and so his formal education was absolutely top rate. He was well fed, comfortable and always happiest when socializing with his friends from the university badminton club, of which he became the honorary treasurer.

The result was that although he sometimes spent too much time playing cards, Norman learned quite a lot during his tertiary education. This was particularly so when it came to his extracurricular quest for improved plan-score forecasting. The



latter fascinated him more and more. It now seemed that he was having experiences, both within the classroom and out of it, which threw light upon this exciting subject.

Knowledge of it seemed to boost his ability to see people for what they really are. It was a good preparation for living life with aplomb, based as it was upon insightful knowledge of how people and their societies work. Having always been interested in the way things hang together, forecasting people's plan scores seemed like a good way to bring focus to his understanding of the world. He resolved to continue his exploration of plan prediction in order to maximise his chances of success and happiness.

## 2.6 Extensions

In fact, this became very clear to him when it came to handing in his class assignments. Norman's rather full life meant that he frequently ran out of time to complete his written work and so he often found himself venturing down the linoleum corridors of different university buildings in search of some teacher with whom he would plead for a time extension. And because he was a polite and well-presented boy of considerable charm, he became quite adept at this—he was frequently granted even more time to finish than he asked for, especially if the teacher was older and/or female. At first he thought this was all quite funny, but he eventually reconsidered.

His department's rule was that students had to arrange a meeting with their lecturer in order to argue their case, after which the lecturer would decide whether or not the student's circumstances were accidental and serious enough to warrant an extension. Yet in practice, lecturers almost always granted an extension, no matter how fanciful an excuse the student came up with—a disastrous fire in their wastepaper basket, their cat destroying a computer device, the recent death of both their grandmothers (again) and so on.

So there were many extensions, extensions of extensions, or even extensions of extended extensions, and these tended to delay the administration of subjects, sometimes to the point where students failed to graduate on schedule and so missed out either on job offers or the chance to win a scholarship to complete a higher degree.

Moreover, some students received long extensions which were, of course, grossly unfair to those who had actually worked hard in order to finish their assignment on time. There was considerable resentment amongst classmates about the favoured treatment which some, like Norman, were receiving. Inconsistency and confusion, as well as student and administrator frustration, were rampant.

The whole situation was so corrosive and harmful that Norman was not really surprised when he found himself telling a young tutor about an eminently more satisfactory system for handling extensions. It had smoothly operated for many

years within one of his friend's department, and it involved giving all assignments a publicized due date as well as a clear stipulation that, while assignments would be accepted for up to 2 weeks after this due date, no work would ever be accepted after that.

The result, of course, was that students hardly ever submitted by the due date. After all, everyone is human, and some students are more human than others. Nevertheless, from the very first day after the official hand-in date, all students increasingly felt that there was some sort of clock ticking down which, of course, there was. As each subsequent day passed they became more and more anxious that they might not finish by the final hand-in date.

This made virtually every student more and more determined to submit their assignment before the 2 week period of grace had expired, and almost everybody managed it. Students knew that the only way they could get away with submitting work after this (extended) deadline was to obtain a doctor's certificate saying that they had been incapacitated for 2 weeks or more, and getting a doctor to write such a certificate would be very difficult unless they had been extremely unwell.

Accordingly, life was made much easier for lecturers because they no longer needed to meet with students to discuss extensions. Also, since almost no extensions were ever granted, there was no class resentment about the unequal treatment of different students. Here was a genuinely creative plan which quickly and effectively solved a pressing problem.

Nevertheless, when Norman's low-status tutor suggested, at the next staff meeting, that this system ought to be adopted in order to clear up the current mess, he could not even find a seconder. Undaunted, he suggested it again at two subsequent staff meetings, only to be rebuffed two more times. This was despite him never hearing a good reason why nobody preferred his excellent plan; the only response he ever got was that his proposal was "too slick". There seemed to be fierce resentment towards any plan that was so glib; there was a deep suspicion of "quick fix" solutions.

So the tutor, who was not all that much older than Norman and who was something of a friend, eventually related all this back to Norman, who in turn explained how his uncle had held a high-tech job in an American communications company and had encountered a similar attitude during the 1990s. This attitude was known as the NIH (Not Invented Here) syndrome. If any idea had not originated within the firm, it was regarded as an inferior one.

Likewise, teachers in Norman's department seemed to have disdain for any system that was already up and running within a rival department. The proposed extensions-granting system simply had to be deficient because it had been fashioned somewhere else, even though all evidence suggested it was an excellent system. But while he thought this explanation was plausible, Norman felt that rejection of the plan also stemmed from far deeper needs and motivations.

First, some lecturers never wanted to change anything about the current, gloriously chaotic, extensions-granting system. It had always generated considerable raw material for enjoyable gossip and comparisons at the lunch table. Like anyone else, lecturers enjoy being entertained, and tales of tortuous and amusing encounters

with students fitted the bill. It trumped any desire that the staff might have had for a more efficient and streamlined existence.

Second, some lecturers actually made their class complete an assignment each week, and they then used such assignments as raw material for discussion during the following week's lecture. Therefore, granting everyone a blanket extension of 2 weeks would deprive the teacher of his/his raw material for the first three weeks of semester—the lecturer would actually have to teach from their own material rather than simply respond to students' work; and they could never accept this. They were that lazy.

Third, people like to be in a position of power, and lecturers are no exception. Meeting a student to discuss their application for an extension placed the teacher in a dominant position, and so it followed that implementing any "automatic" extensions-granting system, one which did not even require meetings with students, was the last plan that they preferred. They would rather retain the current entrenched importance of both themselves and their role.

This set Norman thinking more generally about the planning undertaken by those in authority. He suspected that the plans they preferred might quite often be vastly inferior to the plans preferred by the greater majority of people. Leaders' favourite plans would sometimes be based upon deep and dark personal motivations that they would be reluctant to highlight, even to each other. Again, Norman concluded that plan-score forecasting is not as straight forward as he had hitherto believed.

## 2.7 Traffic

Such a belief was further reinforced when, over the first several weeks of his first university holidays, he took a temporary job in the capital city. Although the position was at the government's under-funded, transport-planning authority, Norman was ecstatic. Here was his chance not only to make some money for the first time in his life, but also to see how government bureaucracy in the national capital operated. He would be able to test whether or not any of his intuitive knowledge of plan-score forecasting was of any real-world relevance.

So every morning he would travel to the authority's office block, which was in the middle of downtown, opposite a large and peaceful park where he enjoyed eating his lunch. He felt like a genuine commuter even though he knew that he was only a student vacation worker. He was determined to learn as much as he could by watching and absorbing government methodologies, and he was able to do this with little effort because he had been assigned to the somewhat laid back, research department.

"We need to find out the attitudes of the residents living along Albert Parade", said his supervisor, referring to a particular inner-city main road which had just undergone rapid change. A massive, internationally financed, tolled freeway, one that had scant regard for the city's social fabric, had recently opened and was now

funneling huge amounts of traffic into Albert Parade. So the transport-planning authorities were anxious to find out whether or not the local residents were suffering any ill effects from all this extra traffic, and Norman was assigned to do some of the leg work.

His job, at least initially, was to knock on residents' front doors and administer a questionnaire. Respondents were asked to answer some 60 questions about both themselves and their attitudes towards living in their area (Wyatt 1984). Crucially, the interviewers never mentioned the traffic problem unless the respondents themselves first raised the issue. Nevertheless, because traffic problems loomed so largely within the local psyche, most householders did in fact raise the traffic issue quite early on.

Each day about 40,000 vehicles were now rumbling along their street, many of them trucks, and since nearly all dwellings were Victorian-era, terrace houses which were built close to the footpath, this traffic was constantly spewing out noise, dust, pollution, vibration and danger just a few metres from people's front windows, most of which were not double glazed. Moreover, their backyards tended to be small, making it difficult to escape both the noise and the pollution swirling out in front of their houses.

To ensure academic credibility for this research's results, Norman's supervisor used a wide variety of methods to analyse the data that was eventually generated from the approximately 60 questionnaires, and the results were startling—the pivotal question, the one that best determined whether any respondent's attitude towards their environment would be positive or negative, turned out to be “length of residence”.

Specifically, if someone had lived in Albert Parade for <5 years they tended to be very disillusioned and intent upon moving out very soon. By contrast, if they had lived there for 5–10 years, then they were often active in the citizens' action and anti-freeway pressure groups' attempts to clean up their neighbourhood which they intended to stay in for now. Finally, if they had lived in their house for 10 years or more they simply asked, “What traffic problem?” That is, long-term residents said that they loved living where they did and they would never move anywhere else. This was despite the fact that they were enduring a traffic-choked environment everyday of their lives.

Norman's supervisor, a decent man with a well-developed social conscience, immediately worried that his bosses might seize upon this result by saying their research proved that people had actually adapted to large volumes of heavy traffic rumbling past front doors. The inevitable outcome, of course, would be to legitimize additional and unfair freeway building elsewhere in the city.

But on a visit home to see his family Norman was told by his sister—the one who had studied psychology, that there were other, possibly more plausible explanations for why residents of ten or more years would say that they loved their environment. First, it is well known that knocking on people's front doors and asking them to tick the boxes of a questionnaire sometimes intimidates respondents to the point where they simply give the answers that they think the interviewer

wants to hear. So questionnaire results should always be taken with a rather large pinch of salt.

Second, this research had been conducted after the freeway had already been opened. This meant that those who could afford to move out would probably have already done so, leaving behind only those residents whose personal circumstances made them unable to escape living with traffic. The latter then justified their inability to move by telling interviewers that there was nothing wrong with their environment.

Whichever, this whole experience left Norman with a mistrust of questionnaire surveys as an instrument for knowing people's true feelings and plans. He began to believe, in fact, that much social science which has been based upon traditional, questionnaire-based methodologies might actually be flawed. Despite the best efforts of glib questionnaires, people's deep-seated preferences and attitudes often remain undiscovered. It followed that forecasting people's plan scores using questionnaires might be dangerously misleading, and so Norman felt that in order to really get inside people's heads, something else will always be needed.

## 2.8 Goals-Achievement Matrix

"What's this?", he wondered one morning when he looked at a document that someone had slipped under his door during the night. The previous evening, spent at a public-speaking forum held in his college's recreation room, had been a heavy one. He had forcefully made known many of his viewpoints to all and sundry, and the ensuing social function had been particularly raucous. Clearly, his stridency had prompted someone to slip him this document in the belief that he would strongly relate to it. And had they seen his reaction, they would certainly not have been disappointed.

It was a research paper that started off by explaining how ordinary people can evaluate alternative plans by employing a method that was originally conceived by Benjamin Franklin. You divide a sheet of paper into two columns. In the left-hand one you write down all of the good things that will result from implementing the plan, and in the right-hand column you write down all of the bad things. It then becomes easier to see whether or not a plan's good consequences will outweigh its bad effects.

The paper then went on to explain how this approach has been expanded and formalized using a method known as the "goals-achievement matrix" (Hill 1968). It divides the page into not two, but several columns, each representing a goal. Then down the left-hand side it lists all of the plans that will impact upon these goals, one plan per line. The result is a segmentation of the page into columns and rows—a matrix, and each matrix cell is assigned a number to show how well that row's plan is likely to satisfy that column's goal.

This makes it easy to evaluate each plan. One simply moves along each row and adds up all of its goal-achievement scores. If this is done for all plans, the one

achieving the highest row sum is obviously the best one; it is the plan that will probably be most preferred.

Norman straight away realized that this goals-achievement matrix method is generic. It can be applied to any problem which can be expressed in terms of goals and plans/entities to achieve them. For example, a banker might use the rows to represent businesses which have applied for a loan, and the columns might represent desirable business goals such as efficiency, assets and cash flow. The numbers in the matrix's cells, which show how well each business (the row) scores for each of the desirable goals (the columns), are then summed to generate an overall score that reflects each business' suitability for being granted a loan.

Similarly, a human resources specialist might use the rows to represent potential employees, with columns representing desirable attributes like punctuality, presentation, competence and friendliness. The row sums will then represent the theoretical probability that each person will have a successful career in the company.

Alternatively, the matrix could be used by educationalists to assess scholarship applicants (rows) by entering the grades they earned for the different subjects taken in their qualifying degrees (columns), with row sums representing their prospects of academic success at graduate school. Also, a medical diagnostician might use each row to represent a disease and each column to represent a relevant symptom, and so the row sums will show how strongly the symptoms point to that patient having caught that row's disease.

Reading further, Norman found that by acknowledging how some goals (columns) are probably more important than others, this method can be made even more useful. If before the row sums are calculated each cell in a column is multiplied by that column's importance weighting, the row sums should be more accurate. They will not now be row sums at all; they will be weighted row sums.

For instance, in the above human resources example, competence might be a more important criterion for job success than say, friendliness, and so one might multiply scores for competence by say, three, and scores for friendliness by say, one. This would generate more carefully weighted, and presumably more accurate row sums.

This really appealed to Norman. Here was a plausible method for evaluating plans to see which ones might be more preferable. It was heavily information-based but simple, reasonable and methodical.

Yet even he could never imagine how it could outperform acknowledged experts. After all, a goals-achievement matrix simply adds up the "score times weight" products along each row. This is surely a cruder approach than that adopted by an acknowledged expert—someone who has a far deeper knowledge of how to combine importance weights in subtle ways. It is simply a no brainer that human experts can usually generate far more accurate results than a goals-achievement matrix, right?

Wrong. The paper's author, Dawes, had searched for studies comparing the predictions of experts with estimates derived from an ordinary, usually weighted, goals-achievement matrix. In every instance, the goals-achievement matrix

outperformed the experts, except for one time only, when the matrix's and the expert's performance were equal. This is truly a remarkable result (Dawes 1986).

In other words, employing a simple goals-achievement matrix to evaluate alternative plans, credit risks, career prospects, academic potential or medical diagnoses was actually a far more accurate than asking a world-leading expert from the relevant field. Although Dawes' experts were often the best available, they almost always performed worse than the simple matrix did—incredible.

Norman read on eagerly, and he immediately found a superb example of the wonderful originality that is often found within truly innovative research. Dawes randomized the importance weights, and then he tested the matrices' performance against the experts' again. While it is true that he did not change the sign of any weight—if a score was assumed to have a negative or positive effect then positivity or negativity was retained, the weights' numerical values were randomized all the same. It was reasonable to expect, therefore, that matrices' performance levels would plummet to a point well below that of the experts. But again, and even more remarkably, the goals-achievement matrices again outperformed the experts (Dawes 1979).

This truly amazing result greatly excited Norman. Even when the matrix was played around with to the extent of randomizing its weighting of factors, it still comprehensively outperformed the renowned experts. Here was an easy-to-follow, cheap and simple method of plan-score forecasting that was demonstrably better than whatever methods were being used by the world's leading experts.

One suggested explanation is that whereas a matrix always takes everything into consideration, experts, who are only human, often forget to acknowledge those factors (columns) which they have come to regard as trivial. Human experts have a tendency to focus solely upon those criteria which they believe have a strong influence and to forget the others.

Whatever the reason, it seemed to Norman that the goals-achievement matrix's approach, using nothing more than comprehensive information and an approximate way of thinking, is a very powerful method for determining what is likely, or preferable. Consequently, he became extremely firm in his belief that whenever one has to choose between bank loan recipients, job applicants, students, medical treatments or alternative plans, one should always shun the experts and build a simple goals-achievement matrix instead.

Yet when Norman told some of his friends about this wonderful method, most of them displayed a cold and frosty attitude towards it. Indeed, some simply dismissed the goals-achievement matrix out of hand. They said it was a useless example of "psycho babble", even though Norman had explained that Dawes' research had been very rigorous.

Norman's conclusion was that some of his friends felt threatened by the goals-achievement matrix. After all, most of them would become experts themselves one day, and so they were naturally very wary of any "common" method which might outperform them in their future professional roles, especially since, by then, they would have invested many years of study and effort towards mastering their chosen field.

Sadly, such attitudes may have even damaged Dawes himself. When he became the President of the American Psychology Society at a young age he looked to be set for a brilliant career, but his impact upon his own discipline has been less than many people expected. His work has often been ignored.

Norman thought this might be because experts make large amounts of money appearing in the media as a commentator, or acting as an expert witness in a court of law, or paying oneself on the dubious grounds of being the key contributor to an overpriced, consulting contract. Experts never want to highlight that a simple goals-achievement matrix is almost invariably more accurate, not to mention much cheaper than they are.

But even potential consumers reject the goals-achievement matrix. They prefer to pay an obscenely high fee to consultants at the big end of town, even though the latter's recommendations will be demonstrably inferior. They can then argue convincingly that they possess the best advice that money can buy, and so everyone's life will be far easier if this fact is simply accepted forthwith. The fact that such advice is inferior seems to be beside the point.

Two caveats are in order. First, in his youthful enthusiasm Norman had glossed over how, in very complicated problem domains, no method performs very well. Goals-achievement matrices may comprehensively outperform experts, but their results are usually quite inaccurate. Since the state of the art is not up to indicating what is really likely or preferable no method, even if it is clearly superior to the expert-based alternative, is going to help very much. Knowing what plan is best still seems a long way off.

Second, even if the goals-achievement matrix does better at revealing what the best plan theoretically is, many people will still opt for a more comforting, big-picture, alternative plan. To many people, intuitively holistic planning seems better than applying the tediously methodical "bean counting" processes of the goals-achievement matrix.

But Norman refused to jettison the approach. To him its simple and methodical nature had huge potential for more clearly communicating to people the logic, or otherwise that lies behind some of their plan choices. Perhaps a matrix would make them see reason and so make plan scores more predictable. In short, Norman was beginning to regard incisive communication methods as an antidote to the irrationality which underpins much planning. It would help save people from being confused, hoodwinked or both.

## 2.9 World Records

Norman had now matured into a well built young man with straight black hair and a direct gaze. He had grown in confidence since his initial days as a student, partly because he had excelled at some of the more difficult subjects that he had been obliged to take. He could still vividly remember the compulsory, first-year engineering classes in mathematics which were necessary for calculating structural



forces within buildings and machinery. But although he had found them interesting in some ways, they had all seemed rather turgid at the time.

It was not until his final years of study that he discovered other, more interesting analytical methods, many of which were in the same mould as the goals-achievement matrix. He gobbled them up eagerly, and he even became well known for championing some of them, such as the one he had discovered during his management diploma's compulsory class in inferential statistics.

This course had been designed to help students from all backgrounds better understand social science data. Lectures were delivered rather formally each Tuesday evening in a large, antique lecture theatre, but the very talented teacher still managed to move the subject away from its mathematical, theorem-proving roots and closer a more practical and applied approach to which most students related. The result was that every week most of the students would show up to happily learn about probability distributions, sampling, correlation and regression analysis.

Norman quickly realized that in many ways regression analysis is the bedrock of quantitative, social science. Whenever a theory needs testing, social scientists single out entities or individuals and represent them as points on a graph. A point's position up or down the  $y$ -axis corresponds to their score for a variable that the researcher is trying to predict, and its position along the  $x$ -axis indicates its score for that variable which is being tested as a possibly good predictor of the  $y$ -axis variable.

For example, suppose a researcher suspects that the number of Olympic medals won by any country is related to its government's expenditure on living allowances, sports academies, travel subsidies, equipment and other support for its elite athletes. His/her supposition can then be tested by having each point represent a country, with its position up the  $y$ -axis showing the number of medals that the country has won, and its position along the  $x$ -axis representing the average per capita amount its government has spent helping elite athletes.

If the points on this graph form into a straight line, or at least a band, this constitutes preliminary evidence that there is, in fact, a relationship between the two variables—gold medals won and government expenditure on subsidies. Conversely, if the points do not form into a band but take on the shape of an amorphous blob, then this indicates that there is no relationship between gold medals won and money expended.

Moreover, if the points do form into a band and the latter slopes upwards from left to right, it means that across the sample of countries taken, as expenditure increases (along the  $x$ -axis) the number of medals won also rises (up the  $y$ -axis). That is, the two variables move in tandem in the same direction, one along the  $x$ -axis and the other up the  $y$ -axis, and the regression co-efficient,  $R$ , whose details need not concern us here, actually measures how closely the two variables move in tandem.

For example, if the variables' movements are perfectly synchronous—if an increase in the supposed cause (subsidies) is always perfectly mirrored by a corresponding increase in the supposed effect (medals), then the  $R$  value will take on its maximum possible value of 1.0. By contrast, if the variables do not move in

tandem at all, then the  $R$  value will be 0.0 (indicating that the points on the graph have formed into a blob rather than into a band).

Usually, a value of around 0.7 or higher is regarded as evidence that the two variables are roughly moving in tandem and so might be related. An  $R$ -score lower than this suggests there is no close relationship between the supposed causal variable (subsidies) and the predicted, dependent variable (medals). So when researchers find that their data generates an  $R$ -score of 0.7 or more, they often become very excited.

For instance, when one graphs say, mice, with the  $x$ -axis showing how much of a certain drug they have ingested and the  $y$ -axis showing the number of symptoms they have, and if the points on the graph are in a band which slopes downwards, one can conclude that there might be a relationship between increasing the drug dose and decreasing the symptoms. Hence it would seem wise to conduct further testing of this drug in order to find out exactly why it decreases symptoms. If, on the other hand, the  $R$  value is low, then it is probably not worth testing this drug any further.

Yet Norman's college tutor constantly warned his students that they should never use regression analysis to jump to premature conclusions. One should never assume that a high  $R$  value always indicates causation. For example, just because the number of medals won moves in tandem with subsidies, this does not necessarily prove that subsidies actually cause medals to be won.

The real situation might be that medals and subsidies are the result of a third factor, say, national wealth, which simultaneously causes many things, such as sports facilities throughout schools, well-nourished athletes and opportunities for travel to elite competitions. So although subsidies and medals rise in tandem, they are not causally related to one another except in the sense that they have both been generated by the same phenomenon—national prosperity. The  $x$ -axis variable (subsidies) did not directly cause the  $y$ -axis variable (medals).

Warming to his theme, the tutor then went on to relate some celebrated examples of how regression relationships have prompted erroneous conclusions. For instance, someone once showed that a relationship exists, with a high  $R$  value, between the number of migrating storks flying south out of Sweden in the autumn and the number of babies born in London during the same period. Despite the old wives' tale about babies suddenly appearing in the chimney courtesy of a visiting stork, it would be a mistake to assume that the first variable (storks migrating) caused the second (babies born). What has really happened is that both events have been simultaneously driven by a third factor, such as the season, and the impression that one caused the other is simply a mirage.

In the same vein, a strong relationship was once found between the number of young priests assigned to a parish and the number of unmarried mothers there. To assume that the first caused the second would be to tarnish a whole group of young men with an unfair reputation. Obviously, a third factor had caused both variables, something like poverty—more priests are assigned to poorer areas, and in poorer areas there are more unmarried mothers.

Because he was fond of using sporting examples, like the one about the possible relationship between subsidies and Olympic medals, Norman suspected that his

teacher may have once been an athlete himself. And since Norman himself had only ever participated in a very narrow range of sports, he was somewhat bemused. In fact, he had never understood what it was that drove some of his friends to compete in endurance events like road cycling and distance running. These were painful activities, as he discovered once when a brutal coach had made members of the badminton squad run fast and over long distances, as part of their pre-season training. Accordingly, Norman secretly admired those runners who voluntarily push themselves to their physical limits.

Moreover, he realized that the ultimate achievement for such odd balls is to run a world record—to cover a measured distance faster than anyone else ever has. It places them at the evolutionary, cutting edge of humankind's physical capabilities. The history of world records actually chronicles our physical progress.

Indeed, Norman became very curious about such records after he listened to his teacher talk about the regression-based work of two Canadian sports physiologists, Edwards and Hopkins (1979). These researchers plotted the progress in world records for each men's and women's Olympic running event, with each point on their graphs representing the breaking of a world record. That is, any record's distance up the  $y$ -axis showed the time that the record breaker took to cover that distance, and its position along the  $x$ -axis corresponded to the year in which the record had been set.

If such points formed some kind of band, this would indicate that there is a relationship between historical time and quality of world records, and of course the points actually did form into a downwards-sloping band. This confirmed what everyone already knows: as the date moves forward, the time taken by the world's fastest human to run a set distance decreases.

Everyone also knows that the band curves towards a shallower slope as the world record approaches some finite limit to human capability. For instance, if the time taken to run 1500 m by the world's fastest human is currently around three and a half minutes, then surely a time of two and a half minutes in the future is unlikely, and 1 min for this distance must be impossible. That is, downwards progress in world record times must be starting to level off.

But again, everyone is wrong. Edwards and Hopkins calculated the straight line  $R$  values for their graphs, and all were above 0.9. This means that in every event, the progression of the world record has not curved towards some notional limit at all. It always has, and continues to progress straight down. There is not a shred of evidence to suggest that the rate of improvement in humans' maximum speed is decreasing. There are no limits to human performance in sight.

Norman's teacher pointed out that many people refuse to believe this. It seems so counter intuitive. After all, running 1500 m in 1 min requires an average speed of 90 km/h, and since our current best sprinters run at about 38 km/h, running the longer distance at such phenomenal speed would seem to be impossible. Yet the only evidence we have about trends are Edwards and Hopkins' charts, and these indicate, unequivocally, that improvement is linear, and Edwards and Hopkins commented as follows:

These findings will be disturbing for many people, but if they are unable to accommodate the conclusions derived from the objective evidence, then that is their problem rather than ours. (p. 36)

Norman's lecturer would not let the story end here. He suggested that it is very interesting to observe how steeply each band of points, for each event, slopes downwards. "How fast is the rate of improvement in each event?", he asked, and he then answered his own question by pointing out that Edwards and Hopkins discovered, perhaps predictably, that the longer an event is, the steeper is its rate of improvement. The slope of the band of points is shallowest for the 100 m, it is steeper for the 200 m, steeper still for the 400 m and steepest of all for the marathon. The 100 m runners are improving much more slowly than marathon runners are.

"More interesting still", enthused the teacher, "is what happens to any downward-sloping, linear band of points. That's right, they eventually intersect with the  $x$ -axis; where  $y$ -axis scores show that the time being taken to cover the distance is zero". The world record holder will be running at the speed of light. In other words, if current trends continue, then at some point in the future running races will take no time at all.

Edwards and Hopkins even coined a word for this point, the Zero Intercept Point (ZIP), and by projecting each event's band of points further into the future they were able to calculate when ZIP will be reached in each event. Because the slope for their improvement is steepest, the marathon runners will reach ZIP first, in about 2200, <200 years from now, whereas the 100 m runners will take until around 2800 to achieve the same speed.

This was becoming too much for some of Norman's usually quiet but now vociferous classmates. Even though they were impeccably polite, they could not hold back from triumphantly telling the teacher that he was being illogical. "If the marathon runners are running at the speed of light, then they must, along the way, have run 100 m, and all of the other distances, at faster than the speed of light", they said, "and this falsifies the statement that 100-m sprinters will take longer than the marathoners to reach the speed of light".

The teacher played along with this. He fell back into his chair and pretended to be shocked by his class' uncharacteristic outburst. But silence returned when he responded. "You have just provided", said the teacher carefully, "a prime example of a notion being rejected simply because it does not conform to current ways of thinking".

He pointed out that everyone was obviously conceiving the activity of running in the time honoured way—the act of putting one foot in front of the other as fast as one can, even though such an assumption cannot possibly be true. At only half the speeds being discussed here, traditional running will be out of the question—the runners would go into orbit around the earth. Worse, relativity theory might even suggest that they would disappear down small cracks in the track which, at such speeds could become gaping chasms.

Clearly then, our projections of records in the future are not referring to the activity of running as we currently know it. To achieve such world records we will need a different method of locomotion—such as body transfer. The starter would fire their gun and the athletes would then transfer their bodies somewhere further along the track, or to the finish line if they are “running” at the speed of light.

And here’s the thing. If we accept the possibility of body transfer, then the regression-based predictions are no longer illogical. Everyone knows that marathon runners train harder than 100 m runners, and so it is plausible that they might be able to attain sufficient mental strength to achieve body transfer before the sprinters do. Hence the 100 m sprinters could be the last athletes to reach ZIP.

If this happens, athletic training will become a matter of training the mind rather than the body. Indeed, some present-day coaches have been saying for some time that fast running is as much a mental as it is a physical skill, as demonstrated by the fact that although some world record holders seem less physically endowed than their predecessors, they still run faster.

Edwards and Hopkins speculated even further. For example, by projecting their bands of points backwards they concluded that long ago the “world record” was so slow that humankind was almost immobile. Remember the organisms floating around in the primeval soup? They also speculated about what happens after improvement extends beyond the speed of light, and they remarked that phrases to describe such a situation have already entered our language, for example “the race was over before it started”.

Although some of the class then returned to shouting down the lecturer, inferring that his ideas were wild, loopy and quite ridiculous, the essential lesson was not lost on Norman. He was fascinated how Edwards and Hopkins had used a simple, analytical technique—regression analysis, to make us to think about something that we would not have otherwise thought of—mental strength and body transfer. He realized that even the humblest, analytical method can sometimes prompt truly original thinking. Regardless of whether or not Edwards and Hopkins’ insights are true, most would agree that our imagination and awareness has been extended as a result of their analysis.

Consequently, Norman told many his friends about the Edwards and Hopkins article, but he found that many were sceptical towards the initial finding that progress in world records shows no evidence of decelerating. Almost everyone wanted to retain their intuition that world records are approaching a finite limit, and they held onto this belief even after Norman pointed out that the only data we have is as described above, and this data shows that there is absolutely no evidence that some limit to improvement is being approached by the world’s fastest humans.

People would insist that this linear-shaped progress must be temporary, because of advances in nutrition, equipment and drugs. “But”, repeated Norman, “the trend has always been linear since we began timing runners, and it remains so even though such influents have now been around for some time”. He maintained, therefore, that the existence or otherwise of some ultimate limit to human capability should at least be regarded as an open question. To assume that limits exist, even

though the only evidence we have suggests that they do not exist, sounded like witchcraft to him.

To be fair, some sceptics did point out that Edwards and Hopkins' analysis is only based upon around a 100 years of record keeping, and so making projections as far out as 2800 is a little like predicting the sales of toothpaste in several years time based upon only 6 days of market research now. Norman had to concede that this was a reasonable argument. Yet it still followed that any deceleration of the linear improvement trend cannot, and should not be simply assumed to exist. We have no evidence for it, so why assume it?

So like Tina, Norman came to realize that people are often very reluctant to accept a fact which is incompatible with their prejudices, even though its very existence is made demonstrably clear using simple methods like linear regression analysis. Norman realized that all of us, sometimes, reject some plan that is demonstrably superior simply because it seems bizarre according to our preconceptions, just like Tina had seen how some people fail to accept that crime control might be achievable through what, to them is abhorrent legalized abortion.

This need to feel comfortable with our plan choices runs deep within us all. It follows, therefore, that our plans will only become consistent and predictable if we have clearer communication methods to demonstrate the error of our ways.

## 2.10 Schizophrenia

Such insights into people's sometimes less-than-rational planning changed Norman a little. He was still a polite young man but he could not resist capitalizing on his perceptiveness in a slightly mischievous way. He became quite well known around university colleges for his willingness to publically demolish "sacred cow" beliefs, or at least the ones that were based upon unfounded prejudices.

The result was that in the debating contests held in his college's refectory after dinner on Friday evenings, he frequently drew a large crowd, not because he was the funniest and most entertaining speaker, but because he was always impeccably prepared and capable of sharing some remarkable insights. His fame, albeit in his particularly small pond, further boosted his quiet self-confidence.

And his insights were further enhanced when he studied Geographic Information Systems (GIS), a subject which was, happily, part of both his engineering degree and his diploma of management. Engineering required it because manipulation of spatial layouts is important for civil and structural engineers, and management studies prescribed it because GIS is a powerful tool in the hands of commercial marketeers.

It was in this subject that Norman first became aware of the huge analytical power of maps (INT6; INT7; INT8) In particular, he was very impressed by the ability of one particular map-based study to overturn traditional thinking regarding the mental illness known as schizophrenia. This terrible disease had particular relevance to Norman because he realized that it usually first surfaces in people of

about his own age, around 21, apparently because of brain damage inflicted two decades earlier while the victim was still a baby in their mother's womb.

Moreover, it had been found that such damage is more common in the babies of mothers who have been exposed to influenza during the third trimester of their pregnancy—the so-called “flu hypothesis”. This states that for babies born in the northern hemisphere during March or April, because their mother carried them through the depths of a sickness-laden winter during her third trimester, schizophrenia is more likely to emerge. Put differently, if mothers are exposed to the influenza virus during their third trimester, they are more likely to give birth to babies who will be afflicted with schizophrenia.

Yet despite this hypothesis having been part of medicine's conventional wisdom for over 30 years, Norman read how some simple mapping had made McGrath (1999) suspicious of its validity. Certain aspects of the hypothesis, and its apparent back-up evidence, worried him.

Firstly, in the southern hemisphere the flu hypothesis was sometimes confirmed and sometimes confounded. In fact, in places like the Australian state of Queensland, the spring spike in schizophrenic births tends to come and go on a 7-year cycle.

Secondly, McGrath was puzzled by the finding that babies born to dark-skinned, immigrant mothers in places like Scandinavia had very much higher incidence of schizophrenia, even though there was no evidence to suggest that these mothers were any more prone to influenza than anyone else was.

McGrath mulled things over for a very long time. He idly inspected maps of the incidence of schizophrenia around the world, and then he saw it—latitude. The higher the latitude, the greater was the incidence of schizophrenic births. Perhaps there is more influenza at higher latitudes, but this is doubtful, and so McGrath suspected something else was at play.

Moreover, as a medico he knew that for mothers to produce vitamin D, which is essential for the development of a healthy brain in the foetus, the sun needs to shine upon their skin. So an absence of sunlight at high latitudes might be a cause of schizophrenia in higher latitudes.

Accordingly, he hypothesized that the spring spike in schizophrenic births is not due to babies' mothers having influenza at all. It is due to the shortage of sunshine falling on their skin during high-latitude, northern hemisphere countries' cold and cloudy winter months. By contrast, in the southern hemisphere, where very few people live at high latitudes because the world is mostly water there; most mothers live closer to the equator where the winters are much sunnier. Moreover, because air pollution is less marked in the southern hemisphere mothers can often live through winters and still receive adequate sunshine.

Also, the El Nino effect in the Pacific causes ocean temperatures to fluctuate, making some southern hemisphere winters so rainy and cloudy that ultraviolet rays are soaked up like a sponge, whereas every 7 years or so the winters are dry. This explains why the Queensland spring spike in schizophrenic births tends to come and go on a 7-year cycle.

McGrath also reasoned that since the amount of vitamin D any mother produces is influenced by the amount of pigment stored in her skin, dark-skinned mothers actually need more sunlight to produce the required quantity. This explains why West Indian mothers living in high-latitude places like Norway and Sweden are particularly deprived of vitamin D during the long northern winters, and so the incidence of schizophrenia amongst their babies is particularly high. In short, McGrath was able to overturn many decades of medical misinterpretation simply by looking carefully at maps and statistics.

He was then able to test his hypothesis because he had access to a testing laboratory. He deprived some mice of vitamin D and, sure enough, their offspring had brain structures which were similar to the brain structures of humans who were burdened with schizophrenia.

Norman did wonder what the medical profession would now do. Presumably, the traditional plan of trying to keep expectant mothers away from the influenza virus during their third trimester would now be replaced by something that dealt directly with the problem of vitamin D deficiency. But he noticed that McGrath did not recommend giving vitamin D supplements to pregnant females because the supplements can sometimes cause birth defects. So McGrath's plan was to simply have some mothers use sun lamps.

Norman remained impressed by how careful thinking, based upon little more than maps, can sometimes lead to an insight that overturns decades of accepted, conventional wisdom and preferred plans. He began to feel that those researchers who are willing to think outside the box in one profession, for example medicine, by embracing the analyses and insights forthcoming from another, like cartography, have a lot to offer both the world in general and plan-score forecasting in particular. By throwing light upon complicated situations, graphic communication tools such as maps could make people's plan scores more predictable.

The net effect of Norman's tertiary education, therefore, was his increased appreciation of the power of analytical and communication methods like goals-achievement matrices, regression analyses and cartography, even though he remained suspicious of some, such as social survey questionnaires. Clear methods would surely allow him to delve more deeply into his extracurricular interest of plan-score forecasting. He might even be able to use them to help mould people's plan preferences into a more evidence-based, consistent and predictable form. Norman was becoming quite an advocate for penetrative, communication techniques.

This brings us to the end of this chapter. While they had not officially enrolled to study plan-score forecasting per se, Norman and Tina had both subconsciously tailored their tertiary education to see what light the academic world could throw upon it. But Tina had become so dissatisfied with the abstract way in which academic researchers describe people's basic needs that she pined for clearer and more operational definitions of such needs. This was particularly so when she saw people's real needs being further obscured by fear-driven acceptance of commentary by over-hyped, crime experts, rather than insistence upon more productive planning by the responsible authorities.



She had also seen how people's deeply hidden hopes and fears can sometimes be further obscured when citizens are forced to embrace political correctness or even prejudice, in pursuit of a comfortable life, rather than adoption of insightful but more radical plans suggested by perceptive, applied economists like Levitt. Her ensuing eagerness to get to the bottom of humans' planning motivations had then seen her delving into the philosophy of action and agency and estimating when plan scoring first appeared on earth—a question which she had found quite confusing until she studied the evolution of human consciousness and hypothesized about the true nature of planning.

By contrast, Norman had already begun to question conventional wisdom, like Tina was now doing, when he had been at high school. But it still took his experiences with college assignment extensions before he fully realized how people's preferred plans can sometimes be almost irretrievably hidden within the deepest recesses of their psyches. His summer job had then convinced him that digging out people's preferred plans would take more than a standard questionnaire survey, and so he had made himself adept at using rather mundane and methodical, yet extremely powerful analytical methods, like the goals-achievement matrix, regression analysis and maps.

Norman and Tina also appreciated how plan evaluation can cause many subtle and hidden motivations to come into play even though it can be difficult to uncover them. And their respective attempts at such uncovering had independently led them to the same conclusion—even though people's underlying motivations might remain mysterious, there is always an underlying, meta-need for any adopted plan to seem reasonable. Whenever a plan does not seem to be based on some, or even a flawed kind of rationality, it will not usually be highly scored. The way in which they might now further develop this thinking was dependent upon their respective characteristics.

Tina was a deeper thinker than Norman, whereas he was more technically skilled, albeit far from bereft of useful insights, and some readers will see irony here. Tina's rigorously logical upbringing should have ensured that she became an analyst, but due to the gender stereotyping of their generation, which still persists to some extent even today, she was always led to believe that mathematics was not her strong suit and so she became a philosopher. Conversely Norman, the synoptic thinker, should have become a generalizing philosopher, but his male-oriented, engineering education eventually turned him into an enthusiast for detailed, analytical methods.

Perhaps that is what pursuit of more accurate plan-score forecasting does to a person—it forces one to broaden one's natural skills to boost one's overall competence. The result was that they were now both formally educated and itching to pursue their interest in plan prediction. As a professional Tina would need to exploit the depth of her philosophical insights whereas Norman was destined to make a living from his analytical and communicative skills, as outlined in the next chapter,

## 2.11 Exercises

1. More than a few plans have undoubtedly failed because they did not take account of one or some of Maslow's five basic, human needs. In about one page, describe an example of this that you know about.
2. The ability of prejudice to get in the way of good planning is well known. Describe an example of where and when this has occurred, and outline ways in which such prejudices could have been neutralized.
3. "Whether planning is a qualitative or a quantitative activity depends on whether or not it is observable". Discuss.
4. In circumstances where an implemented plan pays homage to the motivations of the planners rather than the planned for, what is an obvious solution? Carefully explain the practicalities, or otherwise, of your suggestion.
5. Use a goals-achievement matrix for deciding which career you should pursue. Do you believe the results? Why? Why not?



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