CHAPTER 1

Strategic Reasoning

"When a lady contemplating a picture in Matisse's studio said to him, 'Surely the arm of this woman is much too long', the artist replied, 'Madame you are mistaken. This is not a woman. This is a picture.'"

John Cohen

This book is about understanding individual behaviour in the business world. Rational individuals follow a pattern of behaviour. Think about your own daily routine. Patterns of behaviour can be observed through signals — we can choose either to ignore the signals or to analyse them. If we choose to analyse them, we should begin by representing the signals in a critical timeline (CTL). In the Appendix to the book, a representative set of CTLs are illustrated. Critical timelines in business, however, allow firms and their management teams to identify the patterns of rival firms — patterns that would otherwise be invisible to management. The signals also convey meaning about player type, and players in a game tend to believe what is said as long as such belief is consistent with rationality and the incentives in the game.

Take the following example: If you believe it to be true that Leo the Liar will never tell the truth, how do you respond to his helping hand as you cling for your life over the precipice of a cliff? Do you ignore his help? Do you rely instead on the many applications on your smartphone, so tightly grasped in your other hand, trying to contact your best friend to come and rescue you? Cooperation arises in this instance if you and Leo — as players in a game — can infer from past behaviour that both of you are likely to be trustworthy. Leo may forgo the short-term gain of keeping to type for the long-term benefit of your friendship. He rescues you from the cliff. You, however, will use the experience to determine whether or not to believe Leo in the future.

In business, as in any other game in life, competitors have a type. The objective of a strategist is not only to define their behaviour, but to redefine competition as a market-as-a-game. Your best friend may have influenced your belief system with **cheap talk** about Leo. However, your friend is not hanging over a cliff waiting to be rescued. Cheap talk about a player's type is non-binding, costless communication from another player. It is you, however, who must decide whether to trust Leo. The optimal choice for you — as for any player in a game — depends on what Leo as a player believes to be your strategy. Decoding strategy is about less than fully rational players signalling to each other in a time continuum. We choose strategies through a trial-and-error learning process in which we gradually discover that some strategies work better

than others. How we behave or what we do creates a pattern that is hardwired in our game DNA.

Behavioural economics is one of the most active and rapidly growing areas of research in game theory. Most non-cooperative game theory has focused on equilibrium in games, and explains the equilibrium in terms of the rules of the game, the rationality of players and the likely pay-offs accruing to each player. The assumptions are that individuals are curious by nature; we like to observe people in action, and we not only like to play games but also to win. How we cooperate, in the face of temptations to cheat, is an important field of psychological and economic research. Economic research focuses on the tit-for-tat theory of cooperation wherein rational individuals are disposed to cooperate with each other until one person cheats — at which point cooperation is withdrawn. In time, the cheater will learn the error of his ways and become a more cooperative person. While seamless coordination in the game may be the preferred outcome, a strategy of cooperation requires trust and commitment.

Pattern Hunting: Interpolation

The discussion in the book focuses not only on the actions and reactions of competitor firms, but also on the importance of management type, the role of technology in a game and time. Each makes it possible — and less difficult — to identify patterns of behaviour. The objective is to better understand competitor behaviour with a view to predicting competitor reaction. Our approach is based on the premise that individual behaviour follows a line of action and reaction, thus creating an evolving yet predictable pattern resembling a set of footprints in the sand. The footprints can be observed; the often invisible, often ignored pattern embedded within the footprints, however, is the key to successful strategic planning. As patterns become more complex and signals increase, managing them without a framework becomes more difficult — all you get is a random sequence of signals and you do not really feel in control of the pattern until you construct a critical timeline or CTL.

We work from the premise that a company's CTL is the strategy set of the company as a player in a game. By recording the sequence of

moves, it provides an insight into the game and what the player is likely to do next. Management are players in a game; they have a signature type that competitor firms need to discover in order to predict the next move in a game of action and reaction, much like in a game of chess.

A CTL facilitates visual thinking. It constructs patterns that would otherwise be invisible. As strategy continues to change in a game, it becomes imperative for management to identify and interpret the patterns created within the market-as-a-game. The pattern creates order in past signals by filtering out information that is embedded in the signals 'taking shadows from the reality of things'. This allows observers of the game to decode the strategy of the players.

The CTL is shaped by the actions and reactions in a game, as well as the signals, forming a signalling cycle converging to an equilibrium point. An analysis of the pattern can inform the fact-finder about the details of how strategy is defined. There are three key observations to note, each representing a basic part to the pattern embedded in the CTL, namely, the speed of reaction, the frequency of reactions and the magnitude of signal changes. In addition, thinking strategically requires a degree of lateral thinking. In other words, there is no yesterday, no today and no tomorrow. Instead, there is a time continuum within which the game is played and signals observed. Once a firm — through the auspices of its management team — becomes a player in the market-as-a-game, decisions create their own time so that clock time no longer guides the actions and reactions of a player.

In *The Black Swan*, Taleb (2007) commented that you can never ever predict timing and causation, but you can predict effect. Rather than extrapolate into future time, game embedded strategies (GEMS) recast the prediction problem to one of interpolation in the CTL. The signalling cycle follows probability laws, but "the probability itself propagates according to the law of causality" (Cox and Forshaw, 2011, p. 44). To use an analogy: If you observed the weather only today, then you would have no idea of what happened yesterday. Without the patterns, actions and reactions as signals are just as they superficially appear to be — a string of moves, devoid of any inner information. Strategic lateral thinking holds the key to decoding strategy.

Strategic Lateral Thinking

In the world of business and economics, decisions are made daily. They are reported in the financial press, and commentary on the financial news media channels is instantaneous. Decisions on product launches, the appointment of new chief executive officers (CEOs), and decisions on price, costs and revenues are reported on a daily basis by the financial media. The reports as well as the decisions eventually filter down into a company's performance measures. Guidance from the financial experts is defined in terms of market share movements and profitability numbers. Our premise is that, as more and more decisions are made in the context of time, the time available for making a decision diminishes with time: $dT/dt = -1$. Furthermore, more markets are increasingly characterised by smaller numbers of players whose decisions are wholly interdependent and whose observed behaviour is captured in terms of actions that can lead to a reaction. The actions are signals, and the signals are analysed not just by the financial media but also by competitors in the market. The analysis presented in this book, Framework Tn=3, offers a template with which to comment on the observed signals, a template that focuses on type, technology and time as the three pillars of game embedded strategy.

The theme of this book is strategic thinking. The objective is to decode the strategy of a competitor. This is not a book on game theory per se, nor is it a book on the microeconomics of firm behaviour; it is a book on strategy that draws upon basic arguments in both game theory and microeconomics and distills those arguments into a cohesive setting called Framework Tn=3. In defining the economics of strategy, the emphasis will be on management type, technology and time, the three supporting pillars of strategy. Competitors are increasingly in markets where interdependence has become a key parameter in determining market share and profitability. The decline in the market share of Intel can be mirrored by a corresponding increase in the market share of Advanced Micro Devices, Inc (AMD), a condition known as the zero-sum constraint. It becomes a binding constraint when the market share performance of a company reaches an upper bound imposed by the interdependent rivalry with a competitor.

A key feature of a market is that it involves both anonymous and known competitors, opponents with future interaction. Strategy now depends upon the game and the context in which the game is played. The context in which the game is played depends on management and the preferences that guide their behaviour. The behaviour that is observed depends on management type, which is signalled by a variety of real-life situations in the market. For example, if player A reduces prices and player B follows with a matching price reduction, then player B could be described as a follower type. Player A, who initiated the price reduction, may have done so to increase revenues in a certain product range. If so, player A could be described as a Baumol type. So why is type important?

In the example of Intel and AMD, the market can be described by two competing firms, and it is relatively easy for a fact finder to draw an inference on the relative movements in market share. More significantly, both Intel and AMD management are aware of the two companies' interdependence. However, in markets with more than two competing firms it is more difficult to isolate an upper bound, and more difficult to identify the competitor whose market share increase mirrors one's own decrease unless management take cognizance of type, technology and time in their strategy. Notwithstanding shifts in demand in existing markets, new products and innovation in emerging markets, more consumers at the point of sale, and increasing volumes, unless market shares are at best increasing or stable the zero-sum constraint applies. In expanding markets, for example, mobile telephony or Internet search engines, management will experience an upper bound at a point in time, and when it translates into underperformance in key financial indicators (KFIs) it may be too late for management to identify the competitor.

Observed Learning

Management decisions are influenced by a range of factors — some internal, some external. Principally, management's decision making can be located within the economics of competitor reaction in a 'what if' scenario: What if Dell entered the smartphone market? What if

Starbucks emerged as a competitor to Nestlé in the off-site instant packaged coffee market? What if Apple were to become a telecommunications company? What if a firm reduces price because a competitor firm has done so?

Strategists can look for patterns in the observed signals in order to isolate a strategy set from an evolving string of actions and reactions. Management type provides a key insight into a company's vision and an analysis of type should be a key component in the strategist's toolbox. The learning of type from the signals — referred to as **observed learning** — plays an integral part in decoding strategy. We are not referring to personality traits *per se*; whether a senior executive is aggressive with subordinates or whether a new recruit is docile with senior management can indeed have a bearing on how a company performs. However, throughout the book, type refers to observed behavioural characteristics in 'the situation' of a game of action and reaction. In the psychology literature, the historic debate on 'person-situation' argues that situational factors predict the behaviour of people much better than personality traits (Mischel, 1968). In a price war game, for example, how any one player is likely to react will depend on his player type as observed in a game.

The market-as-a-game is analogous to a situation; the game is composed of individual rational actors — the firms — who are uncertain about each other's behaviour. In seeking to optimise his own actions, each player must attempt to predict the actions of the other players in the market-as-a-game. The system evolves in a complicated way: When Player A forecasts the market strategy of Player B, it must also forecast the latter's predictions of others' forecasts including Player A, and so on. Market uncertainty exists as players do not know whether potential rivals will enter the game or how they will react on entry. Since game embedded strategy introduces a theory of learning into market equilibrium, asking and challenging why and when equilibrium arises, how we behave as individuals, what we do and how we act in a situation are all hardwired into our game DNA. When a company becomes a player in a game, or when an individual becomes a player in a game, the game dynamic envelopes their behaviour and *homo sapiens* evolve into *homo ludens*. Hofstadter (2007) best captures a player in game mode as

follows: You make decisions, take actions, receive feedback, incorporate it into your 'self', then the updated 'you' make more decisions and so forth, continuously, in a strange loop.

The Game

The competitor that poaches market share under a zero-sum constraint is referred to throughout the book as the nearest rival. Zero-sum represents the simplest game, with a long history in game theory. In the classic two-player zero-sum game, one player wins by matching the other's action and the other wins by mismatching. In these circumstances we define management as players in a game wherein the marginal value of their action increases in the level of a competitor's action. This is the Edgeworth constraint, introduced more than 100 years ago by Edgeworth (1881) as the concept of complementarity. For example, the demand for cars increases the demand for petrol; or if Pfizer spend $10 million on research and development (R&D), competitors will do likewise and spend at least $10 million. Complementarities have an important connection with strategic situations (Vives, 2005), and in Framework Tn=3 the issue facing management is whether to follow a rival action or not. Zero-sum games allow us to model business strategy in an easily understood manner. However, they have been criticised as being not very helpful as a guide to prediction or decision making, partly because "equilibrium depends on strategic thinking and not learning" (Crawford and Iriberi, 2007, p. 1731).

In Framework Tn=3, observed learning is important in the sense that management observe actions as signals, but rather than update any prior beliefs about the action, management account for the signal and think that the competitor is likely to act if they want the competitor to act and think that the competitor is less likely to react if their action signals ambiguity that they will act, having been observed in the past as keeping to type. In Table 1.1, player D observes player A's loss in market share. Player D should also think strategically to avoid a loss of 10.

Zero-sum games facilitate an understanding of how players react to the zero-sum constraint. A fact finder observes that player B's market share increases because the market share of A is falling and unless B has

Table 1.1
Entropy and Zero-Sum

	Player A	Player B	Player C	Player D
n = 4	40	30	20	10
Zero-sum	30	40	20	10
Entropy	30	35	25	10
n = 3	40	35	25	—

the capacity (Chapter 5) to match the increased demand through time the market share gain will be elusive. However, if player B increases market share through its low pricing and A follows, then A and B enter a price matching sequence of price movements that could lead to a zero-price equilibrium or player A acquires player D.

The strategic interaction of prices relegates the importance of independent pricing; hence the players are faced with the paradox of tumbling price. The strategic interaction on market shares creates entropy in a game. Apple's iPhone has increased the market for mobile phones, and within that market there is a redistribution of market shares as a direct consequence of Apple's entry.

Management realise that competitors sometimes do things — reduce price or take costs out of production — that cannot be easily modelled. In Framework Tn=3, type of management is based on a range of variables that can be observed and computed by management, allowing them an opportunity to better understand rival management behaviour. However, in the game theory literature, 'differences of opinion arise in assessing the importance of preferences in explaining economic behaviour' (Samuelson, 2005, p. 495). So the proposed framework will draw upon the management models, the traditional Baumol model and the Marris model, and a cost leadership (CL) model. Later chapters will focus on a classification of types that can be drawn from non-cooperative game theory. Although specific economic characteristics will be identified — Baumol on price, Marris on dividends, CL on costs or leader-follower in game theory — our overall objective is to present a

management framework within which management signal their type to the market.

The impact of both type and signalling on business strategy is the genesis of Framework Tn=3. Signals do convey information about type. A signal is the first derivative of type with respect to time allowing the observer of the signal to form a judgement on whether the information conveyed is true or false:

$$\text{Type} = f.(\text{Signals})$$

For example, if Baumol Inc conveys a signal in time period t and it is observed at t by Rival Inc, then Rival Inc can believe with certainty that Baumol Inc is of Baumol type and will be observed as reducing price to maximise revenues in time period t. Rival Inc can trust Baumol Inc, and trust in this particular instance becomes an assessment tool in Framework Tn=3. If they are competing for market share, then both Baumol Inc and Rival Inc are now in the market-as-a-game and they are both players in that game.

Arguably, type can be portrayed by a signal but not every signal observed portrays the truth about type. Baumol Inc can simultaneously signal a type and keep a secret. Rival Inc, a trusted competitor, will be in a preferred position if Rival Inc can read the signals from Baumol Inc and detect that secret. It is in reading the signals that an understanding of management type is crucial. Type as a value badge can therefore be described as a function of signals. If there is a correlation between type and signal, the game is one of observational learning; if not, it is a game of cheap talk.

Strategy

Management behave strategically when they come to understand that each and every decision is followed by an action that is observed by the market participants. This gives us the strategy equation S = PE + NP. It is a combination of minimising the Penrose effect (see Chapter 2) and ensuring that one has a response to any reactions to one's initial decision in a game. The latter is known as the Nash premise (NP). Under-

standing strategy is at the cusp of business acumen, and Framework Tn=3 explores the possibility that there are n = 3 supporting elements of a company's strategy set. A strategy set is a string of moves. Collectively, the three supporting elements define the strategy set, enabling a company to sustain or obtain a strategic advantage in the market. A company's ability or capability to obtain such an advantage depends on its status as a player in the market-as-a-game.

Management are in a game when they abandon independent action, thus realising that there exists interdependence within the market that directly affects performance — not only profitability but also the sustainability of its strategic advantage and its conversion into a competitive advantage. The conversion requires knowledge of rivals and an ability to identify the nearest rival, as well as knowledge of the market in which the game is played. Management teams have many tools of analysis at their disposal. The new tools on display in this book focus on observed learning in a market where individual action has to do with the probability of a likely reaction from a competitor. Framing the action — to change price, to launch a new product or to invest in more R&D — is codependent on reading the signals from competitors in the market; observing their behaviour; and observing, identifying and finding patterns in the observed data. The initial point of analysis is to ascribe a critical timeline (CTL) to the market by converting the observed actions and reactions into a metric.

When Apple Inc launched its iPhone in early 2007, did it do so in the belief that there was a gPhone about to be launched in the market? Our conceptual analysis of **type** is reminiscent of the managerial models with an emphasis on management discretion within a company. The launch of any new product is a company secret. The exact timing is the prerogative of the CEO. The degree of discretion, however, will be influenced by signals in the market-as-a-game, underpinned by reference to the capacity constraints inherent in the production **technology** of the company. Time is introduced by the very nature of the game: in a sequential game each player has the **time** to observe the actions and reactions (the moves) of the opponent.

Collectively, type, technology and time represent Framework Tn=3. If the iPhone was launched at time period t because of signals

about a gPhone, then the Apple Inc strategy can best be understood within Framework Tn=3. Likewise, in August 2009, Nokia signalled the pre-Christmas launch of a new laptop — the Booklet 3G, with both 3G and Wi-Fi capability — and Dell Inc is signalling entry into the smartphone market. Ironically, in the early 1990s there was speculation about a possible link between Dell Inc and Nokia in exploiting the complementarities in an evolving personal computer market. Strategy is about understanding the process of filtering the signals in the market. It has as much to do with avoiding a loss in market share as it has to do with gaining market share, playing to avoid losing rather than to win.

Traditional economic models, known as neoclassical profit maximisation models, are based on perfect knowledge and rational logic, aiming at maximising profit. The firm is defined as a single entity, with no separation of ownership and control, that seeks to maximise profit subject to resource and market constraints. While this has the advantage of being easy to model, it is relatively more difficult to model the importance of the decision-making process within the firm in how it affects the outcome of any decision. Conversely, the behavioural theories of Simon, for example, try to take into account that management, like any other human activity, is subject to the irrational, and is less focused on one single goal. The decision-making process allows the multiple decision makers in a firm to reach a satisfactory level of attainment towards their individual goals and involves a trade-off between each management group in their individual ambitions.

Simon (1958) introduced the notion of 'satisficing', a dilution of the absolute goal of maximising attainment given the limitation of knowledge and the degree of uncertainty that prevails on any given decision. Simon argued that "people possess limited cognitive ability and so can exercise only 'bounded rationality' when making decisions in complex, uncertain situations". This level of satisfaction is not fixed but varies depending on experience and perception of risk and uncertainty. This concept was developed by Cyert and March, who emphasise the "alternative decision logic — the logic of appropriateness, obligation, duty and rules". Thus, in most organisations, a set of standing instructions tends to dominate in most managerial decisions "rather than anticipatory, consequential choice".

Determining where the final decision rests is harder to model, as this varies from one organisation to another depending on how responsive the firm is to adjusting to their collective experience in the market-as-a-game. The outcome will also be influenced by the prevailing conditions surrounding decision making: Is it collective or individual, a sequence of choices or stand-alone, a single criterion or a collection of less-defined criteria, and how much is the inherent willingness within the management structure to obey the rules? By obeying the rules, management keep to type.

Conversely, it may be argued that this adversarial approach to decision making can promote the dysfunctional creativity that Mary Follett espoused in *Creative Experience* (1924). Decisions that have been reached through this process of collective bargaining may be seen as having a greater chance of optimising the firm's resources and therefore its profitability. However, these multiple factors could also act as a constraint in achieving profit maximisation. Leibenstein, in *Beyond Economic Man* (1976), argue that x-factors could also dictate the behaviour and efficiency of the company. Depending on the firm's history of management initiatives, this x-inefficiency can affect the firm's productivity, profitability and size.

What Is Type?

Framework Tn=3 focuses on management as individuals; and, as individuals, management can be assessed or ranked by both personality and style, attributes that are personal, subjective, easily observed but difficult to determine. Management do have a unique idiosyncratic style of leadership. But there is a further intrinsic economic characteristic more meaningful as an innate determinant of a company's performance, and that we call 'type'. Type is a behavioural characteristic, often overt and occasionally covert, an innate characteristic that companies wish to observe as a barometer of the likely future behaviour of competitors in the delivery and execution of their strategy.

It is one thing to believe or think about how another individual is more likely to behave, and in the absence of any signals, chat or communication, one has to rely on one's belief system. Alternatively,

management can observe behaviour as signals of likely action and identify patterns in the signals, as illustrated in Chapter 2.

For example, the Baumol hypothesis is about sales revenue maximisation, and one way to achieve this is to focus on price. Under normal circumstances, when price falls, consumers on average buy more and sales revenue should increase. Management can signal a Baumol type by focusing on price or by focusing on market share. Since revenue maximisation can be achieved by using price, it becomes imperative for management to understand that price not only serves to maximise total revenue, but also acts as a signal to rival competitors. Organic growth, as opposed to growth by acquisition, is a key feature of the Marris model, with its emphasis on using capital for R&D expenditure in a trade-off with less dividends today for more dividends tomorrow. Management can signal a Marris type by focusing on organic growth by signalling increased R&D expenditure.

Later we will explore types that are located in non-cooperative game theory. For example, there is a type called 'price follower', wherein the management of company A are observed as reducing price in reaction to company B's price movement. What, if anything, can the management of company B infer from the behaviour of company A? What, if anything, can they glean from additional information on type? If company A's type is signalled as a price follower type, and if that type has particular attributes, what guarantees do company B's management have that the management of company A will subscribe to them at a given point in time? In particular, would they necessarily follow company B's price lead in a game?

In the market-as-a-game, management wait and observe what happens. Because the future is not certain, the probability that reaction from rivals will follow a certain company's action will be very high in some markets, notably in the oligopoly markets, where interdependence is the norm. The value of waiting thus increases. Management that would have hithertofore acted unilaterally on a product launch (Marris type) or price change (Baumol type) may reconsider their plans. In the interim, rivals observe each other in a wait-and-see scenario. Why is the future not certain? There are many reasons advanced in the

management literature; here we focus specifically on three — type, technology and time, or Framework Tn=3.

Trade-offs

In order to understand types of management we need to understand trade-offs. An indifference relationship considers the trade-off between two variables, X and Y. Management type can be linked to a financial variable — profits, costs, value or sales revenue. For example, a Baumol type of management focuses on revenues and sales maximisation, a Marris type focuses on organic growth through product diversification, and a price follower focuses on competitive price movements. Therefore, one key determinant in understanding management type is the ability to unravel the trade-off that is implicit in the management's decision making. In other words, we need to identify a third variable, Z, about which variables X and Y are indifferent because Z remains constant over the decision-making horizon.

The family of management models, including Baumol, the early models of Williamson and indeed Marris, have two key attributes in common, attributes that park their application outside the traditional range of the microeconomic theory of the firm. First, management are not so preoccupied with profit maximisation as is the norm within the neoclassical models of the firm. There are other variables that attract the interest of management — maximising revenue, maximising the growth of the company, avoiding price wars, or indeed maximising their personal utility or satisfaction. It is the latter that gives rise to a second distinguishing characteristic of the management models — the application of indifference curve analysis to management behaviour.

Indifference Analysis

Within the neoclassical paradigm the indifference analysis is uniquely applied to understanding the behaviour of consumers: the random consumers are said to be indifferent between two baskets of fruit if their utility — the Z or third variable — does not change when choosing one basket over another. So whether the consumers have five apples

and three oranges or three apples and five oranges, their utility does not change, and thus they are declared indifferent between both baskets of fruit. An indifference relationship can be ascribed to their choice. However, we are presented with a unique application when we ascribe an indifference analysis to the behaviour of management.

We need to identify two variables around which management could be indifferent: profits and market share, or profits and annualised sales revenues. The choice of pair may be entirely subjective, as managements differ in their trade-offs across the variables. For some managements intent on lowering costs, there may be a trade-off between labour and capital expenditures, with a shift between less labour-intensive and more capital-intensive production technology, provided productivity does not change. In such a scenario, productivity takes the place of utility — a third parameter that does not change as management decide between the pairs of less L more K, and more L less K. The difficulty lies in identifying that elusive third variable, a difficulty compounded by the subjective nature of the indifference analysis. In the Marris model, however, we will identify value, market capitalisation of a company, as a candidate for the third variable, but value that is underpinned by growth.

Opportunity Cost: Our Binary Reach

One of the key concepts in understanding the motivation of individuals is the **trade-off** or indifference embedded in a binary choice. To do X or to do Y, a choice must be made and it involves a trade-off. So, doing X incurs an opportunity cost of not doing Y.

Some of you reading this book are embarking on an MBA and will spend time in a classroom setting away from family, friends and clients. Imagine it is a balmy, warm afternoon when a casual observer sees you in a classroom rather than outside enjoying the sun. You have traded being outdoors in the sun for being indoors in class. In order for the observer to rationalise what it is he observes, he would require information on your third variable, Z, to explain the observation as a trade-off between Y (being outdoors in the sun) and X (being indoors attending a class). The objective is to maximise the value of your third variable.

Alternatively, ask yourself why your cat is not likely to stick its paw in the pool. It will not get wet because it figures that it is not worth the effort needed to dry and clean itself with its tongue to enjoy something as superficial as marine life. Unless you starve your cat and stock your pool with fish, your cat is likely to remain on dry land.

In the first example of taking a class, effort such as scheduling class attendance or investing in online teaching software will be expended to minimise the opportunity cost. Likewise, in the second example of taking a dip in the pool, effort will be expended and costs incurred in stocking the pool with fish.

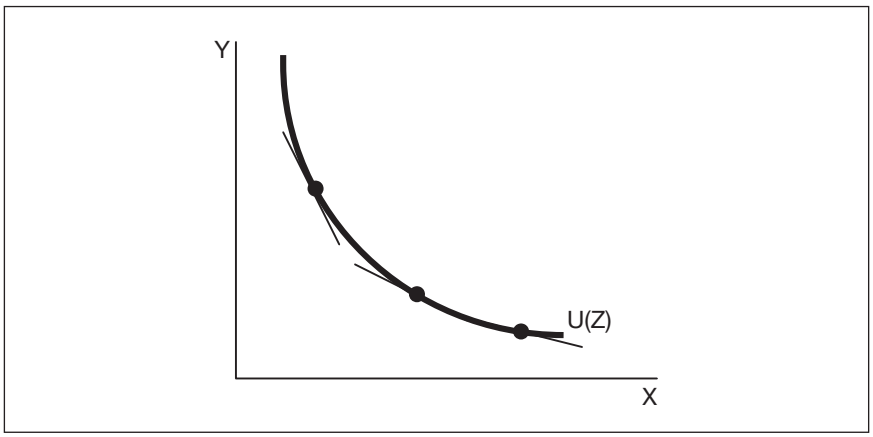
Z or Third Variable

It is in trying to identify a third variable that type becomes important in understanding management behaviour, since type can be signalled to competitors by the observed behaviour of management. As individuals we are inclined to keep to type, indicated by our behaviour as we keep to type. It is these patterns of observed behaviour that companies should be looking for in scoping the behaviour of the management of a competitor. For example, if a new CEO has a history of growing companies by acquisition, then there is a high probability that the CEO will keep to type in the new company and attempt to grow by acquisition rather than achieving organic growth.

Detecting the identity of the third variable, Z, is interesting. Remember that management are prepared to trade off Y and X only if U(Z) does not change. So what is Z? This is a guessing game between management and the investment community, shareholders and external stakeholders, including competitors. The identity of Z could provide an insight into the strategic thinking of the management, and that becomes critical in the playing of games. Figure 1.1 on the following page illustrates a managerial indifference trade-off relationship.

Often, Z is defined as market share, growth, value or costs. But generally it is camouflaged. Management do provide signals to the market, or investment commentators and analysts contribute to the guessing game by offering opinions as to the identity of Z. In the Marris model, managerial discretionary behaviour is allowed within the principal-agent

Figure 1.1
Management Indifference



relationship. It facilitates growth. Management, therefore, have the discretion to focus on a Z. By adjusting Z, management can also achieve their personal goals, such as status, power and pay.

Premium on Type

We can ascribe an indifference relationship to management type. The explanatory power of a managerial indifference relationship is greatly enhanced when we include forms of personal and social capital in the management utility function. Management receive share options, and indeed the share price of a company includes a premium on the type of CEO. In Apple's case, for example, there was a premium on Steve Jobs as CEO built into the share price. Management have objectives, and they derive a sense of personal satisfaction from realising those objectives. An important attribute is that type displays signals to the market inclusive of consumers and competitors. More important, the signals are observed by shareholders and investors in the company. There are two important signals:

(a) dividends signal and
(b) price signal.

What does that mean? Traditionally, when company A lowers its price, it is to boost demand. The very act of lowering price may be construed by a competitor as a threat to their sales and thus provoke a price reaction. One must remember that 50p is cheap if the competitor is 60p; but reducing one's price to 30p will secure more sales only if the competitor is still 60p. The anticipation of a competitor's reaction is the essence of price signalling.

Positive Learning Transfer

In our observations there are different time periods t corresponds to now, and the future as represented by time period t+1. Decisions taken in time period t have consequences in time period t+1. In other words, a trade-off between two variables in time period t could be explained by the likely impact of that trade-off on a third variable in time period t+1. Consider the following scenario. Growth in a company depends upon growth in the market. In the market the company sells a range of products, so growth in the products will grow the market. Product diversification at time period t enables the company to grow organically in t+1. However, this requires investment in R&D and technology to ensure that the products are differentiated in the market to sustain the growth in sales required to filter back into company growth.

With higher investment in R&D there may be a claim on the finances of the company in time period t, as shareholders require dividends; as more is expended on R&D, the company may go to the external market to borrow funds. Alternatively, management may decide to use internal funds to finance the R&D in period t, postpone dividend payments until period t+1 and focus on maximising the growth of the company. As the company grows, and management opt to deliver dividends in period t+1, the value of the company may increase. This implicit trade-off observed in a Marris type, between payment of dividends versus more expenditure on R&D, is at the centre of the Marris model. The elusive third variable is the value of the company, Marris V.

How can an optimal trade-off be achieved? It can be achieved by a positive learning transfer (PLT) from the management to the shareholders, orchestrated by providing information and reassurance in the

Table 1.2
Model Objectives

	Behavioural	Baumol	Marris	Framework Tn=3
Objective	Multiple goals	Sales	Growth	Z or 3rd variable
Approach	Satisficing — subject to profit constraint	Maximisation — subject to profit constraint	Maximisation — subject to security constraint	Maximisation — subject to external constraints
Principal-agent relationship	Yes	Yes	Yes	Yes
Short term *vs* long term	Varies	Short	Long	Time period t+1
Reaction and interaction	Yes	Partial	Yes	Nash replies
Decision-making coalitions	Yes	No	No	DQs

activities of management. And, of course, if management have been observed in the past as successfully maximising growth, then shareholders may be persuaded to trust the type of management. However, shareholders are prone to follow a Bayesian-type rule in seeing what they want to see; so if profits fall in time period t, during the refocus of strategy towards more product diversification, shareholders will only see the falling profits and react by selling stock. It is therefore imperative for management to transfer a positive learning about their behaviour and plans to the shareholders. This can explain the willingness of many CEOs to appear on business channels such as cnbc.com, Bloomberg.com or Thomson Reuters.

Behavioural Approach

One of the more interesting applications in the business world is the application of game theory in shaping strategy. Game theory focuses on observed behaviour and allows us to identify patterns from which we can predict a likely future outcome. Look around you: observe the number of right-handed people you encounter. It is relatively easy to predict that if you were to hand anybody a pen, they would write with their right hand. However, if the individuals know that you are observing them as right-handed individuals, then some of them may try to fool you and write using their left hands. A game of poker is a typical game of observation and trust wherein a sequence of moves is played, the game ends, and then winnings or pay-offs are realised. The sequence of poker hands can be regarded as moves, and they represent a game. Schooled players look for connections between poker hands, and each player observes what every other player does or does not do as the game unfolds. Every day in the business world, management observe rival prices, costs and share price movements. The business environment is one that is rich with observed data.

While all these managerial models recognise and promote a single overriding goal that complements profit maximisation, they are all in their own way forced to recognise that other factors can potentially interfere with the model. This would imply that focusing on a single overriding goal is unrealistic. The behaviourist approach recognises the multiplicity of goals from these managerial models and allows for the greater complexity that results by moving away from a single 'maximised' result to a 'satisficed' result. It is the means by which an outcome is reached — not the goal — that is important, because the outcome is a compromise on many different goals, the influence and importance of each varying from one business to another.

Therefore, management display certain characteristics — a type — depending on their business and industry experience, the costs and the constraints of competition. Over time, management's objective is to increase the relative performance of the company, and Framework Tn=3 conceptually integrates the core of economic reasoning with the other business disciplines, for example, finance and marketing, by

providing a common framework for investigating and understanding management behaviour as a signalling game. Management behaviour expands with the market-as-a-game or disappears as a function of the game. In the real world, business decisions may be influenced by many different considerations. The owners and managers of firms may have a variety of goals and objectives, especially over longer periods of time. They may conceivably be motivated by a desire to become well respected in the community, or to serve some other higher purpose such as promoting their home country's national objectives, or they may simply want their organisation to become as large and powerful as possible. However, the basic economic theory of business behaviour is based on a very different premise: that firms exist to earn profits and that the goal of management is to maximise those profits (or minimise their losses) in time period $t+1$.

Framework $Tn=3$ places emphasis on explaining decisions that are taken within the firm. In our earlier reference to the Baumol hypothesis, if management opt for a price reduction in order to increase total revenue, the objective will depend ultimately on the price reaction of the competitor. Thus, management type, player type and different choice situations call for different decision approaches by management. Completely rational decision making involves identifying alternatives, projecting the probabilities and outcomes of alternatives, and evaluating the outcomes according to known preferences. These information-gathering and information-processing requirements are beyond the capabilities of any organisation. In practice, organisational decision making departs from the rational ideal in important ways depending on the contingencies of the decision context. Cyert and March (1963) coupled bounded rationality with the assumption that human actors are myopic.

Therefore, the behaviour of management is critically assessed in the context of testing management's ability to affect outcomes. Management as an individual is to be understood in terms of a rational individual making a decision. Within the decision-making process for a modern organisation, management teams take actions according to how their combined effort and expertise impact on knowing when and how

to act. The conflict — that is, the trade-off — referred to earlier is necessarily a conflict of subjective outcomes, as different managements have different outcomes in a given action. Management A, for example, change price to achieve a subjective outcome; however, management B's reaction to the price change will depend on B's own subjective outcome. Neither take price as exogenous. Price is now a signal. Therefore, both A and B need to know the types of all participants in the market as well as their own firm's production technology in order to compete. The objective is to obtain a sustainable competitive advantage at t+1.

The price signals, for example, generate wave functions, in an evolving process of actions and reactions. The author is researching this approach. Baumol type players can differ in their subjective preferences over outcomes of the game G, if playing recurrently. They reduce price, but no rival follows. Consequently, their preferences (to reduce price) can determine what is observed in the game (no one follows) and the consequent pay-offs in the game. Therefore, it would be imperative for management to understand their opponent's type and their own type as perceived by their opponents. In seeking to optimise her own actions, each player must understand the competitor's type in order to predict the actions of the other players in the market-as-a-game.

In Chapter 10, we advance the idea that management could consider the market as a **market system** evolving as a sequence of moves in a game or across different games in a time continuum (Radner, 1972). Each game, G, re-opens over time and at each move players act so that plans for action, the market strategy, available in t+1 significantly affect actions at time period t.

A player's actions are restricted by an understanding of competitor type, the technology in the game and by time itself. The transaction costs of playing a game include management time and technology costs, and because of the transaction costs involved an equilibrium may not be forthcoming early in a game. It is not transaction costs *per se* that are prohibitive, but costs arising from the sequence of boundary constraints including: (a) the likely transfer of market share and power, (b) predicting the action of competitors and (c) identifying the near-rival — that competitor in the sum of competitors — who will react first to your move.

As an adviser, the strategist should construct a historic CTL in order to define a likely pattern, focus on the observed behaviour within a pattern, observe the signals and focus on the existence of a stable equilibrium in a game. This represents a long-term vision rather than a focus on drastic changes or technology shocks that can best describe a game. Management needs to understand strategy as a moving target in a time continuum; we address this later in the discussion of spherical competitors.

In the following chapters, hypotheses — based on well-defined economic models — are advanced in the search for signals. Prices, for example, are interpreted as signals within a Baumol hypothesis, and price signalling is identified as one way to execute strategy. At another level, price defines the relationship with the consumer — the demand function. Dividends are introduced as a financial signal within a Marris hypothesis, signalling the use of retained profits for reinvestment, innovation and R&D. More dividend payments translate into a signal on less retained funds for reinvestment. This trade-off, not dissimilar to the retention ratio, defines the relationship with the investor.

In Chapter 5, capacity is presented as a signal within the production relationship and opens a window into the ability and capability of the supply chain to produce the product and provide services at a lower unit cost of production. Capacity signalling allows us to develop a cost-leader (CL) hypothesis wherein players camouflage their capacity in a game. Throughout the book, key decisions on whether to compete or cooperate, to follow or to lead and to enter a market translate into signals and patterns.