THOMAS SCHELLING AND THE NUCLEAR AGE

Strategy as Social Science

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Series Editor's Preface

Writing some 20 years ago, I suggested that there had been a 'golden age' of American strategic thought (*Strategic Studies and Public Policy*, University Press of Kentucky, 1982, Ch. 4). That notion is now widely accepted. Dating is a matter of opinion, of course, but it is not arbitrary. Plausible temporal boundaries were marked by the appearance of William W. Kaufmann, ed., *Military Policy and National Security* (Princeton University Press, 1956), and Thomas C. Schelling's *Arms and Influence* (Yale University Press, 1966). The former was the product of a context dominated by the Eisenhower administration's effort to make strategic sense of the hydrogen bomb, the subsequent debate prompted by Secretary of State Dulles' massive retaliation speech on January 12, 1954, and the need to interpret the course and outcome of the war in Korea (1950–53). The latter, Schelling's *Arms and Influence*, appeared when the United States was fighting a war in South-east Asia, though it was not the kind of war concerning which most of the intellectual leaders of the 'golden age' had much of obvious relevance to contribute. Schelling was an exception to that judgment, but not an entirely happy one, as we shall see. So, the 'golden age' faded in the mid-1960s, both because its policy-oriented strategic ideas, indeed theories, were somewhat sidelined by the grim events in Vietnam, and, simply, because all periods of theoretical innovation have to wind down. After all, there are only so many studies of nuclear deterrence, limited war in the nuclear age, and arms control, that the ideas market needs and will welcome. By 1966, it seemed as if the job of constructing a strategic theory suitable for the nuclear age was 'mission accomplished'.

Prominent among the intellectually more glittering components of American golden age theorizing were the rigorous, innovative and clever writings of Thomas C. Schelling. Whatever one's views of the merit of his ideas for the highly pragmatic realm of strategic behaviour – and I, for one, am fairly critical – there is universal agreement that his writings have a rare intellectual distinction. That alone would guarantee Schelling a place in the strategic theory Hall of Fame. However, his ideas, whether

applied in action as he would approve, or otherwise, have had a profound, pervasive, and enduring influence over strategic discourse. Indeed, it is no exaggeration to claim that no other modern theorist of strategy, with the arguable exception of Herman Kahn, has so shaped the way in which we think about nuclear age strategic problems.

Given the inherent importance of strategy for the nuclear age, and the fact that half a century has now passed wherein theory and policy for a nuclear context have proliferated, if not flourished and prospered exactly, one would perhaps expect there to be a number of enlightening intellectual biographies extant. Alas, that is not the case. As Robert Ayson wryly comments, there is really only a single study of Schelling worthy of note, and that is of chapter length. Published studies of the life, times, and ideas of particular strategic theorists of the nuclear age are all but completely missing. Books on Henry Kissinger abound, but he was never an original strategic thinker. Habitually, he adopted the ideas of others, usually rather late, when the strategic context, and therefore intellectual fashion, had moved out from under him. By common consent, the two most senior American strategic thinkers of the 1950s and 1960s, representing methodologically opposing approaches to the subject, as one would expect given their contrasting root disciplines (mathematical logic and political science), Albert Wohlstetter and Bernard Brodie, have attracted only a single scholarly intellectual biography between them (of Brodie).

It is not difficult to find tolerably plausible explanations of why individual nuclear age theorists should have failed to attract scholarly attention. Most obviously, there is much merit in the view that strategic theory and defence analysis in the early Cold War decades was very much a community product. It may have had its dominant figures, but truly the strategic ideas with which Western policy makers were armed to wage the Cold War or long peace emerged from a process of interaction among a fairly small number of thinkers. Only rarely, and even then often uncertainly, would it be possible to assign intellectual paternity to one, or another, individual. This condition does not make for attractive biography. In addition, the issues of concern, fundamentally bearing upon life and death on the grandest of scales, were so overwhelming that they seemed, indeed still seem, to dwarf even the powerful minds that sought to tame them. In these circumstances, it is extraordinary that Thomas C. Schelling has not, until now, been the subject of a major intellectual biography. Unlike nearly all of his peers who worked at, or around, the RAND Corporation in the golden age, Schelling's personal stamp marks his theorizing indelibly. Of all the leading figures among the American 'defence intellectuals' of the 1950s and 1960s, Schelling's individual contributions are by far the easiest to isolate and attribute with high confidence. Whether or not readers studied and understood his logic, he had a genius

for the telling phrase. The chapter titles of his two books on strategy, *The Strategy of Conflict* (Harvard University Press, 1960), and *Arms and Influence* (Yale University Press, 1966), are little short of choices of genius. Whether they convey wise, or prudent, ideas, is of course quite another matter.

It should be easy to see from the above why we, the Editors, are delighted to publish Robert Ayson's rigorous examination of Thomas C. Schelling's strategic theorizing in the Series. Dr. Ayson treats Schelling's writing 'in the round', explaining most effectively how Schelling the strategist is a dimension and application of Schelling the social scientist. This is a superior intellectual biography. While according his subject all due credit for intellectual rigour and innovation, Dr. Ayson is not an uncritical biographer. He notes the apolitical framework to Schelling's social science: indeed he observes tellingly that 'theory enjoys primacy over strategic context (p. 198)'. I must confess that I find some of Schelling's ideas, even if elegant and sometimes, in a sense, brilliant, perilously lacking in the mud, blood, and local political detail of real history.

I commend this excellent book to anyone who wishes to trace the origins of many of our more familiar strategic ideas, and in particular to anyone who is interested in pursuing the thesis that a general theory of strategy can be developed through the methodology of the social sciences.

Colin S. Gray
Series Co-Editor

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The research itself would not have been possible but for the kind help from the staff at University of London libraries, from Vivian Arterbery and other staff at RAND, and from Anne Caiger and other staff of the Special Collections Department of the UCLA Research Library which has given kind permission to access and quote from the Bernard Brodie Papers. Funding support from the Association of Commonwealth Universities and British Council was crucial in making possible my research in the United Kingdom and the United States.

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To Tom Schelling, I am grateful for such a stimulating body of work which has been a pleasure to write about, for his generous provision of time for interviews, and his enthusiasm for this project.

Finally, I owe a special debt of thanks to my wife Catherine, who has been such a source of encouragement and support during the many years of my Schelling adventure. This book is dedicated to her.

Introduction

In a scholarly career spanning over 50 years, Thomas Schelling has made some of the most distinctive contributions to strategic studies in the age of nuclear weapons.[1] In particular, he played a defining role in shaping the ideas underpinning the so-called 'golden age' of nuclear strategy during the late 1950s and early 1960s.[2] The work of this American economist and strategic thinker is especially notable for using bargaining theory to understand strategic problems and for its pioneering analysis of nuclear deterrence, crisis management, limited war, arms control, coercion and compellence. Schelling also made important contributions to American thinking about Cold War crises in the early 1960s such as Berlin and Cuba and echoes of his approach have been detected especially in the US approach to conducting limited war in Vietnam.[3]

Schelling's arguments continue to be cited frequently in the contemporary strategic studies literature, and in related fields such as international relations. But no full-length study of the nature and evolution of his thinking has been produced until now. In paying especially close attention to the rich and varied intellectual origins of Schelling's distinct approach to strategy, this book fills that void.

It does so in three main ways. First, this study traces the evolution of Schelling's thinking, beginning with his work as an economist in the mid-1940s and leading on to the works for which he is best known, *The Strategy of Conflict*, published in 1960,[4] and *Arms and Influence*, which appeared in 1966.[5] This sheds new light on Schelling's work because the conceptual links and theoretical consistency between his economic and strategic writings have not previously been investigated in any detail.

Second, this study reveals that at the heart of this consistent approach is an abiding interest in the question of stability. While Schelling shared with his contemporaries a keen interest in the stability of the nuclear balance, this book demonstrates that he went much further – in his writings there exists a concept of stability generally applicable to a wide range of situations (military and non-military). To understand Schelling's approach to stability is therefore to understand his approach to strategy.

Third, in explaining the analytical framework underpinning Schelling's continuing interest in stability questions, this book shows how this imaginative thinker treats strategy as a social science. The picture emerges of a strategic thinker whose ideas are linked into many of the intellectual currents of his day from a whole host of disciplines. This extends from economic and game theory (where Schelling's interest is well known but at times rather misunderstood and underappreciated) to theories of organisation, information and social psychology. As a result, Schelling's thinking needs to be seen as more than a theory of strategy for the nuclear age, and more in terms of a quest for a general social-scientific theory within which problems of strategy exist as an important category. This underscores the importance of considering the history of strategic ideas in terms of the history of ideas as a whole.

THE STRATEGIC CONTEXT

The elaboration of the concept of stability during the late 1950s and early 1960s was, first and foremost, part of an attempt to come to grips with the extraordinary challenges of building suitable strategy in an age of thermonuclear weapons.[6] More specifically the concept stemmed from the assessment by American strategic thinkers that the United States' advantage in nuclear weaponry was being swiftly eroded as the 1950s went on. It was necessary to come to terms with the growth in the Soviet Union's capabilities for imposing destruction, against which the United States had no effective means of defence. This made it important to find a replacement for the Eisenhower administration's strategy of 'massive retaliation',[7] which relied heavily on the assumption that the United States alone would have the ability to threaten a severe nuclear response to the actions of its adversary.

Hence, as the decade went on the focus shifted to coming to terms with *mutual* deterrence. This is where stability had its main impact as a strategic concept, worked up by a small group of civilian strategists who followed in the footsteps of Bernard Brodie's pioneering assessment of the implications of the 'absolute weapon'.[8] Strategic thinkers like Schelling did not presume that mutual deterrence could be guaranteed simply by the reciprocal possession of nuclear weapons in substantial quantities. Instead, they put considerable effort into a discussion of what sort of efforts were required for mutual deterrence to be stable. The main immediate context for understanding the concept of stability is thus as a quality of deterrence.

Many of the leading contributions to the understanding of what stable deterrence should look like came from strategic analysts who were

associated with the RAND Corporation in Santa Monica. This 'think-tank' had its origins in the US Air Force's Project RAND (for 'research and development') in May 1946.[9] RAND provided these civilian analysts with a uniquely stimulating working environment, offering an effective halfway-house between academia and officialdom. Schelling's longest stay at RAND was the year he spent there in 1958–59.[10] But during this short period a great deal of the elaboration of the concept of stability occurred, and, given his close association with the strategic analysts based there, it is right to consider his work on stability as part of the flowering of American strategic thought during the late 1950s and early 1960s, in which RAND was so prominent.

The speedy development of these ideas was encouraged by a sense of urgency in the strategic environment during an especially tense period of the Cold War. At the military level, the rapid evolution of the technology of nuclear weapons and their delivery systems, and the competition in their development between the Soviet Union and the United States, appeared to threaten strategic thinking with routine obsolescence. For instance, the idea of mutual deterrence was still being digested when fears of a 'missile gap' began to arise in the late 1950s as an interpretation of the way that the Soviet Union was appearing to pursue the fruits of the missile age. This sense of vulnerability in the United States, to which the Soviet Union's launch of Sputnik in 1957 was such a dramatic contributing factor, acted as a particularly effective stimulus for strategic thinking. In other words, the concept of *stability* would not have received nearly as much attention had the potential for *instability* seemed much smaller.

The effect of military technological change was to provide more than enough food for thought for those like Schelling who were writing about stability. The development during the late 1950s of new missile systems such as the land-based 'Minuteman' and sea-based 'Polaris', for example, held out some hope for reducing the vulnerability to attack of the United States' means of retaliation.[11] This concern had been at the heart of Albert Wohlstetter's influential assessment of the fragility of deterrence,[12] which set the tone for the discussion of stability by Schelling and other strategists.[13] The swiftness with which missiles promised to launch and deliver their warheads, and the judgement that the Soviet Union was making parallel or even greater moves in the same field, meant that to the vast destructiveness of thermonuclear weapons could be added the ingredient of great speed. This could only complicate the picture for efforts to articulate a stable deterrent posture, since decisions over deterrence might have to be made very quickly.

At the political level, ongoing tensions between the superpowers added to the sense of urgency. The paucity of direct communication between Moscow and Washington during the late 1950s and the very

early 1960s made it a tremendous challenge to envisage effective co-ordination between the two leaderships should they find themselves on the brink of war. This was especially problematic if deterrence was to be a mutual affair. The prominence of this sort of uncertainty as a factor in the strategic calculus added to the challenge confronting those wishing to sketch out the conditions for stability.

As well as the need for stability in military relations during the normal course of events in the Cold War, there were also occasional reminders that deterrence would need to withstand graver tests during periods of acute tension. An example was the series of tensions over Berlin, that most obvious bell-wether of East–West relations, which culminated in the crisis of 1961. These sorts of developments provided thinkers such as Schelling with a powerful stimulus for examining how stable military relations might be achieved at different stages of a crisis. The absence of a substantial recent pattern of contact and trust at the political level meant that proposals for stabilising the military environment, if they required some sort of co-ordination between the nuclear powers, would need to be ingenious. Under these circumstances, Schelling's argument that there was common ground between the United States and the Soviet Union which could be exploited in the cause of stability was an especially bold suggestion, and his argument that communication and negotiation in the interests of stability could be tacit rather than explicit was particularly imaginative.

The strategy thus reflected the judgement that ideas of complete victory could be anathema even in limited conflicts during the nuclear age, and that all parties thus had a common interest in stabilising crises and conflicts before mutual disaster struck. This encouraged notions that the superpowers were engaged in processes of bargaining rather than battlefield contests for supremacy. Schelling made this approach a specialty in his contributions to what Lawrence Freedman has called 'the strategy of stable conflict'.[14] This included his well-known analysis of the destabilising effects of what he called 'the reciprocal fear of surprise attack',[15] and his not uncontroversial assessment of the prospects for manipulating risk.[16]

A POWERFUL BUT TROUBLING CONCEPT

The Western concepts which developed in the first few years of the thermonuclear age had profound effects on subsequent strategic thinking and practice. The concept of stability itself was officially adopted in the 1960s as a basis for the development of US strategic policy, and was subsequently applied to all manner of decisions and postures. From

Western nuclear strategy as a whole, right down to individual weapon systems, there was a tendency to judge everything in terms of whether it led to greater or lesser 'stability'. In more recent years, the concept of stability has continued to make frequent appearances in the analysis and description of strategic problems.[17] While the Cold War may be over, many of the concepts associated with its main challenges continue to live on.

Unfortunately, the ubiquity of the concept of stability's appearance is not always matched by a common and clear understanding of its meaning and origins. By becoming one of the tools of the policy-making trade, the analysis of stability could too easily become tied to specific policy goals which might not always be consistent to the original formulation.[18] The problem was only compounded during the 1970s given the increasing complexity of the strategic environment[19] and the tendency for the arms debate to become hostage to domestic American political agendas.[20] This made it much more difficult to apply the earlier thinking.[21] At the end of that decade Colin Gray complained that 'there is no useful consensus about the meaning of stability'.[22] It might also be said that there was a decreasing understanding of its origins of the concept. This adds to the need to look back on a time when the concept of stability had a rather clear and coherent meaning (from the mid-1950s to the early 1960s), and to look at one of the main thinkers responsible for its development (Thomas Schelling).

Perhaps the most serious concern raised about the concept is that the emphasis placed on stabilising the military environment was often at the expense of incorporating political factors into the equation.[23] Gray has argued that the sort of analysis produced by Schelling of the instability which can arise in a crisis 'overemphasizes the probable role of mechanistic instabilities … while taking a wholly apolitical approach to an inherently political phenomenon'.[24] Others take a more sympathetic view of this point; Freedman, for example, explains that the aim of stability thinking was to keep the military situation under control so that the decision to go to war could always be a 'supremely political act'[25] made in the cool light of day.

The criticism is, nonetheless, a powerful one. It gets some support from the idea that the very approaches used by Schelling and the other more formal strategists carried an in-built bias towards arriving at technical solutions to complex strategic problems. This seems especially the case for systems analysis and game theory, both of which were closely associated with RAND.[26] However, as the later chapters of this book will demonstrate, Schelling's own use (and revision) of game theory emphasises the broader ideas which lie behind this method of strategic analysis rather than the mathemetical complexities it sometimes involves.[27]

These approaches associated with stability thinking require close analysis not least because the civilian strategists did not use the same means to arrive at the same concept – Wohlstetter used systems analysis, Schelling used game theory and Brodie, who was more interested in historical method, was not particularly keen on either of these more formal approaches. As Chapter 2 will show, other thinkers such as Hedley Bull and Henry Kissinger arrived at quite similar conceptions of stability by way of rather more political analyses based around balance-of-power concepts.

Moreover, this range of approaches, many of which have links to bodies of thought that lie outside of strategy, also opens up the prospect of treating stability in terms of the wider history of ideas. Freedman has provided a hint of the possibilities here with his brief assessment that: 'The idea of stability was derived from systems theory' which social scientists had 'adopted from biological theories'.[28] More extensive analysis along these lines is required if a thorough understanding of the nature of the concept of stability is to be obtained.

ON SCHELLING

This is especially the case for Schelling, given the breadth and variety of his own theoretical influences. For example, while existing studies have drawn attention to the importance of bargaining in Schelling's approach to strategic problems,[29] much still needs to be explained as to why bargaining theory is important to Schelling, and how it helps his analysis of stability. Both Freedman and Phil Williams provide a valuable service by pointing out the connection between Schelling's interest in bargaining and the idea that the 'antagonism' between the parties to the relationship needed to be restrained.[30] They also offer some useful insights into the game-theoretical concepts Schelling found most helpful.[31] But in keeping with the tendency of histories of strategic thought to stay within the confines of strategic studies, existing studies have given little attention to Schelling's own early work on questions of economic theory and his interest in questions of bargaining outside a military context.[32] Even less has been said in that literature about the wider social-scientific influences on Schelling's thinking,[33] which are dealt with in the final chapter of this book.

Important insights into Schelling's early interest in economics and game theory can be found outside of the strategic studies literature.[34] For example, evidence of significant connections can be found in the formal game-theoretical literature. But while this may help confirm the idea that Schelling's thinking is compatible with game theory,[35] the focus tends to

be in terms of applying the theory rather than explaining its origins. This explanation itself requires an appreciation of the evolution of Schelling's thinking from his very first publications, although it must be said that Marc Trachtenberg's multi-volume set on *American Strategic Thought* has brought many more of Schelling's less prominent strategic writings to a wider audience.[36]

Even so, there is still a gap in terms of a study which includes a larger range of Schelling's work and which captures the essence of Schelling's strategic universe. Existing scholarship has not really succeeded in identifying a central idea or insight which links Schelling's many contributions together. Williams comes closer than most. He provides an excellent account of Schelling's interest in 'stable limits' in limited war – unique qualitative distinctions which allow expectations to be co-ordinated because of their symbolic magnetism.[37] He also refers to Schelling's interest in 'stable patterns of behaviour' in game theory,[38] to the close association between Schelling's stability analysis and the problem of pre-emption,[39] and to the idea of stability involved in Schelling's approach to arms control.[40] But what is needed is to go a step further and to locate that common concept of stability and then to demonstrate the role that game theory, bargaining theory and other social-science theories play in informing it.

ORGANISATION AND METHOD

In order to provide a thorough understanding of Schelling's thinking, it is necessary to begin with an account of the development of Schelling's interests and the context in which this work occurred. This is the task of Chapter 1, which introduces the reader to the range of Schelling's publications which form the main basis of this study, demonstrating the evolution of his theoretical interests from his early work in economics in the 1940s to his subsequent work on strategy in the 1950s and 1960s. This confirms the argument that Schelling's interest in stability and in bargaining predated his work on strategy.

Chapter 2 examines the extent to which Schelling's approach to stability can be understood in terms of his contribution to its emergence as a central concept in the development of strategic theory during the late 1950s and early 1960s. This chapter examines the particular approach to the 'balance of deterrence' and the nature of the contemporary 'arms race' which featured in the writings of Schelling and the other leading strategists. It shows a common concern for the growing vulnerability of retaliatory forces and the danger of surprise attack. However, this chapter also indicates where Schelling differed from his peers by taking a more

inclusive approach to stability, which, in turn, relied on bargaining theory.

This sets the scene for Chapter 3, the central portion of the study which describes and analyses Schelling's general concept of stability. This chapter demonstrates the consistent approach which Schelling takes to a range of strategic situations, exploring some particularly important examples of his stability analysis such as those which he takes from the Korean War. It shows how in each case Schelling's stability analysis is based around his treatment of strategic situations as bargaining processes. It also offers a critique of his general concept by examining the context and assumptions around which it is based.

Chapter 4 begins the analysis of the types of theory which help provide an explanation for Schelling's approach to stability. It offers an insight into the origins of Schelling's stability-bargaining treatment by demonstrating the relevance of aspects of oligopoly and game theory. Because of the confusion over the role of game theory in American strategic thought, this chapter offers a re-examination of this touchy subject in relation to Schelling's work.

Chapter 5 involves an examination of the special relevance to Schelling's stability analysis of a number of central game-theoretical concepts. As a result, it is possible to understand Schelling's analysis in terms of the ideas of 'equilibrium', 'defection' and, most notably, the 'Prisoner's dilemma'.

Chapter 6 analyses the importance of aspects of contemporary theory from other social sciences with which Schelling was familiar, including social psychology, communication and organisation theory. It demonstrates how these theories set the context for Schelling's interest in the co-ordination of expectations in group situations, in a dynamic conception of stability based on organic analogies, and in the idea of 'feedback' as a means of understanding stability.

In the writing of these various chapters, the author has relied heavily on works by Schelling himself (including books, articles and also a large number of RAND studies some of which are not especially well known). Works by other leading strategic thinkers who made significant contributions to the concept of stability in strategy form the second main group of published material, making it possible to examine both the common and uncommon ground existing between Schelling and other strategic thinkers of his time. The third group consists of the range of theoretical literature from different disciplines which helped inspire Schelling's approach to stability and to strategy more generally.

The main findings from this search of the published material have been supplemented by other sources. The author's interviews with Schelling were particularly useful in determining the origins of particular

pieces of his work, the importance of the writings of other theorists and analysts and the relative importance (and unimportance) of different bodies of thought which might relate to stability. The importance of these contacts with Schelling, in combination with the study of his published work, is heightened by the fact that Schelling has not tended to retain (or to deposit at one of his places of work) old drafts of earlier work.[41] Some useful additional insights have, however, been gained from the author's study of the Bernard Brodie Papers at the University of California, Los Angeles. But while this collection contains some interesting correspondence between Schelling and Brodie, most items are from the mid-1960s, by which time Schelling's concept of stability was a very mature one. The emphasis on already published rather than archival material reflects the nature of the project: a study of the strategic thinking of a leading strategist whose main ideas and sources can be found in the public domain.

The findings from this study have emerged from asking such basic questions as, 'What is Schelling's approach to strategy and stability?' and 'What are the main sources of his approach?' In terms of models for this sort of analysis, this study leans on the example provided by the treatment of strategic thinking in Freedman's *The Evolution of Nuclear Strategy* rather than on any more general works on the history of ideas,[42] or upon works which suggest that strategic thinking should be read as a 'discourse' that supports a particular power relationship in society.[43] In overall terms, the effect is to try to let Schelling's own work tell the story.

NOTES

1. See Lawrence Freedman, *The Evolution of Nuclear Strategy*, 2d edn (Basingstoke and New York: Macmillan/St Martin's Press with the IISS, 1989) [hereafter *Evolution*]; Marc Trachtenberg, *History and Strategy* (Princeton, NJ: Princeton University Press, 1991), pp. 18–23; Phil Williams, 'Thomas Schelling', in John Baylis and John Garnett (eds), *Makers of Nuclear Strategy* (London: Pinter Publishers, 1991), pp. 120–35.
2. See Ken Booth, 'The Evolution of Strategic Thinking', in John Baylis, Ken Booth, John Garnett and Phil Williams, *Contemporary Strategy I: Theories and Concepts,* 2d edn (London: Croom Helm, 1987), p. 46. For the argument that this era ended in the mid-1960s, see Trachtenberg, *History and Strategy,* p. 44. For the suggestion that it lasted but five years until 1961, see Michael Howard, 'The Classical Strategists', in Alistair Buchan (ed.), *Problems of Modern Strategy* (London: Chatto & Windus for the Institute for Strategic Studies, 1970), p. 67.
3. On the relationship between Schelling's ideas and Washington's Vietnam policy, see Jeffrey Record, *The Wrong War: Why We Lost in Vietnam* (Annapoli, MD: Naval Institute Press, 1998), pp. 42–3; Richard Ned Lebow, 'Thomas Schelling and Strategic Bargaining', *International Journal*, 51:3 (Summer 1996), p. 563; Fred Kaplan, *The Wizards of Armageddon* (Stanford, CA: Stanford University Press, 1983, 1991), pp. 330–6; George C. Herring, *LBJ and Vietnam: A Different Kind of War* (Austin, TX: University of Texas Press, 1994) p. 5; Freedman, *Evolution*, pp. 334–5.

4. Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960).
5. Thomas C. Schelling, *Arms and Influence* (New Haven, CT, and London: Yale University Press, 1966).
6. For the definitive account, see Freedman, *Evolution*. Other important contributions include Howard, 'The Classical Strategists', pp. 47–76, and Marc Trachtenberg's essay, 'Strategic Thought in America, 1952–1966', in his *History and Strategy*, pp. 3–46.
7. For a description and assessment of 'massive retaliation', see Freedman, *Evolution*, pp. 76–90; Howard, 'The Classical Strategists', pp. 54–6.
8. See Bernard Brodie, 'War in the Atomic Age' and 'Implications for Military Policy', in Brodie (ed.), *The Absolute Weapon: Atomic Power and the World Order* (New York: Harcourt, Brace, 1946), pp. 21–69, 70–107. On the importance of Brodie's early work for stability thinking, see Howard, 'The Classical Strategists', pp. 52–3; Freedman, *Evolution*, p. 43; Ken Booth, 'Bernard Brodie', in John Baylis and John Garnett (eds) *Makers of Nuclear Strategy* (London: Pinter, 1991), p. 23. For a full-length study of Brodie's thinking, see Barry H. Steiner, *Bernard Brodie and the Foundations of American Nuclear Strategy* (Lawrence, KS: University Press of Kansas, 1991).
9. On RAND, see Bruce L. R. Smith, *The RAND Corporation: Case Study of a Nonprofit Advisory Corporation* (Cambridge, MA: Harvard University Press, 1966). For an interesting behind-the-scenes account of American strategic analysts with particular reference to RAND, see Kaplan, *Wizards of Armageddon*.
10. See the brief biographical section on Schelling in Chapter 1 below.
11. See Freedman, *Evolution*, p. 166–7.
12. Albert Wohlstetter, 'The Delicate Balance of Terror', *Foreign Affairs*, 37:2 (January 1959), pp. 211–33.
13. On the significance of Wohlstetter's study for understandings of stability, see Trachtenberg, *History and Strategy*, pp. 18–23; Freedman, *Evolution*, pp. 134–61; Howard, 'The Classical Strategies', p. 17.
14. Freedman, *Evolution*, pp. 173–223.
15. See Williams, 'Thomas Schelling', p. 127; Freedman, *Evolution*, p. 164; Trachtenberg, *History and Strategy*, p. 23; Colin S. Gray, 'Strategic Stability Reconsidered', *Daedalus*, 109:4 (Fall 1980), p. 150; Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, NY: Cornell University Press, 1989), pp. 48, 138.
16. See Freedman, *Evolution*, pp. 219–23; Williams, 'Thomas Schelling', pp. 125–6; Trachtenberg, *History and Strategy*, pp. 15–17; Robert Jervis, *The Illogic of American Nuclear Strategy* (Ithaca, NY: Cornell University Press, 1984), pp. 138–9.
17. On its application in the 1980s to the debates over weapons systems, see Colin S. Gray, *Weapons Don't Make War: Politics, Strategy, and Military Technology* (Lawrence, KS: University Press of Kansas, 1993), pp. 27, 35. Among the many post-Cold War studies where nuclear stability has continued to be a major point of reference, see Steven E. Miller, 'The Case against a Ukrainian Nuclear Deterrent', *Foreign Affairs*, 72:3 (Summer 1993), p. 71; Neil Joeck, 'Maintaining Nuclear Stability in South Asia', *Adelphi Paper* 312 (Oxford: International Institute for Strategic Studies, September 1997), pp. 36–48; James J. Wirtz, 'Beyond Bipolarity: Prospects for Nuclear Stability after the Cold War', in T. V. Paul, Richard J. Harknett and James J. Wirtz (eds), *The Absolute Weapon Revisited: Nuclear Arms and the Emerging International Order* (Ann Arbor, MI: University of Michigan Press, 1998), pp. 137–65. Also see Stephen J. Cimbala and James Scouras, *A New Nuclear Century: Strategic Stability and Arms Control* (Westport, CT: Praeger, 2002), pp. 25–73.
18. For analysis of this problem, see Freedman, *Evolution*, p. 228. On the problems involved in equating 'stability' with 'Mutual Assured Destruction', see ibid., pp. 248,

259. On the 'entropy' which afflicts ideas when they become tied closely to policy-making, see Gray, *Weapons Don't Make War*, p. 154.
19. See Freedman, *Evolution*, pp. 172, 354–5. See also Jennifer E. Sims, *Icarus Restrained: An Intellectual History of Nuclear Arms Control, 1945–1960* (Boulder, CO: Westview Press, 1990), pp. 12–13.
20. See Freedman, *Evolution*, p. 337. Freedman's point about the 'dogmatic' approach to stability which resulted (ibid., p. 339), is also made by Gray, *Weapons Don't Make War*, p. 41. On the deterioration in the quality of strategic thinking brought about by the debates over Anti-Ballistic Missiles (ABMs) and the Strategic Arms Limitation Talks (SALT), see Gregg Herken, *Counsels of War* (New York: Alfred A. Knopf, 1985), pp. 191–3, 230–41. Also note Schelling and Halperin's observation 25 years after the publication of their ground-breaking arms-control text that 'we are struck both by how commonplace the ideas we presented then have become, and the degree to which they have been distorted as they became part of domestic and international reality'. Thomas C. Schelling and Morton H. Halperin, 'Preface to the 1985 Edition', in *Strategy and Arms Control* (Washington, DC: Pergammon-Brassey's, 1985).
21. As noted by Phil Williams, 'Thomas Schelling', p. 130. Williams' essay is the main existing study devoted to Schelling's contribution to strategic thought.
22. Gray, 'Strategic Stability Reconsidered', p. 135. See also Gray, *Weapons Don't Make War*, p. 41.
23. For example, see Trachtenberg, *History and Strategy*, pp. 24–5, 46; Sims, *Icarus Restrained*, p. 117. For the application of this criticism to Schelling's work, see Williams, 'Thomas Schelling', p. 132.
24. Gray, 'Strategic Stability Reconsidered', p. 150.
25. Freedman, *Evolution*, p. 176. Also see Lawrence Freedman, 'Strategic Stability/ Superiority: The US View', in Carl G. Jacobsen (ed.), *Strategic Power: USA/USSR* (Basingstoke: Macmillan, 1990), p. 169.
26. See Kaplan, *Wizards of Armageddon*, pp. 63–8; 86–90; Freedman, *Evolution*, p. 179; Richard Rosecrance, 'Albert Wohlstetter', in Baylis and Garnett, *Makers of Nuclear Strategy*, pp. 57–64.
27. Many of these ideas are discussed in Freedman, *Evolution*, pp. 182–9.
28. Freedman, 'Strategic Stability', p. 170. For further exploration of this point, see Chapter 6 below.
29. See Trachtenberg, *History and Strategy*, p. 15; Williams, 'Thomas Schelling', p. 126; Lebow, 'Thomas Schelling and Strategic Bargaining'; James E. Dougherty and Robert L. Pfaltzgraff, Jr, *Contending Theories of International Relations: A Comprehensive Survey*, 4th edn (New York: Longman, 1997), pp. 520–4.
30. Freedman, *Evolution*, pp. 208–9; Williams, 'Thomas Schelling', p. 121.
31. Williams, 'Thomas Schelling', pp. 121–2; Freedman, *Evolution*, p. 212. Also see Kaplan, *Wizards of Armageddon*, pp. 330–1.
32. Some brief but useful hints are provided by Trachtenberg, *History and Strategy*, p. 15. Also see Lebow, 'Thomas Schelling and Strategic Bargaining', pp. 556, 570; Philip Bobbitt, *Democracy and Deterrence: The History and Future of Nuclear Strategy* (Basingstoke: Macmillan, 1988), pp. 67–8.
33. Williams notes the absence of any 'substantive' incorporation of political science and history into Schelling's work, (Williams, 'Thomas Schelling', p. 133), but does not mention influences such as social psychology and organisation theory. For a rare reference to Schelling's reliance on Gestalt psychology, see Lebow, 'Thomas Schelling and Strategic Bargaining', p. 568. On the broader social-scientific context for appreciating Schelling's work, see Pierre Hassner, *Violence and Peace: From the Atomic Bomb to Ethnic Cleansing*, trans. Jane Brenton (Budapest: Central European University Press, 1997), p. 53.

34. See Richard Swedberg, 'Thomas C. Schelling', in idem., *Economics and Sociology: Redefining their Boundaries: Conversations with Economists and Sociologists* (Princeton, NJ: Princeton University Press, 1990), pp. 187–90.
35. For a very interesting game-theoretical treatment of many of Schelling's ideas, including his approach to stability, see Robert Powell, *Nuclear Deterrence Theory: The Search for Credibility* (Cambridge: Cambridge University Press, 1990).
36. Marc Trachtenberg (ed.), *The Development of American Strategic Thought*, 6 vols (New York: Garland Publishing, 1988).
37. See Williams, 'Thomas Schelling', p. 126.
38. Ibid., p. 122.
39. Ibid., p. 127.
40. Ibid., p. 129.
41. Author's correspondence with Schelling.
42. For prominent examples, see Arthur O. Lovejoy, *The Great Chain of Being: A Study of the History of Ideas* (Cambridge, MA: Harvard University Press, 1936); Arthur O. Lovejoy, *Essays in the History of Ideas* (Baltimore, MD: Johns Hopkins University Press, 1948); Isaiah Berlin, *Against the Current: Essays in the History of Ideas* (London: Hogarth Press, 1979).
43. For an attempt to 'historicize the evolution of strategic studies', see Bradley S. Klein, *Strategic Studies and World Order: The Global Politics of Deterrence* (Cambridge: Cambridge University Press, 1994).

1

From Economist to Strategist

One of the main findings of this study is the degree to which Thomas Schelling's powerful and influential strategic thinking of the 1960s was influenced by questions he had begun to ask as an economist in the early postwar years. A second, and perhaps even more important finding, is the way that Schelling's continuing interest in the concept of stability provides a framework for understanding his overall approach to strategy. This chapter begins the process of outlining these key themes, and shows them to be richly intertwined in the evolution of Schelling's career.

Following a brief biographical summary, this chapter moves through Schelling's main early works, many of which have not been highlighted at all in the existing literature which deals with him. These pieces include his very first articles in economics journals in the mid-1940s as well as later and better-known works wherein Schelling finds military applications for his ideas on bargaining. The culminating point for the chapter is Schelling's 1960 classic, *The Strategy of Conflict*. This is not to deny that he continued with similar themes in his writings on a whole range of public-policy issues in the last three decades of the twentieth century, but by the early 1960s the main evolution in his strategic thinking had occurred, and a mature concept of stability can be located. Schelling himself identifies the movement of American strategic thought from the research institutes and universities to 'the Establishment, the Departments of State and Defense' in 1961 as a significant turning point: 'The idea stage was about over then, although books reflecting earlier thought and work continued to appear in the early 1960s'.[1]

A BRIEF BIOGRAPHY

Thomas Crombie Schelling was born in 1921 at Oakland, California.[2] He began his undergraduate studies before the Second World War at the University of California Berkeley, where he was introduced to economics by William Fellner. Schelling received his BA from Berkeley in 1943,

where he remained to pursue some graduate studies before working in Washington for the United States Budget Bureau under another prominent economist, Arthur Smithies.[3] In 1946 Schelling moved to Harvard University where his work in economics, as both student and lecturer, resulted in some early publications relating to the question of income.

Between 1948 and 1953, Schelling worked as an economist for the US government in Denmark, Paris and Washington DC. During this period he was involved in the allocation of Marshall Plan funds as a member of the Economic Cooperation Administration.[4] Schelling returned to academia in 1953 as an Associate Professor of Economics at Yale University. During his five years at Yale, he produced a number of studies of foreign assistance and bargaining, including essays which were later to become part of *The Strategy of Conflict*.

In the summer of 1956 Schelling attended a discussion group on the east coast set up by the RAND Corporation,[5] which was to play such an important role in the development of his thinking about strategy and stability. He spent the summer of 1957 at RAND's headquarters in Santa Monica, where he was drawn increasingly into the study of military problems and to the group of analysts working on them. During this time he was invited by Charles Hitch, the Director of Economics, to return to RAND for a full year. Before Schelling took up this offer in September 1958, he spent several months in London working on game theory and became Professor of Economics and Associate of the Center for International Affairs at Harvard.[6] In the event, his longer stay at RAND was perhaps the most productive and instrumental single year of his career, not least because of the stimulating environment he enjoyed in the company of other strategic thinkers who were interested in similar questions.

Back on the east coast in 1959,[7] Schelling was one of the leading players of the other main stimulus for American strategic thought, the 'Harvard–MIT axis'.[8] As a strategic thinker, he was particularly influential during the early and mid-1960s, publishing the often-quoted *The Strategy of Conflict* in 1960, *Strategy and Arms Control* with Morton Halperin in 1961 and *Arms and Influence* in 1966. The thinking behind this body of work was a major inspiration for the development of US strategic policy during this period.

Since the late-1960s, Schelling has increasingly extended his range of research to include such issues as segregation, organised crime and energy and environmental questions. In 1969, he was appointed Lucius N. Littauer Professor of Political Economy at the John F. Kennedy School of Government, Harvard University, and in 1977 he won the Frank N. Seidman Distinguished Award in political economy. Since

1990, he has been Distinguished Professor of Economics and Public Affairs at the University of Maryland, College Park.

EARLY WORK ON INCOME ECONOMICS AND BARGAINING THEORY

Schelling's article 'Raise Profits by Raising Wages', which appeared in the prominent journal *Econometrica* in 1946, warrants mention not only because it was his first publication. It is also notable because in Schelling's analysis of the relationship between wages, profits and national income, there are already clear signs of an interest in stability – albeit the stability of an *economic* system. Schelling argues that if the sum of a number of crucial propensities (to spend, to invest and so on) are greater than unity (i.e. their combined probabilities are greater than one), then the 'assumption of a stable system' no longer holds. In such a case, 'the system is "explosive" – i.e., without a finite multiplier'.[9] With this analysis Schelling had presented a basic model of an unstable or 'explosive' strategic situation several years before he had developed an interest in strategy.[10] (Very much the same sort of model was to be applied by Schelling in understanding 'explosive' situations in strategy.)

In Schelling's second publication, his main concern is the stability of economic growth (national income) which he understands in terms of the stability of dynamic equilibrium. Schelling describes the 'equilibrium aspect' as 'the tendency for the appropriate rate of growth to maintain itself'.[11] An unstable system is thus one where the equilibrium is 'unable to survive disturbances',[12] when the '[d]isturbances from equilibrium are self-aggravating'.[13] Hence the search for 'stabilizers' is to seek 'more resiliency in the system, so that disturbances will be cushioned'.[14] The idea of stability in terms of self-aggravation versus self-maintenance is very important for his later strategic thinking,[15] and understanding stability in terms of the ability to retain an equilibrium is discussed in later portions of this study as the 'second aspect' of Schelling's stability concept – the steadiness of the equilibrium or bargain.

The question of income dominated Schelling's research and teaching interests at Harvard. In 1951 he produced his PhD dissertation entitled 'National Income Behavior: An Introduction to Algebraic Analysis' and his first book was published under the same name in the same year.[16] In this text, Schelling develops and solves equations for several variations of national (and international) income behaviour. His main concern is the stability of these various solutions and it is once again a dynamic stability in terms of the tendency for the function to move towards – rather than away from – the given solution. This work builds on an earlier piece in which Schelling treats solutions as equilibria in a discussion of the

dynamic stability of the relationship between price and unemployment levels.[17]

Hence, Schelling's initial interest as an economist was the dynamic stability of income functions. But it was his interest in bargaining, developed while he was a graduate student at Harvard[18] and further stimulated by his experiences as an economist in Europe, which was to brook the divide between economics and questions of strategy and provide him with more valuable insights into the stability question. Shortly before he left Harvard in 1948, Schelling read some reviews of von Neumann and Morgenstern's *Theory of Games*, which prompted him to work on an unpublished paper in which he criticised this pioneering text for its treatment of games involving bargaining situations.[19] Schelling's argument was that a likely solution to these sorts of games was the ability of either side in a bargaining relationship to commit or bind itself to a particular outcome.[20] This approach was to typify Schelling's subsequent writing on bargaining and game theory. His interest in this area was intensified by his experience working as an official economist when he had noticed that almost everything associated with the Marshall Plan and NATO had involved bargaining. Hence by the time he arrived at Yale, Schelling was determined to work on this subject.[21]

In terms of Schelling's published work, an early sign of this interest is his argument in a paper published in 1955 that foreign assistance programmes could be analysed profitably as matters of bargaining. For instance, when many countries were involved in the provision of assistance, the process by which they settled on the division of costs between them could be seen as the resolution of a bargaining situation. Because there were many possible distributions of the costs between the countries providing funds, the main problem was finding a single outcome upon which there could be widespread agreement;

> in many negotiations there is a wide area of outcomes that would be preferable, to all parties concerned, to a breakdown of negotiations. The concepts of 'need,' 'capacity,' 'equity,' and so on, help fill the vacuum of indeterminacy in such negotiations. Precedent helps fill the same vacuum; and having been used, the equity concepts are even more likely to be used again.[22]

With this line of argument, Schelling had laid down in print the approach to bargaining which was to characterise his later strategic analysis. The key question was how to fill the 'vacuum of indeterminacy' – to locate those items ('the procedures and the language and the symbols'[23]) which were able to 'constrain the outcome'.[24] The idea that precedent can provide the obvious way for settling bargaining situations[25] also comes up again and again in his later work. Moreover, because this

was a process of bargaining, there was a tendency for governments to 'jockey towards formulae that establish principles or precedents tending to favour them'.[26] The idea of exploiting the bargaining situations is thus established at this early stage – an approach which was to find its full fruition in Schelling's analysis of coercion in the mid-1960s. A prominent example of this in foreign assistance programmes could be found in the relationship between donor and recipient where the latter could improve their bargaining relationship by putting themselves in a position where there was no room for manoeuvre[27] – thus constraining the outcome to a favourable point.

MILITARY ILLUSTRATIONS OF BARGAINING

While Schelling's essay on cost-sharing is not well known, the same cannot be said for his 'An Essay on Bargaining', published the following year,[28] for this was to become the second chapter of *The Strategy of Conflict* in 1960. This was the distillation of a much longer, unpublished, piece on bargaining which Schelling had begun to write soon after arriving at Yale.[29] Significantly, this essay is the first of his publications in which he cites military examples of particular approaches to bargaining. To be sure, military issues do make an appearance in some of his earlier work. For example, he had already cited NATO's 'burden-sharing' exercise as an example of cost-sharing[30] and discussed the classification of lend-lease and other military expenditure for the calculation of national income statistics.[31] Any scholar concerned with America's finances and role in foreign assistance would have been hard pressed to avoid discussing military questions. But the decision to study the link between military situations and bargaining, based initially on Schelling's reading of memoirs from the Second World War,[32] marks a crucial change in his work. It is crucial because, while there are no references to 'stability' in the essay, the military situations and the ideas about bargaining he uses them to illustrate form the basis for his analysis of stability in subsequent works.

An especially significant part of Schelling's argument in this essay is his elaboration of the problem of indeterminacy. The problem with situations of 'pure bargaining' is that because each side is aware that the other has a whole *range* of acceptable options, retreat from any *single* point is always on the cards. These are thus 'indeterminate situations' because '[t]here is no resting place'[33] – a description which this study will argue is crucial to Schelling's general concept of stability. Schelling's analysis is centred on tactics which can be employed in these situations in order for a bargain to be struck. These are in line with the binding of oneself in foreign aid situations – 'the power to constrain an adversary may depend

on the power to bind oneself'.[34] With the right tactics it is possible to 'squeeze the range of indeterminacy down'[35] to yield a favourable bargain. Schelling also extends his analysis of what might provide the best basis for resolving the indeterminacy, and concludes that qualitative (i.e. symbolic) points are likely to be much more effective than quantitative ones because: 'The numerical scale is too continuous to provide good resting places.'[36]

Examples from military situations are very useful in connection with this problem of resolving the indeterminacy. According to Schelling, success in bargaining is often the result of being able to demonstrate commitment to a particular outcome, and at times this involves commitment to a painful action. Hence Schelling asks the question: 'How can one commit himself in advance to an act that he would in fact prefer not to carry out in the event, in order that his commitment may deter the other party?'[37] Logic alone would suggest that there could be few better or more obvious examples of this problem than attempts at deterrence by the threat of nuclear annihilation. Indeed, at the time of writing the US government was proposing the strategy of 'massive retaliation' as an answer to a whole range of potential military situations. Influenced by both the logic of his own theory and the contemporary strategic context, Schelling thus refers to the threat of 'massive retaliation against small encroachments'[38] as a prime example of a threat 'designed to deter through its promise of mutual harm'.[39]

Similarly, Schelling finds that military situations usefully illustrate the importance of communicating incentives in bargaining, of providing evidence[40] of one's commitment to a particular outcome. In a footnote that carries the essence of a point that he was to develop quite considerably in later writing, Schelling refers to the exchange of hostages[41] as a device used in much earlier times to guarantee a bargain.

Moreover, the first sign of Schelling's later analysis of game theory is to be found in his use of 'An Illustrative Game'[42] to clarify in a more formal style the points he has made in the essay. There are none of the matrices which appear in later work, but this section is enough to confirm that Schelling had already come to the view that game theory could be useful in studies of bargaining. In his Preface to the original edition of *The Strategy of Conflict*, Schelling actually describes 'An Essay on Bargaining' and 'Bargaining, Communication, and Limited War' as 'originally independent articles on "bargaining"' and notes that 'It was evident, after they were written, that they belonged to the same field as the *theory of games*.'[43] Yet even in 'An Essay on Bargaining', the potential for using more formal game-theoretical analysis is already quite clear.[44]

The second essay on the same lines, 'Bargaining, Communication, and Limited War', appeared in 1957 in the first issue of the *Journal of*

Conflict Resolution,[45] a periodical whose interdisciplinary, even eclectic, approach to conflict was very much in line with Schelling's own interests.[46] In this article, the military component is far stronger – Schelling does not merely use military situations for illustrative purposes, but suggests a way of analysing limited war in the nuclear age on the basis of his bargaining theory. Most significantly, moreover, this essay contains Schelling's first references to stability in a military context. The concept appears in his first sentence – 'Limited war requires limits; so do strategic maneuvers if they are to be stabilized short of war'[47] – and appears repeatedly in Schelling's discussion of the relationship between the lines taken up by armies in limited wars.[48]

Again, Schelling's analysis can be related both to strategic context and to the direction in which his own theory had been moving. In terms of the former, the Korean War provides him with a series of 'limits' at which the conflict appeared to have been stabilised successfully. As a conflict where 'weapons were limited between atomic and all other',[49] Korea also leads into the question of how, or indeed whether, atomic retaliation could be *stabilised* at particular limits.[50] By the mid-1950s, this was becoming an increasingly important issue in US relations with the Soviet Union.[51]

In terms of the latter, Schelling's search for stable limits is an extension of his interests in the resolution of bargaining situations, where expectations can be converged at particular points which are mutually attractive because of their unambiguity, conspicuousness or uniqueness.[52] Schelling introduces the notion of the 'focal point'[53] as a means of describing these saliences, the most colourful example of which is the river which has a 'stabilizing power' over the relationship between two armies because it fulfils the requirements of saliency so well.[54] Its power to stabilise means that it 'fills the vacuum of indeterminacy'[55] – a notion which Schelling takes from his earlier work on bargaining.

Similarly, Schelling's earlier description of the bargaining process as a matter of communicating incentives and expectations is also built upon by his treatment of focal points in terms of the 'unique signal' they provide which allows for the co-ordination of expectations.[56] By the same logic, a signal which is 'drowned out by "noise"',[57] will generally mean that it has insufficient power for such convergence. And, in a further elaboration of his earlier work, the unique signal is often provided by earlier bargains – a 'precedent' which can set a 'pattern' for future agreement.[58]

ON INTERNATIONAL ECONOMICS

Indeed, at this time Schelling was still continuing with his more traditional work in economics. In 1958, his textbook *International Economics*

was published, by far his largest single work.[59] This comprehensive survey of the field reflects his continuing interests in the questions of national income and foreign assistance[60] and incorporates his earlier bargaining theory analysis of cost-sharing agreements.[61] Stability – albeit in terms of *economic* relationships – is an important and defining issue in many chapters of the book. A particularly significant example is Schelling's elaboration of the potential for 'explosive' situations in income economics during his discussion of the 'secondary effect' or consumption expenditure. He examines an extreme situation where *no* spending power whatsoever is removed from the national economy via taxes, expenditure on imports, or savings:

> The result would be an infinite series of expenditures … a permanently *rising* level of income … This would be an explosive situation … The economy would be volatile to every sudden change in spending patterns. (emphasis original)[62]

Fortunately, in the real world, the effect of taxes, imports and savings meant that 'successive additions to total expenditure get smaller and smaller … their ultimate cumulative total will be limited to a finite sum'.[63] Instead of an economy which was 'inherently explosive', the expenditure 'eventually comes to "rest"'[64] at the finite sum. Hence, because they 'represent expenditure coming to "rest"', Schelling comments that such activities as savings act to 'limit the ultimate total of re-expenditure'.[65]

These two alternatives, coming to rest or exploding towards the infinite, can be seen in Schelling's examination some three years later of strategic situations. Schelling's work on exchange-rate stability, which is a question of stabilising the rate within acceptable limits of fluctuation,[66] follows a similar pattern of thought. Here a destabilising 'speculative spiral' can be caused if speculators

> … project change into the future. When a currency rises in price, speculators may take its rise as a signal of a further rise, and when they respond by buying they cause a further rise, confirming their own expectations so that they expect still further rises, buy more, force the price higher, etc. This kind of reaction would cause instability, not stability, in the foreign-exchange markets, causing the rate to move in wide swings.[67]

Later analysis in this study will demonstrate the importance of this notion of the self-increasing cycle of expectations for Schelling's understanding of stability in a strategic setting. Of course, this text was not the place for an examination of the military problems of the nuclear age. Yet, within this economic framework, Schelling displays a clear interest in

strategy – in the sense of strategies which can be adopted in international economic relationships. His analysis of these strategies displays a remarkable similarity to his later work on nuclear strategy, especially in terms of the emphasis he devotes to bargaining.

International trade and tariff policy provides him with most fertile ground here, in particular, because different examples illustrate the changing mixture of cooperation and conflict which characterise the international economic strategies which states adopt. As a means of 'international economic cooperation and restraint', Schelling points out that reciprocity (or reciprocal tariff reduction) is a good example because, 'it means taking account of the effect of a nation's policy on the other nations, and searching for policy adjustments that are in the common interest'.[68]

The emphasis on interdependence and common interest here is a precursor to Schelling's theory of a strategy of conflict. Schelling's analysis of interstate cooperation on balance-of-payments policies is even more to the point. He asks: 'What arrangements can a country make with other countries to collaborate in stabilization or to collaborate in controls? What bargaining strategy can a country use to extract the most favourable terms from other countries … ?'[69] The association of stability with bargaining in terms of both cooperation (seeking collaborative arrangements) and competition (extracting favourable terms) will be shown in later chapters to be at the heart of Schelling's stability concept in strategy. The idea of exploiting one's bargaining position is explored in Schelling's analysis of economic warfare – economic policies designed to harm other states.[70] Here, Schelling observes that

> the *threat* of damage is often more important than damage itself. Especially between a large nation and a smaller one that it is trying to coerce, there may be no interest in damage; the threat of damage may be intended to be complied with, not to have to be carried out. (emphasis original)[71]

Hence, bargaining also applies in trade strategies where the cooperative spirit is less pervasive – although even here there is a common interest in avoiding actual damage. The parallels with deterrence in the nuclear age are obvious.[72] (This makes it clear, for example, why Schelling was later to say that war in the nuclear age is a question of bargaining.) In a similar manner, Schelling notes that the practice of discriminatory trade policy (obviously in a different spirit to reciprocity) 'by its very nature, lends itself to bargaining, retaliation, threats, and predatory tactics'.[73]

This is very much the sort of list of actions Schelling was subsequently to employ in examining bargaining in nuclear strategy, but it is still based at this stage on his professional experience and research

interests in international economics. Yet, without question, Schelling's interests in the latter could not but expose him to questions of a military nature. His text, which contains a number of references to examples from American trade and foreign assistance policy under the Marshall Plan and during the Korean War,[74] indicates the way in which postwar international economic policy and military questions were intertwined. Moreover, Schelling's last section is a description of the implications of war in the nuclear age for self-sufficiency in economic resources.[75] His point here is that the unprecedentedly short timescale of war which nuclear weapons were likely to produce brought new challenges for self-sufficiency. Schelling's momentum in the direction of assessing military affairs as important subjects in themselves seems to have become unstoppable by this time.

TOWARDS A STRATEGY OF CONFLICT

Indeed, *International Economics* was the last of Schelling's works which could be labelled 'mainstream' economics. By the time of its publication, his energies were increasingly being devoted to the development of a more general theory of strategy and to the most pressing problem in contemporary strategic affairs – the question of surprise attack. This work was to become especially well known upon the publication of *The Strategy of Conflict*, which collected these studies in a single text.

Schelling's work on general theory involved an attempt to modify existing game theory.[76] This modification was necessary in Schelling's eyes, because he found that while game theory's emphasis on the interdependence of players' choice of action[77] made it ideal for examining the bargaining situations he was so interested in, existing game theory did not do a good job of explaining the sorts of outcomes which these bargaining situations resulted in. Hence his attempt to 'fit' his own bargaining theory-based approach 'into the framework of game theory'[78] was at the same time an effort to mould game theory into an appropriate form for the study of strategy.

What Schelling found most limiting about existing game theory was its emphasis on situations of pure conflict – zero-sum games, where what one player gains the other loses – and its emphasis on solutions which appealed on exclusively mathematical grounds,[79] in particular, the notion that outcomes would tend to be symmetrical.[80] The former emphasis meant that actors could act quite unilaterally[81] – the purely competitive nature of their relationship meant that there was no incentive to collaborate. The latter meant that the types of bargaining outcomes that Schelling had identified in his earlier work – the

saliences which appealed on symbolic and other grounds – had not been catered for.

In fact by this time, Schelling had further developed his understanding of the processes by which the convergence of expectations took place (at these saliences) to resolve the indeterminacy of bargaining situations. He likens the co-ordination of expectations in these situations to the learning of value systems which goes on in the creation of social norms[82] (and the 'intrinsic magnetism' of these non-mathematical outcomes to the findings of Gestalt psychology).[83] Again 'stability' is a crucial part of the discussion for these 'norms' or 'traditions', these 'rules of the game' are 'stable patterns of behavior'.[84] They are examples of the general principle that 'the outcome of the bargaining process' can be seen as 'some phenomenon of stabilized convergent expectations'.[85]

Game theory thus needed to include the strategies which players adopted in bargaining to communicate incentives in order that expectations could be converged at these sorts of points. Hence, Schelling put into matrix form 'threats, commitments, and promises'[86] – all of which communicate constraints on the actors' potential behaviour,[87] so as to narrow down the range of outcomes. This allows an agreement to be made by which players are able 'to avoid mutual destruction',[88] and engenders an interest on Schelling's part in the enforcement of these bargaining outcomes. Given the need to avoid destruction, it is not surprising that he uses as a powerful and colourful example of enforcement the analogy between the exchange of hostages and the 'balance of terror' as an enforcement scheme for the tacit agreement to refrain from surprise attack. According to Schelling, 'the "balance of terror" that is so often averted to is – if in fact, it exists and is stable – equivalent to a total exchange of all conceivable hostages'.[89]

Schelling thus wanted a theory that could accommodate these sorts of problems, which were much less straightforward, and much more interesting, than situations where conflict was the only element. In a footnote, he calls for a 'theory of interdependent decision', which included not only games of pure conflict, but also those which involved 'common interest'.[90] Within the space of a few months, he had produced such a theory in a mature form. In a paper presented to a conference at Northwestern University in April 1959, Schelling announced this 'theory of interdependent decision'[91] as the embodiment of 'the *strategy* of conflict'[92] applying to all situations within the extremes of 'pure and complete antagonism' and 'pure and complete common interest',[93] where 'strategy' is 'concerned with constraining an adversary through his expectation of the consequences of his actions'.[94] It is notable that this involves an emphasis on the *exploitation* of the bargaining situations Schelling had been interested in for some time – the 'conditioning of

one's own behavior on the behavior of others'[95] – rather than on the bargaining theory *per se*, which does not enjoy quite the pre-eminence it is granted in earlier pieces.[96]

The idea that 'international strategy' is a 'retarded science' in need of general theory implies a criticism of existing work. Schelling's argument here is that 'the literature on deterrence and related concepts has been mainly preoccupied with solving immediate problems rather than with a methodology for dealing with problems'.[97] However, there is also the sense that Schelling himself was becoming immersed in this problem-solving literature. For instance, he cites as examples of 'valuable problem-oriented work' (as opposed to the theoretical work he found considerably *more* valuable) studies by William Kaufmann, Bernard Brodie and Malcolm Hoag, who were all also working at RAND.[98] By this time more and more of the references in Schelling's studies are to works of contemporary strategy such as these.[99] Moreover, contemporary problems in strategy were also helping to define which particular applications of his methodology to focus on, and leading him to introduce new ideas into his analysis.

This can be seen in Schelling's discussion of a range of suitable problems for analysis in the penultimate section of his conference paper. These problems include brinkmanship, the 'false-alarm deterrent threat', 'risk-taking', 'the arms race' and 'unintended war',[100] some of which deserve particular attention because of what they reveal about Schelling's ongoing interest in stability.

Schelling analyses brinkmanship and 'risk-taking' as activities which involve the employment of 'The Threat Which Leaves Something to Chance'.[101] They are variations on the appreciation of risk as a 'strategic variable subject to deliberate manipulation'.[102] Schelling offers the very powerful argument that brinkmanship involves 'the deliberate creation of a risk of war, a risk that one does not completely control'.[103] In this situation, it can be shown that the desirability of stability is highlighted by the danger of instability – of the process running out of control. This idea comes across in Schelling's continuing work on limited war, where he develops his analysis of the 'limiting process' in terms of 'where limits originate in war, what makes them stable or unstable',[104] and focuses increasingly on limited war as a question of manipulating risk. The sense that the prospect of instability increases the appeal of not going beyond stabilising limits is quite clear in his comment that 'a particular limit gains in authority from the lack of confidence that either side may have about what alternative limits may be found if the particular limit is not adhered to'.[105]

The 'arms race' is another important and stimulating problem. Mentioned for the first time by Schelling in the first half of 1959[106] as a

'dynamic feedback system',[107] this reflects the influence of contemporary scholarship and strategic debate. From footnotes in Schelling's work it seems likely that, despite his dislike of the term because of the tendency to use it in a 'journalistic' manner,[108] Schelling was pushed in the direction of analysing arms-race phenomena by Anatol Rapoport's review of Lewis Richardson's arms-race theory.[109] Given Schelling's interest in the extent to which a given arms race produces a 'stable equilibrium',[110] the addition of the arms-race idea into his work[111] constitutes an important part of the content of Schelling's stability analysis.

Schelling's analysis of unintended war as a 'dynamic feedback process' working to a much faster tempo[112] is also a sign of an important addition of questions from the contemporary strategic landscape. For here Schelling explains his concerns about stability with close reference to the contemporary picture – he asks, 'How would we go about proving to the Soviet Union that we were not engaged in surprise attack when in fact we were not but they thought we might be?'[113]

THE SPECIAL PROBLEM OF SURPRISE ATTACK

In fact, Schelling was to see the unintentional encouragement of surprise attack as the dominant threat to stability in the nuclear age. In his concluding thoughts in the long 'The Strategy of Conflict' article, Schelling cites Henry Kissinger's warning about the dangers of the 'tempo of modern war'[114] in support of his own thoughts about the 'temptation toward surprise attack'.[115] During the same stay in London in which he had written this longer piece, Schelling had also written 'The Reciprocal Fear of Surprise Attack',[116] which first appeared as a RAND paper but was relatively little noticed until it became the ninth chapter of *The Strategy of Conflict* in 1960.[117]

This paper demonstrates not so much the urgency of contemporary developments in the military relationship between the superpowers as Schelling's skilful marriage of game and bargaining theory to another strategic problem. In other words, Schelling treats surprise attack as belonging to the category of strategic situations which he had discussed in earlier studies. The crux of the matter is that 'a modest temptation on each side to sneak in a first blow – a temptation too small by itself to motivate an attack – might become compounded through a process of interacting expectations'.[118] In line with his earlier analysis, the interaction of expectations is the locus of the stability problem; this interaction can be seen as a 'simple dynamic "multiplier" system' which can be either 'stable or explosive'[119] according to the relationship between each side's assessment of the other's probability of being attacked.

Schelling's rather intricate analysis of these probabilities, which he presents in matrix and algebraic forms, makes this paper rather challenging reading for anyone completely unacquainted with game theory.[120] Indeed Schelling himself had found this paper particularly difficult to write.[121] The surprise-attack problem is presented as an interesting extension of Schelling's pre-existing theory, and there are few concessions to potential policy applications of his work. However, the timing of the paper is significant – it came hard on the heels of some developments in 1957 which had made surprise attack the dominant problem facing American strategic thought.

To be sure, there had been some earlier attempts to get the question of surprise attack firmly on the agenda. The Eisenhower administration's 'Open Skies' proposal made at the July 1955 superpower summit had suggested mutual access to aerial reconnaissance as a method to reduce the prospect that false or inadequate information could encourage a surprise attack.[122] Even earlier in the decade, RAND studies in which Albert Wohlstetter had been involved had already identified vulnerability to surprise attack as a coming problem.[123]

Yet the American imagination was not seized until the Soviet Union's successful test of an intercontinental ballistic missile (ICBM) and the launch of the Sputnik satellite in October 1957.[124] This was quickly followed by the delivery to the President of the Gaither Report in November, which, reflecting the growing influence of Wohlstetter's assessments, warned that the US Strategic Air Command was vulnerable to surprise attack.[125]

The effect of this sudden upsurge of concerns about surprise attack was to bring into question the long-assumed stability of deterrence. It did this by undermining the assumption that there was no obstacle to the United States' ability to use its nuclear weapons at a place and time of its own choosing, to guarantee its ability to retaliate. It was in this context that stability was transformed from assumed quality to a dominant strategic concept that needed to be articulated. Schelling himself has noted the fundamental transition which occurred in this period. In an interview with the author, he noted that the Gaither Report meant that American officials had for the first time become aware of the role of technology in the delicacy of the balance.[126] Moreover, his analysis in a paper written four years after Sputnik underlines the turning point which 1957 represented – here Schelling reflects that there was 'a stable situation in the sense that the American atomic monopoly, and later preponderance, produced strategic stability from 1945 to 1957'.[127]

While the rather dry discussion of surprise attack in Schelling's 'Reciprocal Fear' paper of April 1958 had occurred at some distance from the gathering concern about the issue among the policy-making community, the same cannot be said for his subsequent work on the subject.

Over the summer, Schelling became involved in the preparations for the conference on surprise attack to be held in Geneva at the end of 1958.[128] In terms of the policy-making process, the main outcome was not a stunningly successful conference. Instead, a group of American officials were now persuaded that the strategic issue of highest priority was 'the stability of reciprocal deterrence'.[129]

In terms of Schelling's own work, the main output of this process was one of his most important pieces of writing. At the end of the year he quickly prepared a paper on surprise attack for a conference at Princeton University which took place in the middle of January 1959. 'Surprise Attack and Disarmament', which first appears in early draft form as a RAND paper,[130] is clearly aimed at a much wider audience than his earlier, more theoretical, studies. At one stage, Schelling had a version of his paper lined up for inclusion in *Foreign Affairs*, the handbook of the American foreign policy-making community, which would have given his ideas unprecedented exposure. Schelling's article was to be a companion piece to Albert Wohlstetter's 'Delicate Balance of Terror',[131] but in the event only Wohlstetter's famous article was published in this journal. Schelling got his own paper published elsewhere, in four separate versions.[132]

However, to borrow from Schelling's philosophy, there was not only competition but cooperation too in the relationship between his 'Surprise Attack and Disarmament' and Wohlstetter's extremely influential view that, because of the growing vulnerability of the United States' retaliatory forces, 'the stability of the balance of terror'[133] was far more precarious than had been thought. Of all of the RAND studies which Schelling had digested during his spell with RAND,[134] Wohlstetter's piece in particular stayed with him[135] as he developed his own arguments about the relationship between surprise attack and stability.

Indeed, Schelling's paper can be readily interpreted as a product of the RAND consensus – of which Wohlstetter's work is the most dramatic example – on the problem of stability. Schelling makes the distinction between 'a stable and an unstable balance of terror'[136] in the sense that, 'the situation is stable when either side can destroy the other when it strikes first or second — that is, when *neither* in striking first can destroy the other's ability to strike back' (emphasis original).[137] It is in terms of this relationship that Schelling builds his assessment of surprise attack. Hence he comments that: 'The special significance of surprise attack … lies in the possible vulnerability of retaliatory forces.'[138] On this question Schelling was also drawing on the thinking of Bernard Brodie. In a very favourable review of Brodie's *Strategy of the Missile Age*, Schelling notes that Brodie's central message is that 'the most urgent problem, now and continually, is to

ensure the invulnerability of our strategic retaliatory forces'.[139] It is also notable that Schelling puts the vulnerability problem into the context of contemporary technology by referring to the recent appearance of hydrogen bombs and missiles to deliver them.[140] This marks an important departure from his earlier, more philosophical work, for this paper has an unmistakable air of immediate policy-relevance.[141]

This is not to deny that there are still occasional indications of Schelling's unique theoretical insights into strategic problems. For example, he argues that there are two main features of 'the stability of the balance of terror — the lack of temptation to deliberate surprise attack, and the immunity of the situation to false alarm'.[142] The second of these provides an avenue for Schelling to explore his particular interest in surprise attack as 'a problem of reciprocal suspicion and aggravated "self-defense"'.[143] In further carry-overs from his earlier work, he also equates a stable 'balance of terror' to 'the exchange of hostages',[144] and refers to the prospects for establishing a 'tradition of successful cooperation'[145] and 'mutually accommodated modes of behavior'[146] as ways to ameliorate the surprise-attack problem.

However, there are now few obvious signs of the bargaining theory which is so central to Schelling's earlier work on strategy. The only exceptions are his references to the (explicit) bargaining which might go on between parties wishing to arrange a reduction in alert status and reassurance of each other's intentions in an emergency.[147] Moreover, and this is quite crucial to the broad appeal of his paper, there are absolutely no references to game theory, despite its important role in Schelling's earlier examination of surprise attack. Indeed, from now on, game theory often barely gets a mention from Schelling in his general discussions of strategy. Instead, for the most part, he restricts analysis of game theory to specialist papers on the subject.

STABILITY AS THE BENCHMARK FOR ARMS CONTROL

'Surprise Attack and Disarmament' thus marks a turning point in Schelling's contribution to strategic thought. His subsequent and more detailed studies of arms control in relation to stability can be seen as a natural development of his 'evaluation of proposed arms limitations'[148] in terms of their likely effect on the stability of deterrence.[149] His basic position is a pragmatic one – an acceptance that, since mutual deterrence cannot be dispensed with, stable mutual deterrence is the best hope under the current circumstances.[150]

During 1960 and 1961, Schelling's work is almost completely dominated by the question: 'How can arms control measures promote

stability?' In so doing, he was a leading player in the analysis of the relationship between the stability of deterrence and arms policy, which had by then grabbed the attention of the strategic community.

Schelling's studies of arms control as a means for stability are products of this gathering institutional recognition of the issue of stability – two east coast gatherings held under the auspices of the American Academy of Arts and Sciences (AAAS). To the first, held in May 1960, Schelling presented his paper 'Reciprocal Measures for Arms Stabilization',[151] which was later included in a book that is the epitome of the arms control-stability discussion.[152] The suddenness of the evolution of this debate is evident from Schelling's opening sentence: 'There has been a widespread change in the thinking on arms control in the last year or so',[153] by which he means the adoption as the guiding principle for arms-control measures the need to protect the ability to deter via secure retaliatory forces. The main cause of this speedy transformation is clear from his comment about the rise of concerns about the effect of *surprise attack* on the reliability of deterrence 'over the last 12 months or so'.[154]

Hence, Schelling was part of something approaching a whirlwind, which at the time appeared only to be increasing in momentum due to the pace of military technological change.[155] The absolute predominance of this issue is reflected in the fact that Schelling's first reference to the concept of stability in the paper is to schemes which 'are or are not conducive to *military* stability' (emphasis added).[156]

This is an easily overlooked, but significant change in Schelling's references to stability, confirming the common impression that stability is mainly a question of the impact *military* technology has on deterrence. Schelling's definition of the difference between 'bilateral military stability or instability'[157] bears this out. The alternatives are developments which would favour 'more secure retaliatory weapon systems with better communication and control, less subject to accident and false alarm' or those which would 'enhance the potency of weapons for pre-emptive attack and aggravate the urge, when in doubt, to strike quickly and without restraint'.[158]

While this is a neat definition, it is actually not much more than an elegant restatement of Schelling's views in 'Surprise Attack and Disarmament'. Moreover, what is striking about Schelling's analysis of the possibility of stability through arms control is the extent to which he relies on his earlier work on stability, which predated the spread of concerns about surprise attack. Indeed, 'arms control' becomes another tool in the strategic bargaining process. It is 'mutual arms accommodation',[159] a version of the stabilising limits in limited war, which rely upon tacit understandings involving 'tradition and precedent'[160] and the clear communication of expectations and behaviour.[161] Hence, while

Schelling's call for the ability to exchange information in times of crisis,[162] to cite an important example, reflects a new contribution in terms of policies for stability, his own understanding of stability as a concept was somewhat more established.[163]

The second AAAS gathering of strategic analysts which stimulated Schelling's work on arms control and stability was a Summer School on Arms Control held on Massachusetts Institute of Technology (MIT) premises near Boston from mid-June to mid-September 1960.[164] The little-known reports of the meetings provide evidence of Schelling's involvement in discussions of military-technological capabilities at a rather detailed level.[165] But the main result for Schelling, to quote his description of his earlier work on a similar theme, was a short book largely 'about principles, not about submarines'.[166] Between September and December, Schelling and Morton Halperin, a young scholar at Harvard who was on the Summer School's secretariat, submitted drafts of chapters to a fall session of the Summer School involving approximately 40 participants.[167] The joint Harvard–MIT Faculty Seminar on Arms Control also provided valuable feedback for Schelling and Halperin.[168] The result was their *Strategy and Arms Control*,[169] which built on the foundations erected by Schelling in his preceding piece on the subject,[170] and which probably marks the high point in the elaboration of stability as a guiding concept for the management of mutual deterrence in American strategic thought.

In this text, the concept of stability is explained in terms of the 'balance of deterrence' which Schelling and Halperin describe as 'a situation in which the incentives on both sides to initiate war are outweighed by the disincentives. This 'balance' is '"stable" when it is reasonably secure against shocks, alarms and perturbations',[171] whether these be crises, accidents or changes in technology. The message which this section delivers is that stability *is* the stability of this balance, that searching for stability is to look for

> military forces on both sides that lend 'stability' to the balance of deterrence – weapons that are unlikely to be substantially destroyed in an enemy attack, weapons that are unlikely to become suddenly impotent because of a technological revolution.[172]

The connection between stability and invulnerable retaliatory forces is quite unmistakable here,[173] aligning Schelling's analysis with the work of Wohlstetter and the other leading strategists in an especially strong sense.[174] This particular understanding of stability, in terms of the prevention of general war involving massive nuclear exchanges,[175] dominates any other notion of the concept which can be found hiding elsewhere in the book. For example, because of the 'qualitative' nature of

the 'current "arms race"',[176] its stability can also be seen largely in terms of the vulnerability of retaliatory forces.[177] This dominant notion also overshadows Schelling and Halperin's argument that increasing the stability of the strategic balance may actually 'make local wars more likely' because of the reduction in fears that a local war will 'spiral to total war'.[178] This rather overlooked observation carries the clear implication that stability applies to the control of limited wars as well as to general war. It also marks Schelling's interest in the relationship between the *stabilities* of these two forms of warfare in the nuclear age.[179]

In other words, Schelling's search for a general theory of strategy *appears* to have taken a bit of a back seat to the demands of the day – the implications of the emerging military technology had taken precedence.[180] There are still signs, however, of Schelling's earlier work. For instance, the authors refer to the potential to be found in 'rules, traditions, and clear expectations'[181] if these are communicated effectively[182] as part of a process of 'tacit bargaining'.[183] But this does not quite create the impression of a theory based around a formal notion of bargaining. It is not immediately obvious to the reader that Schelling is able to draw the parallels between arms control and limited war[184] because of his early studies of the latter in a bargaining context. Moreover, there are absolutely no references to game theory at all – an absence which probably made this sort of work especially digestible for the broader strategic community, over whom this text had such an influence.

A 'STABILISED' CONCEPT OF STABILITY?

By late 1960, and certainly by the time *Strategy and Arms Control* was published, Schelling's approach to stability had settled down into what might be called a 'steady state'. A comparison with Schelling's description of the concept five years after *Strategy and Arms Control* in his next text, *Arms and Influence*, illustrates this well. In the latter book, Schelling is still relying on very much the same sort of metaphor when he describes 'stability' as 'the assurance against being caught by surprise, the safety in waiting, the absence of a premium on jumping the gun'.[185] The essential problem is the same one, despite any changes in the strategic context which may have occurred in the intervening years. It is the dangerous pressure to act urgently, the unwelcome incentives brought about by the military technology of the thermonuclear age. It is instructive to note Schelling's footnote for this short definition of stability, where he advises the reader to 'see Albert Wohlstetter's classic, "The Delicate Balance of Terror" … ; it marks a watershed in professional treatment of the "vulnerability" problem and the stability of deterrence'.[186] The reference points

for the stability concept understood in terms of the stability of deterrence were thus largely unchanged. This is an important illustration of the absence of much further evolution in the concept after 1960 and 1961. In terms of the central interest of this study, these years mark the stage at which the main development of the concept had already occurred.

It is perhaps not surprising to find that, with the stability concept so firmly established, and with concern for stable deterrence through arms control increasingly becoming a priority in US policy circles, at least some of Schelling's studies suggest an attempt to apply the concept to policy questions rather than to develop the theory itself much further. This is particularly the case with some of Schelling's arms-control policy suggestions. For example, in 1960 he called for the United States and the Soviet Union to cooperate in forming 'two versatile, flexible, adaptable observation and communication forces, one for each side and each located in the other's country, whose main function is to be available to meet whatever demands are placed on them in a crisis'.[187]

Here, Schelling was drawing on his expertise which he had fashioned on the things which might go awry so as to frustrate attempts to deter war – the sorts of things which could aggravate the reciprocal fear of surprise attack. His proposal for a surveillance force which would allow both sides to wind down dangerous spirals of aggravating actions – for example to allow a scheme of 'crash disarmament'[188] – is based on the need for any system of deterrence to be able to manage crises, accidents, false alarms and other potential problems.[189] What made these possibilities so dangerous was a familiar problem; contemporary military technology, the 'unstable technology of attack and defense', had created 'an enormous advantage in striking first in the event that war occurs'.[190] In other words, the by now 'stabilised' concept of stability was providing a basis for these practical suggestions.

Schelling's expertise was being noticed. His emphasis on the importance of communication between potential adversaries so as to be able to manage crises and similar incidents was a major stimulus for the installation of the famous 'hotline' telecommunications link between the US and Soviet leaderships.[191] However, such practical spin-offs of Schelling's work should not be taken as a sign that he was now a participant in strategic policy-making and no longer a strategic theorist. His abiding interest in theory, and his tendency to theorise rather uniquely, comes through even in the case of the hotline, whose real importance he later suggested

> … may be largely symbolic. Who could devise a more vivid, simple ceremony to commemorate nuclear age relations than the delivery to the Pentagon of Cyrillic-alphabet teletape machinery, manufactured in the Soviet Union and lend-leased in return for American equipment delivered to the Kremlin.[192]

This was but one sign of a continuing theoretical breadth to Schelling's work in relation to stability. Another indication is that in the early and mid-1960s he continued to argue that the problem of stabilising deterrence was not restricted to the contemporary situation characterised by increasing numbers of thermonuclear weapons on both sides. Rather, it was a general principle which could even be seen in an extensively *disarmed* world – hence, disarmament and stability were by no means synonymous.[193] This implies a slightly broader stability concept than that tied to the vulnerability of retaliatory forces as a temptation to surprise attack. Hence, in one study for the State Department in late 1961, Schelling refers to the 'stability of disarmament' as well as that of 'mutual deterrence', which can be examined against differing versions of the same problem; 'the premium on the initiative – on "going first"'.[194] In both cases, instability is about 'expectations about the consequences of waiting and about the likelihood of war'.[195]

Schelling's discussion of temptations to rearm can be linked back to his earlier work on the tendency for arms races – as particularly interesting forms of arms interaction – to produce stable equilibria. The studies in which Schelling continues and in fact *deepens* his theoretical analysis of arms-race behaviour[196] demonstrate the importance of this class of activity for his stability concept well beyond the very early 1960s. This is shown particularly in Schelling's treatment of arms races as processes of 'feedback'[197] and, in line with the consistent framework behind his writings on strategy, as processes of tacit bargaining.[198]

There was a further type of situation which involved the stability concept – the idea of controlling conflict short of 'general war'.[199] Hence, stability could apply to situations where a war was already occurring. This approach built on his earlier studies on limited war which had begun in 1957. Schelling came to argue that the achievement of stable deterrence, of '"strategic stability" – a time when the danger of explosion to general war is much reduced'[200] – might actually 'make the world safer for local war'.[201]

There was an interesting paradox here. Stable deterrence might make limited wars more likely.[202] However, if there were more limited wars, did this not suggest that there would be more opportunities for a general war to be precipitated by a limited war? In one sense, Schelling's answer was a reassuring 'No'. In a lecture in 1959, he argued that the same factors 'which make all-out war more or less likely in the absence of limited war make it more or less likely in the course of limited war'.[203] Yet there is still an important sense in which the stability of these limited wars is important – again, if there is reassurance that the conflict will not expand to general war, how can one be sure that there is a point at which there will be good reason for any expansion to come to a halt?

To deal with this problem, Schelling drew on his pre-existing theory that if local wars carried little risk of expanding, then some such risk might actually be deliberately created. This meant fostering an impression on the enemy's part that any further step *might* just result in the situation running out of control. By the early 1960s, the changing strategic context demanded a further examination of this sort of risk-taking – the attempt to control by threatening a possible loss of control. This context was generated mainly by the US attempt to build a strategy for defending Europe against threats short of all-out nuclear exchange,[204] although it also came to include such other US interests as the war in Vietnam.

It is notable that Schelling's work on this question involves extensive connections between stability and his old favourites, bargaining and limited war. These ideas are all present in his notion of 'limited reprisal … a war of nerve, of resolve, of risk-taking, of intimidation',[205] which is thus a further example of Schelling's search for suitable limits for a bargaining process. Given the changing strategic context, these limits could take both familiar and not quite so familiar forms. In terms of the former, one may note Schelling's description of a Berlin occupied by a small American garrison as a 'threshold' which would only be crossed at extreme peril in a war which might thus not stay so limited.[206]

As for new limits, none could be more celebrated than the idea of precluding attacks on cities in the early stages of a war involving nuclear weapons. If a 'shared expectation of the possibility' of sparing cities could be deliberately fostered, this might be one way to 'reduce the potential enemy's incentives to pre-empt, and may give him some incentive for pause and self-restraint even when he thinks that war may already have started'.[207] For Schelling, this was a way 'to extend deterrence into war itself'.[208]

Here Schelling appears to be providing much of the basis for Defense Secretary McNamara's famous no-cities speech in June 1962.[209] However, this is to ignore his distinction between the idea of not attacking cities and the idea of vigorously attacking military targets (a 'counterforce' strategy).[210] Rather than opting for the latter, Schelling's approach rested on a familiar analogy. What was special about refraining from an attack on cities is that this provided bargaining power in the form of hostages – his old analogy for stable deterrence applied to the control of a limited war: 'The reason for not destroying the cities is to keep them at our mercy.'[211]

If the hostage idea still suggests an implicit notion of stability at best, then the reader is invited to consider the way Schelling's argument equates success in 'nuclear bargaining' to creating the impression that there are 'stable stopping points'.[212] Schelling's emphasis on the *uniqueness* of this

'nuclear bargaining' in terms of the unparalleled scale and type of violence it would involve[213] is quite different from the *sameness* indicated in McNamara's suggestion that a policy favouring attacks on military targets and sparing cities corresponded to the 'way that more conventional military operations have been regarded in the past.'[214]

Schelling's work on nuclear bargaining in wars which had already begun brought to the forefront the role of armaments as signalling devices[215] rather than as weapons which could be used only in the field of battle. The argument was that: 'A limited war is won, if we have to engage in it, mainly in the minds of the Kremlin and not on the battlefield'.[216] This stance had its apogee in *Arms and Influence*, a title which reflects the idea that, in the nuclear age, *arms* were for *influencing* potential opponents rather than for defeating them. The emphasis on military decisions as means of signalling and demonstration put a premium on the ability to *communicate* these messages clearly.[217] This confirms the consistency of Schelling's strategic thought and analysis of stability from his early study of 'Bargaining, Communication and Limited War' to his examination of the same issues in the mid-1960s in *Arms and Influence*.

But what of that other factor in Schelling's earlier work – the important role played by game theory? There is very little reference to game theory in *Arms and Influence*,[218] and matrices and matrix algebra are conspicuous by their absence. Yet this should not be taken as an abandonment of game theory by Schelling, although as time went on he began to feel that game theory had not 'made progress' in the further development of a theory of strategy.[219] For his part, Schelling had continued to treat game theory as a serious source of insights into strategy[220] and robustly defended it against suggestions that it was a dangerous influence.[221]

SCHELLING'S LATER WORK

As the culmination of Schelling's work on the threat of violence as a bargaining instrument, *Arms and Influence* certainly represents one of the high points in Schelling's strategic thought. However, it also marked something of an end of an era, both in terms of US strategic thinking in general and in terms of Schelling's own work. As for the former, it was one of the last texts of what is often called the 'golden age' of US nuclear strategy.[222] In terms of the latter, by the time *Arms and Influence* was published, Schelling was already moving off into different areas of work. The first sign of this was a paper which Schelling gave in August 1964 and had published in 1965,[223] and as time went on his work was increasingly dominated by issues of often little immediate connection to matters of national security.

It is interesting to speculate about the reasons for this transformation in Schelling's interests. For example, it might be observed that there was a correlation between the relative frequency of Schelling's publications dealing with strategy in the nuclear age and US fortunes in the Vietnam War. Certainly the increasing problems associated with US participation in the war can be expected to have made Schelling's audience less receptive to ideas of exploiting the bargaining potential of threats of violence. However, Schelling's work in the late 1960s shows every sign of him holding to notions of strategic bargaining,[224] and also to the relevance of game theory in strategic analysis;[225] the same basic framework which had informed his earlier analysis of the concept of stability.

Moreover, while Schelling's subsequent work on national security topics appeared much less frequently than in the halcyon days of the late 1950s and early mid-1960s, the consistency of theory is striking. There are numerous examples of this continuity. In the mid-1970s, Schelling discussed nuclear terrorism in terms of the 'passive kind of terrorism that is called "deterrence"'.[226] More than 20 years after identical comments in *Strategy and Arms Control*, he notes that his 'underlying premise' is 'that the worst characteristic of today's strategic weapons is that they provide an advantage, in the event that war occurs, to the side that initiates it'.[227] Twenty-five years on, he also reiterates the idea that 'deterrence should be extended even within war itself; that targets greatly valued by the enemy should be held hostage'.[228]

Hence, other explanations for the relative decline in Schelling's output on military affairs need to be sought. One likely candidate is that the urgency of the situation had been tempered, so reducing the need to continue warning about the dangers of instability. In a 1966 article, Schelling argued that the arms race had eased to the point where 'The arsenals of today are not more frought with the danger of war than those of several years ago', and that 'unilateral improvements in the security of strategic weapons and their command and control have made the danger of pre-emptive warfare – or even inadvertent or accidental warfare – much less serious'.[229]

In a retrospective account, Schelling observes that: 'I have thought the likelihood of war significantly small during the entire period since the early 1970s.'[230] As has been shown in this chapter, theory itself as well as the context in which it develops has always been important as a stimulus for Schelling's work. It seems that by the late 1960s he had nearly exhausted the possibilities for the development of theory from the problems of the nuclear age. To add insult to injury, by 1970 he had 'ceased to be a consultant for the government. I no longer had access to information, and I no longer had an audience'[231] for the work on national security topics.

Hence, for a variety of reasons, Schelling was looking elsewhere for the raw material for theory building.[232] He found useful sources in such questions as organised crime[233] and racial segregation.[234] However, these were not quite so new and distinct from his earlier interests as they may seem. Schelling had not only raised many of these issues in his work on the strategy of conflict,[235] but at times did so in a way which suggests the underlying unity of all of the 'strategic' behaviour which he studied.

Racketeers and gangs, for instance, 'carry on limited war, bend their efforts to disarm … mount surprise attacks, engage in retaliation and threat of retaliation'.[236] In a similar vein, Schelling's development of the 'strategy of self-command'[237] whereby individuals impose rules on themselves to deter themselves from harmful activities such as smoking,[238] bears the hallmarks of Schelling's interest in the creation of stable limits in strategic bargaining. Moreover, in his more recent work on global warming, Schelling returns to the division of foreign aid under the Marshall Plan as a precedent for an international carbon emissions regime, noting in the latter that as yet 'there are no accepted standards of fairness'[239] and that the 'objective should be to stabilize that final concentration [of greenhouse gases] at a level compatible with tolerable climate change'.[240] The consistency in Schelling's work belies the apparent variety of his subjects.[241]

CONCLUSION

The consistency of Schelling's view of strategy, outliving by many years the particular strategic problems which brought stability to the fore, is not the only notable point which emerges from this review. A related observation is the continuing importance of understanding strategy, and by implication the concept of stability, in terms of bargaining. The central chapters of this study will examine the nature of this bargaining framework which applies across a wide range of strategic behaviour. Because it can also be shown that Schelling uses 'stability' in a similarly wide range, the connections between the framework and concept are analysed in some depth. Moreover, the relevance of bargaining and game theory literature to Schelling's approach will also be established.

However, there is another important point to emerge from the current chapter – the importance of the 'dominant' notion of stability in terms of incentives to surprise attack which is found by 1960 in the work of Schelling and a number of his contemporaries. The next chapter will thus examine the common ground between Schelling and a number of his fellow strategists, and to explore the relevance of a set of common concepts which most of these thinkers used in their stability analysis.

The effect will be to assess the generality of Schelling's approach to stability before demonstrating its uniqueness.

NOTES

1. Thomas C. Schelling, 'A Tribute to Bernard Brodie and (Incidentally) to RAND', *RAND* P-6355 (July 1979), p. 1. This paper was reprinted from *International Security*, 3:3 (Winter 1978/79). For a similar demarcation, see Freedman, *Evolution*, p. 228.
2. For basic biographical details see Mark Blaug (ed.), *Who's Who in Economics: A Biographical Dictionary of Major Economists 1700–1986*, 2d edn (Brighton: Wheatsheaf Books, 1986), pp. 755–6, and Brian D. Kux, 'Schelling, Thomas Crombie', in Benjamin Frankel (ed.), *Cold War, 1945–1991: Vol. I, Leaders and Other Important Figures in the United States and Western Europe* (Detroit, MI: Gale Research, 1992), pp. 437–8. For more detail on Schelling's theoretical interests as both a student and researcher, see Schelling's interview with Richard Swedberg in Swedberg, *Economics and Sociology*, pp. 186–99.
3. See Schelling, interview in Swedberg, *Economics and Sociology*, p. 187.
4. For Schelling's description of the Marshall Plan, see Thomas Schelling, 'The Marshall Plan: A Rehearsal for the Atlantic Alliance', in Armand Clesse and Archie C. Epps (eds), *Present at the Creation: The Fortieth Anniversary of the Marshall Plan* (New York: Harper & Row, 1990), pp. 60–9.
5. Interview with Thomas Schelling, University of Maryland College Park, 24 September 1996.
6. Interview with Schelling, 24 September 1996.
7. Schelling retained his ties with RAND and was thereafter an occasional consultant.
8. Schelling's own phrase; interview with Thomas Schelling, King's College, London, 10 November 1994.
9. Thomas C. Schelling, 'Raise Profits by Raising Wages?', *Econometrica*, 14:3 (July 1946), p. 233.
10. When asked about the wisdom of making this sort of connection between his early work on economics and his later analysis of stability in a strategic setting, Schelling replied that such links had not occurred to him, but were plausible ones to make. Interview with Schelling, 24 September 1996.
11. T. C. Schelling, 'Capital Growth and Equilibrium', *American Economic Review*, 37:5 (December 1947), pp. 864–5.
12. Schelling, 'Capital Growth', p. 870.
13. Ibid., p. 873.
14. Ibid., p. 875.
15. This is the first sign of the notion of a self-correcting, almost homeostatic idea of stability in Schelling's work. See Chapter 6 below for further analysis of the relevance of this concept.
16. Thomas C. Schelling, *National Income Behavior: An Introduction to Algebraic Analysis* (New York: McGraw-Hill, 1951). This was preceded by Thomas C. Schelling, 'Income Determination: A Graphic Solution', *Review of Economics and Statistics*, 30:3 (August 1948), pp. 227–9. On the origins of *National Income Behavior* as a response to one of his students' problems with algebra, see Schelling, interview in Swedberg, *Economics and Sociology*, p. 188.
17. See Thomas C. Schelling, 'The Dynamics of Price Flexibility', *American Economic Review*, 39:5 (September 1949), p. 915. Schelling's emphasis in this article on the role of 'expectations' on price levels and employment in terms of the 'speculative

expectation effect' (see ibid., p. 913) is also noteworthy, given the importance of the series of expectations for his later work in strategy. Also note that in his rejoinder to an especially critical review of this article, Schelling notes that the reviewer's own system 'does not discriminate between stable and unstable solutions'. Thomas C. Schelling, 'Rejoinder' to reviews of 'The Dynamics of Price Flexibility', *American Economic Review*, 40:4 (September 1950), p. 612.

18. See Schelling's brief autobiographical note in Blaug, *Who's Who in Economics*, p. 756.
19. Note his recollection that at Harvard 'I got a little interested in game theory and started to write something about bargaining'. Schelling, interview in Swedberg, *Economics and Sociology*, p. 188.
20. Interview with Schelling, 24 September 1996.
21. Ibid.
22. Thomas C. Schelling, 'International Cost-Sharing Arrangements', in *Essays in International Finance*, No. 24 (Princeton, NJ: International Finance Section, Department of Economics and Sociology, Princeton University, September 1955), p. 24.
23. Ibid., p. 23.
24. Ibid., p. 24.
25. In terms of the history of cost-sharing, Schelling mentions the adoption by the League of Nations of the model used by the Permanent Court of Arbitration at the Hague, which was itself based on the Universal Postal Union's cost-sharing arrangement of 1874. See ibid., p. 2.
26. Ibid., p. 23.
27. See Thomas C. Schelling, review of *American Foreign Assistance* by William Adams Brown, Jr and Redvers Opie, *World Politics*, 7:4 (July 1955), p. 625. In his 1957 review of a book dealing with issues of foreign aid and the international economy, Schelling focuses on Gunnar Myrdal's treatment of the concept of 'bargaining power'. See T. C. Schelling, review of *An International Economy* by Gunnar Myrdal, *Review of Economics and Statistics*, 39:2 (May 1957), p. 229.
28. Thomas C. Schelling, 'An Essay on Bargaining', *American Economic Review*, 46:3 (June 1956), pp. 281–306. The managing editor of the *Review* was Bernard F. Haley, whom Schelling later thanked for encouraging his work. See Schelling, 'Preface' to the 1960 edition, *The Strategy of Conflict*, p. vi. Daniel Ellsberg described this article as 'one of the most original, intellectually stimulating pieces that I have ever read'. Daniel Ellsberg to Harry Rowen, 'RAND as a Community of Researchers', 14 April 1967, p. 4, Jim Digby Files, Box 5, Folder 'Ellsberg Advice', RAND Archive, The RAND Corporation, Santa Monica, California. For useful introductory comments on Schelling's bargaining theory with particular reference to his 'An Essay on Bargaining', see Oran R. Young (ed.), *Bargaining: Formal Theories of Negotiation* (Urbana, IL: University of Illinois Press, 1975), pp. 303–18. Schelling's essay is reprinted in ibid., pp. 319–42.
29. Schelling, interview in Swedberg, *Economics and Sociology*, p. 188; author's interview with Schelling, 24 September 1996.
30. See Schelling, 'International Cost-Sharing Arrangements', pp. 6–9.
31. See T. C. Schelling, review of *National Income, 1954 Edition, A Supplement to the Survey of Current Business* prepared by the National Income Division, Office of Business Economics, United States Department of Commerce, Washington, DC, 1954, *The Review of Economics and Statistics*, 37:4 (November 1955), p. 327. Schelling also briefly mentions the connection between trade and security in Thomas C. Schelling, 'Trade Policy in 1954', *Current History*, 27:157 (September 1954), p. 139. There were also military experiences in Schelling's personal life which he could draw upon. On his experience as duty officer at an American embassy during the Pearl Harbor attack in

December 1941, see Thomas C. Schelling, 'The Role of War Games and Exercises', in Ashton B. Carter, John D. Steinbrunner and Charles A. Zraket (eds), *Managing Nuclear Options* (Washington, DC: Brookings Institution, 1987), p. 434.

32. See Schelling, interview in Swedberg, *Economics and Sociology*, p. 188. For examples, see Schelling's citation of the autobiographies of Churchill and Truman; Schelling, 'An Essay on Bargaining', pp. 298–9n15.
33. Schelling, 'An Essay on Bargaining', p. 282. On the importance of indeterminacy, see Chapter 3 below.
34. Ibid., p. 282. On the use of such tactics in negotiations over foreign assistance, see ibid., pp. 286–7. For a discussion of this aspect of Schelling's essay by another scholar with similar interests, see Daniel Ellsberg, 'The Theory and Practice of Blackmail', Lowell Institute Lecture, 10 May 1959 (1962) mimeograph, RAND Corporation Library, pp. 24–6. Also see Young, *Bargaining*, pp. 310, 315.
35. Schelling, 'An Essay on Bargaining', p. 283.
36. Ibid., p. 291. Schelling's earlier work on cost-sharing established the importance of symbols and other qualitative bargaining outcomes. These stand out from divisions of the costs along quantitative grounds which have no intrinsic appeal.
37. Ibid., p. 293.
38. Ibid.
39. Ibid.
40. On communicating evidence, see ibid., p. 296. On the theory of evidence, see Chapter 6 below.
41. Ibid., p. 300
42. See ibid., pp. 302–6.
43. Schelling, 'Preface' (to the 1960 edition), *The Strategy of Conflict*, p. v. (Original emphasis.)
44. Hence Schelling's use of (at least portions of) game theory in early 1956 predates the publication of a work which Schelling relied on heavily. The text is R. Duncan Luce and Howard Raiffa, *Games and Decisions: Introduction and Critical Survey* (New York: John Wiley, 1957). It also predates C. W. Sherwin's review of Warren Amster's work, which treats nuclear deterrence in terms of 'a game not worth playing … a special kind of non-zero-sum game – one where both sides have a probability of great loss'. C. W. Sherwin, 'Securing Peace Through Military Technology', *Bulletin of the Atomic Scientists*, 12:5 (May 1956), p. 162. For Schelling's praise of Sherwin's article, see Schelling, *The Strategy of Conflict*, p. 7n2
45. Thomas C. Schelling, 'Bargaining, Communication, and Limited War', *Journal of Conflict Resolution*, 1:1 (March 1957), pp. 19–36. This was to become the third chapter of *The Strategy of Conflict*.
46. The editor was Kenneth Boulding, who had already refereed Schelling's 'An Essay on Bargaining'. Interview with Schelling, 24 September 1996.
47. Schelling, 'Bargaining, Communication, and Limited War', p. 19.
48. Ibid., pp. 24, 30, 31, 33.
49. Ibid., p. 33.
50. Ibid., p. 35.
51. See Schelling's citation of an article from the *Guardian* on possible limits to nuclear warfare between the United States and the Soviet Union, ibid., pp. 35–6.
52. In particular, see ibid., p. 22.
53. Ibid., p. 21.
54. Ibid., pp. 30–1. The river is analysed at length in Chapter 3 below. Schelling had sent a copy of his paper to Brodie who particularly approved of this aspect of Schelling's analysis. See Brodie to Schelling, 9 January 1957, L-557, Box 2, Folder 11, 'Schelling, Tom', Bernard Brodie Papers, Department of Special Collections, University

Research Library, University of California, Los Angeles. The author is grateful for permission to quote from this collection.

55. Schelling, 'Bargaining, Communication, and Limited War', p. 31.
56. Ibid., p. 20.
57. Ibid., p. 26. Also see ibid., p. 29n8. On the significance of the idea of 'noise', see Chapter 6 below.
58. See ibid., p. 28, where Schelling cites the examples of foreign assistance formulae.
59. Thomas C. Schelling, *International Economics* (Boston, MA: Allyn & Bacon, 1958).
60. For the former, see Schelling, ibid., pp. 183–226 and for the latter, see ibid., pp. 415–62.
61. See the chapter entitled 'International Cost-Sharing Arrangements', in ibid., pp. 463–86.
62. Schelling, *International Economics*, p. 204.
63. Ibid., p. 204.
64. Ibid., p. 205.
65. Ibid., p. 225.
66. See ibid., p. 76. For Schelling's treatment of exchange rate stability and stabilisation, see the chapter entitled 'The Stabilized Exchange Market', pp. 73–85. Also see pp. 17, 90, 95-6, 101, 111.
67. Ibid., p. 90.
68. Ibid., p. 360. Schelling first mentions reciprocity in Schelling, 'Trade Policy in 1954', p. 138.
69. Schelling, *International Economics*, p. 264.
70. See the chapter, 'Economic Warfare and Strategic Trade Controls', in ibid., pp. 487–510.
71. Schelling, *International Economics*, p. 490.
72. In an earlier discussion Schelling refers to the 'escape clause' which requires the US President to increase tariffs should the Tariff Commission rule that such an increase is necessary. He comments that 'the potential application of the escape clause is a significant deterrent' of a change in Congressional tariff policy. Schelling, 'Trade Policy in 1954', p. 142. Schelling makes this point in a section devoted to 'The Stability Question', i.e. stable policies on tariffs; see ibid., pp. 141–2.
73. Schelling, *International Economics*, p. 312. For an earlier mention of programs of 'non-discrimination', see Schelling, 'Trade Policy in 1954', p. 139.
74. On the Marshall Plan, see Schelling, *International Economics*, pp. xiv, 25–8, 416–17, 421–2, 431–4, 439, 458. On the Korean War, see ibid., pp. 25–8, 418, 491.
75. Ibid., pp. 530–2.
76. Hence Thomas C. Schelling, 'The Strategy of Conflict: Prospectus for a Reorientation of Game Theory', *Journal of Conflict Resolution*, 2:3 (September 1958), pp. 203–64, which Schelling wrote while in London. (Interview with Schelling, 24 September 1996.) Upon arriving at RAND he published it in almost identical form as T. C. Schelling, 'Prospectus for a Reorientation of Game Theory', *RAND* P-1491 (17 September 1958). This long essay was the basis for the fourth, fifth and sixth chapters of *The Strategy of Conflict.*
77. Schelling, 'The Strategy of Conflict: Prospectus', p. 205.
78. Schelling, 'Preface' (to the 1960 edition), *The Strategy of Conflict*, p. v.
79. See Schelling, 'The Strategy of Conflict: Prospectus', pp. 217, 221, 246, 252.
80. In another article which originated as a RAND paper and which also became part of *The Strategy of Conflict*, Schelling argued that symmetry was a candidate for the convergence of expectations only in very restricted circumstances where the game itself was of a wholly mathematical nature. In most cases other, non-mathematical clues for convergence would be necessary. See T. C. Schelling, 'For The Abandonment of Symmetry in Game Theory', *The Review of Economics and*

Statistics, 41:3 (August 1959), pp. 221–2. The earlier version was T. C. Schelling, 'For the Abandonment of Symmetry in the Theory of Cooperative Games', *RAND* P-1386 (29 May 1958), and it was revised to become 'Appendix B' of *The Strategy of Conflict*. On the same point, see T. C. Schelling, 'Re-interpretation of the Solution Concept for the "Non-Cooperative" Games', *RAND* P-1385 (2 June 1958), p. 16 (which became 'Appendix C' of *The Strategy of Conflict)*.

81. Schelling, 'The Strategy of Conflict: Prospectus', p. 257. Schelling criticises the famous 'minimax' solution of von Neumann and Morgenstern for this unilateral aspect. For his initial reference to minimax solutions in the context of bargaining moves, see Schelling, 'An Essay on Bargaining', pp. 303–4.
82. See Schelling, 'The Strategy of Conflict: Prospectus', p. 260, where he cites Muzafer Sherif's work on social norms. On the significance of Sherif's work, see Chapter 6 below.
83. Ibid., p. 249n33. The relevance of Gestalt psychology is also discussed in Chapter 6.
84. Ibid., p. 260. Also see ibid., p. 218.
85. Ibid., p. 253.
86. Ibid., p. 240.
87. See ibid., p. 245.
88. Ibid., p. 218.
89. Ibid., p. 231. For further examination of the exchange of hostages analogy in relation to Schelling's understanding of stability, see Chapter 3 below.
90. Ibid., p. 207n4.
91. Thomas C. Schelling, 'Toward a Theory of Strategy for International Conflict', International Relations Conference, Northwestern University, 8–10 April 1959, *RAND* P-1648 (19 March 1959, revised 8 May 1959), p. 20. A very similar version is T. C. Schelling, 'The Role of Theory in the Study of Conflict', *RAND* RM-2515 (13 January 1960), which is reprinted in Trachtenberg (ed.), *The Development of American Strategic Thought*, Vol. III, pp. 161–212. (Despite the date attached to it, RM-2515 also appears to have been produced in the first half of 1959). For a rearranged and revised version of the conference paper, see T. C. Schelling, 'The Retarded Science of International Strategy', *Midwest Journal of Political Science*, 4:2 (May 1960),pp. 107–37. A slightly shortened version of this paper, under the same name, became the first chapter of Schelling's *Strategy of Conflict* (pp. 3–20). A very brief version was published as Thomas C. Schelling, 'The Retarded Science of International Strategy', *Bulletin of the Atomic Scientists*, 16:3 (March 1960), pp. 103–6. (Subsequent references will be to the *Midwest Journal of Political Science* version.)
92. Schelling, 'Toward a Theory', P-1648, p. 1. (Original emphasis.)
93. Ibid., p. 13.
94. Ibid., p. 20.
95. Ibid., p. 19.
96. Schelling spends three paragraphs outlining that 'conflict situations are essentially *bargaining* situations' (emphasis original). See ibid., pp. 3–4.
97. Ibid., p. 6.
98. See ibid., p. 7n. Rather diplomatically, Schelling does not include this list in later published versions of the paper. Instead, he restricts himself to praising the few more theoretical studies he had come across. See Schelling, 'The Retarded Science', p. 112n2; Schelling, *The Strategy of Conflict*, pp. 7–8n2.
99. See Chapter 2 below for further analysis of the connections.
100. See Schelling, 'The Retarded Science', pp. 125–33.
101. See Schelling, *The Strategy of Conflict*, pp. 190–201.
102. Schelling, 'Toward a Theory', P-1648, p. 29.
103. Schelling, *The Strategy of Conflict*, p. 200.

104. T. C. Schelling, 'Nuclear Weapons and Limited War', *RAND* P-1620 (20 February 1959), p. 1. For slightly different versions of the same essay, see T. C. Schelling, 'Nuclear Weapons and Limited War', *RAND* RM-2510 (29 December 1959) and his appendix by the same name in *The Strategy of Conflict*, pp. 257–66.
105. Schelling, 'Nuclear Weapons and Limited War', P-1620, pp. 5–6. Also see Schelling, *The Strategy of Conflict*, p. 261. For more comments on this logic, see Chapter 3.
106. See Schelling, 'Toward a Theory', P-1648, pp. 29–31.
107. See ibid., p. 29. On 'feedback', see Chapter 6.
108. See ibid., p. 29. He is even more critical in another version of the same paper where he states that 'arms race' is not only a 'journalistic' term, but also one used in 'propaganda'. Schelling, 'The Role of Theory in the Study of Conflict', p. 32.
109. See Schelling, 'Toward a Theory', P-1648, p. 29n. For Rapoport's review, see Anatol Rapoport, 'Lewis F. Richardson's Mathematical Theory of War', *Journal of Conflict Resolution*, 1:1 (March 1957), pp. 249–99. Schelling subsequently added Samuel Huntington's essay on arms races to this footnote. See Schelling, 'The Retarded Science', p. 130n24. For Huntington's piece, see Samuel P. Huntington, 'Arms Races: Prerequisites and Results', *Public Policy: A Yearbook of the Graduate School of Public Administration, Harvard University*, 9 (1958), pp. 41–86. For further analysis of arms race thinking in the context of stability, see Chapter 2.
110. Schelling, 'The Retarded Science', p. 130.
111. Note that Schelling simply adds the 'arms race' to the list of activities to which his bargaining-based methodology can be applied. The expanded list becomes: 'Threats and responses to threats, reprisals and counter-reprisals, limited war, arms races, brinkmanship, surprise attack, trusting and cheating.' Schelling, 'The Retarded Science', p. 120. For more analysis of Schelling's treatment of 'arms races', see Chapter 2.
112. Schelling, 'The Role of Theory in the Study of Conflict', p. 34.
113. Schelling, 'The Retarded Science', p. 132.
114. Quoted in Schelling, 'The Strategy of Conflict: Prospectus', p. 262n43, from Henry A. Kissinger, *Nuclear Weapons and Foreign Policy* (New York: Harper & Brothers, 1957), p. 225. This was the first time Schelling had quoted a major contemporary piece on nuclear strategy. That it is Kissinger's book is not surprising, given that this was the first 'best seller of the nuclear age'. Lawrence Freedman, 'Henry Kissinger', in Baylis and Garnett, *Makers of Nuclear Strategy*, pp. 98, 100.
115. See Schelling, 'The Strategy of Conflict: Prospectus', p. 262.
116. T. C. Schelling, 'The Reciprocal Fear of Surprise Attack', *RAND* P-1342 (16 April 1958; revised 28 May 1958).
117. See Schelling, *The Strategy of Conflict*, pp. 207–29.
118. Schelling, 'The Reciprocal Fear of Surprise Attack', P-1342, p. 1; Schelling, *The Strategy of Conflict*, p. 207.
119. Schelling, 'The Reciprocal Fear of Surprise Attack' P-1342, p. 21; Schelling, *The Strategy of Conflict*, p. 223. For further analysis of Schelling's stability concept using this idea of a 'multiplier' system, see Chapter 5.
120. In December 1958, Schelling presented a version of this paper to a meeting of the Econometric Society. For an abstract, which contains portions of the original RAND paper, see T. C. Schelling, 'Surprise Attack: A Study in Reciprocal Distrust' (Abstract of Paper Presented to Meeting of the Econometric Society, Chicago, 27 December 1958), *Econometrica*, 27:2 (April 1959), p. 298.
121. Interview with Schelling, 24 September 1996.
122. For a contemporary reference, see Kissinger, *Nuclear Weapons*, p. 214.
123. See the extensive analysis of this point with reference to a number of the RAND studies and to Wohlstetter's approach to stability in Chapter 2.

124. For Schelling's references to the consequences of these developments for strategic thinking, see Thomas C. Schelling, 'Nuclears, NATO and the "New Strategy"', in Henry A. Kissinger (ed.), *Problems of National Strategy* (New York: Praeger, 1965), p. 181; Thomas C. Schelling, 'What Went Wrong With Arms Control?', *Foreign Affairs*, 64:2 (Winter 1985/86), p. 220.
125. See Rosecrance, 'Wohlstetter', pp. 58, 62; Morton H. Halperin, 'The Gaither Committee and the Policy Process', *World Politics*, 13:3 (April 1961), p. 366n21; Freedman, *Evolution*, p. 160; Schelling, 'What Went Wrong With Arms Control?', p. 220. On the impact of Wohlstetter's briefing on the writers of the report, see Herken, *Counsels of War*, p. 114. The Gaither Report was entitled 'Deterrence and Survival in the Nuclear Age', and is reprinted in Trachtenberg, *The Development of American Strategic Thought. Vol. I, Basic Documents*, pp. 511–59.
126. Interview with Schelling, 10 November 1994.
127. T. C. Schelling, 'The Stability of Total Disarmament', Special Studies Group, Study Memorandum No. 1 (Washington, DC: Institute for Defense Analyses, 1 October 1961), p. 31.
128. For instance, Schelling recalls an informal preparatory meeting of Assistant Secretaries (Departments of State and Defense and CIA) in the early summer of 1958. The conclusion had been that the special property of surprise attack was that, if sufficiently large, it could threaten retaliatory forces. Interview with Schelling, 10 November 1994.
129. Interview with Schelling, 10 November 1994.
130. T. C. Schelling, 'Surprise Attack and Disarmament', *RAND* P-1574 (10 December 1958). The conference paper, which barely differs from the RAND original save for a few updated footnotes, was published as Thomas C. Schelling, 'Surprise Attack and Disarmament', in Klaus Knorr (ed.), *NATO and American Security* (Princeton, NJ: Princeton University Press, 1959), pp. 176–208. On this essay's origins in the preparations for the Geneva Conference, see Schelling, 'What Went With Arms Control?', p. 221n1.
131. Interview with Schelling, 24 September 1996.
132. A considerably shorter version of the RAND paper and Knorr version ended up as the tenth, and most quotable, chapter of *The Strategy of Conflict*. See Schelling, *The Strategy of Conflict*, pp. 230–54. An even briefer version was published as Thomas C. Schelling, 'Surprise Attack and Disarmament', *Bulletin of the Atomic Scientists*, 15:10 (December 1959), pp. 413–18, and reprinted under the same name in *Survival*, 2:1 (January–February 1960), pp. 5–11.
133. Wohlstetter, 'The Delicate Balance of Terror', p. 217. In a book edited by Klaus Knorr, there are numerous signs of Wohlstetter's impact. His 'Delicate Balance of Terror' article is cited in papers by Malcolm Hoag, Arthur Lee Burns and by Knorr himself. Knorr also cites the work of Brodie, Herman Kahn and Glenn Snyder, but does not cite Schelling, an indication perhaps of the extent to which Schelling had yet to become recognised as a prominent strategic thinker. See Klaus Knorr, 'NATO Defense in an Uncertain Future', in Knorr (ed.), *NATO and American Security* (Princeton, NJ: Princeton University Press, 1959), pp. 279–306.
134. For Schelling's comment that the influence of his RAND colleagues on his paper is 'too great to cite in detail', see Schelling, 'Surprise Attack and Disarmament', P-1574, p. iii.
135. Schelling had read an early draft of the 'Delicate Balance of Terror', which Wohlstetter had written before the Geneva Conference. See Schelling, 'Surprise Attack and Disarmament', P-1574, p. 7n3. For Schelling's reference to the influence of an early version of Wohlstetter's article (an 'intellectual milestone') on the preparations for the Geneva Conference, see Schelling, 'What Went Wrong With Arms

Control', p. 221n. Also see Schelling, 'Nuclears, NATO and the "New Strategy"', p. 181. For a RAND version of the famous article, see A. J. Wohlstetter, 'The Delicate Balance of Terror', *RAND* P-1472 (6 November 1958, revised December 1958).

136. Schelling, 'Surprise Attack and Disarmament', P-1574, p. 5.
137. Ibid., P-1574, p. 4. The reference to first and second strikes is a clear sign of Wohlstetter's influence. For further analysis of this important passage in Schelling's work, see Chapter 2.
138. Schelling, 'Surprise Attack and Disarmament', P-1574, p. 5.
139. T. C. Schelling, review of *Strategy in the Missile Age* by Bernard Brodie, *Science*, 131: 3399 (19 February 1960), p. 493. In the later versions of 'Surprise Attack and Disarmament', Schelling cites Brodie's book (on the retaliatory advantages of 'super-dirty bombs'). See Schelling, *The Strategy of Conflict*, p. 239n6. In the Knorr version he cites Brodie's 'Anatomy of Deterrence', *World Politics*, 11:2 (January 1959). See Schelling, 'Surprise Attack and Disarmament', in Knorr, *NATO and American Security*, p. 188n8. In the original version Schelling cites Brodie's 'Anatomy of Deterrence' as a RAND paper published in 1958. See Schelling, 'Surprise Attack and Disarmament', P-1574, p. 19n8.
140. Schelling, 'Surprise Attack and Disarmament', P-1574, p. 23. For his reference to 'the technology of modern surprise attack', which 'may not make the initiation of general war anything like suicide', see Schelling, review of *Strategy in the Missile Age*, p. 493.
141. Schelling refers to the 1955 Open Skies proposal as an early attempt to address the problem of surprise attack. See Schelling, 'Surprise Attack and Disarmament', P-1574, pp. 1, 22.
142. Ibid., p. 43. For Schelling's earlier reference to attack through false alarm, see Schelling, 'The Reciprocal Fear of Surprise Attack', pp. 17–18.
143. Schelling, 'Surprise Attack and Disarmament', P-1574, p. 3.
144. Ibid., p. 19.
145. Ibid., p. 1.
146. Ibid., p. 22.
147. See ibid., pp. 34–5, 39.
148. Ibid., p. 10.
149. For references to stability in this context, see ibid., pp. 13, 14, 15, 16, 18, some of which occur in sections which do not appear in the version of the paper contained in *The Strategy of Conflict*.
150. For Schelling's reference to 'taking for granted the idea that nuclear deterrence was here to stay for the foreseeable future' during this period, see Thomas C. Schelling, 'The Thirtieth Year', *Daedalus*, 120:1 (Winter 1991), p. 24.
151. T. C. Schelling, 'Reciprocal Measures for Arms Stabilization', *Daedalus*, 89 (Fall 1960), pp. 892–914. The idea of a special issue of *Daedalus* on arms control belonged to the Harvard University physicist Gerald Holton, the Academy's editor-in-chief, who invited the MIT mathematician Donald Brennan to be guest editor. Among those also giving papers were Herman Kahn, Kissinger and Boulding. Also attending the conference were Wohlstetter, Luce and Raiffa.
152. Thomas C. Schelling, 'Reciprocal Measures for Arms Stabilization', in Donald G. Brennan (ed.), *Arms Control, Disarmament, and National Security* (New York: George Braziller, 1961), pp. 167–86. This essay also appeared as T. C. Schelling, 'Reciprocal Measures for Arms Stabilization', *Survival*, 3:2 (March–April 1961), pp. 50–61. (Hereafter references will be to the *Daedalus* version.)
153. Schelling, 'Reciprocal Measures', p. 892. Also note Holton's comment about the *Daedalus* special issue that, 'As recently as a year ago a coordinated group of papers of this range and quality could not have been assembled.' Gerald Holton, 'Editor's Prefactory Note', *Daedalus*, 89:4 (Fall 1960), p. 675. Holton's comments are also

noted in Emanuel Adler, 'Arms Control, Disarmament, and National Security: A Thirty Year Retrospective and a New Set of Anticipations', *Daedalus*, 120:1 (Winter 1991), p. 3.

154. Schelling, review of *Strategy in the Missile Age*, p. 493.
155. See Schelling, 'Reciprocal Measures', p. 898.
156. Ibid., p. 897.
157. Ibid., p. 899.
158. Ibid., p. 899n. For his call for 'strategic forces that do not have to go off like a match in a fireworks factory when the lights start flashing', see Thomas C. Schelling, 'Meteors, Mischief and War', *Bulletin of the Atomic Scientists*, 16:7 (September 1960), p. 300.
159. Schelling, 'Reciprocal Measures', p. 904.
160. Ibid., p. 902.
161. See Ibid., pp. 903–7.
162. See Ibid., p. 910.
163. For the repetition of the exchange of hostages analogy, see ibid., pp. 892, 895.
164. For a brief analysis which does not distinguish between the origins of the *Daedalus* special issue and the Summer School, see Michael Krepon, 'Has Arms Control Worked?', *Bulletin of the Atomic Scientists*, 45:4 (May 1989), p. 28.
165. For example, Schelling refers to the contrast between what was needed for 'stable retaliation' and 'what the Air Force likes to think of as deliverable megatonnage in the period 1965–1970'; Schelling's remarks to 'Deterrence Force Composition' seminar, ACS-9, 29 June 1960, in the American Academy of Arts and Sciences', in *Summer Study on Arms Control: Collected Papers* (Boston, MA: The American Academy of Arts and Sciences, 1961), p. 59. This set of papers had only limited distribution. Schelling was also on the Steering Committee of the Summer Study. Other noticeable attendees included Kahn, Luce, the British disarmament campaigner Philip Noel-Baker and the Harvard economist Arthur Smithies.
166. Schelling, 'Surprise Attack and Disarmament', P-1574, p. 18n7.
167. Interview with Schelling, 10 November 1994.
168. For Schelling's reference to the Seminar, see Schelling, 'What Went Wrong With Arms Control?', p. 223.
169. Thomas C. Schelling and Morton H. Halperin, *Strategy and Arms Control* (New York: The Twentieth Century Fund, 1961).
170. For example, note the similarity between Schelling and Halperin, ibid., p. 3 and Schelling, 'Reciprocal Measures', p. 895.
171. Schelling and Halperin, *Strategy and Arms Control*, p. 50.
172. Ibid., p. 55. For analysis of the concept of 'balance', see Chapter 2.
173. For Schelling's retrospective reference to the belief at the time of writing *Strategy and Arms Control* that 'a second-strike destructive potential on both sides – the absence of a first-strike capability to eliminate retaliatory potential – was probably the best nuclear configuration to be hoped for', see Thomas C. Schelling, 'From an Airport Bench', *Bulletin of the Atomic Scientists*, 45:4 (May 1989), p. 29.
174. For Schelling and Halperin's reference to work by Wohlstetter, Brodie and Kahn in terms of the question of 'vulnerability in relation to the strategic balance', see Schelling and Halperin, *Strategy and Arms Control*, p. 10n. See Chapter 2 below for an extended discussion of the similarity between Schelling's work and the other strategists from the starting point of *Strategy and Arms Control*.
175. Note that Schelling and Halperin's first chapter is 'Arms Control and General War'. See below for Schelling's definition of general war.
176. Schelling and Halperin, *Strategy and Arms Control*, p. 37.
177. For example, see ibid., p. 36. Many of these observations about the nature of 'arms

races' can be traced back to Schelling's earlier analysis of the nature of 'The Arms Race' in Schelling, 'Toward a Theory', P-1648, pp. 29–31, which does not appear in the version of the essay published in *The Strategy of Conflict*.

178. Schelling and Halperin, *Strategy and Arms Control*, p. 31. Nearly 30 years on, Schelling suggested that most people would judge this 'tradeoff' to be 'advantageous'. Schelling, 'From an Airport Bench', p. 30.
179. See below for more analysis of this point.
180. For acknowledgement of the emphasis on military factors, see Schelling and Halperin, *Strategy and Arms Control*, pp. 5–6.
181. Ibid., p. 4.
182. Ibid., pp. 78–82.
183. Ibid., p. 81.
184. See ibid., p. 78, which draws on Schelling's analysis of 'Limited War as "Arms Control"', a short section in Schelling, 'Reciprocal Measures', pp. 902–4.
185. Schelling, *Arms and Influence*, p. 235.
186. Ibid., p. 235n4.
187. T. C. Schelling, 'Arms Control: Proposal for a Special Surveillance Force', *World Politics*, 13:1 (October 1960), p. 11. In December 1960, Schelling took a translation of his proposal for such a force to the Pugwash Conference in Moscow but it 'did not get very far'. Thomas C. Schelling, 'Confidence in Crisis', p. 59.
188. Schelling, 'Arms Control: Proposal', pp. 5–6. For Schelling's analysis of the danger of accidental war, see Schelling, 'Meteors, Mischief, and War', pp. 293–5. His approach to accidental war was stimulated especially by Peter Bryant's fictional work, *Red Alert* (New York: Ace, 1958), which Schelling found the most detailed and convincing argument of how a war could start. Interview with Schelling, 24 September 1996.
189. For a list, see Schelling, 'Arms Control: Proposal', p. 3.
190. Ibid., p. 4. On the question of offensive and defensive weapons, see Chapter 2.
191. See Webster A. Stone, 'The Hot Line: Washington–Moscow Direct Communication Link, 1963 to the Present', in Richard Dean Burns (ed.), *Encyclopedia of Arms Control and Disarmament* (New York: Charles Scribner's, 1993), Vol. II, p. 848. For Schelling's reference to 'the gold-plated telephone', see T. C. Schelling, 'Arms Control Will Not Cut Defense Costs', *Harvard Business Review*, 39:2 (March–April 1961), p. 157.
192. T. C. Schelling, 'Signals and Feedback in the Arms Dialogue', *Bulletin of the Atomic Scientists*, 21:1 (January 1965), p. 6. This article is a shortened version of Thomas C. Schelling, 'The Role of Communication in Arms Control', in Evan Luard (ed.), *First Steps To Disarmament: A New Approach to the Problems of Arms Reductions* (London: Thames & Hudson, 1965), pp. 201–25.
193. For an earlier suggestion that less does not necessarily mean better, see Schelling, 'Surprise Attack and Disarmament', P-1574, pp. 13–14.
194. Schelling, *The Stability of Total Disarmament*, p. 5. This quotation comes from the second chapter entitled 'The Idea of Stability'. See ibid., pp. 5–7. Schelling had prepared this paper as part of the State Department's Project VULCAN, established in February 1961 to look at 'Arms Control and a Stable Military Environment'.
195. Schelling, *The Stability of Total Disarmament*, p. 6. For a prominently published paper which contains many of the same arguments from this study and from *Strategy and Arms Control*, see Thomas C. Schelling, 'The Role of Deterrence in Total Disarmament', *Foreign Affairs*, 40:3 (April 1962), pp. 392–406.
196. For Schelling's most involved piece of this sort, see his critical analysis of arms-race theories in Thomas C. Schelling, 'War Without Pain, and Other Models', review of *Conflict and Defense: A General Theory*, by Kenneth E. Boulding, *World Politics*, 15:3 (April 1963), pp. 465–87.

197. See Thomas C. Schelling, 'Managing the Arms Race', in David M. Abshire and Richard V. Allen (eds), *National Security: Political, Military, and Economic Strategies in the Decade Ahead* (New York: Praeger, 1963), pp. 601, 608, 609. Schelling prepared this paper for a conference at the Center for Strategic Studies, Georgetown University in January 1963. It was reprinted under the same name in Kissinger (ed.), *Problems of National Strategy*, pp. 361–75.
198. See Schelling, 'Managing the Arms Race', in Abshire and Allen, *National Security*, p. 604; Schelling, 'War Without Pain', pp. 470–1, 476–7; Schelling, 'Signals and Feedback', pp. 8, 10.
199. For references to 'general war' in addition to that in *Strategy and Arms Control* mentioned above, see Thomas C. Schelling, 'Comment', in Klaus Knorr and Thornton Read (eds), *Limited Strategic War* (New York: Praeger, 1962), p. 242; T. C. Schelling, 'Nuclear Strategy in Europe', *World Politics*, 14:3 (April 1962), p. 428. In his best known discussion of this question, Schelling defines 'general war' as 'a war involving the strategic weapons and homelands of the United States and the Soviet Union'. T. C. Schelling, 'Controlled Response and Strategic Warfare', *Adelphi Paper*, 19 (London: Institute for Strategic Studies, June 1965), p. 4. Schelling wrote this paper while a Visiting Research Associate at the Institute in 1965, at which time he was preparing the final draft of *Arms and Influence*. See Schelling, *Arms and Influence*, p. viii. The *Adelphi Paper* gets special attention in Bobbitt, *Democracy and Deterrence*, pp. 57–60.
200. Schelling, 'Nuclear Strategy in Europe', p. 428.
201. Schelling and Halperin, *Strategy and Arms Control*, p. 62. For a particularly clear warning about this problem, see Schelling, *The Stability of Total Disarmament*, p. 27.
202. On this 'stability–instability paradox', see Jervis, *The Meaning of the Nuclear Revolution*, pp. 19–22.
203. T. C. Schelling, 'Limited War' (Center for International Affairs, Harvard University: November 1959), lecture delivered to the National War College, 18 November 1959, p. 3, Box 27, Folder 'Schelling, Thomas C.', Brodie Papers.
204. Hence in a paper on the Berlin crisis, Schelling wrote that: 'The important thing in limited war is to impress the Soviet leadership with the risk of general war – a war that may occur whether we or they intend it or not.' T. C. Schelling, 'Nuclear Strategy in the Berlin Crisis', 5 July 1961, in Marc Trachtenberg (ed.), *The Development of American Strategic Thought: Writings on Strategy, 1961–1969, and Retrospectives* (New York: Garland Publishing, 1988), p. 9.
205. Schelling, 'Comment', p. 253. Also see Thomas C. Schelling, 'The Threat of Violence in International Affairs', *Proceedings of The American Society of International Law*, 57 (25–27 April 1963), p. 105; Schelling, 'Nuclear Strategy in Europe', pp. 428–32. For an earlier reference to the same idea, see Schelling, 'Limited War' lecture, p. 5.
206. Thomas C. Schelling, 'Deterrence: Military Diplomacy in the Nuclear Age', *Virginia Quarterly Review*, 39:4 (Autumn 1963), p. 538.
207. T. C. Schelling, 'Dispersal, Deterrence, and Damage', *Operations Research*, 9 (May–June 1961), p. 365. In this article, Schelling presents an analysis 'giving quantitative weights to alternative outcomes of war', (ibid., p. 363) a sign that in addition to game theory, he also occasionally made use of the operations research/systems analysis approach favoured by so many at RAND. For an earlier indication of Schelling's familiarity with operations research, see T. C. Schelling, 'Comment (Economics and Operations Research: A Symposium)', *Review of Economics and Statistics*, 40:3 (August 1958), pp. 221–4. For Schelling's contribution to RAND's most notable attempt to publicise this approach to strategy, see Thomas C. Schelling, 'Assumptions About Enemy Behavior', in E. S. Quade (ed.), *Analysis for Military Decisions* (Chicago, IL: Rand McNally, 1964), pp. 199–216. This was Schelling's

lecture to a RAND course in 1959 entitled 'An Appreciation of Analysis for Military Decisions'.

208. Schelling, 'Controlled Response', p. 4. For Schelling's defence of the thinking behind the idea of withholding cities from attack on the basis of extending deterrence into war, see Schelling, 'Nuclears, NATO and the "New strategy"', p. 183. This essay, which Schelling wrote in 1963, was the basis for translated versions which appeared in German, French and Italian publications in 1963 and 1964.
209. For Schelling's reference to McNamara's speech see Schelling, 'Nuclears, NATO and the "New strategy"', p. 179; Schelling, 'Controlled Response', p. 4. For further examination of the speech, see William W. Kaufmann, *The McNamara Strategy* (New York: Harper & Row, 1964), pp. 114–17; Desmond Ball, *Politics and Force Levels: The Strategic Missile Program of the Kennedy Administration* (Berkeley, CA: University of California Press, 1980), pp. 196–8; Freedman, *Evolution*, p. 235. For a most helpful summary of this issue in relation to Schelling's work, see Bobbitt, *Democracy and Deterrence*, pp. 37, 57–60.
210. Schelling felt very much that he was rather alone in pushing this distinction between sparing cities and counterforce. He recalled that with the exception of Herman Kahn, no-one else seemed to be interested in how to stop a war once it had begun. Interview with Schelling, 24 September 1996. For Schelling's emphasis on the distinction between sparing cities and counterforce, see Schelling to Brodie, February 22, 1965, p. 4, Box 2, Folder 11, Bernard Brodie Papers.
211. Schelling, 'Controlled Response', p. 5. Schelling's refers to 'hostages' in ibid., pp. 5–6, 9. For Schelling's argument that the work of an international military force might be made easier by 'providing the authority with "hostages" and that, by the same token, a recalcitrant government might *deter* the force from taking action against it by 'using its own population as hostages', see Thomas C. Schelling, 'The Strategic Problems of an International Armed Force', *International Organization*, 17:2 (Spring 1963), pp. 478–9. This essay was also published as Thomas C. Schelling, 'Strategy: A World Force in Operation', in Lincoln P. Bloomfield (ed.), *International Military Forces: The Question of Peacekeeping in an Armed and Divided World* (Boston, MA: Little, Brown, 1964), pp. 212–35.
212. Schelling, 'Controlled Response', p. 10.
213. Ibid., pp. 8–9.
214. As quoted in Kaufmann, *McNamara Strategy*, p. 116, and requoted in Ball, *Politics and Force Levels*, p. 197. For a further quotation, and commentary on Schelling's disagreement with the McNamara approach on this point, see Freedman, *Evolution*, pp. 235–6. For an analysis which suggests that Schelling was 'sympathetic' to McNamara's emphasis on the continuity in strategy, see Williams, 'Thomas Schelling', p. 127. Williams' argument that 'Schelling saw the virtues of counterforce strategies' (ibid., p. 133) seems difficult to justify.
215. See Schelling, 'Nuclears, NATO and the "New strategy"', p. 178; Schelling, 'The Threat of Violence', p. 166; Schelling, 'Signals and Feedback', pp. 6–7.
216. Schelling, 'Deterrence: Military Diplomacy', p. 545.
217. See especially Schelling, 'Nuclear Strategy in Europe', p. 424. This essay, published in 1962, provides a very clear analysis of the role of nuclear weapons in 'a war of nerve, of demonstration, and of bargaining'; ibid. p. 427. On the possibility of learning and teaching which 'demonstration' implies, see Chapter 6 below.
218. The exception is a very informal discussion of games of 'chicken'; Schelling, *Arms and Influence*, pp. 116–25, which builds on a shorter examination of 'chicken' in Schelling, 'The Threat of Violence', pp. 106–7. For an explanation of chicken, see Chapter 4 below.
219. Thomas C. Schelling and Malcolm Palmatier, 'Economic Reasoning and National

Defense', in Alan A. Brown, Egon Neuberger and Malcolm Palmatier (eds), *Perspectives in Economics* (New York: McGraw-Hill, 1971), p. 150.

220. See Thomas C. Schelling, 'Experimental Games and Bargaining Theory', *World Politics*, 14:1 (October 1961), pp. 47–68, which was also published in Klaus Knorr and Sidney Verba (eds), *The International System: Theoretical Essays* (Princeton, NJ: Princeton University Press, 1961), pp. 213–42. (Subsequent references are to the *World Politics* version.) Also see T. C. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', in A. Mensch (ed.), *Theory of Games: Techniques and Applications: The Proceedings of a Conference Held under the Aegis of the NATO Scientific Affairs Committee, Toulon, 29th June–3rd July 1964* (London: English Universities Press, 1966), pp. 469–80.
221. See Thomas C. Schelling, review of *Strategy and Conscience* by Anatol Rapoport, *American Economic Review*, 54:6 (December 1964), pp. 1082–8.
222. See Booth's list of texts belonging to the 'golden age' in Booth, 'The Evolution of Strategic Thinking', p. 50.
223. See T. C. Schelling, 'Strategic Analysis and Social Problems', *Social Problems*, 12:4 (Spring 1965), pp. 367–79. For a sequel, see Thomas C. Schelling, 'Game Theory and the Study of Ethical Systems', *Journal of Conflict Resolution*, 12:1 (March 1968), pp. 34–44.
224. See Thomas C. Schelling, 'Communication, Bargaining and Negotiation', *Arms Control and International Security*, 1 (1969), pp. 63–72, for an application of this thinking to bargaining over ABMs.
225. See T. C. Schelling, 'The Strategy of Inflicting Costs', in Roland N. McKean (ed.), *Issues in Defense Economics* (New York: National Bureau of Economic Research, 1967), pp. 105–27; Thomas C. Schelling, 'Notes on Policies, Games, Metagames, and Vietnam', *Peace Research Society (International) Papers*, 10 (1968), pp. 143–7. For Schelling's later reflections on the lessons of Vietnam which show no sign of an abandonment of his approach, see his comments in Stanley Hoffman, Samuel P. Huntington, Ernest R. May, Richard N. Neustadt and Thomas C. Schelling, 'Vietnam Reappraised', *International Security*, 6:1 (Summer 1981), pp. 3–26.
226. Thomas C. Schelling, 'Who Will Have the Bomb?', *International Security*, 1:1 (Summer 1976), p. 85. For a continuation of this argument see Thomas C. Schelling, 'Thinking about Nuclear Terrorism', *International Security*, 6:4 (Spring 1982), p. 67.
227. Schelling, 'Confidence in Crisis', p. 65. Similarly, for Schelling's confirmation of the signalling role of military behaviour twenty years after *Arms and Influence*, see Schelling, 'The Role of War Games and Exercises', pp. 426–30.
228. Schelling, 'From an Airport Bench', p. 30.
229. Thomas C. Schelling, 'Perspective on Disarmament', *Disarmament*, 9 (March 1966), p. 13.
230. Schelling, 'From an Airport Bench', p. 129. Schelling has recalled that he was unconcerned about supposed 'windows of vulnerability' because of the strength of the tacit understanding between the United States and Soviet Union, which allowed both to be confident that neither side would be able to go to war. Interview with Schelling, 24 September 1996.
231. Schelling, interview in Swedberg, *Economics and Sociology*, p. 189.
232. One exception which indicates there was still some promise in exploring bargaining involving armaments is Thomas C. Schelling, 'A Framework for the Evaluation of Arms-Control Proposals', *Daedalus*, 104:3 (Summer 1975), pp. 187–200.
233. See Thomas C. Schelling, 'Economics and Criminal Enterprise', *The Public Interest*, No. 7 (Spring 1967), pp. 61–78; Thomas C. Schelling, 'What Is the Business of Organized Crime?', *Journal of Public Law*, 20 (1971), pp. 71–84.
234. See Thomas C. Schelling, 'Models of Segregation', *American Economic Review*, 59:2 (May 1969), pp. 488–93; T. C. Schelling, 'Dynamic Models of Segregation', *Journal of*

Mathematical Sociology, 1:2 (July 1971), pp. 143–86. This was based on Schelling's work at RAND during the summer of 1968. See Schelling, interview in Swedberg, *Economics and Sociology*, p. 191; Thomas C. Schelling, 'Models of Segregation', *RAND* RM-6014-RC (May 1969). Further analysis of segregation is to be found in Schelling's chapter 'Sorting and Mixing: Age and Income', in Thomas C. Schelling, *Micromotives and Macrobehavior* (New York: W.W. Norton, 1978), pp. 167–90. Also see Avinash K. Dixit and Barry J. Nalebuff, *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life* (New York: W.W. Norton, 1991), pp. 241–3.

235. For his reference in 1958 to 'tipping', see Schelling, 'Prospectus for a Reorientation of Game Theory', P-1491, p. 12. For analysis of this issue, see Chapter 6.
236. See Schelling, 'The Role of Theory in the Study of Conflict', RM-2515, p. 15. Also see Schelling, *The Strategy of Conflict*, p. 12.
237. See, for example, Thomas C. Schelling, 'Command and Control', in Thomas C. Schelling, *Choice and Consequence* (Cambridge, MA: Harvard University Press, 1984), pp. 27–56, which originally appeared under the same name in James W. McKie (ed.), *Social Responsibility and the Business Predicament* (Washington, DC: The Brookings Institute, 1974), pp. 79–108. Also see Thomas C. Schelling, 'The Intimate Contest for Self-Command', *The Public Interest*, 60 (Summer 1980), pp. 94–118. For a commentary on this aspect of Schelling's theorising, see Michael McPherson, 'On Schelling, Hirschman, and Sen: Revising the Concept of the Self', *Partisan Review*, 51:2 (Spring 1984), pp. 238–41.
238. See Schelling's comments on this sort of work in Thomas C. Schelling, 'Strategy and Self-Command' *RAND* P-7200-RGI (November 1985), p. 2. On the strategic significance of one of Schelling's early reference to cigarettes, see Chapter 6 of this study.
239. Thomas C. Schelling, 'The Cost of Combating Global Warming', *Foreign Affairs* 76:6 (November/December 1997), p. 10.
240. Schelling, 'The Cost of Combating Global Warming', p. 12.
241. Note Schelling's comments on the common threads running through the great range of his essays in his 1984 compilation, *Choice and Consequence*. See ibid., p. viii. Schelling noted to the author that he felt he had been pursuing the same line of argument throughout his career. Interview with Schelling, 24 September 1996.

2

Strategy in the Nuclear Age

By the early 1960s, Schelling's work on stability was dominated by the concern to deter general war in the thermonuclear age. At that time, other leading strategic thinkers, including Brodie and Wohlstetter, were interested in this same sort of stability in response to the same set of strategic challenges. But Schelling's work remained notable for its distinct approach to even this dominant form of stability. This chapter therefore establishes the main sources and components of this stability consensus as a basis from which to assess the uniqueness of Schelling's strategic thinking.

The starting point in sketching this consensus is Schelling and Halperin's definition of 'stability' in terms of the 'balance of deterrence', a curious phrase combining two powerful concepts. This leads on to the important distinction, seen in the work both of Schelling and that of his contemporaries, between equivalent striking power, on the one hand, and stable mutual deterrence, on the other. In the same vein, there is a common emphasis on the twin dangers of a reduction in the costs of attacking and an increase in the pressures to pre-empt. This chapter will then examine the implications of this approach to stability for traditional attitudes to the relationship between armaments and warfare – the idea of a distinction between 'offensive' and 'defensive' weapons and the idea of a dangerous, self-aggravating 'arms race'.

The chapter will finish with an examination of Schelling's keen interest in the link between arms races and stability – an interest which indicates a theory somewhat at odds with the consensus view. This involves a unique and much broader conception of stability on Schelling's part. It also establishes a crucial role for a theory of bargaining, which emerges in this book as Schelling's most powerful strategic insight.

A STABLE BALANCE

A balance of some sort appears to be at the heart of the main writings dealing with stability during the high-point of nuclear strategic thought.

Schelling and Halperin's main examination of the idea of 'stability' occurs in their fifth chapter, entitled 'The Strategic Balance'. Likewise, their definition of 'stability' is in terms of the idea of a 'balance of deterrence', wherein: 'A "balance of deterrence" – a situation in which the incentives on both sides to initiate war are outweighed by the disincentives – is described as "stable" when it is reasonably secure against shocks, alarms and perturbations.'[1] The idea of 'balance' appears to have two important connotations in this particular passage. First, the sense of a balance *between* (as well as in the specific language of the definition) suggests that there are two sides to the equation. This is related to the second sense of 'balance' as a balancing or checking mechanism. Each side seems to be acting as a balance or check on the other. They do so by providing a deterrent to the unwanted behaviour – each makes sure that for the other side the incentives to initiate war are outweighed by the disincentives.[2] (This may appear to fulfil the requirements of a 'balance of power' but the analysis below reveals this not to be the case.)

The other key element of this definition is the idea that the stability of this balance of deterrence is its security 'against shocks, alarms and perturbations'. There are two main points to note here. First, if this balance is stable when it is 'reasonably secure against shocks, alarms and perturbations', logic dictates that it is *unstable* when it is *not* secure. This means that while 'stability' is associated with 'balance', the two are not synonymous. A balance is a necessary but not a sufficient condition for stability, as it is possible for a balance to be unstable. The second point is that any stable balance needs to be able to withstand a changing environment: one in which shocks, alarms and perturbations are likely to occur. This idea is presented clearly in Hedley Bull's subsequent definition: 'By the stability of the strategic nuclear balance we mean its built-in tendency to persist.'[3] All of these important ideas receive further attention in the following analysis.

DETERRENCE

Schelling and Halperin's reference to the balance as a balance of *deterrence*, and their definition of that deterrence in terms of the disincentives to the initiation of war, signifies an important point of contact with the work of other contemporary strategic thinkers. The classic statement of this argument for the nuclear age had been William Kaufmann's assessment of deterrence as a matter of 'cost-risk calculations'. States were deterred from undertaking a certain act when 'the costs and risks are of a sufficient magnitude to outweigh the prospective gain' which that act would produce.[4] This fairly simple but powerful line of thought had

important, and potentially ironic, implications for arms-control policy. For instance, Schelling and Halperin suggest that: 'Any agreement that reduced the capability for destruction in general war might make war more likely, in that the costs and risks in initiating it would not appear as great."[5]

This 'costs and risks' approach can in fact be taken as the standard argument for deterrence, which predates the era of nuclear weapons. Indeed, in one of his retrospective pieces Schelling observes that:

> Deterrence was not a theory ushered in by the advent of nuclear weapons. National governments throughout history have undoubtedly been deterred from military attack and attempted conquest by the possibility of military defeat or the prospect of a war too costly to make even victory seem attractive.[6]

'BALANCE-OF-POWER' THINKING

Given this apparent historical consistency in the understanding of 'deterrence', it is to be wondered whether the same can be said for the idea of a balance, the first half of the 'balance-of-deterrence' formulation. At face value, there seems to be a good case for linking Schelling's balance to the balance of power, a venerable concept which was at the same time enjoying a resurgence in American political-science circles.[7]

Indeed, in traditional European 'balance-of-power' thinking, the 'balance' was often understood as a mechanism where the will to power of rival states was mutually checked or balanced. In the origins of the 'balance-of-power' concept in fifteenth- and sixteenth-century descriptions of relations between the Italian city-states, there is the notion of a group of actors, mutually suspicious of each other's intentions, balancing each other's power with power.[8] Moreover, during the heyday of the balance-of-power concept during the late seventeenth and eighteenth centuries,[9] there was a tendency to take inspiration from rather mechanical understandings of balance in the natural world, such as that which existed between the planets according to the Newtonian view of the universe.[10] This approach speaks especially strongly to the idea of a set of forces balancing one another, so as to produce an orderly relationship in the form of a stable equilibrium.

Despite the many meanings which have been attached to the balance-of-power concept over its long history,[11] there is still a common thread underlying the discussion which also appears to be very pertinent to the idea of a 'balance of deterrence'. According to Martin Wight, the essential meaning of the balance is 'the sense of *an even distribution of power*,

a state of affairs which no Power is so preponderant that it can endanger the others' (emphasis original).[12] Schelling and Halperin's own use of the idea of 'balance' in the above passage *would seem to* accord with at least one part of this central meaning – a reciprocal balance by which each side keeps the other in check.

KISSINGER AND BULL

Indeed, there were some scholars involved in the discussion of the same stability concept, and with whose work Schelling was familiar, who used the 'balance-of-power' concept as an important element of their analysis. The most obvious example is Henry Kissinger, one of the scholars most responsible for bringing earlier forms of balance-of-power thinking to the attention of the modern audience. In his best-selling *Nuclear Weapons and Foreign Policy*, which was read by Schelling, Kissinger compared the traditional European balance of power with the world balance of power in the age of nuclear weapons.[13]

Kissinger's approach reflects the application of broad political motivations in the search for a 'balance'. In 1956, he made the general point that *order* depended upon 'the balance of forces, and in its expression, the equilibrium'.[14] This suggests an overall context for the renaissance of balance-of-power theory, and presumably the conceptualisation of the stable balance of deterrence, which Schelling's work cannot be said to contradict – the search for a non-totalitarian form of order. Hence the equilibrium Kissinger was seeking would prevent any one power from attempting 'to impose its will on the remainder',[15] a natural objective for a '*status quo* power'[16] (emphasis original) such as the United States. This objective was of course the same one as in earlier balance-of-power thinking.[17]

Similar thinking is apparent in Hedley Bull's *The Control of the Arms Race*, an early draft of which Schelling and Halperin saw in their preparation of *Strategy and Arms Control.*[18] For Bull, another strategic thinker immersed in power politics, 'a balance of power between opposed nations or alliances' was characterised by 'the possession on both sides of such forces and weapons that neither is able to impose its will on the other'.[19]

Bull's explanation of the balance of power in terms of 'forces and weapons' is especially significant because it suggests a balance which is based on *military* power, surely a characteristic of any 'balance of deterrence'. Here, Bull was following the line of argument in Samuel Huntington's influential article, which was also read by Schelling and Bernard Brodie.[20] Huntington suggested that, in the twentieth century, armaments had become increasingly important in the determination of

the balance of power at the expense of more political indices of power based on changes in the coalitions between states.[21] Citing Huntington's work, Bull maintained that 'the balance of power can at present be affected very much more by armaments than by diplomacy'.[22] This had consequences for the stability of that balance in the nuclear age: 'If there was to be a stabilization of the military balance, it would have to be by the adjustment of armaments.'[23]

Schelling and Halperin's notion of a stable 'balance of deterrence' might thus be considered a continuation of this trend. This idea appears to receive support from Herman Kahn's argument that: 'The current "balance of terror" can be looked upon as an intensification of the balance-of-power system', in the sense that it was now much more complicated to 'make war unprofitable, or at least so risky that a potential aggressor would choose compromise to risking all'.[24] Could it not thus be argued, in agreement with Lester Pearson's 1955 claim that: 'The balance of terror has replaced the balance of power'?[25]

The logic of the idea of 'balance' and its relation to stability would suggest a further basis for such similarity. In both the 'balance of power' and the 'balance of deterrence', stability would naturally seem to refer to the difficulty of *upsetting* the particular balance. Hence, one can note the comparison Kissinger draws between 'the increment of power required to upset the European balance' and the 'margin of safety' in the nuclear age.[26] That margin might be seen as a precursor to Wohlstetter's influential assessment of the *delicacy* of the 'balance of terror' as a measure of its stability.[27] Indeed there is something to Fred Kaplan's comment that Wohlstetter's delicate balance involved 'an almost mechanical concept of a very delicately balanced set of scales'.[28] For instance, a seesaw at rest can project an image of stability, but if it is sensitive (or delicate) to minute changes in the weight on either side, then the balance is easily upset and its stability is thus illusory.[29] In other words, the stable or unstable 'balance of deterrence' can be portrayed as a stable or an unstable 'equilibrium'.

As Schelling was intricately involved in this assessment of the balance of deterrence, there would seem to be some compelling links with balance-of-power thinking. But, in fact, there are few direct connections at all. Schelling was not inspired by, or even particularly aware of, balance-of-power theory. He has made this point quite unequivocally in interviews with the present author,[30] and his writings contain few references to the sorts of text which contain that tradition of thinking.[31]

What unites Schelling with scholars such as Kissinger and Bull is an interest in the elaboration of stability as a strategic concept and not an interest in the balance of power. The political backdrop which informs Kissinger's and Bull's balance-of-power analysis is not to be found in

Schelling's (and Wohlstetter's) stability analysis. It would be wrong to claim that Schelling was uninterested in the maintenance of political order, but his conception of 'balance' and its stability is presented in quite apolitical terms.[32] In this sense, a contrast can be drawn between Bull's text, which Schelling himself describes as 'a cool and competent envelopment of recent strategic thinking in a political treatise on international violence',[33] and Schelling and Halperin's *deliberate* concentration on the 'military environment' as opposed to the 'more purely political and psychological consequences'[34] of arms control.

Again, this is not to say that Schelling's approach is incompatible with that of Bull and Kissinger. In *Strategy and Arms Control*, Schelling and Halperin argue that their text should not be 'wholly inconsistent with an approach that emphasizes the political environment more and the military environment more'.[35] It is just that the route which Schelling takes to arrive at the concept of stability is a different one – he is inspired by a different sort of theory than one involving balance-of-power thinking.

BRODIE'S STABLE 'BALANCE'

Nonetheless, the 'balance' metaphor does shed some light on the body of thinking (or at least of *one* of the bodies of theory) which Schelling himself was able to draw upon. His notion of the 'balance of deterrence' is best understood as belonging to a rather *new* tradition ushered in by the arrival of nuclear weapons. This consisted of a rather unique understanding of the requirements of deterrence, which were first outlined by Bernard Brodie in studies read by Schelling[36] and which have very little direct connection to traditional balance-of-power thinking.[37]

Brodie identified the central challenge of the atomic age as the unprecedented advantage which nuclear weapons offered to the attack. He argued that, because of its destructive capability, 'the atomic bomb already has a fearful lead in the race'[38] over measures to defend against it. This meant a dramatic reversal of the reassuring tendency which Brodie had observed in his earlier studies of the development of military technology and its effect on naval strategy – the tendency for an advance in one area to be met by an effective countermeasure.[39] As Brodie later explained:

> This process never permitted any one invention in itself to subvert or even threaten for long the previously existing equilibrium of military force. Any startling innovation either of offense or defense provoked some kind of answer in good time.[40]

In other words, the atomic bomb meant that there was a rather unprecedented *disequilibrium*, the effect of which was to make bombing very 'cheap'.[41] A more likely encouragement for aggression would be difficult to find. Fortunately, Brodie found a way out of this dilemma. He was influenced by the argument of his doctoral supervisor, University of Chicago economist Jacob Viner, that since atomic weapons might also be useful in responding to an attack, it was likely that 'even the strongest country will no longer have any reasonable chance of a costless victory over even the smallest country with a stock of atomic bombs'.[42] Precisely because there was no defence against the atomic bomb, any side threatened with attack which itself also possessed atomic weapons thereby possessed the ability to impose great costs on the attacker. In Brodie's analysis, the fear of retaliation on the scale which this gave rise to meant that 'no victory, even if guaranteed in advance – which it never is – would be worth the price'.[43]

In other words, for only one side to possess these weapons was asking for trouble: 'If the atomic bomb can be used without fear of substantial retaliation in kind, it will clearly encourage aggression.'[44] However, mutual possession offered some hope[45] as this would produce a restraint to aggression in the form of a 'mutual fear of retaliation'.[46] There was the prospect, in Brodie's words, for 'the state of balance – in terms of reciprocal ability to retaliate in kind if the bomb was used'.[47] While Brodie makes no mention in these early studies of stability as a strategic concept, his idea of the 'state of balance' strongly suggests it.[48]

Brodie's analysis here is especially noteworthy because it anticipates the move away from viewing the atomic bomb as the ideal weapon of attack to seeing it as a basis for deterrence. It is important to note that this deterrence is based on a fear of retaliation, and not the ability to resist conquest. Hence, Schelling, in the same passage in which he argues that deterrence is much older than nuclear weapons, also notes that: 'One of the things brought by nuclear weapons was the prospect of terrible civilian damage being inflicted, independently of what occurred on the battlefield; it would all happen in one unrestrained burst of violence.'[49]

STABILITY AND RETALIATION

Brodie's 'state of balance' also anticipated developments on the ground. The monopoly on atomic weapons which the United States enjoyed for some years may help explain why there was little immediate follow-up to his pioneering analysis.[50] These circumstances also made the most important implication of his argument somewhat premature – the need to preserve the capacity to retaliate.[51] Even when the Soviet Union broke the

US monopoly, the situation did not change immediately. The reciprocal possession of retaliatory capabilities was not initially accompanied by the reciprocal ability to threaten their survival. In other words, as long as both sides possessed nuclear weapons in reasonable numbers, a state of balance could be said to exist.[52] To this extent, stability could rest on mutual possession and not much more – simple notions of the 'balance of terror' were thus not completely inappropriate.

However, the cruder conceptions of the stability of the balance of terror tended to outlive the circumstances which permitted them. The most dramatic attack on the dangers of this thinking is of course Wohlstetter's 'Delicate Balance of Terror' article, the culmination of a long series of RAND studies which highlighted the apparent vulnerability of the US ability to retaliate.[53] Two main aspects to this vulnerability problem were identified. In the first place, there was a problem in the practice of placing US missiles on European bases close to the Soviet Union. Combined with the latter's own growing striking power, this was changing for the worse the cost-risk equation upon which deterrence was based. For instance, Wohlstetter argued that: 'To eliminate them requires a smaller expenditure of resources on his part than targets at intercontinental range.'[54] In other words, such a posture was making an attack less unattractive to the Soviet Union.

Second, concerns also grew about the vulnerability of the Strategic Air Command forces based in the United States. In a prominent study produced in 1954, Wohlstetter and his RAND colleagues warned that, by 1956, advances in the size and quality of its 'offensive capabilities' might allow the Soviet Union to 'neutralize … our "deterrent" power' – America's ability to impose 'widespread destruction'.[55] In a subsequent study, Wohlstetter and Fred Hoffman used the idea of risks to drive home the point. They argued that 'it is a painful fact that the risks to the Soviets of attempting a surprise attack on the United States are much lower than are generally estimated'.[56] For Wohlstetter's part, there was another factor which made the costs-risks problem even more acute. Because the Soviet Union was a totalitarian regime, it would have the advantage of secrecy and control to add to the other advantages of attacking first.[57] In citing Wohlstetter's argument, Brodie concurs with the warning that

> the problems confronting a shrewd and aggressive enemy in surprising and penetrating our defenses are usually … exaggerated in the popular mind … our ability to retaliate in great force to a direct Soviet attack is taken far too much for granted by almost everybody.[58]

Thanks in no little part to Wohlstetter's influence, the concern about the United States' declining ability to retaliate also pervaded the Gaither

Report of 1957.[59] It is Wohlstetter's reference to 'retaliatory power under attack'[60] which clarifies the special character of the 'balance' which Brodie had identified so soon after the Second World War. It is the security of this retaliatory power which is behind Wohlstetter's understanding of 'the stability of the thermonuclear balance'.[61] This was no ordinary balance of power, not even a balance of military power, but a *balance of retaliatory power.*

Wohlstetter developed this approach into a high art by formulating the influential distinction between first and second strikes.[62] This provided a powerful means for defining the stability of deterrence in terms of the familiar idea of the costs of risks of attacking, as seen in Brodie's definition: 'Stability is achieved when each nation believes that the strategic advantage of striking first is overshadowed by the tremendous cost of doing so.'[63] As the only way to ensure that these costs of attacking were tremendous was a secure retaliatory capability – the ability to strike second – deterrence could thus not be a question of 'simply matching or exceeding the aggressor's capability to strike first'.[64] The distinction between 'balance', in the sense of even first strike capabilities, and the stability of the balance was thus presented to bold effect.

This is the logic one finds in Schelling's own classic statement of the same distinction:

> There is a difference between a balance of terror in which *either* side has the capacity to obliterate the other, and one in which *both* sides have the capacity no matter who strikes first. It is not the 'balance' – the sheer equality or symmetry in the situation – that constitutes 'mutual deterrence'; it is the *stability* of the balance (emphasis original).[65]

By placing quotation marks around 'balance', Schelling denotes the need for caution in using this term.[66] A balance of deterrence is not symmetry in striking power, but is the reciprocal ability to promise retaliation – hence the ideas of an 'even' distribution of forces which lies behind a good deal of balance of power thinking is not a sufficient condition for stability in this case.[67] Schelling's elaboration of this point can be found in the next sentence, most of which was not included in the version of the essay which appeared in *The Strategy of Conflict*: 'The situation is symmetrical but not stable when either side, by striking first, can destroy the other's power to strike back; the situation is stable when either side can destroy the other whether it strikes first or second.'[68]

Schelling's employment of the first- and second-strike distinction is a clear reflection of Wohlstetter's influence. Similarly, Schelling's rejection of 'symmetry' can be compared to Wohlstetter's rejection of 'matching'

forces.[69] Indeed, the idea that the key to a stable balance is a secure capability to retaliate after attack is the most crucial part of the consensus on 'stability' which links Schelling to other leading contemporary strategic thinkers such as Wohlstetter and Brodie.

INSTABILITY THROUGH A PREMIUM ON HASTE

Wohlstetter and Brodie were also involved in highlighting the other main aspect of the instability problem; the disadvantages of placing a premium on haste.[70] This was to become something of an area of speciality for Schelling. Vulnerable retaliatory forces not only reduced the costs of attacking and thus undermined the stability of the 'balance of deterrence', they could also increase the costs of waiting to attack (which in a crisis could be especially dangerous).

The seeds of this line of argument had been planted by Brodie's early concern that in a conventional war involving two countries possessing atomic bombs, both sides would constantly be afflicted by the 'intolerable fear that the enemy might at any moment resort to this dreadful weapon, a fear that might very well stimulate an anticipatory reaction'.[71] Again this concern was a descendant of similar observations Brodie had made during the Second World War. He had been worried about the implications of military technology whose nature made the decision for war a far more urgent affair. Given such urgency: '"Defense" must then take on a more active and anticipatory attitude.'[72]

The logic of this problem was relatively simple. The more vulnerable one's retaliatory forces, the greater the temptation to anticipate enemy attack by going early, if not earlier. As vulnerability began to be recognised as a practical problem, so too did concern grow about being on the edge strategically. For instance, in 1954, Brodie expressed concerns that retaliatory forces vulnerable to surprise attack might encourage the nuclear powers to be 'trigger happy' – for Brodie, this would make the situation akin to a Western gunfight, where the first to draw has all the advantage.[73] In the same year, Wohlstetter produced a RAND study with Hoffman which stated that a vulnerable 'capability for retaliation … would make us rather trigger happy' and would also 'appear to make the Russians equally trigger happy', since 'striking the first blow is the only means of defense'.[74]

Hence, when Schelling compares an unstable balance of terror to the '"equalizer" of the Old West', where 'the advantage of first shot aggravates any incentive to shoot',[75] he is in good company. In fact, when Schelling notes that the pistol is 'another offensive weapon against which no good defense was ever devised', he cites Brodie's *The Absolute*

Weapon in support of this observation.[76] Once again, there is an aspect of his thinking on stability – this time the question of pre-emption – which fits into the stability analysis of the other strategists. It is notable, for instance, that Wohlstetter's 'Delicate Balance of Terror' also contains a reference to 'the old-fashioned Western gun duel', which was 'extremely unstable' because: 'It would be extraordinarily risky for one side *not* to attempt to destroy the other, or to delay doing so.'[77]

There is a difference, then, in an instability attached to lower risks of attacking (as in the case of a pre-meditated attack) and one attached to rising risks of not going first (in a growing crisis).[78] Schelling's perspective on this problem is especially clear and compelling: 'We live in an era in which a potent incentive on either side – perhaps the main incentive – to initiate total war with surprise attack is the fear of being a poor second for not going first.'[79] Indeed, Schelling employs one of his trademark series of compounding expectations to drive the point home: '"Self Defense" becomes peculiarly compounded if we have to worry about his striking us to keep us from striking him to keep him from striking us … '[80] With this particular insight to the dynamics of pre-emption, Schelling was developing his special expertise on the problem. Indeed, Brodie quotes Schelling's compounded self-defence series, noting that Schelling's work on reducing the incentives to surprise attack 'is one of the most incisive contributions to the literature of disarmament'.[81] Particularly noticeable is Schelling's emphasis on the expectations which developed in the minds of decision-makers. There was not a direct connection between the strategic situation and the likelihood of war. Rather, there was a crucial intermediary factor – a cognitive process involving expectations.[82]

An important reason for the quality and depth of Schelling's analysis of pre-emption is that it came out of the body of strategic theory which he had been developing for some time. As Chapter 1 has pointed out, by the time he arrived at RAND in September 1958, Schelling had already written 'The Reciprocal Fear of Surprise Attack', which dealt at a theoretical level with the tendency for such fears to be mutually aggravating. Hence, contrary to Trachtenberg's account, it was not an early draft of Wohlstetter's 'Delicate Balance of Terror' which *first* got Schelling interested in the question of pre-emption in 1958.[83]

Nonetheless, it is very useful to compare Schelling's sophisticated analysis of aggravated self-defence with Wohlstetter's observation that placing missiles close to the enemy 'might be a considerable provocation'. This would 'place a great burden on our deterrent force which would more than ever have to guarantee extreme risks to the attacker – worse than the risks of waiting in the face of this danger'.[84] Schelling's 'fear of being a poor second' is a colourful way of saying that the risks of waiting

had increased to the point at which they had become intolerable. His analysis of this problem can thus be seen as a stylish counterpart to Wohlstetter's systems analysis of 'alternate risks', the risks of attacking and waiting.[85]

THE IMPORTANCE OF SYSTEMS

This raises another part of the common ground between Schelling and his fellow strategists – the tendency to view the stability of deterrence as the stability of a *system*. The term 'system' appears in different contexts but there is a common theme – a set of interdependent (and interacting) variables which are all part of the same process.

The most obvious and formal sense of this idea is the 'systems analysis' approach for which RAND became so well known. This was developed as a means for dealing with problems which involved especially large numbers of interdependent variables. In Wohlstetter's words, the 'ties' could be 'multiple and fiercely knotted'.[86] The systems analyst, according to E. S. Quade, works out 'which interdependencies are important, and then studies the total complex system'.[87]

The same idea could be applied at different levels.[88] For example, one side's retaliatory forces could be treated as a system of interdependent parts. This is indicated by Schelling and Halperin's description of one of the prerequisites for the stability of deterrence: '"Invulnerable" strategic forces consist not only of weapons and vehicles but of communications, command and control arrangements, warning systems, reconnaissance and intelligence, and all the other components of the "system".'[89] At a more inclusive level, the system idea also applied to the relationship between both sides' military forces and decision-making. This can be found in the best-known product of the systems-analysis approach, where Wohlstetter notes the challenge of 'stabilizing deterrence' in light of the 'uncertainties and interactions between our own wide range of choices and the moves open to the Soviets'.[90] In short, the United States' best choice of system depended on the wider system which incorporated this interaction (this wider system was itself composed of opposing national systems).[91] Again, there are notable similarities between the strategists in their work on stability – for example, Schelling and Halperin's description of the six reasons why 'a diversified mix of retaliatory weapons' may help make successful attack less achievable[92] can be compared with Wohlstetter's analysis of the six hurdles which stand in the way of effective retaliation.[93]

A similar, albeit less formal, sense of this broader system involving both sides is to be found in Hedley Bull's description of the US and

Soviet 'ability to deter each other by threat of retaliation' as a 'system of deterrence',[94] which he also refers to as 'a system of balance at the strategic level'.[95] For Bull and other international relations theorists of the time, there was a not dissimilar notion to be found in the way that traditional balance-of-power thinking depended on the idea of a *system of states*[96] (although, as with balance-of-power ideas, this involved a much more explicitly political framework than is apparent in Schelling's work).

The idea of a system as a way of explaining complex phenomena can also be seen in the rise of systems theory in American social sciences in the 1950s and 1960s.[97] However, few of the strategic thinkers responsible for analysing stability were immersed in the social sciences. This is *not* the case for Schelling, a point which helps to separate his approach from that of many of his colleagues. Chapter 6 will look at the way social-scientific insights provide some of the context for his own, quite particular, analysis of stability as a concept not limited to understanding the deterrence of general war. To appreciate this also requires an analysis of the breadth of Schelling's concept of stability, which is the task of the third chapter of the book.

STABILITY AND THE 'OFFENCE'–'DEFENCE' DISTINCTION

The special understanding of stability in terms of a 'system' or 'balance' of deterrence based around the ability to retaliate had some interesting implications. One of these was the development of a particular interpretation of the way that military technology was developing, a concern which further underlines the connections between Schelling's thinking with that of other prominent strategists. There were two main options here. On the one hand, it was conceivable that the future course of technological innovation might allow the United States and the Soviet Union each largely to 'assure the invulnerability of its own retaliatory forces irrespective of what the other side does, and assure it in a way that is manifest to the other side, so that a powerfully stable mutual deterrence results'.[98]

On the other hand, there was a more worrying possibility: 'Alternatively, nature may have planted mischievous secrets ahead of us, so that we and the Russians continually find new ways to destroy retaliatory forces at a faster rate than we find new ways to protect them.'[99]

The corollary of this argument was that it might be possible to distinguish between those sorts of developments in military technology which favoured the protection of the ability to retaliate after attack, and those which threatened that same capability – in the terminology of Wohlstetter, between technologies favouring second strikes and those favouring first

strikes. This sort of either/or distinction is also implicit in a question asked by Brodie: 'How much will or should SAC be willing to sacrifice of its strike-first offensive potential in order to buy itself more defense?'[100] It is Schelling who presents the most colourful picture of this bifurcation when he cites as stabilising influences,

> the weapons of retaliation – the weapons whose mission is to punish rather than to fight … A "good" weapon – to push this philosophy all the way – is a weapon that can only hurt *people* and cannot possibly damage the other side's strategic striking force; such a weapon is profoundly defensive in that it provides its possessor no incentive at all to strike first and initiate a major war (emphasis original).[101]

At the other extreme,

> clean weapons with the capability of seeking out enemy missiles and bombers, i.e. with the capability of destroying 'military' targets, are 'bad'. They are the weapons that can *exploit* the advantage of striking first and consequently provide a temptation to do so (emphasis original).[102]

This is something of a rhetorical flourish on Schelling's part. For, subsequently, he notes that in reality most weapons fall '[b]etween the extremes of the "pure" strike-first weapon and the "pure" strike-back weapon'[103] as long as 'reasonable precautions are taken for their protection'.[104] Even so there is still a strong case for eschewing any weapons which tended towards the more dangerous extreme. For example, Schelling and Halperin advocate the sort of agreement between the nuclear-armed powers which 'enhances those aspects of technology that we like and that helps nullify those that we do not'.[105]

Hence, there seem to be grounds for differentiating between measures which, in Schelling's own words, are 'profoundly defensive' and those which, by an extension of the same logic, are presumably *profoundly offensive* because they create the temptation for surprise attack. In other words, one might distinguish between those measures which make war in the nuclear age profoundly less appealing and those which make it profoundly more appealing. Again there is a connection here with the analysis of the stability problem made by Schelling's colleagues. Wohlstetter, for instance, argues that it is difficult 'at any level of nuclear technology' to create 'a stable equilibrium' in an age where 'thermonuclear weapons give an enormous advantage to the aggressor'.[106]

The same logic can be seen in Brodie's admission at the end of the 1950s that 'the "balance of terror" is far from stable' given the incentives for 'surprise strategic attack'.[107] His answer to this problem appears to

confirm the wisdom of making the same sort of distinction between weapons that favour the attack and those which do not; reducing these dangerous incentives is a question of 'promoting measures that enhance deterrent rather than aggressive posture – where the two can be distinguished, which, if one is looking for the chance to do so, is probably pretty often'.[108] Given the consensus among the nuclear strategists that stability was endangered largely by military-technological change which encouraged striking first and striking early, their arguments might be interpreted as a continuation of the interest during the interwar years in outlawing 'offensive' or 'aggressive' armaments.[109] This was the thinking behind the 'qualitative principle', to which the British strategist Basil Liddell Hart claimed ownership, and which was especially influential during the World Disarmament Conference in Geneva in 1932. In defending such an approach by the British delegation to that conference, Liddell Hart argued that:

> The point of the qualitative principle is not that certain weapons are in themselves more offensive than others, but that they alone make it possible under modern conditions to make a decisive offensive against a neighbouring country. Abolish such weapons by agreement, and there would be little chance of successful aggression – and so a real discouragement to any would-be aggressor.[110]

Liddell Hart's argument that it was those weapons that could 'easily break through entrenched defenses'[111] that encouraged aggression and thus needed to be restricted, would appear to be even more applicable to nuclear weapons given their formidable offensive power. Indeed, Philip Noel-Baker, who had been an assistant to Arthur Henderson, the President of the 1932 Geneva Conference, made the forceful argument in the late 1950s on the basis of the qualitative principle that 'nuclear weapons and other weapons of mass destruction are offensive weapons, against which there is no adequate defence'.[112] From this logic, Noel-Baker argued that the only reasonable course was nuclear disarmament.

At least two of the studies used by Schelling had cited this interwar distinction between 'offensive' and 'defensive' armaments. In his article on arms races, Samuel Huntington had cited Marion William Boggs' authoritative study on historical attempts to make such a distinction.[113] Even more significantly, Hedley Bull, who at one stage had been recommended as a research assistant to Noel-Baker for the preparation of *The Arms Race,*[114] cites the qualitative principle of the Geneva Conference as a basis for limiting weapons which were 'specifically offensive'.[115] Bull also notes that: 'The distinction between offensive and defensive is a basic one in all discussions of strategy', and cites Clausewitz's interest in the question as to which of the two was ascendant.[116]

However, there are significant problems in suggesting a connection between the tradition of the offence–defence distinction and Schelling's stability analysis. First, Schelling makes no direct reference to the inter-war writings of Liddell Hart or the analysis by Boggs. Second, his analysis denies the link quite explicitly – 'the old distinctions between offensive and defensive weapons are quite inapplicable in the present era, and are more nearly applicable in reverse'.[117] Perhaps Schelling's clearest explanation of why this is the case appears in *The Stability of Total Disarmament*, when he discusses the two factors which in the nuclear age, 'keep "defensive" weapons from being inoffensive'. First, some historically *defensive* capabilities, such as air defence, which can protect bombers against interception, are 'superbly useful in attack and invasion'. Second, and more critically, 'defenses against retaliation are substitutes for offensive power'.[118]

Schelling and Halperin even note that while it is 'useful to make a 'distinction between a "first-strike" and a "second-strike" military capability', it is also 'crude because almost any weapon capable of firing back in retaliation is worth something in a first strike, or can be adapted to the purpose'.[119] Their rejection of the either/or approach is similar to Wohlstetter's argument that the enemy can 'use his offensive and defensive forces so as to exploit the weaknesses of each of our systems'[120] – i.e. not one or the other but both. Indeed, Wohlstetter provides a particularly useful commentary on this point in relation to the concept under study in this thesis. He states that 'no simple hard-and-fast distinction divides the effects on stability of offence and defence, making offence changes good or innocuous and defence changes bad'.[121]

UNDERSTANDING THE 'ARMS RACE'

The inapplicability of the old offence–defence distinction was not the only implication of this concept of stability for thinking about armaments in the thermouclear age. The same logic also suggested that fewer weapons might not actually be better for security. If a stable balance required both sides to be able to promise retaliation after attack, stability might be served by each side having large numbers of the sorts of forces which could be relied on for that retaliation.[122] Schelling put it like this:

> For anything like equal numbers on both sides, the likelihood of successfully wiping out the other side's missiles becomes less and less as the missiles on both sides increase. And the *tolerance* of the system increases too. For small numbers on both sides, a ratio of 2 or 3 to 1 may provide dominance to the larger side, a chance of

> striking first and leaving the other side a small absolute number for striking back. But if the initial numbers on both sides are higher, it may take a ratio of 10 to 1 rather than 2 or 3 to 1 to have a good chance of striking with impunity.[123]

One of the effects of this argument is to suggest that there is at least some residual relevance of the association of 'balance' with 'evenness'. There is not only the sense here of a balance which is harder to 'upset' the larger the numbers of missiles are on both sides, for in this passage Schelling seems to be implying that this principle works best when the numbers are reasonably even. Because of Schelling's aversion to symmetry, evenness cannot be considered a *sufficient condition* for stability. But even with large numbers of missiles, it was better for force levels to approach symmetry rather than for them to be closer to extreme asymmetry.[124] Hence, some rough degree of parity seems, at least in this situation, to be almost a *necessary condition* for stability.

More significantly, Schelling's argument demonstrates that the premium on survivable retaliatory capabilities has important implications for approaching the difficult issue of the 'arms race'. He states that the relative benefits of having larger numbers of missiles is an example of the principle that 'an "arms race" does not necessarily lead to a more and more unstable situation'.[125]

Schelling's practice of putting quotation marks around the term[126] is again something of a give-away, signifying unease with the tendency to take the idea of an 'arms race' literally.[127] Indeed, his argument about the stabilising possibilities of larger stocks of missiles refutes the idea which seems intrinsic to the term – the equation of instability with rising levels of armaments, the idea of a dangerous 'race' between states for an advantage in the size of stockpiles where victory in this race denotes war.[128]

Instead of associating their concerns about stability with this sort of competition for greater quantities of armaments, Schelling and Halperin make it clear that the problem at hand was a *different* sort of 'race' with its own dangers: 'Although it has been argued that qualitative races have been historically more stable than quantitative ones, the present arms race seems unstable because of the uncertainty in technology and the danger of a decisive break-through.'[129]

The logic here is consistent. A race in the quantity of arms would effect any efforts to match numbers of missiles, but this was not the basis for the stability of the balance. Here Schelling and Halperin were again in line with Wohlstetter's argument against making crude missile counts, namely that: 'Matching weapons … misconstrues the nature of the technological race.'[130] Hence stability would not necessarily be served by reducing the growth of missile stockpiles. Instead, if there was

any reducing to be done it was in the form of measures to 'slow down and stabilize the technological race'.[131]

It was the technological aspect of the race which was crucial, because this was the type of 'race' likely to have the greatest bearing on the vulnerability of retaliatory forces – the race was between technology favouring reciprocal retaliatory capabilities and that which could endanger them.[132] Schelling and Halperin cite as an example of a 'destabilizing' break-through in the race, 'the improvement in missile accuracy that has already occurred'. The problem here was that this could 'increase the likelihood that an attack on retaliatory forces would succeed, and thus increase the dangers of premeditated and pre-emptive attack'[133] – the two main sorts of dangers which the stability concept incorporated (see above). Again it was an altered conception of stability which was dictating the approach to be taken.

UNIQUENESS IN SCHELLING'S APPROACH TO 'ARMS RACES'

Given this consensus, it is rather surprising then Schelling also shows an interest in 'arms race' theory of a rather different, more traditional, and quantitative kind. The first clue to this puzzle is Schelling's citation of Anatol Rapoport's review of Lewis F. Richardson,[134] an English scholar who had spent several decades after the First World War developing a largely numerical model of arms races which owed much to his background in physics, meteorology and psychology.[135] Schelling argues that Rapoport's rather enthusiastic review is a rare example of the sort of theoretical study of which more were needed,[136] and he later devotes an important essay to a discussion of the sort of arms-race thinking which connects the work of Richardson, Rapoport and one of Schelling's mentors, Kenneth Boulding.[137] It is thus important to determine what, if any, links there are between the analyses of Richardson and Schelling.

Richardson's work on arms races seems to incorporate many of the bugbears which Schelling and the other strategists were so careful to avoid in their approach to stability. The heart of Richardson's analysis is a pair of differential equations, one for each side of the arms race, representing the threats each country poses to the other. These are based largely on the mutually stimulating mixture of armaments[138] and the fear which they are supposed to provoke, reflecting Richardson's attempt to formalise Lord Grey's famous statement that:

> If there are armaments on one side there must be armaments on other sides … Each measure taken by one nation is noted and leads to counter-measures by others … Fear begets suspicion and distrust

> and evil imaginings of all sort … The enormous growth of armaments in Europe, the sense of insecurity and fear caused by them – it was these that made war inevitable.[139]

Among the more dedicated followers of Grey's approach in the nuclear era was one Philip Noel-Baker,[140] whose assessment of arms races as inevitable routes to war Hedley Bull was busily trying to demolish.[141] Hence any interest by Schelling in Richardson's analysis would seem to be potentially contradictory. But, in one respect at least, Richardson's formal models had emphasised an important element of traditional arms-race thinking which Schelling and Bull recognised as legitimate and quite vital. This element was the sense of interaction between the military forces of both sides. Hence one can find in *Strategy and Arms Control* Schelling and Halperin's definition that an: '"Arms race" refers to the interaction between two or more adversaries' military programs, to a tendency for each side's program to respond to what the other is doing.'[142] Similar thinking can be found in Bull's analysis of the arms race as a question of 'competition'.[143] Huntington also explores this idea as part of a long tradition going back to Immanuel Kant,[144] which had emphasised the dangers and the economic burdens imposed by military rivalry.[145] For his part, Bull also refers to 'the action and reaction which constitutes an arms race'.[146] He even goes so far as to observe, in language not entirely distinct from the analyses of Richardson and Grey, 'the fact that the arms race is a vicious circle: that arms preparations inspire arms preparations, and fear provokes fear'.[147] In their own discussion of the incentives which can arise to abrogate an arms agreement, Schelling and Halperin use metaphorical language, which seems to reflect the same sort of thinking when they refer to the 'dash for supremacy'[148] that a state might thus be tempted to make. This would seem to tie in with Richardson's opinion that: 'Whoever coined the phrase "arms race" … must surely have been thinking of competition and movement and probably also of athletes running.'[149] The potential relevance of Richardson's analysis does not stop there. The English scholar also develops a concept of stability, based on the notions of stable and unstable equilibria in classical mechanics,[150] which seems quite pertinent. An arms race was stable in Richardson's model if it tended towards a 'balance of power', which he identified as the intersection of the two differential equations.[151] The alternative was an unstable arms race which moved further and further away from the equilibrium, whereby the threat levels 'would tend to positive infinity' in which case 'their tendency is interpreted as meaning that war would sooner or later break out'.[152]

Schelling himself would seem to be reflecting an approach very similar to Richardson's approach when he notes that various kinds of

arms-race processes 'may find a stable equilibrium point at some enhanced level of readiness, or may explode into war'.[153] This can be compared with Boulding's coverage of Richardson's idea that the two differential equations 'may have an equilibrium solution (a "balance of power") or they may be indefinitely explosive up to some boundary'.[154] In common with Richardson's approach, Schelling appears to be suggesting that an arms race may be unstable in and of itself, in addition to the destabilising consequences it can have for the balance of deterrence.

This sort of approach helps distinguish Schelling from other major strategic thinkers of the time who contributed to thinking about the stability of deterrence. Indeed, as a reflection of Schelling's rather unique and quite broad understanding of 'arms races', the stability of deterrence in terms of the reciprocal fear of surprise attack can itself be treated as the stability of a particular type of arms race. This emerges from the very important essay 'War Without Pain', in which Schelling argues that 'there are at least three different orders of arms race, to be distinguished by their tempo'.[155] In each case, Schelling is interested in the tendency of the arms race towards a stable equilibrium or towards aggravation.

The first category is the more straightforward 'race' in armaments, of which Schelling gives two examples, 'the dreadnought competition between Germany and Britain before World War I, or the missile build-up of East and West at present'.[156] Here, Schelling has drawn a link between the armaments competition in the nuclear age and the armaments competition which helped stimulate so much of classical arms-race thinking,[157] which involved some of the very assumptions that Schelling and the other strategists were eager to avoid.

Schelling's second category of arms races is notable for similar reasons. It is 'the phenomenon typified by the "mobilization race" at the outbreak of World War I (and perhaps reflected in some recent crises)', with which he compares 'the process nowadays described as "escalation"'.[158] If any single event could be identified as the major stimulus for the argument that arms races caused war it was the outbreak of the First World War.[159] As the 'war by mobilisation' theory implies the inevitability of war, it seems to be the sort of deterministic theory to which a strategist interested in the possibility of stability would be unlikely to hold. But Schelling's other work also suggests that the connection to 1914 is valid.[160] This is most vividly displayed in the sixth chapter of *Arms and Influence*, where Schelling argues: 'Railroads and army reserves were the two great pieces of machinery that meshed to make a ponderous mechanism of mobilization that, once set in motion, was hard to stop.'[161]

In fact, the 1914 mobilisation example is also pertinent to Schelling's third category of arms race – 'the process of interacting expectations, which may lead to pre-emptive initiation'.[162] What characterises this

category is the speed at which it occurs; 'hours or even minutes'.[163] While the earlier mobilisation took far longer than this extremely quick process, which was to be found in the missile age, both are examples of a situation where the decision-making methods of the time cannot handle the pace set by the latest technology of war – 'the sheer inability of organized decisions, reconnaissance, and communications to keep up with events'.[164]

Schelling's classification of the interaction of the reciprocal fears of surprise attack as an 'arms race' may seem to be bending the term somewhat.[165] But it is extremely helpful in showing both the breadth and the theoretical unity in Schelling's approach. For the stability of this particular 'arms race' – whether it is possible to somehow reduce or dampen these fears – is in fact the stability of deterrence.[166] To put this in reverse, the stability of deterrence is the stability of the 'arms race' process of the fastest tempo. A similar connection can be seen when Schelling notes that certain types of limited war involving aspects of 'mobilization' and 'escalation' are analogous to the respective forms of 'arms races'.[167] This all suggests a much wider notion of stability than one restricted to the balance of deterrence – in fact, a 'general' concept of stability in Schelling's work which is the subject of Chapter 3 below.

THE IMPORTANCE OF BARGAINING

There is one question here crying out for an answer. Since Schelling has admitted the relevance of the 1914 analogy, how does he account for the possibility of stability instead of the apparently inevitable explosion of these various 'arms races'? Does Schelling's criticism that 'in Richardson's model there is no boundary to the process except war itself'[168] not apply to his own approach?

There are a number of possibilities here. One is to align the prospects for stability to a balance of deterrence based on reciprocal retaliatory forces. However, this formula only seems to work well for the particular 'technological race' around which it was developed – for the stability of deterrence of general war. It does not seem to have the broader appeal to match Schelling's interest in the stability of many kinds of arms races – especially if these include examples of limited wars.

A second suggestion comes from Hedley Bull's approach to 'arms races'. As a student of international politics, Bull maintained that what was missing from a good deal of arms-race thinking was an understanding of the political context in which arms races occurred, without which there was a tendency to view the arms race as 'an autonomous process in which the military factor alone operates'.[169] Hence, according to Bull's

logic, the prospects for stability might be enhanced by incorporating the political relationship between states involved in competitions in armaments. For example, efforts 'to stabilize the arms race' should be accompanied by efforts to 'stabilize the whole field of political relations between the two antagonists'.[170] There is much to be said for this argument. However, as this chapter has demonstrated, Schelling was not very concerned with political analysis.

What, then, is Schelling's answer? On what basis can the various forms of 'arms race' be expected to find stable equilibria? The key lies in Schelling's assessment of the implications of the *interaction* which is at the heart of all 'arms races'. For Schelling, instead of a deterministic, unthinking explosion to war, either side in an 'arms race' can become aware of the interaction which is occurring between them. In other words, each side can know that its own behaviour has a large impact on the behaviour of the other. This opens up the possibility for choosing behaviour which will have a reasonable outcome, for exploiting the bargaining relationship between the parties.[171]

In Schelling's opinion, therefore, the great improvement on Richardson's model which is to be found in the works of both Rapoport and Boulding is the incorporation of an element of bargaining. Significantly, this also opens up the possibility for a game-theoretical approach to the subject. Schelling notes that: 'In Rapoport's terminology, the arms race at this point ceases to be a "fight" and becomes a "game". That is a bargaining element is introduced.'[172] Similarly, Schelling cites Boulding's reliance upon the game theorist Martin Shubik's examination in *Strategy and Market Structure* of 'the interaction between firms, a firm's profits being a function of its own behavior and the behavior of its rivals'.[173]

Hence, there is a possibility for participants in the arms race to bargain their way to stability – to guide their mutual interaction towards a place of common interest. It also seems that for Schelling game theory offers a powerful means of analysing this bargaining process across the full range of activities which can be understood as varieties of 'arms races'. This provides an insight into the extent of Schelling's unique approach to the question of stability.

CONCLUSION

This chapter presents something of a paradox. On the one hand, there is considerable similarity between Schelling's treatment of stability as a strategic concept in the early 1960s and the corresponding analysis of other prominent strategic thinkers. They use a common set of important ideas in explaining what they mean by 'stability'. On the other hand, this

set of ideas offers at best a partial explanation of Schelling's approach to the concept. Not only does Schelling join other strategic thinkers in finding fault in many common interpretations of 'balance', 'arms race' and 'offence–defence', there are also areas where his own analysis is quite unique.

In short, Schelling appears to have a concept of stability which he applies to a very wide range of strategic activity. Understanding these situations as bargaining processes seems to be important in explaining the prospects for stability in each case. These two points are crucial in explaining the origins of Schelling's own approach to stability and in assessing its uniqueness as opposed to its commonalty. In this connection, it is worth recalling that Schelling's interest in both stability and bargaining predates the particular strategic circumstances which helped stability become a dominant strategic concept in the late 1950s and early 1960s.[174]

This leaves the author with two main tasks. The first is to explain and analyse in some detail the consistency in Schelling's approach to the concept of stability. Hence Chapter 3 identifies a general concept of stability in Schelling's work – a characteristic which sets him apart from many of his contemporaries. The second task is to provide an extended assessment of the intellectual origins of Schelling's general concept. This assessment is to be found in Chapters 4 and 5, which discuss the importance of ideas from microeconomic theory and game theory, and Chapter 6, which discusses the relevance of ideas from other social sciences.

NOTES

1. Schelling and Halperin, *Strategy and Arms Control*, p. 50.
2. It can also be argued that this balance between the parties is a particular manifestation of *the balance* of forces, i.e. the relationship between force levels which may or may not constitute a balance of deterrence. For a contemporary example of this approach, see the Institute for Strategic Studies, *The Soviet Union and the NATO Powers: The Military Balance* (London: ISS, 1959).
3. Hedley Bull, 'The Scope for Super Power Agreements', in Robert O'Neill and David N. Schwartz (eds), *Hedley Bull on Arms Control* (Basingstoke: Macmillan in association with the IISS, 1987), p. 75. This was originally an article published in 1970 in the journal *Arms Control and National Security*.
4. William W. Kaufmann, 'The Requirements of Deterrence', in William W. Kaufmann (ed.), *Military Policy and National Security* (Port Washington, NY: Kennikat Press, 1956), p. 16. For a very similar definition of deterrence in a text which made use of Schelling's work, see Glenn H. Snyder, *Deterrence and Defense: Toward a Theory of National Security* (Princeton, NJ: Princeton University Press, 1961), pp. 3, 12. For Snyder's acknowledgement of Schelling's influence, see ibid., p. vi. For Schelling's later reference to Snyder's work, see Schelling, *Arms and Influence*, p. 79n21. On the tendency to define deterrence in terms of costs and risks, see Lawrence Freedman,

'Strategic Defence in the Nuclear Age', *Adelphi Paper*, 224 (London: International Institute for Strategic Studies, Autumn 1987), p. 18; Patrick M. Morgan, *Deterrence: A Conceptual Analysis* (Beverly Hills, CA: Sage Publications, 1977), pp. 33–5, 58–9, 72.

5. Schelling and Halperin, *Strategy and Arms Control*, p. 17. Note Herman Kahn's similar argument that arms control will often tend to 'make the deterrence of war harder by reducing the risks of war'. Herman Kahn, *On Thermonuclear War* (Princeton, NJ: Princeton University Press, 1960), pp. 230–1.
6. Thomas C. Schelling, 'The Thirtieth Year', p. 24. Also see Schelling, 'War Without Pain', p. 481. Also note Wohlstetter's comment: 'Deterrence itself, of course, is nothing new.' Albert Wohlstetter, 'Analysis and Design of Conflict Systems', in E. S. Quade (ed.), *Analysis for Military Decisions*, (Chicago, IL: Rand McNally, 1964), p. 122.
7. This renaissance had become evident by the early 1950s. See Ernest B. Haas, 'The Balance of Power: Perception, Concept or Propaganda', *World Politics*, 5:4 (July 1953), p. 442.
8. On Francesco Barbaro's conception of the balance of power in 1439, see M. S. Anderson, *The Rise of Modern Diplomacy 1450–1919* (London: Longman, 1993), p. 151. In an older study, Herbert Butterfield identifies Francesco Guiccardini's posthumous work of 1561 as the earliest clear description of the balance of power in terms on an equilibrium of forces. See Herbert Butterfield, 'The Balance of Power', in Herbert Butterfield and Martin Wight (eds), *Diplomatic Investigations: Essays on the Theory of International Politics* (London: Allen & Unwin, 1966), p. 137.
9. See Anderson, *Rise of Modern Diplomacy*, p. 163.
10. See Butterfield, 'Balance of Power', p. 132; Anderson, *Rise of Modern Diplomacy*, pp. 167–8; Torbjorn L. Knutsen, *A History of International Relations Theory: An Introduction* (Manchester: Manchester University Press, 1993), p. 96. The etymology of 'balance' also suggests mechanical overtones. The late Latin 'bilancia' means a 'pair of scales', which is likely to have come from the classical Latin 'bilanx'; 'bi' meaning twice and 'lanx' meaning 'flatplate' or 'scale'. *Oxford English Dictionary*, 2d edn (Oxford: Clarendon Press, 1989), Vol. I, p. 894. A similar analysis of 'balance' appears in A. F. Pollard, 'The Balance of Power', *Journal of the British Institute of International Affairs*, 2 (March 1923), p. 60. For a contemporary use of the 'scales' metaphor, see Hedley Bull, *The Control of the Arms Race: Disarmament and Arms Control in the Missile Age* (London: Weidenfeld & Nicolson for the Institute for Strategic Studies, 1961), p. 38.
11. Wight observed no less than nine distinct meanings of the 'balance of power'. See Martin Wight, 'The Balance of Power', in Butterfield and Wight, *Diplomatic Investigations*, pp. 149–75. Haas identified eight 'verbal differences in meaning' and four 'applied meanings' of the concept. See Haas, 'Balance of Power', p. 442.
12. Wight, 'The Balance of Power', pp. 151–2.
13. See Kissinger, *Nuclear Weapons and Foreign Policy*, pp. 7–10.
14. Henry A. Kissinger, 'The Congress of Vienna: A Reappraisal', *World Politics*, 8:2 (January 1956), p. 265. On Kissinger's contribution to strategic thought, see Freedman, 'Henry Kissinger', pp. 98–119.
15. Kissinger, 'The Congress of Vienna', p. 266. Also note the description of the balance of power by Kenneth Waltz, another contemporary theorist of international relations, as 'a series of coalitions in which the momentarily disadvantaged combine and recombine to prevent the ascendancy (the winning of the game) of the opposing country or coalition'. Kenneth N. Waltz, *Man, the State and War: A Theoretical Analysis* (New York: Columbia University Press, 1959), pp. 206–7.
16. Kissinger, *Nuclear Weapons and Foreign Policy*, p. 8.
17. Robert Osgood, another strategic thinker quite well versed in power politics,

observed that stability was 'an old ideal in international relations, expressing the goal of moderating and regularizing the competition of power among states so as not to disrupt the political system'. Robert E. Osgood, 'Stabilizing the Military Environment', *The American Political Science Review*, 55:1 (March 1961), p. 24. Clausewitz, according to the most recent English translation, proposed that 'a state of balance tends to keep the existing order intact – always assuming the original condition was one of calm, of equilibrium'. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), Bk. VI, Ch. VI, p. 374.

18. For Schelling's favourable review of Bull's book, see T. C. Schelling, review of *The Control of the Arms Race* by Hedley Bull, *Survival*, 3:4 (July–August 1961), pp. 195–6. In turn, Bull's text owed much to Schelling's earlier work. He cites not only several essays in *The Strategy of Conflict*, but also Schelling's 'Reciprocal Measures for Arms Stabilization', 'Meteors, Mischief and War', and 'Proposal for a Special Surveillance Force'. For examples of Bull's reliance on Schelling, see below.
19. Bull, *The Control of the Arms Race*, p. 57. Also see Snyder, *Deterrence and Defense*, p. 48 on the conditions under which a 'potential aggressor is "balanced"'.
20. On Schelling's initial citation of Huntington's article see Chapter 1 above. For subsequent citations, see Schelling, 'War Without Pain', p. 470 and Schelling, 'Managing the Arms Race', pp. 611–12. Wohlstetter also read Huntington's study. See Albert Wohlstetter, 'Rivals But No "Race"', *Foreign Policy*, 16 (Fall 1974), p. 75.
21. See Huntington, 'Arms Races', p. 46. For Huntington's argument that the industrial revolution made possible large increases in the power of armaments in terms of both quantity and quality, see ibid., p. 48. On the special improvements in armaments technology from about the 1870s onwards, see Brian Bond, *War and Society in Europe, 1870–1970* (Leicester: Leicester University Press, 1983), pp. 18, 20, 42–3, 52, and William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since AD 1000* (Oxford: Basil Blackwell, 1982), pp. 232–50.
22. Bull, *The Control of the Arms Race*, p. 6. For Bull's citation of Huntington, see ibid., p. 5, n. 1. For Kissinger's similar observation, see Kissinger, *Nuclear Weapons and Foreign Policy*, p. 9.
23. Bull, *The Control of the Arms Race*, p. 59.
24. Kahn, *On Thermonuclear War*, p. 526.
25. Quoted in Wight, 'The Balance of Power', p. 153.
26. Kissinger, *Nuclear Weapons and Foreign Policy*, p. 9.
27. For earlier comments on Wohlstetter's contribution, see Chapter 1.
28. Kaplan, *The Wizards of Armageddon*, p. 172
29. Also note Snyder's comment, in a section on stability which is similar to Schelling's work in 'Surprise Attack and Disarmament', that 'the balance would be unstable if either side required only a small additional expenditure of resources to achieve a first-strike capability which could reduce the opponent's retaliation to acceptable proportions'. See Snyder, *Deterrence and Defense*, p. 97.
30. Interviews with Schelling, 10 November 1994 and 24 September 1996.
31. The author is indebted to Jan Willem Honig for highlighting this point.
32. On the apolitical nature of much of Schelling's analysis, see Williams, 'Thomas Schelling', p. 132; Lebow, 'Thomas Schelling and Strategic Bargaining', p. 566. Also see Robert Jackson and Georg Sorenson, *Introduction to International Relations* (Oxford: Oxford University Press, 1999), p. 83.
33. Schelling, review of *The Control of the Arms Race*, p. 195.
34. Schelling and Halperin, *Strategy and Arms Control*, p. 6. In an interview Schelling noted that political factors were deliberately excluded so as to draw attention to the military factor. Interview with Schelling, 24 November 1996.

35. Schelling and Halperin, *Strategy and Arms Control*, p. 6.
36. In particular, see Brodie's two essays, 'War in the Atomic Age' and 'Implications for Military Policy', in Bernard Brodie (ed.), *The Absolute Weapon*, pp. 21–69 and 70–107 respectively. For Schelling's citation and praise of Brodie's work in *The Absolute Weapon*, see Schelling, 'Surprise Attack and Disarmament', P-1574, p. 5; T. C. Schelling, review of *Strategy in the Missile Age*, p. 493; Schelling, 'A Tribute to Bernard Brodie', P-6355, p. 1. For a discussion of Brodie's early contributions to nuclear strategy, see Steiner, *Bernard Brodie*, pp. 27–45.
37. For a useful distinction between the balance of power and the balance of terror, with the latter described as a 'balance of deterrence', see Synder, *Deterrence and Defense*, pp. 41–51.
38. Brodie, 'War in the Atomic Age', p. 32. This is a restatement of the same argument which Brodie had presented the previous year in his lesser known Yale University paper. See Bernard Brodie, 'The Atomic Bomb and American Security' (Yale University, Memorandum No. 18, 1945), in Philip Bobbitt, Lawrence Freedman and Gregory F. Treverton (eds), *US Nuclear Strategy: A Reader* (Basingstoke: Macmillan, 1984), p. 65. For Brodie's later confirmation of this huge 'lead to the offense over defense', which had only been increased by subsequent development in technology, see Bernard Brodie, *Strategy in the Missile Age* (Princeton, NJ: Princeton University Press, 1959), p. 165.
39. See Bernard Brodie, *Sea Power and the Machine Age*, 2d edn (Princeton, NJ: Princeton University Press, 1943), pp. 7, 439. Steiner is right to point to the 'destructive potential' of the atomic bomb as a 'point of departure' for Brodie's analysis. Steiner, p. 5, but more attention needs to be paid to the methodological relevance of *Sea Power* for Brodie's writing in the nuclear age.
40. Brodie, 'War in the Atomic Age', p. 34.
41. Brodie, 'Implications for Military Policy', pp. 75–6. Also see Brodie, *The Atomic Bomb and American Security*, p. 83.
42. Jacob Viner, 'The Implications of the Atomic Bomb for International Relations', *Proceedings of the American Philosophical Society*, 90:1 (January 1946), p. 55. For a quotation from the same passage, see Freedman, *Evolution*, p. 28.
43. Brodie, 'Implications for Military Policy', p. 74. On the tendency for nuclear weapons to make the costs of attacking especially stark, see Morgan, *Deterrence*, pp. 58–9.
44. Brodie, *The Atomic Bomb and American Security*, p. 77.
45. Note Brodie's point that it would be better for *both* sides to have 'bombs in quantity from the beginning', see Brodie, 'Implications for Military Policy', p. 85. This is not to deny the logical possibility that deterrence can be unilateral – i.e. where one state can deter the other but not vice versa. Somewhat confusingly this could be seen as a force for 'stability' (or order) if it was used to deter a state from attempting to upset the status quo. But the logic of Brodie's argument suggested that with nuclear weapons, unilateral deterrence would not generally be stable.
46. Brodie, 'Implications for Military Policy', p. 84.
47. Brodie, 'Implications for Military Policy', p. 87.
48. Note Freedman's point that 'Brodie suggested that a stable balance in atomic arsenals might be safer than asymmetries'; Freedman, *Evolution*, p. 43. This follows on from Howard's argument that in *The Absolute Weapon*, Brodie presented 'the concept of a stable balance of nuclear forces'. Howard, 'The Classical Strategists', pp. 52–3. Also see Booth, 'Bernard Brodie', p. 23.
49. Schelling, 'The Thirtieth Year', p. 24.
50. On the scarcity of further analysis, see Freedman, *Evolution*, pp. 43–4.
51. On the circumstances at the start of the 1950s, see Wohlstetter, 'Analysis and Design of Conflict Systems', p. 124.

52. Note Freedman's observation that it was not until the late 1950s that much attention was paid to the challenges of preserving the capability to retaliate. Freedman, *Evolution*, p. 95.
53. The first of these studies was Wohlstetter and Henry Rowen's internal working paper, 'Economic and Strategic Considerations in Air Base Location: A Preliminary Review' of 29 December 1951. See Smith, *RAND Corporation*, p. 205. The Air Force had requested RAND to study criteria for the selection of overseas air bases earlier in May of the same year. See ibid., p. 199. On the importance of the vulnerability question, see Freedman, *Evolution*, pp. 135–6; Trachtenberg, *History and Strategy*, p. 20.
54. Wohlstetter, 'The Delicate Balance of Terror', p. 225.
55. A. J. Wohlstetter, F. S. Hoffman, R. J. Lutz and H. S. Rowen, 'Selection and Use of Air Bases', *RAND* R-266 (April 1954), p. 226. This paper is reprinted in Trachtenberg, *The Development of American Strategic Thought: Writings on Strategy 1952–1960*, Vol. I, pp. 163–589. For a case study of the origins of this paper, see Smith, *RAND Corporation*, pp. 195–240. Also see E. S. Quade, 'The Selection and Use of Strategic Bases: A Case History', in E. S. Quade, *Analysis for Military Decisions*, (Chicago, IL: Rand McNally, 1964), pp. 24–63, and Ball, *Politics and Force Levels*, pp. 38–40.
56. A.J. Wohlstetter and Fred Hoffman, 'Protecting US Power to Strike Back in the 1950s and 1960s' *RAND* R-290 (Abridged) (1 September 1956), p. 41. This paper is reprinted in Trachtenberg, *The Development of American Strategic Thought: Writings on Strategy 1952–1960*, Vol. II, pp. 127–234.
57. See Wohlstetter, 'The Delicate Balance of Terror', p. 216. On Wohlstetter's idea of the Soviet Union's greater tolerance for casualties, see Freedman, *Evolution*, p. 142. In a rare call for an appreciation of non-military factors, Schelling also allows for some difference between the two sides and thus calls for 'two sets of numbers to represent our two different appreciations of the consequences'. Schelling, 'Assumptions About Enemy Behavior', p. 212.
58. Brodie, *Strategy in the Missile Age*, p. 282. For Brodie's citation of Wohlstetter, see ibid., p. 282, n. 4. For the argument that in subsequent years Brodie came increasingly to distance himself from Wohlstetter's 'delicate' balance, trusting that the political judgements of those involved would more than compensate for any military instabilities, see Steiner, *Bernard Brodie*, pp. 16–17, 199, and Trachtenberg, *History and Strategy*, p. 44; Michael Howard, 'Brodie, Wohlstetter, and American Nuclear Strategy', *Survival*, 34:2 (Summer 1992), p. 111. On the political element in Brodie's thinking, see Freedman, *Evolution*, p. 300.
59. For further discussion, see Chapter 1 above.
60. Wohlstetter, 'The Delicate Balance of Terror', p. 225.
61. Ibid., p. 211. Also note Wohlstetter's and Hoffman's comment in 1956 that 'the possibility of protecting our own strategic capability is … the most important element of stability in the military situation'. Wohlstetter and Hoffman, 'Protecting US Power', p. 7.
62. For Wohlstetter's recollection of the use of the first and second strike distinction in the base studies, see Wohlstetter, 'Analysis and Design of Conflict Systems', p. 126.
63. Brodie, *Strategy in the Missile Age*, p. 303.
64. Wohlstetter, 'The Delicate Balance of Terror', p. 225. For an earlier rejection of matching as a 'criterion' for deterrence, see Wohlstetter and Hoffman, 'Protecting US Power', p. 5. For early concern about the deficiency in the popular understanding of the 'balance of terror', see ibid., p. 7. For commentary, see Trachtenberg, *History and Strategy*, p. 20.
65. Schelling, 'Surprise Attack and Disarmament', p. 4; Schelling, *The Strategy of Conflict*, p. 232. For a similar formulation, see Snyder, *Deterrence and Defense*, p. 97.

66. For other examples of the practice of placing quotation marks around the similarly problematic 'balance of terror', see Brodie, *Strategy in the Missile Age*, p. 331; Kahn, *On Thermonuclear War*, p. 233. Also note Schelling and Halperin's attack on the notion that a stable balance in the nuclear age was 'the simple arithmetic ratio of strength between the power blocs'. Schelling and Halperin, *Strategy and Arms Control*, p. 50. For Bull's similar rejection of the idea of simply 'totting up and comparing numerically the forces and weapons available to both sides', see Bull, *The Control of the Arms Race*, p. 43.
67. For further analysis of this point, see Chapter 3 below.
68. Schelling, 'Surprise Attack and Disarmament', p. 4. For Brodie's quotation of this passage from Schelling's RAND Paper, see Brodie, *Strategy in the Missile Age*, p. 303. In a later version of the same essay, Schelling writes that 'The balance' (rather than *the situation*) 'is stable only when neither, in striking first, can destroy the other's ability to strike back'. Schelling, *The Strategy of Conflict*, p. 232. In this case at least, Schelling appears to be using the term 'balance' as a form of shorthand.
69. Schelling also had other reasons for being averse to symmetry. See Chapter 4 below.
70. For Snyder's identification of this as a 'second form of instability', see Snyder, *Deterrence and Defense*, p. 98.
71. Brodie, 'Implications for Military Policy', p. 86. For confirmation that Brodie sees the problem of 'anticipation' as the same as the subsequent concern with 'pre-emption', see his reference to the 'pre-emptive' or 'anticipatory strike'. Brodie, *Strategy in the Missile Age*, p. 401.
72. Brodie, *Sea Power*, p. 447.
73. See Bernard Brodie, 'Unlimited Weapons and Limited War', *The Reporter* (18 November 1954), p. 18. This is quoted in Freedman, *Evolution*, p. 131, and cited in Trachtenberg, *History and Strategy*, p. 23n45.
74. As quoted in both Trachtenberg, *History and Strategy*, p. 22, and Rosecrance, 'Wohlstetter', p. 60, from Wohlstetter and Hoffman, 'Defending a Strategic Force after 1960', *RAND* D-2270 of 1 February 1954.
75. Schelling, 'Surprise Attack and Disarmament', p. 5. For a slightly rearranged version, see Schelling, *The Strategy of Conflict*, p. 232.
76. Schelling, 'Surprise Attack and Disarmament', p. 5.
77. Wohlstetter, 'The Delicate Balance of Terror', p. 230. A longer extract of this passage is to be found in Trachtenberg, *History and Strategy*, p. 23.
78. However this is not to deny the close relationship between the two problems, which can be seen in Kaufmann's classic analysis: 'Our problem, therefore, is to find deterrents that forecast costs sufficient to discourage the enemy, but not provocative enough to make him turn, out of fear and desperation, to contingencies of the last resort.' Kaufmann, 'The Requirements of Deterrence', p. 29.
79. Schelling, 'Surprise Attack and Disarmament', p. 2; Schelling, *The Strategy of Conflict*, p. 231. See also Schelling and Halperin, *Strategy and Arms Control*, pp. 9–11.
80. Schelling, 'Surprise Attack and Disarmament', p. 2; Schelling, *The Strategy of Conflict*, p. 231.
81. Brodie, *Strategy in the Missile Age*, p. 301. Again, Brodie is quoting from the RAND paper in advance of the publication of 'Surprise Attack and Disarmament'. With that publication, Schelling's influence grew. For example, note the citation of Schelling's 'Surprise Attack and Disarmament' by Osgood, 'Stabilizing the Military Environment', p. 33. Osgood's article is a good demonstration of the influence Schelling's ideas were having on other strategic thinkers by the early 1960s. For instance, note Osgood's agreement on the need for a 'tacit agreement' (one of Schelling's main reference points) so that 'the balance of terror might become very stable in terms of mutual deterrence against first strikes', ibid., p. 31. For Snyder's

citation of 'Surprise Attack and Disarmament', see Snyder, *Deterrence and Defense*, p. 100n27. On Schelling's treatment of bargaining, see ibid., pp. 11n6, 23n18.

82. On this cognitive aspect, see Chapter 6 below.
83. This was confirmed in the author's interview with Schelling, 24 September 1996. For Trachtenberg's account, itself citing an interview with Schelling in 1983, see Trachtenberg, *History and Strategy*, p. 23.
84. Wohlstetter, 'The Delicate Balance of Terror', p. 229. Note Brodie's agreement on this point which is also reminiscent of Kaufmann's point about provocation: 'Unlike the ICBM, the nearby missile seems to denote arrogance as well as strength', Brodie, *Strategy in the Missile Age*, p. 398.
85. For discussion of a paper in which Daniel Ellsberg applies Wohlstetter's idea of 'alternative risks', see Rosecrance, 'Wohlstetter', pp. 61–4.
86. Wohlstetter, 'Analysis and Design of Conflict Systems', p. 117. Also see C. J. Hitch, 'Analysis for Air Force Decisions', in E. S. Quade, *Analysis for Military Decisions*, (Chicago, IL: Rand McNally, 1964), p. 14.
87. E. S. Quade, 'Recapitulation', in Quade, *Analysis for Military Decisions*, p. 321. On the challenge of this complexity, see Wohlstetter, 'Analysis and Design of Conflict Systems', pp. 103–10.
88. See Freedman, *Evolution*, p. 179.
89. Schelling and Halperin, *Strategy and Arms Control*, pp. 121–2.
90. Wohlstetter, 'The Delicate Balance of Terror', p. 215.
91. See Freedman, *Evolution*, pp. 179–80. On the use of 'opposed systems design' and analysis by Wohlstetter and his RAND colleagues, see Herken, *Counsels of War*, p. 90.
92. See Schelling and Halperin, *Strategy and Arms Control*, p. 55.
93. See Wohlstetter, 'The Delicate Balance of Terror', pp. 219–21. These six hurdles are listed in Rosecrance, 'Wohlstetter', p. 61. Also note Schelling's comment that Brodie's *Layman's Guide to Naval Strategy*, (published in 1942) 'contains some of the best early "systems analysis" I ever saw'. Schelling, 'A Tribute to Bernard Brodie', p. 1.
94. Bull, *The Control of the Arms Race*, p. 163.
95. Ibid., p. 59.
96. For example, note Gulick's comment that the existence of the state system was the first assumption of the balance of power theorists; Edward Vose Gulick, *Europe's Classical Balance of Power: A Case History of the Theory and Practice of One of the Great Concepts of European Statecraft* (Ithaca, NY: Cornell University Press, 1955), p. 55. On the emergence of this idea in the seventeenth century, see Martin Wight, *Systems of States*, ed. Hedley Bull (Leicester: Leicester University Press, 1977), p. 24. On the importance of the interdependence between the states of Europe in the development of balance-of-power thinking, see Anderson, *Rise of Modern Diplomacy*, p. 151; Hedley Bull, 'Introduction: Martin Wight and the study of international relations', in Wight, *Systems of States*, p. 18.
97. Note the comparison which Bull draws between the classical European idea of the states system and the tendency in contemporary American social science 'to view the international political field as a whole as a particular kind of system of action', an approach which he locates in such texts as Morton Kaplan's *System and Process in International Politics*, a book which Schelling read. Bull, 'Introduction: Martin Wight', p. 16. For reference to Kaplan's book as an important example of the systems approach which influenced stability thinking, see Freedman, 'Strategic Stability', p. 171.
98. Schelling, 'Surprise Attack and Disarmament', p. 43; Schelling, *The Strategy of Conflict*, p. 251.
99. Ibid.
100. Brodie, *Strategy in the Missile Age*, p. 177.

101. Schelling, 'Surprise Attack and Disarmament', p. 6.
102. Ibid. For a discussion of this distinction in Schelling's work, see Freedman, *Evolution*, pp. 194–5.
103. Schelling, 'Surprise Attack and Disarmament', p. 20.
104. Ibid., p. 21. Note that in the later version of the essay Schelling deletes the reference to weapons being either 'good' or 'bad'. See Schelling, *The Strategy of Conflict*, p. 233.
105. Schelling and Halperin, *Strategy and Arms Control*, p. 4.
106. Wohlstetter, 'The Delicate Balance of Terror', p. 222. For citation of the Gaither Report's concerns about the instability of the equilibrium due to technological change, see Freedman, *Evolution*, p. 161. Also note Osgood's comment that technological innovation tended to 'perpetuate an unstable equilibrium between offensive and defensive capabilities'. Osgood, 'Stabilizing the Military Environment', p. 30. For a similar concern in the secondary literature, see George Quester's warning that 'the destabilizing impact of the offensive advantage threatens to raise its ugly head again'. George H. Quester, *Offense and Defense in the International System* (New York: John Wiley, 1977), p. 159.
107. Brodie, *Strategy in the Missile Age*, p. 331.
108. Ibid., p. 301. Brodie cites Schelling's 'Surprise Attack and Disarmament' on the same page.
109. See Gray's comment that a 'stabilizing/destabilizing dichotomy has partially replaced, but certainly has not exiled, the older distinction between offensive and defensive'. Gray, *Weapons Don't Make War*, p. 41.
110. B. H. Liddell Hart, 'Aggression and the Problem of Weapons', *English Review*, 55 (July–December 1932), p. 73. On Liddell Hart's abrupt shift in the early 1930s away from his earlier Blitzkrieg theory because of his overriding concern that Britain should avoid a commitment to another costly war in Europe, see John J. Mearsheimer, *Liddell Hart and the Weight of History* (London: Brassey's, 1988), pp. 105–10.
111. B. H. Liddell Hart, *The Liddell Hart Memoirs* (London: Cassell, 1965), Vol. I, p. 186.
112. Philip Noel-Baker, *The Arms Race: A Programme for World Disarmament* (London: Atlantic Books, 1958), p. 394. Noel-Baker's position is noted in Hedley Bull, 'Disarmament and the International System', in Robert O'Neill and David N. Schwartz (eds), *Hedley Bull on Arms Control* (Basingstoke: Macmillan in association with the IISS, 1987), p. 28. (This article originally appeared in 1959 in the *Australian Journal of Politics and History*.)
113. See Marion William Boggs, 'Attempts to Define and Limit "Aggressive" Armament in Diplomacy and Strategy', *University of Missouri Studies*, 16:1 (1941), pp. 1–113. For Huntington's citation of Boggs, see Huntington, 'Arms Races', p. 72n39. Also see Freedman, 'Strategic Stability', pp. 171, 173n6.
114. See O'Neill and Schwartz, 'Introduction', p. 3. In the event, Bull did not take up this opportunity because of his disagreement with Noel-Baker's approach.
115. See Bull, *Control of Arms Race*, p. 32. Also see ibid., pp. 121–2, where Bull attacks the simple offence–defence distinction as a basis for conventional disarmament. Bull's analysis is likely to have provided some of the basis for Schelling and Halperin's observation that: 'In earlier eras there was interest in the limitation of offensive weapons in contrast to defensive weapons.' Schelling and Halperin, *Strategy and Arms Control*, p. 51. For Wohlstetter's much later comments on the problems encountered during the interwar years with attempts to apply a simple offence–defence distinction, see Albert Wohlstetter, 'The Political and Military Aims of Offense and Defense Innovation', in Fred S. Hoffman, Albert Wohlstetter and David S. Yost, *Swords and Shields: NATO, The USSR, and New Choices for Long-Range Offense and Defense* (Lexington, MA: D. C. Heath, 1987), p. 4.

116. Bull, *The Control of the Arms Race*, p. 121. For Brodie's reference to Clausewitz's belief in the superiority of the defensive, see Brodie, *Strategy in the Missile Age*, pp. 43–4. For the original, see Clausewitz, Bk. VI, Ch. VI, p. 372. Also see Azar Gat, 'Clausewitz on Defence and Offence', *Journal of Strategic Studies*, 11:8 (March 1988), pp. 20–6; Freedman, 'Strategic Defence in the Nuclear Age', pp. 39–40; Jack S. Levy, 'The Offensive/Defensive Balance of Military Technology: A Theoretical and Historical Analysis', *International Studies Quarterly*, 28:2 (1984), p. 220. On Sun Tzu's interest in this question, see Quester, *Offense and Defense*, pp. 8, 72.
117. Schelling and Halperin, *Strategy and Arms Control*, p. 52. On the difficulties in applying such distinctions to the pre-nuclear era, See Freedman, 'Strategic Defence and the Nuclear Age', pp. 14–15. On the additional problems which the nuclear age brought, see ibid., p. 16. For a relatively recent defence of the distinction, see Sean M. Lynn-Jones, 'Offense–Defense Theory and its Critics', *Security Studies*, 4:4 (Summer 1995), pp. 660–91.
118. Schelling, *The Stability of Total Disarmament*, p. 10. Also note Bull's assessment of the 'de-stabilizing' character of the 'anti-missile missile, aimed at the restoration of defensive power'. Bull, *The Control of the Arms Race*, p. 208. For Schelling's rather separate analysis of offence and defence as actions rather than as characteristics of weapons, and their connection to 'deterrence' and 'compellence' respectively, see Schelling, *Arms and Influence*, pp. 78–80. Also see Freedman, 'Strategic Defence in the Nuclear Age', pp. 17–18.
119. Schelling and Halperin, *Strategy and Arms Control*, p. 51.
120. Wohlstetter, 'The Delicate Balance of Terror', p. 216. In the language of game theory, the relationship between offence and defence is non-zero-sum. Note Schelling's criticism of Kenneth Boulding's advocacy of armaments which are purely defensive: 'The interaction between defensive and offensive arms – the immunity to retaliation or counterattack that defensive weapons may provide, and their release of resources (and possibly of motivation) for offensive action – does not fit into his model. (This is somewhat surprising, Boulding being an economist.)' Schelling, 'War Without Pain', p. 481.
121. Albert Wohlstetter, 'Strength, Interest and New Technologies', *Adelphi Paper*, 46 (London: Institute for Strategic Studies, March 1968), p. 1.
122. There is a similar logic to the arguments of the interwar years whereby more 'defensive' weapons could be better than less.
123. Schelling, 'Surprise Attack and Disarmament', pp. 13–14; Schelling, *The Strategy of Conflict*, p. 237. Kahn took the same line as Schelling, arguing that 'a "balance of terror" between two large military establishments tends to be much more stable against crises, accidents, cheating, minor changes in technology or posture, or miscalculations … than a balance of terror stabilized with small establishments'. Kahn, *On Thermonuclear War*, p. 233.
124. For Bull's assessment of the dangers of a 'massive numerical superiority' in nuclear weapons in terms of increasing the threat of surprise attack, see Bull, *The Control of the Arms Race*, p. 172.
125. Schelling, 'Surprise Attack and Disarmament', p. 13; Schelling, *The Strategy of Conflict*, p. 237. Note Bull's agreement: 'There are powerful arguments that the maintenance of a stable Soviet–Western balance may require higher levels and advanced kinds of armaments, and may even be served by the further prosecution of the arms race in certain fields.' Bull, *The Control of the Arms Race*, p. 60. For Bull's acknowledgement of his dependence upon Schelling's development of these arguments, see ibid., p. 60n17. Also note Snyder's conclusion that 'the missile arms race … becomes more stable as it proceeds. The incentives to continue the arms race diminish rapidly as the numbers of weapons increase on both sides'. See Snyder,

Deterrence and Defense, pp. 100–1 and note his citation there of Schelling's 'Surprise Attack and Disarmament'.

126. For the same practice, see Schelling and Halperin, pp. 34, 37.
127. In the mid-1970s, Wohlstetter attacked the logic of arms-race 'doctrines', claiming that they offered 'little more than metaphor about the process of arms decision'. See Albert Wohlstetter, 'Is There a Strategic Arms Race?', *Foreign Policy*, 15 (Summer 1974), p. 7. For the second instalment, see Wohlstetter, 'Rivals, But No "Race"'. For a further critique from the 1970s, see Gray, 'Strategic Stability Reconsidered', p. 145; idem, 'The Arms Race Phenomenon', *World Politics*, 24:1 (October 1971), pp. 39–79.
128. On the tendency for the term 'arms race' to take on this sort of meaning, see Lawrence Freedman, 'Nuclear Weapons in Europe: Is There an Arms Race?', *Millennium*, 13:1 (1984), p. 63; Charles H. Fairbanks Jr, 'Arms Races: The Metaphor and the Facts', *The National Interest*, 1 (Fall 1985), p. 77; Gray, *Weapons Don't Make War*, p. 48.
129. Schelling and Halperin, *Strategy and Arms Control*, p. 37. The authors probably had in mind Huntington's argument that qualitative arms races were less likely to lead to war than quantitative arms races. See Huntington, 'Arms Races', p. 79. The potential for instability via 'technological or scientific breakthrough' is also noted in Snyder, *Deterrence and Defense*, p. 97. At the time, Wohlstetter suggests a similar concern with his comment that nuclear 'technology is changing with fantastic speed'. Wohlstetter, 'The Delicate Balance of Terror, p. 222. However, 15 years later he cited Huntington's study to support the argument that 'military innovation was fundamentally benign'. Wohlstetter, 'Rivals But No "Race"', p. 75. Also note Brodie's comment before the nuclear age that a 'rapid transition in matériel' may create 'an instability' and 'upset conditions of military security'. Brodie, *Sea Power*, p. 12.
130. Wohlstetter, 'The Delicate Balance of Terror', p. 212. Indeed, Schelling and Halperin insist that some technologies, even if they were possessed by *both sides*, could actually be 'seriously destabilizing'. This was on the grounds of the danger they would pose in terms of increasing the vulnerability of retaliatory forces. See Schelling and Halperin, *Strategy and Arms Control*, p. 37. For a similar rejection of 'symmetrical' retaliatory forces, see Bull, *The Control of the Arms Race*, p. 163.
131. Schelling and Halperin, *Strategy and Arms Control*, p. 37.
132. Hence the same technological race which had allowed for a simple state of balance based on the reciprocal ability to retaliate was now threatening that balance.
133. Schelling and Halperin, *Strategy and Arms Control*, p. 37.
134. As noted briefly in Chapter 1. Also note Huntington's summary of Richardson's 'stimulating work'; Huntington, 'Arms Races', p. 84.
135. See E. Gold, 'Biographical Note', in Lewis F. Richardson, *Statistics of Deadly Quarrels*, ed. Quincy Wright and C. C. Lienau (London: Stevens & Sons, 1960), pp. xix, xx, xxix; Quincy Wright and C. C. Lineau, 'Editors' Introduction', in ibid., p. vi; Craig Etcheson, *Arms Race Theory: Strategy and Structure of Behavior* (New York: Greenwood Press, 1989), pp. 25–9.
136. Schelling, 'The Role of Theory', p. 7n; Schelling, *The Strategy of Conflict*, pp. 7–8n3.
137. See Schelling, 'War Without Pain'. Richardson's best-known work was published posthumously. See Lewis F. Richardson, *Arms and Insecurity: A Mathematical Study of the Causes and Origins of War*, ed. Nicholas Rashevsky and Ernesto Trucco (London: Stevens & Sons, 1960). For Schelling's citation of this text, see Schelling, 'War Without Pain', p. 466n3.
138. These were measured according to each country's expenditure on them; see Richardson, *Arms and Insecurity*, pp. 14–16. This is quite a different notion of the 'arms race' than the technological race of Wohlstetter, Brodie and Schelling. For doubts about this aspect of Richardson's methodology, see Huntington, 'Arms Races', p. 84.

139. Viscount Grey of Fallodon, *Twenty-Five Years, 1892–1916* (London: Hodder & Stoughton, 1925), Vol. I, pp. 91–2. For Richardson's acknowledgement of Grey's inspiration, see Richardson, *Arms and Insecurity*, p. 15.
140. For Noel-Baker's citation of Grey, see Noel-Baker, *The Arms Race*, p. 32. On Noel-Baker's approach, see Freedman, *Evolution*, pp. 205–6.
141. For Bull's critique of Noel-Baker's defence of 'general and comprehensive disarmament', see Bull, 'Disarmament and the International System', pp. 27–40; Bull, *The Control of the Arms Race*, pp. 140–4.
142. Schelling and Halperin, *Strategy and Arms Control*, p. 34. For Wohlstetter's acceptance of this basic idea, although not of the implications which many take from it, see Wohlstetter, 'Is There a Strategic Arms Race?', p. 4.
143. See Bull, *The Control of the Arms Race*, p. 5.
144. For Huntington's definition of arms races incorporating the ideas of competition and interaction, see Huntington, 'Arms Races', p. 27. Huntington quotes Kant's complaint in *Perpetual Peace and Other Essays on Politics, History and Morals*, trans. and ed. Ted Humphrey (Indianapolis, IN: Hackett, 1983 [1795]) that competition between states in the number of men under arms becomes so financially burdensome as to lead to war; see Huntington, 'Arms Races', p. 48n11. For the original passage, see Immanuel Kant, 'To Perpetual Peace: A Philosophical Sketch (1795)', in *Perpetual Peace*, p. 108.
145. See Bull, *The Control of the Arms Race*, p. 12n3. The economic burdens argument was prominent in the Hague Conference of 1899, called for by a Russian government anxious to avoid the financial strain of matching the rapid improvements in the armed forces of other European powers. See Trevor N. Dupuy and Gay M. Hammerman (eds), *A Documentary History of Arms Control and Disarmament* (Dunn Loring, VA: T. N. Dupuy Associates in association with R. R. Bowker, 1973), pp. 49–53; Barbara W. Tuchman, *The Proud Tower: A Portrait of the World Before the War 1890–1914* (London: Macmillan, 1980; 1966 originally), p. 236; Carlton J. H. Hayes, *A Generation of Materialism, 1871–1900* (New York: Harper & Brothers Publishers, 1941), p. 327. On the Hague Conference as a precursor to the international disarmament efforts under the League of Nations, see Hayes, *Generation of Materialism*, p. 327; Michael Howard, 'Introduction', in R. Ahmann, A. M. Birke and M. Howard (eds), *The Quest for Stability: Problems of West European Security, 1918–1957* (London: Oxford University Press, 1993), p. 9. For Bull's reference to the first Hague Conference, see Bull, *The Control of the Arms Race*, p. 31. For Huntington's reference to the second Hague Conference of 1907, see Huntington, 'Arms Races' p. 74n40. Schelling makes little use of the burdens argument, although he does refer to the potential expense of arms races in times of substantial technological change. See Schelling and Halperin, *Strategy and Arms Control*, p. 37.
146. Bull, *The Control of the Arms Race*, p. 7.
147. Ibid., p. 90. Also note Bull's reference to the 'spiral of arms and insecurity', ibid., p. 142.
148. Schelling and Halperin, *Strategy and Arms Control*, p. 74.
149. Richardson, *Arms and Insecurity*, p. 62. Also see Etcheson, *Arms Race Theory*, p. 4.
150. See Richardson, *Arms and Insecurity*, p. 22.
151. As described in Rapoport, 'Lewis F. Richardson's Mathematical Theory', pp. 277–8.
152. Richardson, *Arms and Insecurity*, p. 61. Also see Rapoport, 'Lewis F. Richardson's Mathematical Theory', p. 278.
153. Schelling, 'War Without Pain', p. 473.
154. Kenneth E. Boulding, 'Organization and Conflict', *Journal of Conflict Resolution*, 1:2 (June 1957), p. 132. Also see Rapoport, 'Lewis F. Richardson's Mathematical Theory', p. 291. For Wohlstetter's critique of the idea of an 'explosive' process, and for his

citation of Grey's, Richardson's and Kant's thinking, which seems to derive from his reading of Huntington, see Wohlstetter, 'Is There a Strategic Arms Race?', pp. 4–7.

155. Schelling, 'War Without Pain', p. 473.
156. Ibid.
157. For Huntington's description of the dreadnought issue, see Huntington, 'Arms Races', pp. 69–71 (and note Schelling's enthusiastic citation of Huntington in 'War Without Pain', p. 470). Also note Bull's concerns about exaggerating the role of 'the Anglo-German naval race, in contributing to the outbreak of the First World War', see Bull, *The Control of the Arms Race*, p. 7. On Grey's involvement as Foreign Minister in the British panic over the dreadnoughts in 1909, see Keith Robbins, *Sir Edward Grey: A Biography of Lord Grey of Fallodon* (London: Cassell, 1971), pp. 177, 196–8. For the comment that it was this scare which left a 'life-long impression' on Philip Noel-Baker, see Michael Howard, *The Lessons of History* (Oxford: Clarendon Press, 1991), p. 92. For Schelling's later reference to the dreadnought competition in his description of Churchill's attempt in 1912 to 'deter an expensive acceleration of the arms race by communicating what the British reaction would be', see Schelling, 'Signals and Feedback', p. 9.
158. Schelling, 'War Without Pain', p. 473. In terms of 'recent crises', Cuba is a more than likely example of what he had in mind.
159. See Geoffrey Blainey, *The Causes of War*, 3d edn (Basingstoke: Macmillan Press, 1988), p. 27; Freedman, 'Nuclear Weapons in Europe', p. 57; Patrick Glynn, *Closing Pandora's Box: Arms Races, Arms Control and the History of the Cold War* (New York: Basic Books, 1992), p. 2; Bull, *The Control of the Arms Race*, p. 4. The term 'arms race' emerged before the war, as part of concerns during the late nineteenth century about the growing armament of Europe. See Fairbanks, 'Arms Races', p. 77. Huntington cites Caprivi's reference to 'arms race' in 1893, see Huntington, 'Arms Races', p. 46, n. 8. On the rise of opposition to armaments which began to gather steam in the 1870s, see Blainey, *Causes of War*, pp. 135–6; Merze Tate, *The Disarmament Illusion: The Movement for a Limitation of Armaments to 1907* (New York: Macmillan, 1942), *passim*.
160. For Schelling's citation of Ludwig Reiners' *The Lamps Went Out in Europe*, trans. Richard and Clara Winston (New York: Pantheon, 1955) as an authority on 'the actual decisions to mobilize on the brink of World War I', which he compares to his own theoretical study of analogous processes in 'The Reciprocal Fear of Surprise Attack', see Schelling, 'Meteors, Mischief, and War', p. 294n4. On this sort of connection, see Freedman, *Evolution*, p. 163.
161. Schelling, *Arms and Influence*, p. 221. For Schelling's citation of Reiners' book in this later text, see *Arms and Influence*, p. 223n1. For a reference to Schelling's approach to the 1914 question in *Arms and Influence*, see Trachtenberg, *History and Strategy*, pp. 47–8, who also implies a connection back to the early thinking of Grey; see ibid., p. 97n174. Schelling's description of this problem appears to undermine Richard Ned Lebow's criticism that his treatment of 'crisis stability' ignored the danger of war by 'loss of control' typified by the apparent rigidity of the interlocking mobilisation plans of 1914. See Richard Ned Lebow, *Nuclear Crisis Management: A Dangerous Illusion* (Ithaca, NY, and London: Cornell University Press, 1987), pp. 25–6.
162. Schelling, 'War Without Pain', p. 473. Schelling's interest in the events of 1914 as an example of the pre-emption problem is noted in Williams, 'Thomas Schelling', p. 40. For the criticism that Schelling's account of these events lacks clarity, see Jack Snyder, 'Civil–Military Relations and the Cult of the Offensive, 1914 and 1918', in Steven E. Miller, Sean M. Lynn-Jones and Stephen Van Evera (eds), *Military Strategy and the Origins of the First World War,* revised and expanded edn

(Princeton, NJ: Princeton University Press, 1991), p. 25n8; Stephen van Evera, 'The Cult of the Offensive and the Origins of the First World War', in ibid., p. 72.

163. Schelling, 'War Without Pain', p. 473.
164. Schelling and Halperin, *Strategy and Arms Control*, p. 27. In this discussion Schelling and Halperin confirm the 1914–1960s similarity. Also see Schelling, *Arms and Influence*, pp. 221–32. Reiners' description of the mobilisation in 1914 is notable here: 'Every hour brought fresh telegrams, demanding fresh decisions. Answers had to be approved by all concerned, then ciphered; they were hours being transmitted, were then deciphered and were meanwhile overtaken by new events; then there would be more endless consultations and constant vacillation between the fear of war and the fear of mobilizing too late.' Reiners, *The Lamps Went Out in Europe*, p. 140. Schelling confirmed in an interview that Reiners' book had had quite an effect on him. Interview with Schelling, 24 September 1996.
165. Note that Kahn takes a similar line. In his analysis of 'the "1871–1914" problem' (Kahn, *On Thermonuclear War*, p. 526), he compares the mobilisation of July 1914 with 'current quick reaction schemes' where there is a 'possibility of setting into motion a series of self-confirming signals generated by reactions and counteractions'. Ibid., p. 368. For Schelling's brief comments on mobilisation as a feedback process, see Schelling, 'Signals and Feedback', p. 5.
166. On the connection between mobilisation-type arms races and deterrence, see Schelling's comment that: 'At the outbreak of World War I, "deterrent threats," unfortunately unsuccessfully, were aimed at domestic acts of mobilisation as well as against overt aggression'; Schelling, 'Managing the Arms Race', in Abshire and Allen, *National Security*, p. 604.
167. Schelling, 'War Without Pain', p. 473.
168. Ibid., p. 472n12.
169. Bull, *The Control of the Arms Race*, p. 7. For Bull's earlier examination of the 'primacy of politics', see Bull, 'Disarmament and the International System', p. 31.
170. Bull, *The Control of the Arms Race*, p. 205.
171. Schelling, 'War Without Pain', p. 476. Bull explains an arms agreement as 'the striking of a bargain'. Bull, *The Control of the Arms Race*, p. 69. But this is not quite the tacit bargaining Schelling has in mind. See Chapter 4.
172. Schelling, 'War Without Pain', p. 476. Note Rapoport's argument that Richardson did not allow for rational behaviour as an explanation for the interaction which stimulated the 'war moods' driving arms race behaviour. Rapoport, 'Lewis F. Richardson's Mathematical Theory', pp. 284–5. This meant that even if Richardson had been aware of game theory, he would not have been able to take advantage of its power in theory building in situations involving parties with 'partially conflicting, partially coinciding, goals'; ibid., p. 296. On the point of departure between Kenneth Boulding and Schelling on the Richardson process, see Hassner, *Violence and Peace*, p. 56.
173. Schelling, 'War Without Pain', p. 471.
174. See Chapter 1.

3

Schelling's General Concept[1]

This chapter demonstrates the existence of a 'general'[2] concept of stability in Schelling's work which is applicable across a wide range of particular 'cases'.[3] It will also be shown that Schelling's general concept is underpinned by his understanding of strategy as a bargaining process where the parties involved are linked by their common interest in avoiding a mutually painful outcome. Schelling's strategic bargains can be viewed from two main, but complementary, perspectives, resulting in a two-tiered general concept of stability. The first tier is the ability to strike a bargain. The second is the ability to maintain that bargain over the long term.

These two tiers will be used to illuminate Schelling's analysis of stability in the most important case of all: the stability of the balance of deterrence. The crucial assumptions underpinning Schelling's strategic analysis will also be critically assessed. This will demonstrate that some cases fit his stability/bargaining framework rather better than others.

GENERAL CONCEPT VERSUS PARTICULAR CASE

The analysis in the early portions of the last chapter confirms Schelling's contribution to the development of a dominant understanding of stability applying to the deterrence of general war involving nuclear weapons. Hence his work on the problem of surprise attack, in which he made his best-known contributions to the understanding of the concept of stability, locates the concept in the context of the requirements for a stable balance of deterrence. If taken as a stand-alone essay, Schelling's 'Surprise Attack and Disarmament'[4] functions well as a self-contained analysis of stability against the backdrop of the rapidly evolving military technology of the nuclear age.[5]

From this basis, one might conclude that the requirements of nuclear deterrence explain the concept. Indeed, Colin Gray has argued that the: 'Discussion of stability and its possible requirements is in fact a discussion of deterrence theory, which in reality is a debate about the

operational merits of different postures and doctrines.'[6] This assessment seems to be backed up by Schelling's own definition of 'stabilizing deterrence' in terms of 'reducing the vulnerability of each side's retaliatory forces to the other's forces'.[7] As Chapter 2 has demonstrated, other prominent strategic thinkers of the time follow similar lines of argument, and more recent discussions of stability as a strategic concept also tend to accord to the same logic.[8]

However, it can be argued that Schelling's own treatment of stability in terms of the vulnerability of retaliatory forces is a single, albeit very important, *case* of his general concept. This can be seen in one of his essays where he makes the crucial distinction between 'stability' in terms of the 'unlikelihood that the deterrent balance would be upset' and a more inclusive notion of 'stability' in terms of 'the advantage, in case of war, of striking first and the advantage, in case war is already launched against one, of reacting quickly'.[9] The latter suggests a concept of stability applicable to a wide range of strategic situations where the danger of haste is a common factor (and which, by implication, is not restricted to the nuclear balance between the Cold War superpowers).

SCHELLING'S BARGAINING FRAMEWORK

The argument that Schelling employs a general concept of stability is strengthened if a common theoretical framework can be identified in the wide range of strategic situations which interest him. This framework can be found in Schelling's explanation of the title of his major work on strategy: 'To study the strategy of conflict is to take the view that most conflict situations are essentially *bargaining* situations' (emphasis original).[10] Schelling's later work, *Arms and Influence*, is a study of the applications of this central insight, providing guidance on how best to exploit 'the bargaining power that comes from the physical harm a nation can do to another nation'.[11] This bargaining power was present across a full range of 'conflict' situations, including,

> notions like deterrence, retaliation, and reprisal, terrorism and wars of nerve, nuclear blackmail, armistice and surrender, as well as in reciprocal efforts to restrain that harm in the treatment of prisoners, in the limitation of war, and in the regulation of armaments.[12]

As a result, Schelling is particularly interested in the process by which bargains are struck. He explains that:

> A bargain is struck when somebody makes a final, sufficient concession … There is some range of alternative outcomes in which any

> point is better for both sides than no agreement at all. To insist on any such point is pure bargaining, since one always *would* take less rather than reach no agreement at all, and since one always *can* recede if retreat proves necessary to agreement (emphasis original).[13]

The 'range of alternative outcomes' is a feature common to all of the bargaining/conflict situations Schelling examines. In each case, the indeterminacy is overcome by striking a bargain even when the mathematics of the situation offer little clear guide:

> The final outcome must be a point from which neither expects the other to retreat; yet the main ingredient of this expectation is what one thinks the other expects the first to expect, and so on … These infinitely reflexive expectations must somehow converge on a single point, at which each expects the other not to expect to be expected to retreat.[14]

It is hard to overstate the importance of the notion of compounding expectations – what *I expect he expects I expect* and so on. This captures the essence of Schelling's notion that strategy is a matter of interdependent decision. It is this infinite series of expectations which produces the indeterminacy: 'if both parties are aware of the limits to this range, *any* outcome is a point from which at least one party would have been willing to retreat and the other knows it! There is no resting place' (emphasis original).[15]

It is a bargaining process of some sort which allows for a resting place to be settled on. Two considerations link this point to the general concept of stability. First, there is Schelling's description of war as 'not so much a contest of military strength as a bargaining process'.[16] Second, there is an intuitively close relationship between the idea of stability and the ability to put a halt on moves towards war or towards the unwanted expansion of a war in progress.

Indeterminacy via compounding expectations should thus be central to Schelling's general concept of stability. This connection is evident in a statement made by Schelling and Halperin in *Strategy and Arms Control*:

> We are particularly concerned with the incentives that arise from the character of modern weapons and the expectations they create … a main determinant of the likelihood of war is the nature of present military technology and present military expectations.[17]

The reverse should also hold true: being able to settle on a bargain, where expectations converge at a particular point, should be the key to stability. This logic finds support in Schelling's description of the (tacit) bargaining which occurs in war as 'anything … that conveys intent to the

enemy or structures his expectations about the kind of war it is going to be'.[18] Elsewhere he states that: 'The fundamental problem in tacit bargaining is that of co-ordination.'[19]

It might be objected that to associate stability with co-ordination is a case of stating the obvious. Was Schelling adding to anything here apart from the *terminology* of strategic studies? For example, Bernard Brodie's analysis of the stability of technology[20] might be seen as a description of the difficulty of 'co-ordinating' the competing technologies of ordnance and armour. The absence of co-ordination means the unlikelihood of an 'equilibrium' (a term Brodie himself used[21]).

Schelling, however, had done much more than come up with another synonym for 'stability'. His discussion of these problems of co-ordination, of finding a resting place, is contained within a bargaining framework which introduces systematic theory into this area of strategic studies. This theory makes a crucial difference not only in *describing* the problem, but also in providing guidance as to how it might be resolved.[22] Moreover, it is applicable across a range of individual cases.

SCHELLING'S RIVER AND OTHER KOREAN WAR CASES

Perhaps the most powerful example of this quest to discover the qualities of points of convergence is Schelling's analysis of a river which offers stability in the bargaining relationship between opposing armies. This river is a point beyond which one of the armies *cannot afford to retreat* – a fact which crucially is also easily recognisable by the other party. This river thus offers the two armies the possibility of arriving at 'a mutually identifiable resting place',[23] where their expectations and actions can converge:

> If some troops have retreated to the river in our map, they will expect to be expected to make a stand. This is the one spot to which they can retreat without necessarily being expected to retreat further, while, if they yield any further, there is no place left where they can be expected to make a determined stand. Similarly, the advancing party can expect to force the other to retreat to the river without having his advance interpreted as an insatiable demand for ultimate retreat.[24]

Schelling's conclusion makes explicit the link between this point at which expectations are co-ordinated and the concept which is the subject of this article. For his next sentence is: 'There is stability at the river – and perhaps nowhere else.'[25] Stability can thus be seen as the tendency of the interaction to settle at an easily recognisable 'resting place'. There is

also a close link between this idea of stability and the bargaining framework employed by Schelling. He argues that natural features like rivers have the 'power to crystallize an agreement', because they are an '"obvious" focus for agreement'.[26]

The river does not appear to be an example chosen at random by Schelling to demonstrate his thinking. The Korean War, which was to provide Schelling with ample illustrations of his bargaining theory, is a useful guide here. In his analysis of this conflict, Schelling notes that 'the principal northern political boundary was marked dramatically and unmistakably by a river'.[27]

Yet the Yalu is almost a case of the exception proving the rule. China's crossing of the river in late 1950 after MacArthur's forces had advanced towards it, and Washington's concerns in early 1951 over the dangers of bombing targets over the river into Manchuria,[28] suggest the grave consequences for the stability of a limited war which can come from exceeding such a crucial limit. However, the prospects of producing instability by crossing limits actually reinforces the idea that stability consists of staying within them. As Schelling noted in the mid-1960s: 'The Yalu was like the Rubicon. To cross it would have signalled something.'[29]

Other natural features could act in a similar manner. Referring to another instance of the United States' recent experience in Northeast Asian military affairs, Schelling observes that 'The Formosan Straits made it possible to stabilize a line between the Communist and National government forces of China.'[30] This was because of the strict demarcation the Straits made possible between land and water. The boundary was thus as 'obvious' as any river. The relevance of the bargaining framework is important to note here – for it is in terms of the resolution of the problem of indeterminacy that the stabilising effect of these natural features can be understood. The way in which these features stand out and draw attention to themselves against the indistinctness and ambiguity of the surrounding terrain is the key here. Hence, with reference to both the Korean and the Formosan experiences, Schelling argues that:

> The Americans will not stop at the Yalu, nor the Chinese at the shoreline, nor will any other significant boundaries be recognized and observed *if all modes and degrees of participation merge together along an undifferentiated scale* (emphasis added).[31]

Schelling also suggests that a similar quality adheres to some landmarks of human invention. The war in Korea again serves as useful material as Schelling observes that: 'The thirty-eighth parallel seems to have been a powerful focus for a stalemate.'[32] It has an 'if not here, where'[33] quality precisely because it has been used as a resting place in the past and can be readily recognised as such by both parties.[34]

However, this raises the question of what made the parallel such a precedent in the first place. In terms of supporting Schelling's interpretation of events, the record appears to be a mixed one. On the one hand, it is not clear that the division in 1945 at the 38th parallel came about on the basis of two armies finding a suitable resting place in a process of bargaining. Rather, it was suggested as a convenient place for dividing the peninsula by officials in Washington and later accepted by the Soviet Union, and apparently all without any sense of *explicit* bargaining between the two parties.[35] On the other hand, Richard Whelan has noted out that the 38th parallel was attractive to US officials 'because it had the great virtue of being on most maps in Korea'. Whelan's observation that the parallel was 'approximately halfway up the peninsula' also seems to conform to Schelling's preference for 50–50 splits as obvious agreement points.[36]

In a similar fashion, evidence can be found both to support and to question Schelling's observation that during the Korean War the parallel became 'a powerful focus for a stalemate'. As part of the early negotiations for a cease-fire in 1951, the North Korean and Chinese representatives proposed drawing the demarcation line along the 38th parallel. However, this was rejected by the United Command, who insisted on the line at which the opposing armies had fought to a standstill.[37] In the event, the United Command's position prevailed and the result was a postwar Korea divided at a line running to the north of the 38th parallel for most of its distance.[38]

On the one hand, the United Command's reasons for rejecting the parallel seem to bring Schelling's perspective into doubt. Vice-Admiral Charles Turner Joy, the head of the United Command negotiating team stated that 'not since the outbreak of the war … [had] there been any valid basis for considering the 38th parallel as a military demarcation line'.[39] Similarly, Whelan points to the Americans' rejection of the parallel on the basis that the ground involved was difficult to defend, whereas the alternative ground was more easily fortified.[40] This would seem to undermine the role of the parallel as a suitable focal point. On the other hand, given the amount of movement up and down the peninsula during the war, it seems a curious coincidence that the eventual line of cease-fire should have been so close to the parallel. Even so, this does not seem to be quite the stabilising power of the parallel which Schelling envisages.

In Schelling's analysis, though, the parallel is an unmistakable feature. Any side would realise that all eyes would be focused upon any attempt to move near it, or more decisively, past it. Accordingly, he states that parallels are 'merely lines on a map, but they are on *everybody's map*' (emphasis original).[41] This allows the 'I expect that you expect … ' sequence to converge on a common single point of attention.

Schelling also finds corresponding boundaries in the Korean conflict when the issue is the scale of violence being used: 'In Korea, weapons were limited by the qualitative distinction between atomic and all other; it would surely have been much more difficult to stabilize a tacit acceptance of any limit on size of atomic weapons or selection of targets.'[42] That the same sort of bargaining theory informs the analysis is clear when Schelling states that the limit which halts action before the use of nuclear weapons constitutes a mutually acknowledged 'tradition for their non-use'.[43] It is, in other words, 'a "tacit bargain"'.[44]

At least in the way that Schelling perceives it, the Korean War seemed ready-made for this sort of theory-building. The apparent simplicity of these actual situations provided him with readily identifiable, symbolic resting points which could be used to model the conflict as a bargaining situation. Indeed, the ablility to isolate crucial parameters is fundamental to Schelling's stability theory. In his pathbreaking work on the mutual fear of surprise attack, Schelling states that: 'What we need is a formulation of the problem that permits us to work with a limited number of arbitrary parameters.'[45]

At the same time, Schelling is not arguing that war is simple. War is complex, but it can be stabilised at a suitable resting place. Easily recognisable thresholds provide a way out of the mire of ambiguity and complexity which characterise conflict. One of Clausewitz's most memorable lines is 'Every thing in war is simple, but the simplest thing is difficult.'[46] Schelling seems to be saying, 'Everything in war is complex, but even the most complex thing can be made to appear simple.'

Korea thus seemed to provide a suitably parsimonious conflict, and a prominent one for Schelling's work in other areas. In his textbook on international economics, Schelling notes that Korea accelerated the military orientation of the US foreign assistance programme.[47] This reference is additionally significant because so much of Schelling's work on bargaining dates from his professional experience of foreign-assistance programmes in Europe under the Marshall Plan. But despite the theoretical consistency here, the resting places in Korea might have been less obvious had the outcome been less reasonable for the United States, or had the United States been able to roll back the North Korean armed forces and keep them rolled back.

SEEKING STABLE PATTERNS IN VIETNAM AND ELSEWHERE

In this context, it might be thought that Vietnam would provide the most stunning of reversals to Schelling's optimism about the availability of obvious resting places. Yet his comments on the United States' early,

indirect involvement in Indochina by way of assistance to the French effort[48] suggests that he foresaw few such obstacles if appropriate qualitative limits were identified and observed.

The sorts of distinctions which applied in Korea could also be applied to the scale of violence used in Vietnam, even though America's actions against North Vietnam were cases of 'coercive violence' rather than being the 'limited war on the battlefield'[49] observed in Korea. In Vietnam, Schelling argues that America observed 'discrete steps' in increasing its participation – 'first, military-aid personnel; then bombing from the air; then a commitment of ground troops'.[50] Similary, he argued that the United States was successfully exploiting the distinctions in the Vietnam conflict between providing material and personnel and also between participating in the air and on the ground.[51] These were all examples of 'thresholds' which Schelling defines as 'finite steps in the enlargement of a war or a change in participation'.[52]

Schelling's analysis of the early stages of the Vietnam War provide further insight into his general concept of stability. One prominent case here is his assessment of the Gulf of Tonkin incident. He argues that the US reaction was immediate, could not be confused as anything but a response to the North Vietnamese attack on its own destroyers and continued to confine the violence within naval parameters: 'A good way to describe the American response is that it was unambiguous. It was articulate. It contained a pattern.'[53]

Examined nearly four decades after he wrote these words, Schelling's approach to the events of early August 1964 has its strengths and weaknesses. On the one hand, his line of argument can be used to counter the criticism that strategists like Schelling made unwarranted assumptions about the way the enemy works.[54] Schelling's analysis here is aimed at highlighting patterns which are so clear that even those not looking for it would find them. On the other hand, the Tonkin Gulf incident turns out to be a further instance where the fit between theory and practice is not as good as it may first have seemed. Recent historical research indicates that the rather confusing chain of events in August 1964 does not conform to an unambiguous pattern which observed the clear limits sought by Schelling.[55]

The object in seeking such patterns was to encourage the other side to 'keep things in the same currency'.[56] The same thinking is evident in Schelling's analysis of the Soviet Union's ability to detect the 'authentic' US message on arms control in the midst of the 'noisy interference' created by the formal negotiations.[57] Given Schelling's interest in stabilising the superpower arms competition,[58] this is a significant case of his general theory. The connection back to the same bargaining framework is confirmed when Schelling mentions that the US government 'may

accommodate its goals to Soviet behavior'[59] (emphasis added). For early in *Arms and Influence*, Schelling states that: 'To be coercive, violence has to be anticipated. And it has to be avoidable by *accommodation*. The power to hurt is *bargaining power*'[60] (emphasis added).

The idea here is that strategic activity is maintained within a threshold, beyond which resting places may not be so readily found. Once again, this is all based on the framework dealing with the familiar problem of settling on a bargain from a range of indeterminacy. Schelling views the Tonkin response in light of his theory that, 'there may be a hundred ways to respond to an enemy action, somehow a choice has to be made, and the choice is easy if the range is narrowed by some tradition or instinct that keeps the game in the same ballpark'.[61] By the same logic, it would also be clear when the pattern was being violated. One of the ways of keeping strategic action in the same idiom was to emphasise the dangers of crossing the 'threshold'. The very threat of instability, if it was recognised by both sides, could actually have a stabilising effect. Such distinctions could thus satisfy, 'the need of any stable limit to have an evident symbolic character, such that to breach it is an overt and dramatic act that *exposes both sides to the danger* that alternative limits will not easily be found'[62] (emphasis added).

Once again there is a strong similarity between situations involving the intensity of violence and those involving its geographical spread. The same logic applying to choices about the types of weapons to be used also holds in the case of the decision on whether or not to widen a war from its initial location – a location which may provide intrinsic limits which are exceeded at one's peril. Hence, 'the initial departure of retaliation from the locality that provokes it may be a kind of declaration of independence that is not conducive to the creation of stable mutual expectations'.[63]

In the Cuban crisis of 1962, Schelling finds a very good example of this theory. He identifies as crucial 'the universal tendency – a psychological phenomenon, a tradition of convention shared by Russians and Americans – to *define* the conflict in Caribbean terms' (emphasis original).[64] It is clear that stability is involved here when Schelling adds that: 'The risk of further metastasis must have inhibited any urge to let the crisis break out of its original Caribbean definition'.[65] While Schelling's language here again suggests adherence to a discrete pattern observing clear limits, more recent scholarship has drawn attention to the involvement of America's nuclear forces in Turkey and Italy in both the build-up to, and the resolution of, the Cuban crisis.[66]

But these findings do not undercut Schelling's general principle that there are certain stabilising limits *within which* it is possible to coordinate expectations and behaviour and *beyond which* the prospects for

such stability are very doubtful.[67] In the case of breaching one of these 'rules' (as Schelling describes them), 'there is no assurance that any new ones can be found and jointly recognized in time to check the widening of the conflict'[68]. Schelling finds in the Berlin garrison a particularly powerful example of this principle: 'What can 7,000 American troops do, or 12,000 Allied troops? Bluntly, they can die. They can die heroically, dramatically, and in a manner that guarantees that the action cannot stop there.'[69]

All of these cases, from abstract and real rivers to Vietnam, Berlin and Cuba, help Schelling communicate his approach to stability as a strategic concept. At the same time, they do not determine Schelling's theory. Instead, they tend to confirm Schelling's faith in the validity of applying the bargaining framework to strategic situations, and in the existence of conspicuous, obvious, qualitative limits. They represent the extension of Schelling's approach across an ever wider range of activities.

Hence, while other strategists may have been equally concerned with the question of stability in the nuclear age, it is Schelling who comes up with a consistent approach to this concept across a wide range of strategic situations. Each case is a bargaining situation characterised by the problem of indeterminacy whose resolution lies in the identification of suitable 'rivers' which provide a 'focus for … tacit agreement', and which for this very reason can be said to possess 'stabilizing power'.[70] That these examples can properly be viewed as cases of a general theory, and not as the original determinants of that theory, is clear when Schelling states that what applies to the selection of stable limits in war is also 'true of restrained competition in every field in which it occurs'.[71]

This is not to imply that each strategic situation is identical. While different activities can be analysed for stability according to the same framework, they (and the theories with which they are associated) can emphasise different elements of it. For instance, cases which involve limited war highlight especially well the *jockeying* which is part of the strategic bargaining process.[72] This can be seen in the toing and froing of two armies that are trying to make a tacit agreement which stabilises the conflict situation; this dynamic element of strategic bargaining is emphasised.

However, in cases involving arms races, it is the *interactive* nature of mutual expectations and behaviour which stands out above other aspects of strategic bargaining. According to Schelling, the defining quality of an 'arms race' is competitive interaction.[73] This makes arms races the ideal illustrations of the 'I think that you think' series which is to be found in all examples of strategic bargaining.

THE STABILITY OF THE NUCLEAR BALANCE: THE SAME GENERAL CONCEPT?

While present in all of the above cases, Schelling's general concept of stability is rather less significant if it fails to apply to the most vital of all strategic situations in the nuclear age. In other words, does Schelling's general concept apply to the stability of the 'balance of terror'?

A positive answer to this question would imply that the 'balance of terror' was not as novel as ideas of a 'nuclear revolution' may indicate. Indeed, in the mid-1960s, Schelling advised against the tendency to 'exaggerate the historical novelty of deterrence and the balance of terror'.[74] The same principle extends to stability problems which nuclear weapons had helped generate. In *Arms and Influence*, Schelling advises that the 'stability' he has been discussing in his chapter on 'The Dynamics of Mutual Alarm', 'is relevant to any era and to any level of armament or disarmament'.[75]

With such a claim Schelling was not denying that nuclear weapons in themselves constituted a new phenomenon, quite unlike anything which had gone before. The point was that with their arrival, the question of bargaining had been brought right to the forefront: 'Now we are in an era in which the power to hurt … is commensurate with the power to take and to hold, perhaps more than commensurate, perhaps decisive, and it is even more necessary to think of warfare as a process of bargaining.'[76] But what was the nature of this particular bargaining situation and how does it relate to the general concept? The connection appears in one of Schelling's most striking passages where he asserts that,

> the 'balance of terror', if it is stable, is simply a massive and modern version of an ancient institution: the exchange of hostages … As long as each side has the manifest power to destroy a nation and its population in response to an attack by the other, the 'balance of terror' amounts to a tacit understanding backed by a total exchange of all conceivable hostages.[77]

What is crucial at this point is not the actual situation which Schelling is referring to here: the ability to promise destruction in response to attack takes one back to the question of the vulnerability of retaliatory forces. Rather, it is Schelling's point that a stable balance of terror 'amounts to a *tacit understanding*' which evokes his familiar bargaining framework. For on the same page Schelling observes, 'in a lawless world that provides no recourse to damage suits for breach of this unwritten contract, hostages may be the only device by which mutually distrustful and antagonistic partners *can strike a bargain*'[78] (emphasis added). But what should be made of the idea of the exchange of hostages which provides the

'backing' for this tacit understanding, which he also raises in a reference to two parents kidnapping each other's children so as to use them as 'hostages to guarantee' their 'safety'?[79] The significance of this analogy is explained in an earlier essay when he examines bargaining situations which require a third-party agreement as an incentive for holding to the main agreement. In providing a military example, Schelling notes that: 'Two countries that wish to agree not to make military use of an island may have to destroy the usefulness of the island itself.'[80] This latter action is the third-party agreement, the incentive for the fulfilment of the main bargain, and is another modern version of the same ancient practice: 'In an earlier age, hostages were exchanged.'[81] Moreover, Schelling's treatment of the third-party question also links back to the economic inspirations of his theory of strategy. His first example of these types of third-party solutions to bargaining situations is the use of fair-trade laws and exchanges of shares by oligopolists.[82]

The specific case of 'the total exchange of all conceivable hostages' is very much in line with Schelling's general idea of a limit which possesses 'symbolic character such that to breach it is an overt and dramatic act' (as quoted above). This illustrates the similarity between the balance of terror and the other cases of stability discussed above. The role of the exchange of hostages is to crystallise the agreement to be deterred which both sides have tacitly entered into. It does so by making it inescapably clear how very dangerous and damaging the resort to nuclear weapons would be. (In terms of a series of expectations, it almost implied an 'I *know* that you *know* that I *know* … ' situation.) The clarity of this threat is reflected in Martin Wight's comments, in which he mentions Schelling's rediscovery of this old and rather repellent institution of statecraft, that hostages are 'an instrument of coercion' and that their exchange can be viewed as 'a kind of communication'.[83]

For Schelling, there is something about the exchange of hostages which makes the agreement especially hard to ignore. He argues in *Arms and Influence* that: 'Hostages represent the power to hurt in its purest form.'[84] They were thus ideal for the bargaining framework on the basis that: 'If a model of warfare ignores the pain, the fear, and the cost of war, it cannot encompass the bargaining process.'[85] As the *sine qua non* of bargaining power in terms of 'an undischarged capacity for violence',[86] the existence of mutual hostages offered the best chances for stability in terms of a tacit agreement between both sides.

The exchange of *all* conceivable hostages is thus presented as an example of the all-or-nothing qualitative distinctions which Schelling favours as resting places.[87] Yet the almost philosophical taboo preventing the use of nuclear weapons may not be quite as tangible as the natural boundary provided by the Yalu. The river is a physical reality whereas the

exchange of hostages is an analogy and the balance of terror is a construct. The balance of terror is also a product of the conflict situation – it is dependent on the situation it is trying to stabilise, and its unambiguity may therefore be much more open to question.

THE ADVANTAGES OF LUMPY BARGAINS

The all-or-nothing issue takes us back to the familiar question of ameliorating the problem of indeterminacy across a range of possible outcomes. It reflects the same thinking that Schelling applies when he states that, 'the problem of limiting warfare involves not a continuous range of possibilities from most favourable to least favourable for either side; it is a lumpy, discrete world that is better able to recognize qualitative than quantitative differences'.[88] As far as Schelling is concerned such 'lumpy' bargains hold out much greater prospects for stability in the real world than neat equilibria which can be logically determined from the mathematics of the bargain. This helps deflate the criticism that 'formal' strategists like Schelling felt that strategic problems could be 'solved' by mathematical calculation.[89] This point is easily lost given the prevalence of the dry missile exchange ratio formulae used by many subsequent strategic analysts to calculate the stability of the nuclear balance.[90] By contrast, Schelling joins Hedley Bull in rejecting '"missile mathematics" – attempts to establish some optimum and exact number of missiles for both sides'.[91]

The preference for lumpy bargains appears in Schelling's attitude to the likelihood of establishing 'stopping points' (i.e. places at which stability is established) once the first nuclear weapons have been launched in an exchange. It would be very much like the difficulty Schelling envisions should the United States have committed personnel as well as materiel to help the French in Indochina: 'One's intentions to abstain from ground intervention can be conveyed by the complete withholding of ground forces; one cannot nearly so easily commit *some* forces and communicate a persuasive limit to the *amount* that one intends to commit'[92] (emphasis original). It does not follow, however, that the only conceivable outcome from the use of nuclear weapons is the all-or-nothing extreme of mutual destruction – a 'pure spasm of massive retaliation'.[93] Schelling even concedes that 'in the intense crisis, belief that the war could be controlled short of cataclysm, might actually help to deter a desperate gamble on preemption'.[94] However, 'alternative limits' are not at all easy to foresee once the nuclear threshold has been crossed: '"No nuclears" is simple and ambiguous. "Some nuclears" would be more complicated. Ten nuclears? Why not eleven or twenty or a hundred? Nuclears only on troops in the field? … '[95]

In the background here is Schelling's recognition of the enormous destructive power which nuclear weapons bring with them. Indeed, the idea of setting 'stopping points'[96] which must not be breached seems problematic, since any limits set may be so easily exceeded. In Brodie's words, strategic bombing in the nuclear age is just 'too effective, too tremendously destructive'.[97] By their sheer scale, these weapons threaten, figuratively and literally, to blow away any prospects for their being a co-ordination within any limits at all.

Yet it is clear that Schelling sees the same theory apply not only in cases involving the limitation of existing wars, but also where the very outbreak of war is to be avoided in the first place. In comparing the mobilisation crisis of the First World War with the dangerous mixture of unstable technology and crisis in the nuclear age, Schelling argues that: 'once it started, it was not to be stopped … if the real process is stopped the men get hungry and the horses thirsty, things in the rain get wet … and the process is as stable as an airplane running out of fuel on a fogged-in landing field'.[98] This volatile combination encourages a 'precipitate decision'.[99] It is not conducive to stable expectations because a precipitate act is the very opposite of accommodation (of striking a bargain). In this case, the only really 'safe' limit, the one conspicuous 'resting place' where nuclear weapons are directly involved, is that which corresponds to the tacit agreement not to use them at all. The best way to reinforce this is to view the balance of terror as an exchange of all conceivable hostages.

A TWO-TIERED CONCEPT OF STABILITY

On this basis, developments which undermine the exchange of all conceivable hostages and which thus corrode this third-party agreement, also tend to 'decrystallise' the bargain which is mutual deterrence. Accordingly, Schelling was concerned about the extent to which expectations might move out of this reassuring pattern. There was likely to be a critical limit to a particular variable beyond which the corrosion of this third-party agreement seriously destabilised mutual deterrence. In such circumstances, the negative incentive to hold to the bargain would have largely disappeared.

This is evident in Schelling's analysis of the way the mutual fear of surprise attack could threaten the stability of deterrence. The connection between the question of surprise attack and the common bargaining framework is indicated by the fact that Schelling's two chapters on the subject in *The Strategy of Conflict* are contained in a section entitled 'Surprise Attack: A Study in Mutual Distrust'. The opposite, *trust*, is just what is required for a bargain to be possible:

> What makes many agreements enforceable is only the recognition of future opportunities for agreement that will be eliminated if mutual trust is not created and maintained, and whose value outweighs the momentary gain from cheating in the present instance … if a number of preparatory bargains can be struck on a small scale, each may be willing to risk a small investment to create a tradition of trust.[100]

In the game Schelling uses to model the danger of surprise attack, the key question is what it would take to change the decision from the 'joint no-attack' bargain to a unilateral surprise attack. For Schelling the crucial parameters are two probabilities: 'there is some probability, P_r, for player R, and P_c, for player C, that the player will in fact attack when he elects (or should elect) a strategy of no-attack'.[101] The decision on whether to hold to or break the bargain depends on: 'The limits to the values of our two parameters, P_r and P_c, beyond which they make the situation unstable and provoke joint attack.'[102] The idea that it is the breaching of the limit which is crucial (and beyond which disaster via instability is likely) is confirmed by Schelling's conclusion from examining the effect on the game of different values attached to the two probabilities: 'If both are below the critical limit, it does not matter what they are.'[103]

This is looking at stability from a rather different point in proceedings than the question of how to achieve a bargain in the first place. Instead, the 'joint no-attack' bargain has already been struck and the question is whether or not it will hold. This suggests that Schelling's general concept of stability is two tiered. His concern across a range of 'conflicts' was not only how a bargain came to be struck in the first place, but also what made for a bargain which was likely to hold. It is in terms of this second tier or aspect that his analysis of the stability of the balance of terror under the threat of the mutual fear of surprise attack can best be understood.

This would suggest that for Schelling, resolving the indeterminacy problem is not always sufficient for stability over the longer term. It is not just enough to have *arrived at* a particular bargain to ensure stability. The possibility of this difficulty is suggested when Schelling notes that: 'Sometimes the focal point itself is inherently unstable. In that case it serves not as an outcome but as a sign of where to look for the outcome.'[104] In other words, such a focal point is stable only if the agreement or accommodation can last. Hence Schelling and Halperin argue that a 'balance of deterrence' is only stable if it is 'reasonably secure against shocks, alarms and perturbations'.[105] The ability to survive such tests over time, the second tier of the concept, is crucial to stability.

In fact, the two aspects of Schelling's stability concept are mutually reinforcing. The prospects of the second aspect of stability (steadiness

over time) encourages the first. If both parties recognise the same convergence point or bargain which offers prospects for long-term stability, they are likely to settle on that point in the first place, and even put up with a few perturbations in the short term for the sake of long-term gain. This fits in with Schelling's treatment of the ideas of tradition and precedence in bargaining; the repeated settlement on a particular point. Moreover, the maintenance of a bargain presupposes its establishment in the first place. The second type of stability presupposes the first.

Recognising the existence of these two tiers provides insights into the nature of the cases already discussed in this article. For example, in the case of stability in a war which has already begun, the aim is to arrive at a new resting point, to arrange a new bargain. The first aspect of stability is dominant here. The same can be said for trying to 'impose' stability on an arms race which is running out of control.

But it is a different picture for the stability of mutual deterrence in terms of the mutual fear of surprise attack. Here the steadiness of an existing bargain is paramount: the second aspect of stability is stronger. This second tier is at work in many of Schelling's references to the stability of nuclear deterrence. For example, he mentions that people who have been confined to shelters for an amount of time which is nearing the limits of their endurance, can, 'like aircraft in the air … coerce the nation's leaders into decisions that reflect the inability of the country to sustain its readiness indefinitely'.[106] This lack of endurance is destabilising precisely because it provides an incentive for the existing joint no-attack bargain to be broken. It is thus destabilising in the second sense of this general concept. The 'premium on haste',[107] at such a premium given the speed of nuclear weapons, is thus inversely related to the stability of the bargain. The danger of the crisis is precisely because it is likely to lead to actions, postures and expectations which undermine this second aspect of stability. The object is thus to 'stabilize deterrence and make it more reliable',[108] in other words to work for the 'stickability' of a bargain which has already been made.

THE ASSUMPTION OF RESTRAINED COMPETITION

Schelling's stability thinking may be especially sophisticated, but its applicability rests on a crucial assumption about the amount of competition present in each strategic relationship. In each case, not only must both sides be able to recognise the same resting place and to know that each other's expectations are converging upon it. In addition, both sides' expectations and behaviour must be based on the need to restrain the competition.

One issue here is the degree to which Schelling's approach to stability applies to conflicts before the age of nuclear weapons. Schelling argues, for example, that during the Second World War there was a tacit agreement which precluded the use of gas.[109] Bernard Brodie protested in correspondence with Schelling that this non-use was based as much on a formal treaty as it was on any informal understanding between adversaries.[110] But what is more telling here is Brodie's point that: 'The use of gas could in itself almost never be enough to cause either side to quit.'[111] In other words, to identify instances of restraint and tacit accommodation in earlier wars is not necessarily the same as identifying crucial restraint.

Indeed, in situations where the extreme levels of violence represented by nuclear weapons are absent, the need for restraint may be far less onerous. In such a case many an advancing army would not hesitate to cross Schelling's river because there was little incentive on its part to seek out a resting place. Forcing absolute retreat beyond the river would appear to be quite an appropriate objective if unconditional surrender was the aim. Schelling himself notes that in both the First and Second World Wars, 'until surrender or truce, the use of force was substantially unbounded'.[112]

It is the arrival of the nuclear age and the Cold War which really gives credence to Schelling's assumption of restraint in conflict. This is clear when Schelling argues that: 'The circumscribed use of force on the Korean peninsular can be understood only by reference to the fearsome threat of violence in the background.'[113]

In the nuclear age, the idea of unrestrained competition even in limited war was a recipe for disaster. Indeed, in a lecture on limited war given in 1959, Schelling argues that: 'The threat of general war is the background that gives meaning to the motives and the calculations that lie behind the limits in limited war.'[114] Similarly, the idea of stopping or resting places as 'thresholds' seems especially suited to the nuclear age. The term itself implies a substantial change in activity once the boundary has been crossed. What could be more dramatic than the transition from a very tense peace to a sudden, massive exchange of thermonuclear weapons?

The main hopes for restraint clearly lie in the age of nuclear weapons and superpower competition. Schelling's argument that limited Cold War conflicts like the Korean War were 'really between us and the Soviet bloc'[115] seems to hold some water even in the notorious case of Vietnam. Washington shaped a bombing campaign that would avoid dragging the Soviet Union and China into the war and thereby risk a nuclear conflagration with them,[116] while Moscow wanted to ensure its increasing assistance to Hanoi did not lead it into a shooting match with the

Americans.[117] Moreover, China's plans for qualitatively different levels of intervention into the conflict in the mid-1960s, which depended in turn on the extent of US escalation,[118] suggest a remarkable similarity to the distinctions Schelling had noted in the United States' own early Vietnam commitment. In terms of a tacit mutual bargain stabilising the military contest short of the most devastating levels of escalation, there are signs that Schelling's assumption of restraint holds to at least some degree.

But, to modify Brodie's comment, such restraint may not be enough to force *both* sides to quit. Like Washington, Hanoi certainly had a clear interest in limiting the extent of America's military role in Vietnam.[119] But its long-term political aims of unification, independence and liberation were rather incompatible with the idea of a robust bargain encouraged by the mutual fear of massive damage.[120] Indeed, William Duiker cites Hanoi's judgement in 1965 that if the increased US military presence in the South stabilised the situation there, the North would need to fight harder as such a development was not in its political interests.[121]

On the whole, Hanoi's actions do not fit the model of a local power whose behaviour is thoroughly constrained by the superimposition of superpower rivalry and the nuclear balance. To adapt Schelling's comment on Korea noted above, the Vietnam War was not really just *between us and the Soviet bloc.* As such the imperatives for restraint were less onerous than Schelling's 1960s perspective of international affairs suggested.

This does not alter the appropriateness of Schelling's theory for problems such as mutual fear of surprise attack, where military instability threatened to overturn any political accommodation which had been reached between Cold War adversaries. But his approach seems less effective when political instability (and room for manoeuvre) threatened to undermine the chances for military accommodation.

This is not the only instance where political realities may get in the way of good theory. For example, some analysts of crisis behaviour have contrasted Schelling's idea of renouncing options in the art of commitment with their own findings from case studies that political leaders generally wish to keep their options open in bargaining.[122] Some scholars have suggested that it is difficult for political leaders to convince their opposite numbers that their hands are tied, at least in cases where domestic political constraints are supposed to be doing the tying.[123] Such scholarship does add to the notion that there are difficulties with theory which excludes political factors from a concept of stability.

Any concern about political obstacles to strategic cooperation go right to the heart of Schelling's theory. Symbolic resting points seem only to be attractive *if* there is enough cooperation to go with the conflict. It is possible that he may have overestimated the presence of

co-operation in some instances and thus the tendency for competition to be restrained, and the background power of nuclear weapons to make all of this necessary.

However, this does not mean that Schelling's general concept of stability and the assumption of restraint which supports it should be seen as direct descendants of the nuclear age. The era of thermonuclear competition certainly provided a strong backdrop for the ready acceptance of the ideas Schelling was promoting. But his own attraction to the idea of restrained competition as a general principle also needs to be traced to his reading of economic theory, game theory and related portions of contemporary social science, which will all be dealt with in subsequent chapters.

Even so, the connections Schelling draws between these fields and problems of strategy are hard to imagine in a non-nuclear environment. This can be seen when he mentions the 'avoidance of mutual disaster' as a motivation for 'collaboration or mutual accommodation' across the range of situations ranging from war itself to 'strikes, negotiations, criminal deterrence, class war, race war, price war, and blackmail'.[124] For what better reminder could there be of the need to 'avoid mutual disaster' than the prospect of nuclear devastation?

CAN ONE BARGAIN WITH NUCLEAR WEAPONS?

Moreover, if reaching a bargain requires both sides to recognise that one is needed, it is difficult to think of something that would focus expectations on both sides to a greater extent than an exchange of hostages. Given the nature of nuclear weapons, Schelling appears to have found a truly all-or-nothing distinction in the balance of terror. With bargaining power present in 'its purest form', there would seem to be every reason to be confident about the prospects for coming to a tacit agreement. But is the bargaining power involved in this case too strong, too all-or-nothing for the good of the bargain?

It is useful here to compare this most important case of stability with some of the other cases which Schelling mentions. To go back to first principles in terms of determining a single bargain from a range of possible bargains, the cases of the river and the scale of conventional violence used in Vietnam both seem to fit the bill here. Both sides would be faced with a range of meaningful bargains.

With respect to the river, for example, the alternatives could include high-ground, low-ground and vegetation as well as the river. Even without these alternative natural features, there would be other meaningful points in the bargaining range one yard beyond the river,

two yards beyond it and so on as Schelling suggests. In the case of Vietnam, the bargaining set *could* include stopping at the use of fixed wing aircraft, or alternatively at the introduction of 1,000 troops, or 2,000 troops and so on.

Of course, the absence of any qualitative distinction between one foot and two feet beyond the river and so on until 1,000 miles beyond the river, and similarly between 1,000 troops and 2,000 troops and one's whole army, is precisely why Schelling believes that such points are poor candidates for resolving indeterminacy and thus not conducive to the creation of stable bargains. Yet these seem quite different from the 'range of bargains' represented by the use of one nuclear weapon or two nuclear weapons and so on, as alternatives to the bargain enforced by the exchange of hostages (i.e. no nuclear weapons used at all).

At face value, the logic of indeterminacy seems similar, but the particular case is different quite simply because it is nuclear weapons that one is dealing with. The power of each weapon to hurt is so great that it is difficult to consider them as options at all. Is there really a bargaining 'set' here at all, or simply one bargain and one non-bargain, the exchange of hostages and their execution respectively?

This even applies to Schelling's comments on the avoidance of nuclear attacks on cities,[125] which might be described as the retention of the most important hostages. The idea of retaining cities as hostages is attractive theoretically as a logical extension of Schelling's bargaining theory into war involving nuclear weapons. But it does not seem to be a meaningful, let alone practical, option in the bargaining range because of the uniqueness of the nuclear threshold.

By contrast, in the case of the river each side is aware that the river is not the *only* place towards which the conflict situation might conceivably move. However unwise it would be to move beyond the river, such an alternative position still makes sense. In fact, this (meaningful) notion of exceeding the river can be exploited as a threat to enhance bargaining power.

However, in the case of the balance of terror, the no-use norm is so strong that the very notion of going beyond it – that there is *something* meaningful beyond it – seems to fall down. The idea of jockeying for position, of a nuanced approach to bargaining, seems quite inappropriate.[126] The one bargaining option is fixed very quickly and is an immovable object. There appears to be little flexibility for bargaining power itself to be used coercively.

It follows that while the power to hurt may be understood as bargaining power, its purest form is too pure for bargaining to take place because it removes the options that bargaining would seem to require. In other cases, there may be points on a scale which can be rejected because they

afford no qualitative distinction. But the crucial fact is that there are these points, whose very indeterminacy indicates the need for a bargain to be struck around something more conspicuous. In the case of the balance of terror, such points are meaningless. The river and the distinction between air and ground combat are distinct and conspicuous in contrast to their alternatives. But the balance of terror is not the same sort of conspicuous resting place. Its uniqueness is unique, although not necessarily in a positive sense of the term.

A further point of comparison is that in the case of the armies jockeying about the river, there are actual 'moves' taking place. There appears to be little scope for real 'moves' in the case of the balance of terror. This again raises the question as to whether bargaining is actually going on in this particular case. Certainly, it does not seem to be the sort of *explicit* bargaining easily recognised in the case of jockeying towards the settlement on an arms agreement, which Hedley Bull, clearly influenced by Schelling's work, equated with 'the striking of a bargain'.[127] However, the balance of terror may be understood as a result of *implicit* bargaining process, where there are few observable moves. Here, the bargaining is solely a matter of co-ordination of expectations. Moreover, there is no formal bargain struck (or 'crystallised'), but instead a constant jockeying occurs around the resting place. Whether or not this is stretching the idea of bargaining too far is open to question.

This all points to a concept of stability which seems to be more fragile in some cases than in others. In fact, to be more precise, Schelling's general concept of stability, based as it is around a bargaining framework, seems most fragile where it is most important: the stability of nuclear deterrence.

This leaves us a with a curious paradox. On the one hand, the application of Schelling's bargaining-based theory of stability to cases of limited war (such cases as the river and other situations in Korea where nuclear weapons are *not directly* involved) only seems to work because of the background presence of nuclear weapons. These weapons are necessary because of the premium they put on restraining competition. As Schelling commented in respect of likely strategies in Europe: 'Any strategy is bound to be conventional *and* nuclear in the weapons implicitly available. The nuclears in the background will be decisive in determining the shape and scope of any conventional engagement, even one in which no shots are fired'[128] (emphasis original).

On the other hand, Schelling's framework seems to have rather more difficulty in the case of deterring major nuclear war itself, rather than the stabilisation of a conventional war. In cases where nuclear weapons are directly involved, there seems to be some real problems with the notion of bargaining.

CONCLUSION

The notion of a (two-tiered) general concept of stability is right at the centre of Schelling's search for a general theory of strategy. The crucial point is that all of the cases in which the general concept applies are bargaining situations. Different cases reflect different mixtures of these two aspects, and Schelling's approach seems to work better in some cases than in others.

The identification of this general concept also helps explain the relationship between Schelling's approach to stability and the wider strategic context in which he was working. There is no doubt that the growing concerns during the 1950s about the dangers of surprise attack had an appreciable impact on stability thinking within the strategic community as a whole. But these concerns do not tell us that much about the origins of Schelling's own approach. Instead, they heightened the importance of *one particular case* of his general concept – the stability of the balance of terror – and made the idea of restrained competition especially compelling.

Developments in the early thermonuclear age certainly made his ideas of restrained competition especially relevant. But, rather than shaping Schelling theory, these circumstances gave him room to apply his view of human affairs to strategic issues. The next two chapters will show how Schelling's approach, and thus his general concept of stability, strongly resembles certain bodies of theory which are in fact external to the central strategic studies literature. These influences include the economics literature on oligopoly and other situations of imperfect competition, and, most importantly, the game theory connected with these types of economic relationships. The links between Schelling's approach to stability and other portions of contemporary social science, including social and Gestalt psychology and organisation and communication theories, will then be considered in Chapter 6.

NOTES

1. A shorter version of this chapter has appeared as Robert Ayson, 'Bargaining with Nuclear Weapons: Thomas Schelling's "General" Concept of Stability', *Journal of Strategic Studies*, 23:2 (June 2000), pp. 48–71.
2. By 'general' is meant 'of or affecting all or nearly all, not partial or local or particular'. *Oxford Paperback Dictionary*, 2d edn (Oxford: Oxford University Press, 1983) p. 268.
3. By 'case' is meant 'an instance or example of the occurrence of something'. *Oxford Paperback Dictionary*, p. 93.
4. Schelling, 'Surprise Attack and Disarmament', in Knorr (ed.), *NATO and American Security*, pp. 176–208, became Chapter 6 of *The Strategy of Conflict*.
5. A comparable role – examining the stability of deterrence – is played by the chapter entitled 'The Dynamics of Mutual Alarm' in Schelling, *Arms and Influence*, pp. 221–59.
6. Gray, 'Strategic Stability Reconsidered', p. 135.

7. Schelling, *The Strategy of Conflict*, p. 235.
8. Trachtenberg, *History and Strategy*, pp. 24–5; Walter B. Slocombe, 'Strategic Stability in a Restructured World', *Survival*, 32:4 (July/August 1990), pp. 304–8.
9. See Schelling, 'Comment', in Knorr and Read, *NATO and American Security*, p. 251. Also note his comment in another essay that the concept of deterrence is 'not our subject but just our point of departure'. Schelling, 'The Role of Theory', RM-2515, p. 12.
10. Schelling, *The Strategy of Conflict*, p. 5.
11. Schelling, *Arms and Influence*, p. v.
12. Ibid., pp. v–vi.
13. Schelling, *The Strategy of Conflict*, pp. 21–2.
14. Ibid., p. 70. Also see Williams, 'Thomas Schelling', pp. 126–7.
15. Schelling, *The Strategy of Conflict*, p. 22.
16. Schelling, *Arms and Influence*, p. 7. Also see p. 142.
17. Schelling and Halperin, *Strategy and Arms Control*, p. 3.
18. Schelling, *Arms and Influence*, p. 216.
19. Schelling, *The Strategy of Conflict*, p. 69.
20. See Brodie, *Sea Power and the Machine Age*, pp. 7, 439.
21. See Brodie, 'War in the Atomic Age', p. 34.
22. For Brodie's citation of Schelling's work 'on how tacit agreements are reached', see Brodie, *Strategy in the Missile Age*, p. 323n9.
23. Schelling, *The Strategy of Conflict*, p. 71.
24. Ibid. Also see Schelling's reference to the 'idea of burning bridges – of maneuvering into a position where one clearly cannot yield'. Schelling, *Arms and Influence*, p. 44. The latter is discussed with reference to Schelling in Dixit and Nalebuff, *Thinking Strategically*, pp. 152–4.
25. Schelling, *The Strategy of Conflict*, p. 71.
26. Ibid., p. 68. Also see Freedman, *Evolution*, p. 212.
27. Schelling, *The Strategy of Conflict*, p. 76.
28. See Richard Whelan, *Drawing The Line: The Korean War, 1950–1953* (London: Faber & Faber, 1990) pp. 238–52.
29. Schelling, *Arms and Influence*, p. 134. For a critique of Schelling's use of the Yalu example on the basis of the quite different meanings attached to it by the United States and China, see Lebow, 'Thomas Schelling and Strategic Bargaining', p. 567.
30. Schelling, 'Bargaining, Communication, and Limited War', p. 33; Schelling, *The Strategy of Conflict*, p. 76.
31. Schelling, *Arms and Influence*, p. 164.
32. Schelling, *The Strategy of Conflict*, p. 76.
33. Schelling, *Arms and Influence*, pp. 159–60.
34. On the appeal of the status quo as a likely location for tacit bargaining, see Jervis, *The Meaning of the Nuclear Revolution*, pp. 29–35.
35. See Bong-youn Chong, *Korea: A History* (Rutland, VT: Charles E. Tuttle, 1971), p. 204, and his quotation from Truman's memoirs to the effect that the parallel 'was not debated over nor bargained for by either side', p. 430n7.
36. Whelan, *Drawing the Line*, p. 29.
37. See Sydney D. Bailey, *The Korean Armistice* (Basingstoke: Macmillan, 1992), p. 78; Whelan, *Drawing the Line*, pp. 324–5.
38. See ibid., p. 362.
39. Quoted in Bailey, *The Korean Armistice*, p. 78.
40. See Whelan, *Drawing the Line*, p. 324.
41. Schelling, *Arms and Influence*, p. 133. Note the similarity here with the judgement of the American officials in 1945 on the virtues of the 38th parallel.
42. Schelling, *The Strategy of Conflict*, p. 76.

43. Ibid., p. 260.
44. Ibid., p. 261.
45. Schelling, 'The Reciprocal Fear of Surprise Attack', p. 4; and slightly revised in Schelling, *The Strategy of Conflict*, p. 209.
46. Clausewitz, *On War*, p. 119.
47. See Schelling, *International Economics*, p. 418.
48. On that assistance, see Schelling, *International Economics*, pp. 452–5.
49. This distinction is made in Schelling, *Arms and Influence*, p. 176. Also see ibid., pp. 170–1.
50. Schelling, *Arms and Influence*, p. 134.
51. Schelling, *The Strategy of Conflict*, p. 76.
52. Schelling, *Arms and Influence*, p. 135.
53. Ibid., p. 145. On the links between Schelling's idea of patterns in strategic situations and the work of the Gestalt psyschologists, see Chapter 6 below.
54. For a recent example, see Campbell Craig, *Destroying the Village: Eisenhower and Thermonuclear War* (New York: Columbia University Press, 1998) pp. 153–62.
55. See Edwin E. Moise, *Tonkin Gulf and the Escalation of the Vietnam War* (Chapel Hill, NC: University of North Carolina Press, 1996) pp. 208–43. Also see Lebow, 'Thomas Schelling and Strategic Bargaining', pp. 565–6.
56. Schelling, *Arms and Influence*, p. 147.
57. See Schelling, 'Signals and Feedback', p. 8.
58. In particular see Schelling and Halperin, *Strategy and Arms Control*.
59. Schelling, 'Signals and Feedback', p. 8.
60. Schelling, *Arms and Influence*, p. 2.
61. Schelling, *Arms and Influence*, p. 148. Note the tremendous similarity between these military cases where 'somehow a choice has to be made', and the general bargaining framework where: 'Somehow, out of this fluid and indeterminate situation, a decision is reached' (as quoted above). The relationship between the idea of setting a clear pattern on behaviour and the restriction on choices is perfectly summarised by Schelling's statement: 'One constrains the partner's choice by constraining one's own behavior.' Schelling, 'The Strategy of Conflict: Prospectus', p. 245.
62. Schelling, *The Strategy of Conflict*, p. 262.
63. Ibid., p. 77.
64. Schelling, *Arms and Influence*, p. 87n5.
65. Ibid. Also see Schelling, 'Nuclears, NATO and the "New Strategy"', p. 173. That Cuba could be seen from the standpoint of the same general concept of stability – against the background of indeterminacy created by compounding expectations – is also suggested when Schelling argues: 'We did, in the Cuban event, engage in a process intended to *teach the Soviets something about what to expect of us* and to discourage them from making future miscalculations that might be costly for us' (emphasis added). Schelling, *Arms and Influence*, pp. 280–1. On the significance of strategic 'learning' and 'teaching' for Schelling's approach, see Chapter 6 below.
66. See Philip Nash, *The Other Missiles of October: Eisenhower, Kennedy, and the Jupiters, 1957–1963* (Chapel Hill, NC: University of North Carolina Press, 1997); Aleksandr Fursenko and Timothy Naftali, *'One Hell of a Gamble': Khrushchev, Castro, and Kennedy, 1958–1964* (New York: W. W. Norton, 1997) pp. 195–7, 249–53.
67. Hence Schelling's concern with 'stabilizing the action within limits'. Schelling, *The Strategy of Conflict*, p. 78.
68. Ibid., p. 77.
69. Schelling, 'Deterrence: Military Diplomacy in the Nuclear Age', p. 539. Also see Schelling, 'The Threat of Violence in International Affairs', p. 106.
70. Schelling, *The Strategy of Conflict*, p. 72.

71. Ibid., p. 77. On Schelling's interest in theories of restrained competition, see Chapter 4 below.
72. For Schelling's reference to 'jockeying for limits in limited war', see Schelling, 'The Strategy of Conflict: Prospectus', p. 215; Schelling, *The Strategy of Conflict*, p. 102.
73. See Schelling, 'War Without Pain', p. 473.
74. Schelling, *Arms and Influence*, p. 18.
75. Ibid., p. 259.
76. Ibid., p. 33.
77. Schelling, *The Strategy of Conflict*, p. 239.
78. Ibid., p. 239.
79. Schelling, *Arms and Influence*, p. 201.
80. Schelling, *The Strategy of Conflict*, p. 44.
81. Ibid., p. 44n17. For a discussion of the holding of hostages (including its use by corporations to avoid being taken advantage of), see Jervis, *The Meaning of the Nuclear Revolution*, pp. 13–14.
82. Schelling, *The Strategy of Conflict*, p. 44.
83. Wight, *Systems of States*, p. 31.
84. Schelling, *Arms and Influence*, p. 6.
85. Schelling, 'War Without Pain and Other Models', pp. 483–4.
86. Schelling, *Arms and Influence*, p. 195.
87. See ibid., p. 132.
88. Schelling, *The Strategy of Conflict*, p. 77.
89. For example, see Anatol Rapoport, *Strategy and Conscience* (New York: Harper & Row, 1964) pp. 84, 199.
90. For example, see the calculation of stability via 'dynamic exchange modelling' in Stephen J. Cimbala, 'Deterrence Stability with Smaller Forces: Prospects and Problems', *Journal of Peace Research*, 32:1 (1995), pp. 65–78.
91. Schelling, review of *The Control of the Arms Race*, p. 195.
92. Schelling, *The Strategy of Conflict*, p. 76.
93. Schelling, *Arms and Influence*, pp. 202–3.
94. Ibid., p. 198.
95. Ibid., p. 132.
96. Ibid., p. 208.
97. Brodie, *Strategy in the Missile Age*, p. 316.
98. Schelling, *Arms and Influence*, p. 222.
99. Schelling, *Arms and Influence*, p. 228.
100. Schelling, *The Strategy of Conflict*, p. 45. Indeed, there is a close relationship between this 'tradition of trust' and the notions of 'stable patterns of behaviour' and 'stable expectations' in Schelling's work. On the connections to von Neumann and Morgenstern's idea of 'standards of behavior' [*sic*] and Bavelas' idea of stable organisations, see Chapter 6 below.
101. Schelling, *The Strategy of Conflict*, p. 210.
102. Ibid., p. 215.
103. Ibid., p. 216.
104. Ibid., p. 112.
105. Schelling and Halperin, *Strategy and Arms Control*, p. 50.
106. Schelling, *Arms and Influence*, p. 241.
107. Ibid., p. 227.
108. Ibid., p. 233.
109. Schelling, *The Strategy of Conflict*, p. 75; Schelling, *Arms and Influence*, p. 131.
110. See Brodie to Schelling, 9 January 1959, L-557, p. 2, Box 2, Folder 11, Bernard Brodie Papers (Collection 1223), Department of Special Collections, University Research Library, University of California, Los Angeles. For Brodie's repetition of this point

in comments on a draft of Schelling's *Arms and Influence*, see Brodie to Schelling, 15 December 1964, L-25151, p. 4, Box 2, Folder 11, Brodie Papers.

111. Brodie to Schelling, 15 December 1964, L-25151, p. 4.
112. Schelling, *Arms and Influence*, p. 129.
113. Ibid., p. 130. Given that only some countries are able to promise a truly 'fearsome threat of violence', this also indicates the limitations of such theory. Trying to coerce an opponent into accepting stabilised limits in this fashion would only seem to work for a state which itself had recourse to overwhelming levels of force, or which could exploit the impression that another state might resort to such force on its behalf.
114. Thomas Schelling, 'Limited War' (Center for International Affairs, Harvard University: November 1959), Lecture Delivered to the National War College, 18 November 1959, p. 3; Box 27, Folder 'Schelling, Thomas C', Brodie Papers.
115. Schelling, 'Limited War' lecture, p. 11.
116. See Robert S. McNamara, *In Retrospect: The Tragedies and Lessons of Vietnam* (New York: Vintage Books, 1995), p. 160; H. R. McMaster, *Dereliction of Duty: Lyndon Johnson, Robert McNamara, The Joint Chiefs of Staff, and the Lies that Led to Vietnam* (New York: HarperCollins, 1997), p. 73.
117. See Ilya V. Gaiduk, 'Developing an Alliance: The Soviet Union and Vietnam, 1954–75', in Peter Lowe (ed.), *The Vietnam War* (New York: St Martin's Press, 1998), p. 146.
118. See Chen Jian, 'China and the Vietnam Wars, 1950–75', in Lowe, *Vietnam War*, pp. 169–70.
119. See Nguyen Vu Tung, 'Hanoi's Search for an Effective Strategy', in Lowe, *Vietnam War*, pp. 45–6.
120. For a criticism of Schelling's reading of North Vietnam's political commitment, see Lebow, 'Schelling and Strategic Bargaining', pp. 559, 564.
121. William Duiker, *The Communist Road to Power in Vietnam*, 2d edn (Boulder, CO: Westview Press, 1996), p. 264.
122. Glenn H. Snyder and Paul Diesing, *Conflict among Nations: Bargaining, Decision Making, and System Structure in International Crises* (Princeton, NJ: Princeton University Press, 1977), p. 230; James L. Richardson, *Crisis Diplomacy: The Great Powers since the Mid-Nineteenth Century* (Cambridge: Cambridge University Press, 1994), pp. 30, 364. Both of these studies take inspiration from Schelling's theory of bargaining.
123. See Peter B. Evans, 'Building an Integrative Approach to International and Domestic Politics', in Peter B. Evans, Harold K. Jacobson and Robert D. Putnam (eds), *Double-Edged Diplomacy: International Bargaining and Domestic Politics* (Berkeley, CA: University of California Press, 1993), pp. 399–403; Richard Ned Lebow and Janice Gross Stein, *We All Lost the Cold War* (Princeton, NJ: Princeton University Press, 1994), pp. 338–40.
124. Schelling, *The Strategy of Conflict*, p. 83.
125. See Schelling, 'Dispersal, Deterrence, and Damage', p. 365; Schelling, 'Nuclears, NATO and the "New Strategy"', p. 183; Schelling, 'Controlled Response and Strategic Warfare', p. 4.
126. Similarly, ideas of carefully controlled escalation in nuclear strategy have not been immune from harsh criticism. See Desmond Ball, 'Can Nuclear War Be Controlled?', *Adelphi Paper*, 169 (London: International Institute for Strategic Studies, Autumn 1981), pp. 1–2, 30, 35–7. For one critique which cites Schelling's work in particular, see Lebow, *Nuclear Crisis Management*, pp. 104–9. For a defence of Schelling's approach, see Hassner, *Violence and Peace*, pp. 60–1.
127. Bull, *The Control of the Arms Race*, p. 69.
128. Schelling, 'Nuclears, NATO and the "New Strategy"', p. 178.

4

Bargains and Games

It is hard to dispute the conclusion that Thomas Schelling has made an original (and very important) contribution to the study of strategy. But this originality can take a number of forms. On the one hand, he may have been thoroughly original in the sense that his approach had not been explored before in either the strategic studies literature *or in any other* academic discipline. This would have been something of a rarity in the history of ideas. On the other hand, he may have an original contribution in terms of bringing a new approach to strategy but one bearing the hallmarks of ideas from the other disciplines which had most influenced his thinking.

Between these two options exists a happier and more applicable middle ground: Schelling's insight was to transfer certain ideas from one body of thinking to another, but he also adapted and developed this theoretical framework to suit the particular situations typically encountered in strategic studies. In this way, his work has not only made an original contribution to strategic theory. The adaptation and development phase also means that he has contributed to these other fields, and prominent among these are branches of microeconomic and game theory, which will be the focus of the next two chapters of this study.

Schelling's cross-fertilisation of ideas does raise the question of whether his work ought to be classified as strategic studies or whether it actually belongs better in economics or game theory. Schelling's own retrospective description of *The Strategy of Conflict* as 'a dozen essays in bargaining, conflict, and strategy'[1] suggests that, in his own eyes at least, his approach transcended any such boundaries, which in many ways are artificial constructs which ought not to be observed religiously. The intellectual breadth, even eclecticism, of Schelling's approach does not make for easy categorisation. In one essay, first published in the mid-1960s, he commented that there was 'no conventional term' to describe the 'frontier' he was pushing back – the 'often virgin territory', which was 'some part of social science (including law), not a branch of mathematics'.[2] In the preface to the 1980 edition of *The Strategy of Conflict*, he

continues to note that this field, 'cutting across economics, sociology and political science, even law and philosophy and perhaps anthropology' still lacked 'a name of its own'.[3]

But all of this does not alter the understandable tendency for Schelling's academic work to be closely, and perhaps even exclusively, associated with the special demands of strategy in the thermonuclear age. A related impression is that his ideas have a rather direct continuity with the other mainstream strategic-studies literature. Schelling's description of Bernard Brodie as 'the dean of us all'[4] seems to confirm this, as does his work on the stability of deterrence, which was evaluated in Chapter 2.

But one important point at which this continuity with many other strategic thinkers does stop is in terms of the broader theoretical influences which inform Schelling's general approach to strategic problems and, more specifically, his general concept of stability. While theoretical economics and game theory may not be every strategic thinker's conceptual cup of tea, it is important to consider the elements within them which shed light on the intellectual context for Schelling's work on strategic stability. Recognising the importance of these literatures does not undermine the argument that Schelling's contributions were often revolutionary in terms of the history of *strategic* ideas. But in terms of a wider history of ideas, Schelling's analysis might be seen more as the stuff of creative variations on a substantial body of existing theory outside the normal confines of strategic thought.

OLIGOPOLY AS A MODEL FOR INCOMPLETE ANTAGONISM

As Chapter 3 demonstrated, the assumption of bargaining and the incomplete antagonism it represents, lies at the heart of Schelling's distinct approach to strategy and stability. His assessment of what makes a particular strategic problem situation a *bargaining* situation, and the link in his thinking between bargaining and stability, not only forms a part of his systematic theory which stands very well on its own feet in terms of his general concept of stability. It also connects his theoretical framework back to discussions in the economics literature. These discussions had been taking shape several years before the publication of *The Strategy of Conflict*, the work in which the consistency of Schelling's bargaining framework is displayed most clearly.

The key linkage here is Schelling's insight that 'concepts like deterrence, limited war, and disarmament, as well as negotiation' involve not only conflict, but 'common interest and mutual dependence'[5] between the parties. In a significant elaboration of the same point he argues that:

'The deterrence concept requires that there be both conflict and common interest between the parties involved; it is as inapplicable to a situation of pure and complete antagonism of interest as it is to the case of pure and complete common interest.'[6] Such a classification of deterrence, and of other conflict situations involving bargaining, is in fact very similar to the classification in economics of the problem of 'oligopoly'. This is a situation where there are few sellers in the market which makes it much more complex than 'pure monopoly or pure competition'.[7] The similarities are obvious – between the extremes of 'pure monopoly' and 'pure competition' in oligopoly theory, and those of 'pure and complete common interest' and 'pure and complete antagonism of interest' in Schelling's theory of strategy.

This connection is not necessarily self-evident from Schelling's writings. For instance, in *The Strategy of Conflict*, Schelling's most theoretically involved work, Schelling rarely mentions oligopoly theory itself and does not explain it as a separate, self-contained, theory outside the context of the analysis of strategic questions. Instead, one has to rely on the occasions when, in dealing with specific cases of his general theory, Schelling makes direct comparisons with situations of oligopoly and other conditions of fewness such as bilateral monopoly and duopoly. For example, in *The Strategy of Conflict* he makes the comparison between the limitation or avoidance of war and a '"successful" employees strike' (i.e. a case of bilateral monopoly) which share the characteristic that they are 'not enormously destructive of values to both sides'.[8] There is also Schelling's comment that 'even the problem of surprise attack is logically equivalent to a problem in partnership discipline'.[9]

By comparison, in *Arms and Influence* it is more difficult to discern a general concept of stability relying on a consistent bargaining framework, which itself is grounded in a particular body of economic theory. But there are some hints nonetheless. For example, at one point Schelling compares the threat of war with 'the threat of a strike in industrial relations'.[10]

As Schelling himself does not tend to dwell on these theoretical connections, it is perhaps unsurprising that references to their importance are few and far between in the secondary literature. One exception is Marc Trachtenberg, who mentions oligopoly theory in his discussion of Schelling's contribution to US strategic thought.[11] In the event, however, Trachtenberg devotes less time to the ideas stemming from this theory than some other commentators who note the importance of bargaining in Schelling's thought without mentioning oligopoly specifically. For instance, Lawrence Freedman notes the importance of 'Schelling's theoretical structure, reflecting his background as an economist'[12] and devotes a chapter of *The Evolution*

of Nuclear Strategy to 'Bargaining and Escalation' in which Schelling is the dominant authority.[13]

In fact, Freedman's analysis of Schelling's strategic thinking can be used to make a good advertisement for the special relevance of oligopoly thinking. For Freedman begins his chapter on 'Bargaining and Escalation' with the comment that: 'At the centre of the strategy of stable conflict was the concept of incomplete antagonism.'[14] The above discussion confirms this concept as the strategic equivalent of conditions of fewness in economics. Freedman's analysis can also be used to highlight the importance of the distinction between case and general theory in Schelling's work on stability. Freedman notes the agreement among strategic thinkers that the nature of nuclear weapons had placed a premium on some sort of restraint between the countries possessing them: 'The prospect of an all-engulfing nuclear war reminded the super-powers that they should not push their differences over ideology and geopolitical interests too far.'[15]

It was precisely this sort of judgement which helped make stability such an important objective for the strategic studies community. But unlike his colleagues, Schelling had a pre-existing theoretical framework dealing with 'incomplete antagonism' across a range of bargaining situations, both military and non-military. The pervasive influence of nuclear weapons certainly created the right environment for Schelling to apply his brand of strategic thinking, as this study has already suggested. Yet for Schelling, at least, the thermonuclear age should not be regarded as the sufficient condition for applying ideas from situations of fewness in economics.

THE IMPORTANCE OF INTERDEPENDENCE

What linked oligopoly theory and nuclear strategy was the *interdependence* of the moves made by the respective actors. The interdependency of superpower decisions and expectations is at the heart of Schelling's insights into nuclear strategy. In one of his most notable phrases, Schelling states that his theory of strategy could be called 'the *theory of interdependent decision*' (emphasis original).[16] The similarity with the conditions of oligopoly could hardly be stronger: 'This complex interdependency of firms' decisions with respect to the important market variables is the essential and distinguishing feature of oligopoly.'[17]

It was this factor which explained the fascinating complexity of situations which existed between the extremes of pure monopoly and pure competition (the strategic analogies of which are pure cooperation and pure conflict). By contrast, 'neither the monopolist nor the purely

competitive firm must consider how alternative actions by rival firms will affect its own revenue possibilities'.[18] The relevance of a basic distinction within game theory is clear here; a 'purely competitive' relationship between many sellers would constitute a zero-sum game, whereas oligopoly (or partial competition) lies in the realm of non-zero sum games.[19]

Unfortunately, the importance of this distinction for Schelling's theory appears to have been lost in some prominent readings of his work.[20] Yet the link back to Schelling's theory of interdependent decision is striking: 'The fundamental idea is that war – whether a "fighting" war or a process of strategic maneuver – is not a zero-sum game … It is a "bargaining situation", in which the conflict and interdependence are inseparable.'[21] The idea that interdependence prevails when there are few actors in the market is well captured in one of the most important texts which Schelling cites. According to William Fellner, his former teacher:

> Many prices and wage rates are determined under conditions which are neither atomistic nor monopolistic. They are determined under conditions of fewness: a few decision-making units shape their policies in view of how they mutually react to each other's moves.[22]

INDETERMINACY AND THE RANGE OF BARGAINS

A further connection between oliogopoly theory and Schelling's approach to stability is the *determination* of (equilibrium) prices and wages. For the former: 'The central analytical problem … is how each of the few sellers reacts to the economic activities of its rivals in order to bring about determinate equilibrium solutions.'[23] As Chapter 3 of this study demonstrated, the existence of a 'vacuum of indeterminacy' provides the background for Schelling's analysis of the general concept of stability. The amelioration of this indeterminacy (a bargaining process which rests largely on psychological rather than mathematical factors) involves the search for 'rivers' which offer stabilising power. Schelling's argument that from such indeterminate situations a bargain *must be struck* may owe as much to his observation of determinate outcomes in oligopolistic situations, as it does to any observation bargains being struck in strategy.

The importance of the relationship between Schelling's general concept of stability and this branch of economic theory is highlighted when one compares details of Fellner's framework with Schelling's description of the problem of indeterminacy.[24] According to Fellner, in oliogopolistic situations there will be a range of possible outcomes within

certain 'limits to what is acceptable' to the parties, 'to what from their point of view is preferable to going out of business'. These limits thus 'exclude the possibility of outcomes by which any one party suffers a loss (negative profit) in relation to the zero line determined by not considering the deal in question'.[25] In other words, they *include* those outcomes where the loss involved in coming to an agreement is smaller than the loss involved in having no agreement in the first place.

This is exactly the way Schelling sees things when he comments that in bargaining situations: 'There is some range of alternative outcomes in which any point is better for both sides than no agreement at all.'[26] It is this range of options which gives meaning to bargaining power. For this power lies in the ability to manufacture accommodation at a particular point within the range: 'Coercion requires finding a bargain, arranging for him to be better off doing what we want – worse off not doing what we want – when he takes the threatened penalty into account.'[27] This formula – a range of plausible bargains, in which accommodation at any one of them is better than no accommodation at all – is vital in Schelling's approach to stability. It shows up, for example, in his assessment of attempts to use coercion (the exploitation of bargaining power) to stabilise the arms race where: 'The first step toward inducing a potential enemy to moderate his arms buildup is to persuade him *that he has more to lose than to gain* by failing to take our reaction into account' (emphasis added).[28]

Schelling's comparison here between using the threat of an accelerated arms build-up to coerce restraint and analogous measures in 'tariff bargaining'[29] underlines the connection between his bargaining framework in strategy and the very similar one which occurs in economic theory. The value of this comparison can be illustrated by the language used by American and Japanese participants in a mid-1990s example of tariff bargaining. This involved the imposition of a 100 per cent tariff on certain Japanese cars in May 1995, which would only be removed if a suitable accommodation could be found within six weeks. According to one American negotiator, 'We came to the conclusion that either we draw the line here, or throw in the towel on Japan.' The response to the American threat by Masaharu Tanaka of Toyota was even more significant: 'The US government conducts its trade policy in a coercive manner completely beyond our comprehension.'[30]

The idea of a range of potential bargains where there is less to lose than if there were no bargain also functions in reverse for Schelling. Nuclear deterrence breaks down and gives way to war (in an obvious example of great instability) when there is no prospect of such a bargain at all: 'Both sides may get into a position in which compromise is impossible, in which the *only visible outcomes would entail a loss to one side*

or the other so great that both would choose to fight a major nuclear war' (emphasis added).[31]

The trick in fact is to narrow the range of plausible bargains without eliminating the prospect of bargaining at all; to avoid throwing out the baby with the bath water. The ability to resolve the indeterminacy in the range depends on whether the parties are able to converge on a particular point within it. That Schelling and Fellner are facing the same basic question is clear when one considers the latter's complaint that traditional value theory is 'insufficient if what I am willing to do depends on what I assume the other party's response will be, and if, at the same time, what the other party is willing to do depends on what he thinks my position will be'.[32] These are of course the situations which involve compounding expectations – of the 'I think that he thinks that I think' variety – which Schelling argues are initially indeterminate because both sides know that retreat is possible at each point within the range. For his part, Fellner argues that there is a need for more information than just the mathematics of the situation in order to resolve the indeterminacy in these situations of 'conjectural interdependence'.[33] He concludes that 'all problems of conjectural interdependence are essentially problems of bargaining'.[34] The similarity with Schelling's framework, upon which the general theory of stability is constructed, could not be much closer.

The identification and analysis of these conditions of fewness as bargaining situations which comprise a range of possible outcomes is a feature of other sources cited by Schelling in *The Strategy of Conflict*. For instance, he also notes an article in which John Harsanyi refers to Pigou's idea of a 'range of practicable bargains' which occupy the space 'between two limits' on the 'Edgeworth contract curve'.[35] The nature of these limits brings one right back to the apparently indeterminate range discussed above; Harsanyi notes that these limits can be seen as 'the "maximum-concession points" of each party … which are determined by the fact that neither party would accept an agreement that put him in a worse position than the conflict situation (not reaching an agreement)'.[36]

The references to Pigou and Edgeworth illustrate the way Schelling's essential ideas can be linked back to much earlier discussions in the economics literature. Edgeworth (in the late nineteenth century in such works as *Mathematical Physics*) and Pigou (in the 1930s) had both contributed to the understanding of the nature of oligopoly, a category of economic relationships which had been identified by Augustin Cournot as far back as 1838. Cournot's own approach had been based on classifying markets according to the number of sellers. Edgeworth had then argued that in situations where there were few sellers, the result was indeterminacy.[37]

According to Philip L. Williams, it was not until the publication in 1928 of A. L. Bowley's *The Mathematical Groundwork of Economics*, that 'anticipations of the reactions of the rival to the move being considered' (Schelling's 'I think that he thinks that I think' formula) were included in 'formal behavioural functions' of duopoly models.[38] This appears to have marked the beginning of modern formal oligopoly theory, and an understanding of its intrinsic complexity in light of the interdependency which it now recognised. These were aspects which Schelling was clearly able to draw upon, and help explain how he saw conflict situations in the way that he did.

THE RELEVANCE OF GAME THEORY

This is also where we find important common ground with game theory, and indeed with some of the very origins of this much maligned but often poorly understood area of scholarship. The relationship between the idea of the range of bargains and game theory is suggested by Williams' observation that 'Edgeworth's contract curve is a solution to the bargaining problem of von Neumann and Morgenstern',[39] widely regarded as the main architects of the theory of games. For an explanation of this connection it is instructive to turn to Oskar Morgenstern's recollection of the unanswered questions which had led him in 1928 to deal with the issue of economic interdependency:

> I was constantly troubled by the fact that Böhm-Bawerk's theory of bargaining and of the 'marginal pairs', while dealing with fundamentals, could not be considered completed. This also led me, while still in Vienna, to Edgeworth's contract curve in his *Mathematical Physics*.[40]

In fact, Morgenstern's approach in this early text to interdependency as a general idea is well worth quoting when one considers his examination of a situation involving Sherlock Holmes and Professor Moriarty:

> I showed in some detail in particular that the pursuit developing between these two could never be resolved on the basis of one of them out-thinking the other ('I think he thinks that I think!! … '), but that a resolution could only be achieved by an 'arbitrary decision', and that it was a problem of *strategy* (emphasis original).[41]

It is almost impossible to overstate the importance of the 'I think he thinks that I think' formulation in Schelling's own approach to strategy. In the event, the Holmes and Moriarty case went on to appear in the 1953 edition of von Neumann and Morgenstern's *Theory of Games and*

Economic Behavior,[42] the edition Schelling refers to in *The Strategy of Conflict*. There is, however, an important difference in Schelling's use of this example. In von Neumann and Morgenstern's presentation of the problem, which involves Holmes and Moriarty's separate movements on trains, Holmes wishes to avoid Moriarty, who is hunting him down – if Moriarty catches Holmes he is likely to kill Holmes. Schelling reformulates the situation so that Holmes and Moriarty *both* have an interest in co-ordinating their behaviour,[43] indicating his strong interest in cooperative strategic activity. He also introduces his later 'What is Game Theory?' essay by discussing a number of co-ordination problems involving passengers of trains along lines similar to the reformulated Holmes and Moriarty game.[44]

NON-ZERO-SUM GAME THEORY AND THE NEED FOR CREATIVE THINKING

To some extent the potential for Schelling's work had been outlined in the pioneering game theory text where von Neumann and Morgenstern had advertised that, in accordance with the title, their theory had two main applications; 'to games in the proper sense' and 'to economic and sociological problems'. What is more, they had stated that: 'Our major interest is, of course, in the economic and sociological direction.'[45] But the text itself tends towards mathematical proof rather than economic application.[46] This reflected the need to build solid foundations for a new method of analysis, von Neumann's concerns about the almost Newtonian approach to mathematics in contemporary economics,[47] and von Neumann's disproportionately large share in the project.[48]

For Schelling, von Neumann and Morgenstern's work thus went only part of the way. Hence he offers the mixed praise that *Theory of Games* was 'a stunning architectural achievement, even if not, now, the best route of access for most social scientists'.[49] On this point, Schelling is once more in line with the influential Fellner, who had argued in the late 1940s that 'the von Neumann–Morgentstern analysis has not so far been presented in a form in which economists could find it directly applicable to their problems'.[50]

Instead, Schelling was drawn much more closely to Luce and Raiffa's *Games and Decisions*, the text which he notes was of 'immeasurable help' for his own *The Strategy of Conflict*.[51] In many ways, including the relative scarcity of mathematical proofs, Schelling's approach is much closer to Luce and Raiffa's[52] than it is to von Neumann and Morgenstern's.

One of the most important features of *Games and Decisions* for the work that Schelling was engaged in was its demonstration of the links

between game theory and the question of bargaining. An important example is the way in which Luce and Raiffa distinguish the relative simplicity of zero-sum games from the complexity of non-zero-sum games. They state that,

> an adequate discussion of non-zero sum games seems possible only in terms of special cases, and, even so, one is often forced into extra-theoretic questions such as the '*bargaining philosophies of the individuals*', 'interpersonal comparison of utility', etc. The extent and complexity of this *penumbra of indeterminateness*, even in an idealized mathematical model, should invite speculation and experimentation among economists, sociologists, and psychologists (emphasis added).[53]

This sets up exactly the type of problem Schelling was dealing with (indeterminateness in non-zero-sum games), and illustrates the need for the sorts of options he went on to consider (creative approaches to bargaining). The invitation for social scientists to speculate on likely solutions to the indeterminateness seems almost personally designed for Schelling. It is certainly much more appealing to him than Jessie Bernard's earlier suggestion that a rather mathematical game theory could be a productive basis for the analysis of social conflict.[54]

It is also notable that Luce and Raiffa describe an implication of von Neumann and Morgenstern's work in precisely the sort of way that would appeal to Schelling. Luce and Raiffa comment that, 'the actual selection of an outcome from the multiplicity of points in the negotiation set … depends upon certain psychological aspects of the players which are relevant to the bargaining context'.[55] Luce and Raiffa's reference here to the problem of many points within a *negotiation set*,[56] from which an outcome needs to be selected by a bargaining process, illustrates the similarity between non-zero-sum game theory and bargaining/oligopoly theory. Moreover, their reference to the importance of psychological aspects of bargaining indicates the potential for a broader social-scientific approach to the theory of games. In another commentary on contemporary theory which Schelling refers to in *The Strategy of Conflict*, this time by John Harsanyi, a similar pattern emerges. Harsanyi observes that, 'current economic theory does not explain how the position of the actual agreement point is determined *within* the range of practicable bargains, that is, how the division of the net gain is determined between the two bargaining parties' (emphasis original).[57]

There are at least two ways in which Harsanyi's approach helps put Schelling's own work into context. First, Harsanyi argues for the development of 'theory yielding determinate predictions' to help in describing 'social situations' such as 'the "balance of power" between two parties'.[58]

Such theory would, he says, 'fill a significant gap in both economics and political science'.[59] As an attempt to provide this sort of theory Schelling's work should thus be understood in this broader social-scientific context,[60] and not just as a contribution to the theory of strategy. As this study has already argued, Schelling is engaged in developing general theory. His analysis of the stability of deterrence as a pressing strategic issue is one particular application of this general theory.

Second, Harsanyi's reference to the 'division of the net gain' is also relevant. This not only implies a non-zero-sum game (where one party's gain does not necessarily translate into a corresponding loss for the other[61]). It also seems to suggest that situations across a range of social sciences can be seen as *distributive* processes resolvable by bargaining. Harsanyi's reference to political science is useful because this idea of distribution is reflected, for instance, in David Easton's influential notion of the political system in terms of the 'authoritative allocation of values for a society' – a mechanism for arranging 'the distribution of things considered valuable'.[62]

Schelling himself notes that he is concerned with 'the "distributional" aspect of bargaining: the situations in which a better bargain for one means less for the other'.[63] This itself provides an important link to the selection of equilibrium points in game theory. Outcomes where one player cannot achieve a better payoff without worsening the payoff of the second player are 'Pareto-optimal' points.[64] The establishment of the set of Pareto-optimal points is an important part of the narrowing-down process within game theory as any or all of the equilibrium point(s) to the game are also Pareto optimal. The nature of zero-sum games, where one player's loss is the other player's gain of the same amount, means that all zero-sum strategies are Pareto optimal. The links between zero-sum and non-zero-sum theory are important here given Schelling's argument that so much of existing theory was an application of thinking from zero-sum to mixed-motive games. This is another example of the close connections between Schelling's bargaining framework, existing bargaining theory and game theory.

The idea of 'distribution' is also contained in much of the oligopoly literature relevant to Schelling's work. For example, Schelling cites Fellner's argument that an 'agreement' in a bargaining situation 'may be dependent on some means of redistributing costs or gains'.[65] In fact, Fellner's analysis of this question suggests a rather explicit connection between Schelling's stability concept and the treatment of bargaining outcomes in this literature. In his examination of factors which contribute to 'bargaining power',[66] Fellner mentions a condition familiar to readers of Schelling: 'the failure to develop *established patterns of behavior* in oligopolistic industries' (emphasis added). This would

encourage firms 'to force each other into accepting some pattern of behavior. Such warfare creates a great deal of instability, and it does not tend to lead to a socially desirable allocation of resources.'[67]

STABILITY AS THE STRIKING OF A UNIQUE BARGAIN

The corollary of this argument, which ties in with the analysis in Chapter 3 above, is that stability is a matter of successful bargaining, of finding a place where expectations can be co-ordinated. In game theory terms, this translates into finding an equilibrium. Hence, Schelling notes that an 'equilibrium pair' of strategies will be produced if there is a 'line of reasoning by which we can reasonably expect each other to expect it'. In other words this will work if the players 'hold a consistent pair of expectations'.[68]

The idea that the successful striking of a bargain is at the heart of stability is also evident in Fellner's treatment of another factor affecting bargaining power: 'The ability of the parties to take and inflict losses during stalemates.' Fellner's point here is that in the case of bilateral monopoly (like oligopoly a condition of fewness), the 'failure to establish stable relations between the parties … typically results in the inability of the parties to conclude a sales agreement'.[69] Schelling's argument is essentially a corollary of this observation about bargaining situations in economics: stability is typified by the ability to conclude an agreement, to strike a bargain, to find an equilibrium pair.[70]

The plausibility of this link between stability and the ability to strike a bargain (the first of the two tiers of Schelling's general concept[71]) is also evident in Luce and Raiffa's suggestion that arbitration by a mediating party on behalf of those involved in the bargaining situation might help overcome the problem of indeterminacy:

> the net effect is to associate to each possible conflict of interest a single outcome. Thus, we define an *arbitration scheme* to be a function, i.e., rule, which associates to each conflict, i.e., two person non-strictly competitive game, a unique payoff to the players (emphasis original).[72]

Accordingly, Schelling refers to this proposal as one of a number of suggestions from the existing literature explaining how the parties in bargaining situations might 'coordinate their expectations on the same outcome'.[73]

While the search for agreements bargains or equilibria links Schelling's stability concept to existing bargaining and game theory, his assessment of the nature of that single outcome provides a point of theoretical departure. Schelling argues that, contrary to much accepted wisdom, the eventual bargain may not always be the one which allows the joint maximisation of gains.[74] This highlights a shift away from orthodox economics where joint maximisation was such an important principle. Fellner's observation that von Neumann and Morgenstern's treatment of oligopoly-type situations 'also leads to joint maximization'[75] suggests that game theory had not really gone much further. In fact, Harsanyi had argued that von Neumann and Morgenstern's game theory 'is no more able than is orthodox theory to determine the exact position of the agreement point within the range of practicable bargains'.[76]

This criticism is an important guide to Schelling's approach to game theory. He was seeking an approach which could yield unique outcomes from 'I think that you think that I think' situations which were mixtures of both conflict and cooperation. Standard game theory, based as it was upon an assumption of rational actors trying to maximise their gains, was not a sufficient guide to outcomes for these sorts of situations.

This observation may seem to be at odds with Schelling's prominent statement that his own theory of strategy 'assumes a "rational" value-maximizing mode of behavior'[77] based on 'an explicit and internally consistent value system'.[78] However, one of the reasons why Schelling finds the assumption of rationality useful for theory-building is that it highlights the point that 'it is not a universal advantage in situations of conflict to be inalienably and manifestly rational in decision and motivation'.[79] For instance, as Chapter 1 showed, Schelling argued early in his work on bargaining that one sometimes needed to commit oneself to an action which one would quite clearly prefer not to undertake. In this sense, the threat of apparently 'irrational' behaviour can be a useful method in the manipulation of the opponents' expectations in the direction of a favourable resting place.[80]

In fact, according to Schelling's view of strategic behaviour, 'irrationality' tends to be quite a pervasive characteristic. He argues that:

> Irrationality can imply a disorderly and inconsistent value-system, faulty calculation, an ability to receive messages or to communicate efficiently; it can imply random or haphazard influences in the reaching of decisions or the transmission of them.[81]

Schelling's interest in these sorts of situations means a departure from orthodox theory based on value-maximising behaviour by participants

who possess perfect knowledge of the situation and are aware of the full range of choices available to them and of the consequences of each of these choices.[82] The challenge Schelling set for himself was to find a strategy of conflict which helped describe how one might expect rational actors to behave in a situation characterised by such irrationality and uncertainty.[83]

The notion of actors fully maximising their utilities based on perfect information can be ruled out for the non-zero-sum or oligopolistic situations which feature in Schelling's theory.[84] As Herbert Simon noted in an essay which cited Schelling's work on bargaining, and which was in turn cited by Schelling: 'Where there is imperfect competition among firms, maximizing is an ambiguous goal, for what action is optimal for one firm depends on the action of the other firms.'[85] The upshot of this is that each actor is faced by 'the complexity and instability of his environment'.[86] These are of course the very problems which interest Schelling. Indeed, his understanding of bargaining outcomes as symbolic resting places which resolve indeterminacy compares well with Simon's analysis of 'satisfying' rather than 'maximising' behaviour.[87] Simon draws the distinction between the orthodox 'economic man' who 'maximises' and 'administrative man' who 'satisfices – looks for a course of action that is satisfactory or "good enough"'.[88] Schelling's idea of resolving indeterminacy by seeking conspicuous outcomes for bargaining fits well alongside Simon's observation that: 'Administrative man recognises that the world he perceives is a drastically simplified model of the buzzing, blooming confusion that constitutes the real world.'[89] Schelling was thus in line with this major move in contemporary social-scientific theory to develop alternatives to orthodox theory, which could not deal adequately with the particularly challenging demands of bargaining situations.

AN AVERSION TO MATHEMATICAL SOLUTIONS

The apparent limitations of traditional, mathematical game theory help underscore Schelling's drive into what he called 'virgin territory'. For example, he believed that experimental games were often more useful than formal game theory since, in the latter, 'the constraints imposed by the quantitative structure of the game are insufficient to determine a solution'.[90] Hence, for Schelling, something other than mathematical reasoning (based on the assumption of fully rational participants maximising their values) was needed to work out where one could expect a particular bargain to be struck.

Schelling's drive for non-mathematical theory is evident in his early work on bargaining. For instance, in an essay published in 1956 he notes

that if commitments are to provide a good basis for resolving the indeterminacy of bargaining situations, they 'usually have to be qualitative rather than quantitative … The numerical scale is too continuous to provide good resting places, except at nice round numbers.'[91] Indeed, his later analysis of the dangers of going one pace beyond the river and using just one (rather than no) nuclear weapons (as discussed in the previous chapter) can be compared to his earlier reference to labour–management negotiations over wage rates where he notes that: 'It may be difficult to conceive of a really firm commitment to $207½; why not $2.02¼?'[92]

The idea that mathematical solutions are tidy but may well be unstable is reflected in Schelling's call for the abandonment of symmetry in game theory.[93] Schelling argues that:

> We must avoid assuming that everything that the analyst can perceive is perceived by the participants in a game … In particular, game characteristics that are relevant to sophisticated mathematical solutions (except when the same solution can also be reached by an alternative, less sophisticated route) might not have this power of focusing expectations and influencing the outcome. They might have it only if the players perceived each other to be mathematicians. This may be the empirical interpretation of such 'solutions' as those of Braithwaite, Nash, Harsanyi, and others.[94]

John Nash's work comes in for particular criticism on this score. Schelling argues that from Nash's theorising: 'The resulting focal point is limited to the universe of mathematics … which should not be equated with the universe of game theory.'[95] Nash's bargaining solution – which is not to be confused with the Nash equilibrium concept discussed below – is a solution which is 'fair' to both parties. It involves the mathematical derivation of the point at which the product of the two players' utilities is maximised.[96]

Schelling's argument is not with the idea of 'fairness' (potentially valuable as a qualitative resting place) but with its calculation in mathematical terms. Given the extent of Schelling's opposition to solutions of this sort, it is more than a little curious to read Green's assertion that 'in the game-theoretic universe in which Schelling begins his analysis, paper opponents respond to threats and promises by choosing the most mathematically correct among the strategies that remain to them'.[97]

Schelling's aversion to mathematical symmetry and joint-maximisation is also reflected in his rejection of the notion that *equality* in nuclear arsenals is sufficient for a stable strategic balance. As Chapter 2 indicated, Schelling is one of a number of strategists to argue that a stable balance is not necessarily achieved when the offensive capabilities of the two powers *match* one another.

This observation may seem odd, since Schelling is keen to recognise the inherent attractiveness of 50–50 splits in the division of certain quantities – for example, in the division of an amount of money. Similarly, in the explicit bargaining which takes place in formal arms control, simple and obvious numerical values (such as equivalence in missiles numbers or megatonnage) can serve as obvious focal points for an agreement. However, the stability in question in the latter case is in terms of the ability of two negotiating parties to stabilise their *negotiations* at an explicit point of agreement. There is no necessary correspondence between this and the stability of the strategic balance. The latter involves a tacit agreement not to attack each other based on the expectations of what would happen if either side attacked, and equality in force levels may not be at all stabilising in this case.

CLARIFYING THE DEBATE OVER GAME THEORY

Schelling's aversion to mathematical solutions identifies him as a non-orthodox game theorist. This sheds light on the debate over the role of game theory in strategy which has tended not to appreciate the significance of his rather unique approach to the subject.

Game theory probably has the dual misfortune of being the most heavily criticised and least understood element of modern strategic thinking. It has been vulnerable, in Schelling's own words, to 'frivolous connotations',[98] not least because of the charges of mathematical complexity and irrelevancy which it seems to attract very readily but which are often unjustified.

The attacks on the use of game theory in strategic analysis began in earnest in the early 1960s. The assault was a trans-Atlantic affair with the British spearhead led by critics of the new strategic thinking such as P. M. S. Blackett and Solly Zuckerman,[99] whose background in operational research unfortunately was not matched by a corresponding expertise in game theory.[100] Their main complaint was that game theory was far too mathematically abstract to be sutitable for strategy, a claim which is rather untenable at least in the case of deliberately non-mathematical work.

In terms of direct and more learned criticism of Schelling's game-theoretical analysis in particular, it was Anatol Rapoport, the mathematical biologist and game theorist based at the University of Michigan, who led the way. His initial critique of Schelling's call for a reorientation of game theory was restrained and methodical,[101] but his later attack in *Strategy and Conscience* was shrill by comparison. The other main American criticism came in the form of Green's *Deadly Logic*.

This critique of game theory essentially suggested (1) that the use of game theory was widespread among the leading civilian strategists, and (2) that this game theory was an inappropriate, and probably a dangerous way of looking at strategic problems. From (1) and (2) it could thus be argued that modern strategic analysis was fundamentally flawed.

Perhaps the least helpful aspect of this criticism was its extreme nature – this made any detached, sound analysis of the role of game theory in strategic thinking difficult to detect in the noisy debate between these critics and the strategic analysts who responded to them. Schelling himself was not at all reluctant to take on the critics. In one essay he responded: 'Most of those who have recently screamed against "game theory" (outcries really directed at theory, not at game theory) seemed unaware that it could infect the angels too and that some were in fairly high fever.'[102]

Stung by the accusation that the use of game theory was rife among their ranks, prominent strategic analysts claimed innonence in the matter. Albert Wohlstetter, who was himself aware of some of the basic texts in game theory,[103] stated that it had only been used by,

> Schelling, Daniel Ellsberg, and Kenneth Boulding. On the other hand, analysts such as C. J. Hitch, McKean, and myself have quite self-consciously made no practical use of the theory. And Bernard Brodie, Henry Kissinger, Klaus Knorr, and W. W. Kaufmann have not so far as I know bitten the apple at all.[104]

Wohlstetter's own preference was for a methodology not entirely unrelated to game theory. Along with Hitch and McKean, he favoured the treatment of strategy as a series of problems in resource allocation and cost-effectiveness.[105] It can be reasonably argued that in their most optimistic and technically involved guises, studies of this sort promised the sort of numerical 'optimal solutions' for which game theory was so often, and mistakenly, held responsible, although Wohlstetter himself appears to have been searching for *better* rather than *optimal* solutions.

There are certainly similarities in the basic concepts employed in both systems analysis and game theory: Hitch and McKean's explanation of 'feasible', 'efficient' and 'optimal' points[106] compare with the game-theory concepts of 'negotiation set', 'Pareto-optimality' and 'equilibrium', respectively.[107] Ideas of optimality are certainly far from out of bounds in traditional game theory. Oskar Morgenstern explained that, 'The theory of games is a mathematical discipline designed to treat rigorously the question of optimal behavior of participants in games of strategy and to determine the resulting equilibria.'[108] It is therefore not hard to see why Rapoport should argue that the strategic analysts were compelled by a 'problem-solving mood' and therefore used game theory

in an inappropriate quest for 'optimal' solutions.[109] Yet Schelling, arguably the most influential user of game theory among this group, also saw this quest as inappropriate. In the non-zero-sum game theory he both used and adapted, optimal solutions that were not on the menu.

Support for the idea that game theory in strategy was more about using ideas rather than mathematical proofs can be seen in Wohlstetter's influential argument that: 'it is not the theorems but "rather the *spirit* of game theory and the way it focuses attention on conflict with an intelligent and live, reacting opponent that is useful"' (emphasis original).[110]

Bernard Brodie, another strategic thinker who wished to make at least some acknowledgement of game theory, but not be infected by it himself, produced an almost identical argument that:

> The refinements of *game theory* as developed mostly by the late mathematician John von Neumann are generally of little importance to the strategist … What matters is the *spirit* of the gaming principle, the constant reminder that in war we shall be dealing with an opponent who will react to our moves and to whom we must react (emphasis original).[111]

Although Brodie came to doubt that economists had much of value to offer strategic thinking, he did come down on the side of Wohlstetter, noting that they were especially suited for '"cost-effectiveness" analysis'.[112] As for game theory, Brodie's unwillingness to see much promise in this area[113] may well have been influenced by his PhD supervisor, the economist Jacob Viner.[114] According to the prominent game theorist Martin Shubik, Viner's 'favourite comment on the subject was that if game theory could not even solve the game of chess, how could it be of use in the study of economic life, which is considerably more complex than chess.'[115]

Even Schelling himself seems to add to the argument that game theory was hardly pervasive in the development of strategic thought. In one essay he argues that 'the fact is that for most American strategists, the influence of game theory has been modest and indirect'.[116] It is thus not a complete surprise to see Schelling cited by Marc Trachtenberg to support a repetition of the familiar theme. While noting that the general approach contained in game theory suited an 'interactive' view of superpower relations, Trachtenberg cites Schelling's review of Rapoport's *Strategy and Conscience* to argue that: 'This, of course, is a far cry from the idea that the mathematical theory of games, for example, was a major force in shaping American strategic thought'.[117]

If all of this is not enough to put a dent in opinions that game theory has had some all-pervasive (and perverse) influence on strategy, it should

also be noted that Schelling was criticised by game theorists for inadequately understanding and applying central theorems of the discipline. In their respective reviews of *The Strategy of Conflict*, Morgenstern and Shubik both complained that Schelling's critique of mathematical game theory was based on a misinterpretation of the central texts in the field.[118] According to Shubik, Schelling's attempt to reorient game theory had resulted in theory which had little to do with the original:

> It is my opinion that this book would have been a much stronger contribution had most of the references to game theory been deleted. Although the formal structure of the topic could have been of considerable assistance to the type of analysis presented by Schelling, there is little evidence that it has been used.[119]

In sum, there appears to be a strong case against considering game theory useful in understanding even Schelling's approach to strategy, and thus the concept of stability. But this conjecture requires further analysis. First of all, the argument that *few* strategic thinkers used game theory should not be used to suggest that game theory was thereby uninfluential. The case falls down even if only Schelling's work is considered. Bruce Russett makes a similar distinction between quantity and significance when he cites Schelling's work in support of the assessment that 'professional economists in the strategy field have been more important than numerous'.[120]

In this context, it is important not to misread Schelling's review of Rapoport. Schelling definitely denies any claim that a large number of prominent strategic thinkers laboured under the spell of game theory. But he certainly does not accompany this by recanting his own belief in its relevance. Schelling argues that: 'The book makes two points. (1) Strategic thinking is bad. (2) Game theory is to blame.'[121] He is hardly arguing that game theory is irrelevant. Instead his response to Rapoport is that: 'Actually I was surprised that he wrote his book against game theory, rather than one against bad game theory calling for better.'[122]

In other words, Schelling sees a role for game theory in strategic analysis, provided that it is approached in a thoughtful and creative manner. This means that for Schelling rather more than the 'spirit' of game theory was useful. Wohlstetter and Brodie were certainly pointing to a key element in game theory – so much follows from this crucial insight. But if all that game theory taught was that strategy involved interaction with an intelligent opponent, then it would simply be rediscovering a principle pointed out by major pre-game theory strategists as Clausewitz and Sun Tzu. However, given Schelling's comment that the American strategists of the nuclear age had little acquaintance with Clausewitz, such a contribution would not have been wasted.[123]

But for Schelling at least, game theory offered rather more than its spirit:

> I find it useful, in dealing with one of these 'strategic situations' – whether it involves deterrence, arms control, discipline, negotiation, contract enforcement, or anything else – to put the situation in somewhat game-theoretical terms … the pay-off matrix, by itself, as a way of ordering choices and the participants' preferences among them, is an enormously helpful thing.[124]

FIGURE 1
A GAME-THEORY MATRIX

		B's Choice: I	B's Choice: II
A's Choice: I		10 / 10	20 / -10
A's Choice: II		-10 / 20	-5 / -5

Each box represents a pair of strategies (and the staggered representation of each pair is Schelling's invention[125]). Payoffs in the top right-hand corner of each box are for player B. Payoffs in the bottom left-hand corner are for player A for the same strategy pair. In this game, both players will be drawn towards strategy II to increase their payoffs on strategy I (from 10 to 20), but the result of them both doing so will be II, II, (bottom right-hand corner) where both lose. This is an example of the Prisoner's Dilemma discussed in the next chapter.

The matrix (see Figure 1), while a very basic element of game theory, made a crucial contribution to Schelling's assessment of strategic situations. It was much more than a tool[126] which some strategists could choose to apply but which had little connection to deeper theory, let alone to strategic situations in 'the real world'. Indeed, viewing things in terms of the game-theory matrix is, according to Schelling, and in contrast to Viner's opinion, particularly useful for dealing with the *complexity* intrinsic to conflict situations.

Schelling makes this point in 'What is Game Theory?' In this piece, he does not deal specifically with the application of game theory to situations involving the stability of nuclear deterrence. But the fact that he

deals with game theory in a broad manner is valuable precisely because it underlines the importance of this approach to Schelling's overall theoretical outlook:

> One of the first things that strike a social scientist when he begins to experiment with illustrative matrices is how rich in variety the relationships can be even between two individuals, and how many different meanings there are for such simple notions as 'threat', 'agreement,' and 'conflict' … For this reason, game theory is more than a 'theory,' more than a set of theorems and solutions; it is a framework for analysis. And for a social scientist the framework can be useful in the development of his own theory. Whether the theory that he builds with it is then called game theory, sociology, economics, conflict theory, strategy, or anything else, is a jurisdictional question of minor importance.'[127]

Similarly, Schelling was referring to more than just the 'spirit' of game theory when he argued in 1959 that 'in the theory of international strategy the promise of game theory is so far unfulfilled'.[128] Schelling's eventual disappointment that the theory of games had not lived up to the potential which he had earlier identified[129] does not really alter its value for his own theorising in the 1950s and 1960s, in which his approach to stability emerged.

Schelling's distinction between good and bad game theory also helps counter the suggestion that he did not really use game theory at all. What Schelling objects to is game theory which is 'pitched at a level of abstraction where it has made little contact with the elements of a problem like deterrence'.[130] Schelling is keen here that the baby not be thrown out with the bath water – to avoid dismissing game theory as a whole just because some of it does not work for strategic situations.

Hence, Morgenstern rather misses the point when he criticises Schelling for failing to develop 'one single new theorem to be added to, or to replace those'[131] in the original *Theory of Games*. In explaining the sort of work he was involved in, Schelling argued that,

> if game theory is defined as what game theorists do, this is not game theory itself. Nor is it aptly characterised as 'applied game theory': the analysis does not usually involve just applying some existing game theory. It often involves making some theory, but at a different level of concreteness from game theory and often in a different mood.[132]

In other words, to criticise Schelling's work for being outside the realms of formal, mathematical game theory is not necessarily to deliver a decisive blow against him. More importantly, this criticism does not

render game theory irrelevant to his work, because he was drawing on some basic but nonetheless powerful aspects of the discipline. The simple matrix, and concepts such as 'defection' and the Prisoner's Dilemma, which will be discussed in the following chapter, were not elaborate theorems involving extensive mathematical analysis. However, they were still very much part of the subject. Schelling observed that: 'The game theory that is so helpful may be quite elementary, but this is not the only subject in which helpfulness and complicatedness are uncorrelated.'[133] As a result, Schelling falls between two stools. Because of his use of game theory, he is actually something of an atypical strategist. But because of his attempt to adopt a non-mathematical approach to game theory, he is a rather atypical game theorist. It is no surprise that when some writers have tried to pin Schelling's theory down, they have not always got the full picture.

CONCLUSION

On the basis of the previous chapter it can be argued that Schelling's understanding of the concept of stability rests heavily on a bargaining framework within which he consistently examines strategic situations. The present chapter has revealed some of the deeper sources of this framework.

These theoretical insights do not negate the role of contemporary strategic affairs in raising Schelling's concern with stability. Nor do they mean that his work is incompatible with the analysis of other strategic thinkers who were dealing with the same concept. But they do help explain the richness and distinctness of Schelling's approach in terms of a coherent body of theory which had been developed outside the normal bounds of strategic-studies literature. The literature on questions of oligopoly and game theory provides a dependable platform from which his stability analysis can proceed. This is a platform which is much more uniform, internally consistent and sharply focused than, for instance, attempts in political science and international relations to understand stability in terms of the 'balance of power'.

Moreover, because Schelling develops a reoriented, non-mathematical form of game theory, a detailed study of his work provides valuable perspectives on the often extreme reactions to game theory in the secondary literature. This is important since many commentaries imply that either game theory in all of its mathematical complexity tended to dominate strategic thinking, or that game theory as a whole was largely irrelevant. It is therefore necessary to re-evaluate the true significance of game theory for the development of strategic thinking in the nuclear age.

NOTES

1. Schelling, *Choice and Consequence*, p. viii.
2. Schelling, 'Strategic Analysis and Social Problems', pp. 370–1.
3. Schelling, 'Preface to the 1980 Edition', *The Strategy of Conflict*, p. vi.
4. Thomas C. Schelling, 'The Status of Nuclear Weapons', Annual Lecture, Department of War Studies, King's College London, 9 November 1994 (author's notes).
5. Schelling, *The Strategy of Conflict*, p. 5. Hence despite its title, his text is not about 'pure conflict' at all.
6. Ibid., p. 11. That 'deterrence' is mentioned here is significant for it means that included within this theory is the most important 'case' of stability, viz. the stability of deterrence.
7. Jesse W. Markham, 'Oligopoly', *International Encyclopedia of the Social Sciences* (New York: Macmillan Company & The Free Press, 1968), Vol. XI, p. 283.
8. Schelling, 'Toward a Theory of Strategy', p. 4; Schelling, *The Strategy of Conflict*, p. 6. Hence, they are, according to Schelling's earlier definition, cases where instability has been avoided.
9. Schelling, 'The Strategy of Conflict: Prospectus', p. 207n4; Schelling, *The Strategy of Conflict*, p. 89n5.
10. Schelling, *Arms and Influence*, p. 34. See also ibid., pp. v, 4, and for a similar comparison between war and industrial disputes, see Schelling, 'Experimental Games and Bargaining Theory', p. 58.
11. Trachtenberg, *History and Strategy*, p. 15.
12. Freedman, *Evolution*, p. 193.
13. Ibid., pp. 208–23.
14. Ibid., p. 208. For Schelling's reference to his own work in terms of 'the theory of incomplete antagonism', see Schelling, *The Strategy of Conflict*, p. 15.
15. Freedman, *Evolution*, p. 208.
16. Schelling, 'Toward a Theory of Strategy', p. 20; Schelling, *The Strategy of Conflict*, p. 16. Also see Chapter 1 above.
17. Markham, 'Oligopoly', p. 284.
18. Ibid., p. 284.
19. See the comments below regarding the relationship between oligopoly and game theory.
20. For a leading critique of Schelling's game theory, which is self-defeating because it dismisses the importance of the distinction between zero-sum and non-zero-sum games, see Philip Green, *Deadly Logic: The Theory of Nuclear Deterrence* (Columbus, OH: Ohio State University Press, 1966), pp. 294–5n9.
21. Schelling, 'Experimental Games and Bargaining Theory', p. 50.
22. William Fellner, *Competition Among the Few: Oligopoly and Similar Market Structures* (New York: Alfred A. Knopf, 1949), p. v. For a brief but very rare citation of Fellner's text in an assessment of Schelling's strategic thinking, see Trachtenberg, *History and Strategy*, p. 15.
23. Markham, 'Oligopoly', p. 283.
24. Schelling's single reference in *The Strategy of Conflict* to Fellner's book (on p. 31n4) does little to indicate the similarity between the theoretical frameworks of the two scholars. For Schelling's citation elsewhere of Fellner's *Monetary Policies and Full Employment*, see Schelling, 'Capital Growth and Equilibrium', p. 866. For Schelling's citation of Fellner's work on equilibrium, see Schelling, 'Income Determination: A Graphic Solution', p. 227. For Schelling's dedication of one of his more recent books to the memory of Fellner, see Schelling, *Choice and Consequence*, p. v.

25. Fellner, *Competition Among the Few*, p. 12.
26. Schelling, 'An Essay on Bargaining', p. 281.
27. Schelling, *Arms and Influence*, p. 4.
28. Ibid., p. 281.
29. Ibid.
30. 100% Tariff Aimed at Japanese Autos', *International Herald Tribune*, 17 May 1995, p. 1.
31. Schelling, *Arms and Influence*, p. 95.
32. Fellner, *Competition Among the Few*, p. 13.
33. Ibid., p. 14. For Schelling's forceful argument on the need to go beyond mathematics, see below.
34. Ibid., p. 16.
35. John C. Harsanyi, 'Approaches to the Bargaining Problem before and after the Theory of Games: A Critical Discussion of Zeuthen's, Hicks', and Nash's Theories', *Econometrica*, 24:2 (April 1956), p. 144. Schelling cites this article in Schelling, 'For the Abandonment of Symmetry in the Theory of Cooperative Games', p. 16n; Schelling, *The Strategy of Conflict*, p. 267n1.
36. Harsanyi, 'Approaches to the Bargaining Problem', p. 145.
37. See Fellner, *Competition Among the Few*, p. 56; Philip L. Williams, *The Emergence of the Theory of the Firm: From Adam Smith to Alfred Marshall* (London and Basingstoke: Macmillan Press, 1978), pp. 73, 131.
38. Williams, *Emergence of the Theory of the Firm*, p. 136.
39. Ibid., p. 133.
40. Oskar Morgenstern, 'The Collaboration between Oskar Morgenstern and John von Neumann', *Journal of Economic Literature*, 14:3 (September 1976), p. 805 (Morgenstern had received his doctorate at Vienna in 1925). Böhm-Bawerk's marginal pairs consisted, via the concept of marginal utility, of the pair of prices between which there was a range of possible prices for transactions in situations of bilateral monopoly. Because a competitive market was assumed to operate, this range was somewhat narrower than von Neumann and Morgenstern's. See Carl Kaysen, 'A Revolution in Economic Theory?', review of *Theory of Games and Economic Behavior* by John von Neumann and Oskar Morgenstern, *Review of Economic Studies*, 14:1, No. 35 (1946), p. 9.
41. Morgenstern, 'The Collaboration', p. 806. The text was Morgenstern's *Wirtschaftprognose-eine Untersuchung ihrer Voraussetzungen und Möglichkeiten* (Vienna: Springer Verlag, 1928).
42. As Morgenstern notes; see Morgenstern, 'The Collaboration', p. 806. See John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior*, 3d edn (Princeton, NJ: Princeton University Press, 1953), pp. 176–8. For von Neumann and Morgenstern, the Holmes and Moriarty situation called for the employment of 'mixed strategies' – where instead of playing a single strategy with a probability of 100 per cent, one adopted a mix of strategies with individual probabilities. Schelling refers to mixed strategies as 'randomization' and claims they are useful whenever a 'pure' (i.e. non-mixed) strategy has little credibility in bargaining games where coordination is the aim. See T. C. Schelling, 'Randomization of Threats and Promises', *RAND* P-1716, (5 June 1959), p. 5; Schelling, *The Strategy of Conflict*, p. 179.
43. Schelling mentions the Holmes and Moriarty situation in Schelling, 'The Strategy of Conflict: Prospectus', pp. 205, 212, 256; Schelling, *The Strategy of Conflict*, pp. 87, 97, 162.
44. Thomas C. Schelling, 'What is Game Theory?', in James C. Charlesworth (ed.), *Contemporary Political Analysis* (New York: The Free Press, 1967), pp. 212–13. This essay became the tenth chapter of *Choice and Consequence*.
45. Von Neumann and Morgenstern, 'Preface to First Edition', *Theory of Games*, 3d edn, p. v.

46. In the third edition, it is only late in the piece that von Neumann and Morgenstern advise that they would now 'begin to deal with questions of bilateral monopoly, oligopoly, markets, etc'; von Neumann and Morgenstern, *Theory of Games*, p. 504.
47. See Morgenstern, 'The Collaboration', p. 810; Norman Macrae, *John von Neumann* (New York: Pantheon Books, 1992), p. 14
48. See Urs Rellstab, 'New Insights into the Collaboration between John von Neumann and Oskar Morgenstern on the *Theory of Games and Economic Behavior*', in E. Roy Weintraub (ed.), *Toward a History of Game Theory* (Durham, NC, and London: Duke University Press, 1992), p. 87. For a more generous assessment of Morgenstern's contribution to the book, see Andrew Schotter, 'Oskar Morgenstern's Contribution to the Development of the Theory of Games', in Weintraub, *Toward a History of Game Theory*, pp. 95–112.
49. Schelling, 'What is Game Theory?', p. 238n7.
50. Fellner, *Competition Among the Few*, p. 41, n. 12. Fellner had been one year behind von Neumann in the same Lutheran gymnasium in Budapest and had also been with him at the Institute of Technology in Zurich. See Macrae, *John von Neumann*, pp. 71–4.
51. Schelling, 'Preface' (to the 1960 edition), *The Strategy of Conflict*, p. vi., R. Duncan Luce and Howard Raiffa, *Games and Decisions*: *Introduction and Critical Survey*, is in fact the only piece of writing by another author which Schelling mentions in this preface. In the event, Schelling cites *Games and Decisions* more frequently than any other work in *The Strategy of Conflict*. In turn, for Howard Raiffa's praise of Schelling's *The Strategy of Conflict*, see Howard Raiffa's contribution in C. Maury Devine, Claudia M. Dissel, and Kim D. Parrish, *The Harvard Guide to Influential Books: 113 Distinguished Harvard Professors Discuss the Books that Have Helped to Shape Their Thinking* (New York: Harper & Row, 1986), p. 207.
52. This does not mean that he always agrees with them. For example, see Schelling, *The Strategy of Conflict*, p. 272n8.
53. Luce and Raiffa, *Games and Decisions*, pp. 88–9.
54. Jessie Bernard, 'The Theory of Games of Strategy as a Modern Sociology of Conflict', *American Journal of Sociology*, 59:5 (March 1954), p. 412. For Schelling's reference to Bernard's essay, see Schelling, 'Toward a Theory of Strategy', p. 19; Schelling, *The Strategy of Conflict*, p. 10. For comment on Schelling's work in light of Bernard's essay, see Johan Galtung, review of *The Strategy of Conflict* by Thomas Schelling, *American Journal of Sociology*, 67:1 (July 1961), p. 118.
55. Luce and Raiffa, *Games and Decisions*, p. 118.
56. The 'negotiation set' is also known in game theory as the 'bargaining set' or 'attainable set'. See Michael Nicholson, *Formal Theories in International Relations* (Cambridge: Cambridge University Press, 1989), p. 107.
57. Harsanyi, 'Approaches to the Bargaining Problem', p. 145.
58. Ibid.
59. Ibid., p. 146.
60. See Chapter 6 for an exploration of some of the broader social-scientific influences in Schelling's work.
61. In fact, it implies a particular type of non-zero-sum game; a positive-sum game where both parties benefit.
62. David Easton, *The Political System: An Inquiry into the State of Political Science* (New York: Alfred A. Knopf, 1953), pp. 129, 137. Easton is also notable for his great interest in the concept of equilibrium for understanding the way in which the 'interrelated parts' of a political system tend to 'cohere'. See ibid., p. 291. For Easton's advocacy of a political science which discovers the 'determinate relation' between the elements of the political system, in a similar fashion to economics, see ibid., p. 97.

Moreover, for Easton's suggestion of a close resemblance between 'equilibrium' and 'accommodation', which seems similar to Schelling's own thinking, see ibid., p. 274.

63. Schelling, *The Strategy of Conflict*, p. 21. For a slightly differing version, see Schelling, 'An Essay on Bargaining', p. 281.
64. See Nicholson, *Formal Theories in International Relations*, p. 29. Even though it follows from Pareto optimality that more for one means less for another, this concept is still applicable to non-zero-sum situations – Pareto-optimal *bargains* involve net gains for both sides, wherein moving from one bargain to another involves a different distribution (i.e. more for one and less for the other) of the net gains. Vilfredo Pareto (1848–1923) was an Italian economist who applied mathematical techniques to make important contributions to equilibrium economics (including utility theory). See Eric Roll, *A History of Economic Thought*, 3d edn (London: Faber & Faber, 1954), pp. 408–14. Pareto's work in sociology, which involved an attempt at applying equilibrium analysis more widely, also influenced American social theory. For a rare reference to Pareto 'standards' in the context of Schelling's work, see Bobbitt, *Democracy and Deterrence*, pp. 68–70.
65. See Shelling, 'An Essay on Bargaining', p. 289; Schelling, *The Strategy of Conflict*, p. 31.
66. Fellner, *Competition Among the Few*, p. 24. In this context, however, one should keep in mind Schelling's argument that to be in a weaker position is often an advantage in bargaining situations. To be able to convince the opponent that you have few options (i.e. that for you retreat is out of the question) is often helpful in striking a bargain. But while Schelling's definition of 'bargaining power' may be somewhat unorthodox on this score, his bargaining framework is similar to the literature examined here.
67. Ibid., p. 26.
68. Schelling, 'What is Game Theory?', p. 230. Schelling does not consider 'equilibrium' in terms of a balance of forces but as the tendency for the system in question to converge on a particular outcome – its determinateness.
69. Fellner, *Competition Among the Few*, p. 27.
70. Chapter 5 discusses the particular relevance of the equilibrium concept in game theory to Schelling's stability analysis in more detail.
71. See Chapter 3.
72. Luce and Raiffa, *Games and Decisions*, p. 121. Note the similarity between Luce and Raiffa's definition of 'conflict' as a 'non-strictly competitive game' and Schelling's own view of conflict situations as mixtures of conflict and cooperation.
73. Schelling, 'For the Abandonment of Symmetry', p. 23n; Schelling, *The Strategy of Conflict*, p. 284n17.
74. See Schelling, 'An Essay on Bargaining', pp. 289-90; Schelling, *The Strategy of Conflict*, pp. 31–2.
75. Fellner, *Competition Among the Few*, p. 41, n. 12 (Fellner's own position was that bargaining situations tended to fulfil 'qualified joint maximization').
76. Harsanyi, 'Approaches to the Bargaining Problem', p. 145.
77. Schelling, *The Strategy of Conflict*, p. 15.
78. Schelling, 'Toward a Theory of Strategy', p. 2; Schelling, *The Strategy of Conflict*, p. 4. On the complexities in Schelling's approach to rationality, see Hassner, *Violence and Peace*, p. 57.
79. Schelling, *The Strategy of Conflict*, p. 18.
80. For comments on this point, see Young, p. 309. Also see Hassner, p. 57.
81. Schelling, *The Strategy of Conflict*, p. 16. On Schelling's approach to rationality, see McPherson, 'On Schelling, Hirschman, and Sen', pp. 236–41.

82. See Herbert A. Simon, *Administrative Behavior: A Study of Decision-Making Process in Administrative Organization*, 2d edn (New York: The Free Press, 1957), p. 81.
83. The author is grateful to Patrick Morgan for his comments on this point.
84. For a useful discussion of the incompatibility between the interdependency in bargaining situations and the assumption of perfect information, see Oran R. Young, 'Strategic Interaction and Bargaining', in Young, *Bargaining*, pp. 9-14.
85. Herbert A. Simon, 'Theories of Decision-Making in Economics and Behavioral Science', *The American Economic Review*, 49:3 (June 1959), p. 262. For Simon's citation of Schelling's work on bargaining, see ibid., pp. 266, 283. For Schelling's citation of Simon's article, see Schelling, *The Strategy of Conflict*, p. 93n8.
86. Simon, 'Theories of Decision-Making', p. 256.
87. Ibid., pp. 262–4.
88. Simon, *Administrative Behavior*, p. xxv.
89. Ibid.
90. Schelling, 'Experimental Games and Bargaining Theory', p. 54. On the need for experimental games, see the above quote from Luce and Raiffa inviting 'speculation and experimentation' in game theory. On the relevance of experimental games for Schelling's analysis in terms of their overlap with communication and organisation theory, see Chapter 6.
91. Schelling, 'An Essay on Bargaining', p. 291, Schelling, *The Strategy of Conflict*, p. 34. See Chapter 3 above for an extended discussion of Schelling's analysis of the superiority of qualitative resting places.
92. Schelling, 'An Essay on Bargaining', p. 291.
93. See Schelling, 'For the Abandonment of Symmetry', and Appendix B in *The Strategy of Conflict*. Also see Schelling, 'Experimental Games and Bargaining Theory', pp. 55, 58.
94. Schelling, *The Strategy of Conflict*, p. 113. For a slightly different version, see Schelling, 'The Strategy of Conflict: Prospectus', p. 252.
95. Schelling, *The Strategy of Conflict*, p. 290.
96. See John F. Nash, 'The Bargaining Problem', *Econometrica*, 18:2 (April 1950), p. 159. For a useful discussion of Nash's solution, see Rapoport, *Strategy and Conscience*, pp. 59–63. Braithwaite also proposed a 'fair' solution. See Nicholson, *Formal Theories in International Relations*, pp. 109–10. For one of the few studies which discusses Schelling's approach to bargaining in terms of Nash's solution, see James G. March and Herbert A. Simon, *Organizations* (New York: John Wiley, 1958), p. 134.
97. Green, *Deadly Logic*, p. 145.
98. Schelling, 'What is Game Theory?', p. 237.
99. See P. M. S. Blackett, 'Critique of Some Contemporary Defence Thinking', *Encounter*, 16:4 (April 1961), p. 16 and Sir Solly Zuckerman, 'Judgement and Control in Modern Warfare', *Foreign Affairs*, 40:2 (January 1960), pp. 209–12. For additional commentary on the opinions of Blackett and Zuckerman, see Freedman, *Evolution*, p. 181.
100. Oskar Morgenstern suggested that while Zuckerman was 'a very worthy zoologist and a great authority in particular on monkeys', his criticisms of game theory betrayed great ignorance of the subject. Morgenstern, 'On Some Criticisms of Game Theory', in Mensch, *Theory of Games*, p. 451. Wohlstetter decried the tendency among critics such as Blackett and Zuckerman to assume incorrectly that conflict situations were being treated as zero-sum games. See A. Wohlstetter, 'Sin and Games in America', in Martin Shubik (ed.), *Game Theory and Related Approaches to Social Behavior* (New York: John Wiley, 1964; repr., New York: Robert E. Kriegur, 1975), p. 214.
101. See Anatol Rapoport, *Fights, Games, and Debates* (Ann Arbor, MI: University of Michigan Press, 1960), pp. 226–34.
102. Schelling, 'War without Pain', p. 468.

103. For his citation of Luce and Raiffa's *Games and Decisions*, see Wohlstetter, 'Sin and Games', pp. 215–16. Also see Kaplan, *Wizards of Armageddon*, pp. 90–1.
104. Wohlstetter, 'Sin and Games', p. 218n21.
105. For example, see Hitch and McKean's section on 'Optimal, Efficient, and Feasible Positions', wherein the aim was 'to reach *optimal* solutions to problems of choice' (emphasis original). Charles J. Hitch and Roland N. McKean, *The Economics of Defense in the Nuclear Age* (Cambridge, MA: Harvard University Press, 1960), pp. 109–13. Wohlstetter's 'Delicate Balance of Terror' is reprinted as Chapter 18 of this text under the title, 'Choosing Policies for Deterrence', see ibid., pp. 333–57.
106. See Hitch and McKean, *Economics of Defense*, p. 111.
107. See the next chapter for more explanation of the second and third of these concepts.
108. Oskar Morgenstern, 'Game Theory: Theoretical Aspects', in *International Encyclopedia of the Social Sciences* (New York: Macmillan and the Free Press, 1968), Vol. VI, p. 62.
109. Rapoport, *Strategy and Conscience*, pp. 84, 199.
110. Wohlstetter, 'Sin and Games in America', p. 220.
111. Bernard Brodie, 'The American Scientific Strategists' (October 1964), in Trachtenberg, *The Development of American Strategic Thought*, p. 294. For Freedman's citation of the same passage from a slightly different version of Brodie's essay, see Freedman, *Evolution*, p. 450n11.
112. Brodie, 'The American Scientific Strategists', p. 286. Regarding Brodie's doubts about the value of economists for strategy, see Steiner, *Bernard Brodie*, p. 196, Trachtenberg, *History and Strategy*, pp. 12–16. On his earlier enthusiasm for economics, see Steiner, *Bernard Brodie*, p. 8.
113. See Steiner, *Bernard Brodie*, p. 223.
114. The similarity between the general outlook of the two is briefly noted in ibid., p. 252n3.
115. Martin Shubik, 'Game Theory at Princeton, 1949–1955: A Personal Reminiscence', in Weintraub, *Toward A History of Game Theory*, p. 152.
116. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 473.
117. Trachtenberg, *History and Strategy*, p. 14n21.
118. See Oskar Morgenstern, review of *Fights, Games and Debates* by Anatol Rapoport and *The Strategy of Conflict* by Thomas C. Schelling, *Southern Economic Journal*, 28:1 (July 1961), pp. 103–5; Martin Shubik, review of *The Strategy of Conflict* by T. C. Schelling and *Fights, Games and Debates* by Anatol Rapoport, *Journal of Political Economy*, 64:5 (October 1961), pp. 501–3.
119. Shubik, review of *The Strategy of Conflict*, p. 502. On John Harsanyi's similar criticism that Schelling had pushed some of the postulates related to game theory rather too far, see Hassner, *Violence and Peace*, p. 57. This is reminiscent of the complaint made a decade before by economist Lawrence R. Klein that Schelling's concepts of dynamic equilibrium and dynamic stability 'have no meaning unless Schelling provides his readers with some rigorous definitions. I find his casual literary statements about these concepts too vague.' Lawrence R. Klein, review of 'The Dynamics of Price Flexibility' by Thomas Schelling, *American Economic Review*, 40:4 (September 1950), p. 606.
120. Bruce M. Russett, 'Introduction', in Bruce M. Russett (ed.), *Economic Theories of International Politics* (Chicago, IL: Markham, 1968), p. 4.
121. Schelling, review of *Strategy and Conscience*, p. 1082. For Morgenstern's rejection of some of Rapoport's criticisms of the use of game theory in strategic analysis, see Morgenstern, 'On Some Criticisms of Game Theory'.
122. Schelling, review of *Strategy and Conscience*, p. 1083.
123. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 473.

124. Ibid., p. 479.
125. As noted in Dixit and Nalebuff, *Thinking Strategically*, p. 90n.
126. The tendency in international relations to treat economics in this way has been noted by Russett, *Economic Theories*, p. 3.
127. Schelling, 'What is Game Theory?', pp. 219–20.
128. Schelling, 'Toward a Theory of Strategy', p. 9. Also see Schelling, *The Strategy of Conflict*, p. 10. Also note Schelling's point that by referring to 'strategy' he was taking the usage of that term 'from the *theory of games*' (emphasis original), ibid., p. 3n1.
129. Schelling, 'Preface to the 1980 Edition', in *The Strategy of Conflict*, p. vi. Part of the problem is perhaps that there were few other scholars who were keen to search the 'virgin frontier', involving the application of non-mathematical game theory to strategic problems.
130. Schelling, *The Strategy of Conflict*, p. 10.
131. Morgenstern, review of *Fights, Games and Debates* and *The Strategy of Conflict*, p. 104.
132. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 470.
133. Ibid., p. 479.

5

Prisoner's Dilemmas

Schelling's work on strategy and stability is underpinned by a bargaining framework which has strong connections to aspects of contemporary economic theory and game theory. His reorientation of the latter in the search for a non-mathematical approach demonstrates that Schelling not only sees the *opportunity* to fit his bargaining framework into game theory, but also sees the *need* to adapt game theory to the particular types of bargaining situations which one finds in strategy.

However, while Schelling's game theory is reformulated, it is not completely informal. He makes good use of some concepts that, while elementary in comparison to the more elaborate mathematics of advanced game theory, still have quite strict, formal meanings which are useful to investigate. This chapter deals with some of these basic concepts – 'Nash equilibrium', 'defection' and the 'Prisoner's Dilemma' – which appear in Schelling's analysis and can be traced back to the more mathematical literature of orthodox game theory. The result is a deeper understanding of the relevance of contemporary game theory to Schelling's approach to stability. There is also a need, however, to consider the problems associated with using these sorts of formal concepts in strategic analysis.

THE SEARCH FOR STABLE EQUILIBRIA

Schelling found the more mathematical style of standard game theory was not conducive to the sort of stabilising outcomes he was seeking in his strategy of conflict. But there is still a remarkable resemblance between his approach and more formal game theory in terms of what defines a certain place as 'stable'. This is especially clear when considering the *second* aspect of Schelling's general concept of stability – the steadiness of the bargain.[1]

It is illuminating here to look at the way Schelling uses the example of a Wild West gunfight to illustrate the 'difference between a stable and

an unstable balance of terror'.[2] If the normally unstable gunfight could be changed in some way so that 'both were assured of living long enough to shoot back with unimpaired aim, there would be no advantage in jumping the gun and little reason to fear that the other would try it'.[3] The revised gunfight situation is 'stable' because each side lacks the incentive to 'jump the gun' and is not fearful that the other side has such an incentive or that the other side thinks that it may have such an incentive, and so on.

In other words, it is a situation where neither side is likely to *abandon the strategy* of not attacking. Each side has every reason to remain faithful to this agreement or bargain. Neither party has any reason to doubt that the loss involved in holding to this agreement is smaller than the loss involved in abandoning it. The pair of strategies equivalent to joint no-attack is thus stable in this case. A game-theoretical framework is helpful here because it connects stability in the above case with a pair of strategies where neither side is tempted to move to another strategy. This gives real, formal, meaning to the idea of 'strategic stability' (i.e. in terms of a pair of stable strategies) and Schelling's gunfight is thereby more powerful conceptually than the corresponding assessment of trigger-happiness by both Brodie and Wohlstetter which was also applied to the stability of deterrence.[4]

In game-theoretical terms, Schelling's revised gunfight situation is stable because there is no incentive for either side to 'defect' from the no-attack strategy. This pair of strategies is comparable with the stable pair where the two armies stop at the river. In such a case, both sides know that neither can afford to move beyond the river, i.e. to abandon this particular strategy. In his own examination of the concept of stability as it applies to game theory, Schelling demonstrates that instability occurs generally when there is an incentive to defect, to break the bargain which has been struck: 'It seems worth conjecturing that the "reprisal move" contained within the game, or a change in the moves that gives a strong advantage to the player who breaks an agreement (engages in "surprise attack", for example), may create instability."[5] This provides more evidence for the way that elementary ideas in game theory inform Schelling's bargaining framework and his concept of stability. The reference to 'surprise attack' as a version of the generic idea of breaking an agreement (or defecting on a bargain) adds strength to the distinction made in this thesis between the specific case of instability (in this instance surprise attack) and the general concept (breaking the agreement).

The idea behind Schelling's revised gunfight is that the proposed change removes any 'advantage to the player who breaks an agreement'. In game-theoretical terms, the pair of strategies corresponding to joint no-attack in the revised gunfight can be regarded as a stable equilibrium.

It has already been shown that there is a connection between Schelling's concept of stability and the search for a unique *equilibrium* pair of strategies.[6] In fact, in game theory there is often a tendency for 'equilibrium' to imply stability,[7] in the sense that an equilibrium is a place from which there is no incentive to defect. This is the case in one of the most important and influential theories of equilibrium in game theory – the Nash equilibrium.[8] In a two-person game, a pair of strategies is a Nash equilibrium when for each player, given the strategy that the other player has adopted, there is no incentive to change his/her own strategy. The idea that the Nash equilibrium implies stability can be found in Michael Nicholson's description of the relationship between 'stability' and 'equilibrium' in game theory: 'a point is regarded as stable by one of the parties, if it is impossible for it to improve its position, on the assumption that the rival holds to its current strategy. A point is in equilibrium if, in a two party game, a point is stable by both parties.'[9]

The Nash equilibrium can thus be seen as a generally applicable equilibrium concept. For instance, James Friedman notes that 'the Nash equilibrium is a straightforward generalization of the Cournot equilibrium'.[10] This demonstrates the similarity and links between the Nash equilibrium and the original model of oligopoly – and thus to pre-game-theoretical approaches to bargaining. Schelling's own search for stability in conflict situations can be seen as a search for something very much along the lines of the Nash equilibrium.

However, the Nash equilibrium does not sufficiently restrict the range of outcome to offer the unique outcome that Schelling is looking for in a bargaining range. Some games, for example, produce *multiple* Nash equilibrium points.[11] The consequences of this for stability not only apply to Schelling's work but also to more formal game-theoretical analysis. More recently, Elon Kohlberg and Jean-Francois Mertens have noted that some Nash equilibria involve 'the use of (weakly) dominated strategies'. This is where there are others strategies available which produce payoffs which are just as favourable. Kohlberg and Mertens argue that this makes some Nash equilibria 'stable' but not 'strategically stable', by which they mean that such equilibria are not 'self-enforcing'.[12] The idea of 'self-enforcing' stable strategies seems to tie in with the second aspect of Schelling's stability concept in terms of the steadiness of the bargain.

Even so, there is more than a passing connection between the Nash equilibrium and Schelling's search for stable outcomes. Nash developed his concept to deal with 'non-co-operative games',[13] which he defined as games in which 'each participant acts independently, without collaboration or communication'.[14] The absence of formal communication and collaboration meant that no binding agreements could be made.[15] This is one of the main characteristics of the sorts of games that Schelling spends

a long time analysing in his work; games which involve the *tacit* (as opposed to *explicit*) bargaining which he sees occurring in situations of limited war and nuclear deterrence, which often involve continuous 'jockeying' rather than a 'crystallised agreement'.[16] Hence, Schelling notes that these 'bargaining games quite typically involve a dynamic process of mutual accommodation rather than pure communication culminating in a crystallized agreement'.[17]

The absence of formal communication means that there is a challenge in satisfying one of the preconditions of the Nash equilibrium – that each player is sure what the strategy of the other will be. As George Mailath has pointed out in commenting on this challenge in non-cooperative games, Schelling's suggestion is of course that *focal points* provide the answer to this problem.[18]

If a pair of strategies is stable when there is little incentive to defect, it follows that stability, in terms of the steadiness of the bargain, can be seen as the robustness of that pair of strategies under pressure. Here, Luce and Raiffa's discussion of arbitration schemes is relevant once again. They argue that 'an unstable scheme' would be one where 'slight perturbation in the utility values can alter the arbitrated solution drastically'.[19] Similarly, in a much more recent piece examining recent developments in game theory, Jeroen Swinkels has noted that: 'The idea of stability is to examine the robustness of a set of equilibria to perturbations in the underlying game.'[20] The very appearance of 'strategic stability' as a concept in game theory itself (based on a definition of 'strategy' as in games of strategy rather than as in strategic studies) underlines the plausibility of making a linkage between the standard game-theory definitions of stability and Schelling's own approach to the concept.

Indeed, this idea of stability being a measure of ability to withstand perturbation is in tune with Schelling's description of some very important cases of stability including the stability of deterrence.[21] For example, Schelling argues that:

> a successful 'disarmament' scheme … should lead to some kind of stable equilibrium … Stability may … depend on this equilibrium's not being too sensitive to changes in force levels, to errors in the estimate of each other's forces, or to technological change. In other words, the system must have a certain amount of tolerance to errors and disturbances.[22]

Such a conception of stability in terms of the ability to withstand shock and perturbation fits in well not only with the notion of the stability of the equilibrium in game theory (in terms of incentives to defect from that equilibrium pair of strategies), but also with the rather older

understanding of the stability of equilibrium in mainstream equilibrium economics. As Chapter 1 of this book has shown, very similar thinking is evident in Schelling's early work on economics. In *National Income Behavior*, Schelling writes that:

> A solution is 'stable', or the equilibrium it represents is 'stable', if deviations of the variables from their solution values lead to adjustment back to those solution values … A solution or equilibrium is unstable if variables, when they have other values than their solution values, move away from their solution values.[23]

There is clearly a close connection between the idea of moving away from solution values and the idea of *defection* from strategy pairs in game theory. Moreover, just as the search for stable equilibrium dominates Schelling's application of game theory to questions of strategy, so too does the question of stability dominate his earliest text. In *National Income Behavior* Schelling derives a 'system' of equations relating to national income behaviour at different levels of complexity, solves each of these systems of equations and then tests each one of these solutions for stability.[24] This confirms that stability is as much a constant frame of reference for Schelling in his work in modern economic theory as it is for his contributions to strategic thought.

The comparison with his earlier work is most fruitful in the case of Schelling's analysis of the 'process ofi nteracting expectations'[25] in the reciprocal fear of surprise attack. Here Schelling describes the compounding interaction of the estimates of surprise attack betweenthe two parties as a 'simple dynamic "multiplier" system' which can be 'stable or explosive' according to the particular values which apply.[26] This can be compared with Schelling's analysis in his first publication of the stability of national income in the face of factors such as the propensities to spend and invest. Schelling concludes that if the sum of these propensities is greater than unity, then the system can no longer be assumed 'stable'. Rather, 'the system is "explosive" – i.e., without a finite multiplier'.[27]

Returning to the reciprocal surprise analysis, the resemblance is more than striking. Schelling allocates two differential equations, one for each player, to measure the relation between their respective probabilities of 'attack through false alarm'.[28] For players R and C, this gives R's (dB_r/dB_c) and C's (dB_c/dB_r). Schelling's conclusion is that: 'A stable equilibrium requires that player R's (dB_r/dB_c) and C's (dB_c/dB_r) should have a product less than one'[29] – in other words, the same requirement of unity in the multiplier for a stable system.

WHY DO PLAYERS DEFECT?

It is thus important to understand why, in game theory, defection (and thus instability) could be expected at certain points and not others. Much of this boils down to a comparison of payoffs – if at least one player believes that another point will provide greater payoffs, there will be an incentive to move towards it. Again, it must be stressed that these are quite elementary aspects of game theory and do not involve the more technical higher reaches of the subject.

The selection of equilibrium thus revolves around finding points where the payoffs are such that there is no incentive for defection. One of the means of selection is to rule out pairs of strategies whose payoffs for both sides are worse than that for a different pair of strategies – in game-theory terminology these are 'dominated' payoff pairs. (In a two-person game, outcome A 'dominates' outcome B when the payoffs for *both* sides under A are superior to those under B).[30] Hence, Luce and Raiffa describe the narrowing down process in von Neumann and Morgenstern; 'the players act jointly to discard all jointly dominated payoff pairs and all undominated payoffs which fail to give each of them at least the amount he could be sure of without cooperating'.[31] From this set of undominated payoffs the equilibrium strategy can be found. In some games this is a straightforward affair because of the existence of dominant strategies for both sides, whereby the payoffs for this strategy are higher than for other strategies no matter what the other side does. In such a case, the intersection of these dominant strategies provides a pair of strategies which is an optimal equilibrium point.[32] There is no incentive to defect for either side from this equilibrium.

However, for the sorts of games that Schelling was interested in, no such dominant strategies existed – for the United States there was therefore no strategy which was '*superior* to the alternatives no matter what the Russians do'.[33] Instead, the games were much more interesting than this. They were especially challenging when they took the form of the 'Prisoner's Dilemma'.[34] The difficulties and paradoxes associated with determining (stable) equilibria in games of this sort can be used to highlight the importance of game theory for understanding Schelling's general concept of stability.

THE PRISONER'S DILEMMA AND STABILITY

The Prisoner's Dilemma, which was first outlined in 1951 by Merrill Flood,[35] is a game in which mutual cooperation will bring gains for both players, but where the payoff structure makes mutual defection and

greater loss to both players the logical outcome.[36] Its name, chosen by Albert W. Tucker, the scholar who formalised the game, relates to a version where the players are two prisoners who are unable to communicate (i.e. a non-cooperative game) and who are both given the choice of confessing or not confessing to a particular crime. The outcomes and the payoffs, which are known to both players are as follows. If neither prisoner confesses (mutual cooperation), both will be acquitted (this is the cooperative outcome). If only one prisoner confesses (i.e. defects from cooperation), he/she will get the best payoff possible (acquittal plus a reward) and the non-confessing prisoner will get the worst possible payoff (conviction plus additional punishment). However, if both prisoners confess (mutual defection) they will both be convicted of the crime.[37] The temptation for both players to seek their own individual maximum outcome (aquittal plus a reward) means that both are tempted to confess – the result is conviction for both.

This sort of game is not only intrinsically interesting for game theorists, it also models the sorts of problems that one often finds in nuclear strategy – the attractions of unilaterally defecting from a tacit agreement which confronts each individual player (e.g. the temptations of pre-emption in a crisis) raises the prospect that both players will defect. This outcome, however, would not result in unilateral advantage but in mutual disaster. Given that Schelling occupies the intersection of nuclear strategy and game theory, it is thus unsurprising that Prisoner's Dilemma games hold interest for him.[38] While it is often noted that the Prisoner's Dilemma can be applied readily to arms-race behaviour and that Chicken applies to the rising tensions involved in a crisis,[39] Schelling's argument is that the Prisoner's Dilemma is quite universal:

> It underlies not only the 'social contract' that binds citizens together with mutual obligations but the ordinary notion of enforceable contract, damage suits, and all the other social schemes by which obligations are negotiated, monitored, and enforced.[40]

Hence, arrangements which produce 'binding promises', which create solidarity when the natural tendency is to break ranks, are thus ways of resolving the Prisoner's Dilemmas found in all types of situations.[41] The mutual exchange of hostages, which underlies the stable balance of terror is precisely one of these arrangements. The original problem of stable deterrence can thus, in Schelling's analysis, be explained as a Prisoner's Dilemma.[42]

From this basis, Schelling is able to demonstrate the relevance of Prisoner's Dilemma in the analysis of the mutual fear of surprise attack,[43] when both sides estimate that the possibility of an irrational attack from the other side is especially high. This he notes, produces a matrix which

is 'symmetrical and unstable'.[44] In fact, the Prisoner's Dilemma raises particular problems for the notions of equilibrium and stability already discussed in this chapter. Some of these difficulties are highlighted by Luce and Raiffa in their discussion of the outcome (_1, _1) where neither player confesses (i.e. mutual cooperation). This is one of the two plausible outcomes of the game – the other is where both confess (mutual defection).[45] Luce and Raiffa argue that, '(_1, _1) is not in equilibrium, which is but a formal way of saying that there is a good reason for each of them to defect on the bargain'.[46]

It is clear that Luce and Raiffa are looking for the Nash equilibrium in the Prisoner's Dilemma – an equilibrium from which there is no incentive to defect. To translate this in terms of nuclear strategy, this creates a problem in the sense that the one plausible bargain which results in the avoidance of mutual disaster is *not* a stable pair of strategies. That this creates particular problems for Schelling is clear when one considers his definition of instability in game theory: 'By "instability" is meant here the tendency of a game to generate mutually destructive behavior and low scores.'[47]

Similar problems arise in Luce and Raiffa's discussion of a game which involves the repetition of the Prisoner's Dilemma – the thinking behind this sort of game is that if it is repeated, players may learn to cooperate because they can anticipate the disaster which would be at hand should they both defect.[48] Luce and Raiffa note that there is *some* cause for hope in the sense that: 'in the repeated game the repeated selection of (_1, _1) is in a sort of quasi-equilibrium: it is not to the advantage of either player to initiate the chaos that results from not conforming'.[49] This would seem to resolve the stability problem. However, any such resolution of the dilemma is only fleeting because: 'this quasi-equilibrium is extremely unstable; any loss of "faith" in one's opponent sets up a chain which leads to loss for both players'.[50]

The connections with Schelling's notions of stability in terms of both resistance to perturbation and 'the tendency of a game to generate mutually destructive behavior' are quite clear here – once again, Luce and Raiffa provide a valuable illustration of the links between Schelling's theory and the game theory which he read. In fact, they conclude that the equilibrium for repeated Prisoner's Dilemma is the pair of strategies where both confess.[51] The repetition of the game does not resolve the dilemma.

A CONTRADICTION IN TERMS OR A CLARIFIED CONCEPT OF STABILITY?

Given the links between equilibrium and stability, this seems to create a contradiction – for here the equilibrium involves mutual defection, i.e. stability involves instability. But all is not quite as it seems. As Nicholson has pointed out, in the Prisoner's Dilemma this equilibrium (mutual defection) does not satisfy the condition of Pareto optimality. In other words, there is another 'achievable result' (cooperate, cooperate) where both parties can achieve better payoffs.[52] The equilibrium is thus not compatible with one of the main tenets of the underlying theory, and it would be unwise to use it to suggest that there is a contradiction in game-theoretical terms in Schelling's concept of stability.[53]

In fact, this tortuous process actually *clarifies* Schelling's stability concept. The two main elements of his concept in game-theoretical terms – *defection* and *loss for both players* – are not mutually exclusive. In the context of nuclear strategy, for example, it is clear that defection from the outcome involving mutual cooperation results in 'mutually destructive behaviour'. The combination of these two elements can be used to derive a working definition of Schelling's stability concept – at least in its second aspect in terms of the steadiness of the bargain. Stability can thus be defined as: the absence of incentives to defect from a cooperative outcome to an outcome involving great loss for both players.

From this definition, it is easy to see the instability inherent in such games as the Prisoner's Dilemma – there is instability because the tendency is for the players to defect from a cooperative, mutually beneficial outcome, and this defection ends up at a point ensuring great loss (i.e. conviction) for both of them. Moreover, it can be shown that this definition applies, for instance, to Schelling's assessment of stability at the river. His analysis clearly suggests that in practical terms, stability in this case is a measure of the tendency to avoid unbounded retreat. In other words, it is the tendency to avoid great loss – by staying at the river – which constitutes the cooperative outcome. However, the importance of the background presence of nuclear weapons in such a situation arises once again, for in their absence, unbounded retreat is only a great loss for the retreating party. If, however, the retreating party is able to threaten the advancing army with nuclear retaliation, then there is the prospect of great loss for *both* sides.

REVERSING THE LOGARITHM

The nature of the connection between Schelling's game theory and his understanding of stability can also be clarified by referring back to the

argument that there are essentially two aspects of the stability concept.[54] The first aspect – identifying a symbolic resting point at which a bargain is possible – can be presented as, 'given situation *a*, what is the stable equilibrium *b*?' (Schelling's general conclusion is that *b* is a matter of bargaining and owes much to factors other than the mathematics of *a*.) For the second aspect – the steadiness of the bargain at a particular resting place – this logarithm appears in reverse: 'given stable equilibrium *b*, what aspects of situation *a* are necessary?' In other words, the logarithm is reversed.

When presented in this way, stability in terms of the first aspect tends to involve a more passive approach – the situation is as one finds it, and game theory helps determine the best prospects for stability. However, the second approach, where the logarithm is reversed, reveals much more scope for manufacturing stability where none may have existed previously. An example of this occurs in Schelling's examination of the way experimental games illustrate the potential for co-ordination. He argues that in looking at these games, 'a main effort will be to learn how to manipulate the parameters and structural features of the game in order deliberately to generate particular results and phenomena'.[55]

Hence, when Schelling refers to voting strategy to demonstrate the role of game theory, he states that: 'One way to work this problem is to start from the final votes and work up.'[56] (In other words, how can one 'coerce' certain pre-identified decisions?) The answer is to structure expectations so that they consistently point to the same, jointly expected decision. (For in game theory: 'Each must base a decision on his expectations.')[57] Hence, Schelling refers to 'a concept like deterrence, the whole idea of which is the manipulation of the enemy's intentions by confronting him with a properly designed set of choices'.[58] Indeed, for the deterrence of nuclear war, by far the most important case of Schelling's general concept, it can be argued that the identification of the pair of strategies which need to be stabilised goes right back to the foundations of nuclear strategy. This pair, which Schelling refers to as 'joint no-attack', had been established by applying to both sides Brodie's famous statement about strategy in the atomic age: 'Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them.'[59]

Structuring a situation to produce a desired outcome is a general principle for Schelling. He argues that Prisoner's Dilemmas, which can be seen simply as 'the ubiquitous situations in which miscellaneous incentives occur', can be resolved by just this sort of manipulation. These situations 'can be re-structured to permit a more socially efficient choice'.[60] The connection with stability (in terms of the avoidance of mutual harm) is clear in Schelling's assessment of arms control as an

effort 'to shift certain parameters in the "arms race" to make the interaction less mutually self-defeating'.[61]

It is thus a matter of identifying the desired outcome and making sure, by structuring the situation, that this is the stable strategy. At least two observations might be made about such an approach. The first is that it seems to reflect a quite substantial optimism about the ability to manipulate a conflict situation – to make an adversary realise what the obvious resting place is. If such an optimistic approach is tied to the possession of overwhelming force – bargaining power *par excellence* in the form of nuclear weapons in large quantities – then the applicability of the idea of restructuring the conflict situations may be somewhat limited, if not rather dangerous.

Second, it may be more risky to suggest that one can manufacture stability by restructuring a situation, rather than just locating stability from a situation in its natural form.[62] Given that the basis of Schelling's strategic theory is interdependence between the actors, it can be assumed that not just one but both sides will be attempting to restructure and manipulate the situation. In the case of the river, where stability is found from the natural form of the situation, the prospects for both choosing the same resting place seem high. But where both sides are seeking to manufacture a stable resting place through the manipulation of the situation, the competitive aspect of their relationship may undermine the chances that both sides will be trying to manufacture stability at *one and the same* place.

THE FUZZINESS OF 'STABILITY' AND THE QUESTION OF CLOSURE

These connections between Schelling's general concept of stability and aspects of economic theory and game theory may help explain some of the 'fuzziness' of stability as a strategic concept.[63] To the extent that Schelling borrowed elements of his bargaining framework and concept of stability from this body of theory, he was applying and adapting ideas from perhaps the most formal and precise areas of the social sciences to a field which did not share quite the same attributes.[64]

To take the most obvious example, the bargains in situations of oligopoly would arguably be much less 'fuzzy' than their strategic counterparts – and thus one might expect the same distinction to apply to the stability concept associated with these bargains. Although the question of comparing utilities was a difficult one for economists, it was still possible to consider with some precision a particular bargain struck in a situation of 'fewness'. In bilateral monopoly, for example, one could identify a bargain between an employer and union in terms of a certain

movement in wages: there was a particular monetary value to fall back on. Schelling notes an aspect of this when he observes that: 'An important limitation of economic problems, *as prototypes of bargaining situations*, is that they tend disproportionately to involve divisible objects and compensable activities' (emphasis added).[65]

By comparison, there is something rather less tangible in the 'bargains' involved in mutual nuclear deterrence. For one thing, the systems of values involved appear to be rather hazier.[66] This difficulty is not completely removed by Schelling's argument that in game theory, 'there really are no "utility scales" to compare. There are merely preference rankings among outcomes',[67] for preference rankings require an assessment of values which may again rest on less definable ground than do certain bargaining situations in economics. (Additionally, as discussed in Chapter 3, the idea of a *range* of bargains in mutual deterrence involving nuclear weapons is problematic.)

The obvious shortcomings which arrive in attempts to judge stability according to numerical scales of values such as those involved in missile exchange ratios indicate some of the problems here.[68] Additionally, Schelling himself makes the point that the sort of bargaining situations one finds in international affairs tend to involve tacit bargains between parties whose moves are part of the negotiating process.[69]

In short, the idea of a bargain seems to be much firmer in the original disciplines than in the one in which a very similar framework was applied. The concept of stability associated with this framework is thus also likely to be similarly affected. One therefore has to ask precisely how appropriate economic bargains are as 'prototypes' for Schelling's theory. Another question in this context is whether domestic economic relationships are a suitable basis from which to draw connections to international strategic relationships. If power relationships in the international arena are inherently different to those in a domestic setting (because the former occur under a more extensive rule of law, for instance), then this may affect the legitimacy of drawing parallels between the two types. This could be important, since the basis of so much of Schelling's thinking is bargaining in a domestic setting.[70]

One must also consider the point that the relationship between Schelling's approach to stability and this particular body of theory is not a common basis for all of the other main strategic thinkers who were influential in the discussion of the concept. There appears to be an inevitable possibility of further 'fuzziness' when thinkers understand stability against somewhat different theoretical backgrounds, each of which may have influenced the respective thinkers in rather different ways. This might be contrasted with economists who, while they may not share commonly defined concepts to the same extent as physicists and

chemists, at least have some reasonably common and 'unfuzzy' theoretical frameworks to fall back on when such concepts as stability and equilibrium are discussed.

Indeed, orthodox game theory can be said to offer determinate solutions for at least some games – i.e. zero-sum games. By comparison, Schelling's notion of symbolic resting places should be seen as a thoughtful guide to the sorts of outcome which one might expect participants in strategic bargaining to be drawn to, and to the sorts of tactics which might be adopted to narrow down the bargaining range in the search for a favourable unique outcome. In a sense, his theory is more about interesting possibilities and tendencies in bargaining behaviour.[71] To borrow Young's neat distinction, Schelling's work on stability has rather more to say about bargaining *processes* than about the *outcomes* of bargaining.[72]

Hence, Schelling's theory is more effective in describing the strategic bargaining environment in terms of the perpetual problem of the need to resolve the vacuum of indeterminacy. This applies, for example, to Schelling's treatment of game-theoretical concepts such as Prisoner's Dilemma and the risk of defection. His use of these ideas clarifies the problem of instability which characterises certain bargaining situations, but does not provide a definitive account of particular outcomes where the bargain can be closed.

CONCLUSION

Schelling's theorising involved a conscious effort to avoid a strictly mathematical approach to bargaining situations which so much of the economic and game-theory literature took for granted. However, this does not mean that all of the concepts in this literature which lean towards mathematical economics are irrelevant or inapplicable in Schelling's stability analysis.

In fact, some rather basic concepts within the economics and game-theory literatures, dealing essentially with the understanding of the stability of equilibrium, helped provide Schelling with a firm basis for understanding stability in all sorts of conflict situations. The ideas of 'defection' and Prisoner's Dilemma, which are basic but still very conducive to mathematical analysis, make vital contributions to Schelling's conception of stability.

This only increases the importance of understanding Schelling's sensitivity to contemporary developments in the social sciences. Moreover, the relevance of contemporary social science to Schelling's understanding of stability does not stop with game theory. The next chapter will examine relevant works in such areas as organisation and

communication theory to clarify further the intellectual context for Schelling's stability concept.

NOTES

1. See the discussion of the two aspects of stability in Chapter 3.
2. Schelling, 'Surprise Attack and Disarmament', p. 5. Also see Schelling, *The Strategy of Conflict*, p. 232.
3. Schelling, *The Strategy of Conflict*, pp. 232–3. For a different version, see Schelling, 'Surprise Attack and Disarmament', p. 5.
4. See Chapter 2 above.
5. Schelling, 'Experimental Games and Bargaining Theory', p. 62.
6. See the short section on 'Stability as the Striking of a Unique Bargain', in Chapter 4 above.
7. A parallel might be drawn here to some of the strategic studies literature of the nuclear age, where the idea of 'balance' often seems to imply 'stability' even though the potential for both 'stable' and 'unstable' balances is still acknowledged. Such an assumption of stability does not apply in the case of conventional balances, where, by comparison, there is much less certainty that going to war would produce a disastrous outcome and where the actual costs of fighting appear to be rather smaller. This makes any conventional 'balance' much less inherently stable. See Morgan, *Deterrence*, pp. 59–60.
8. In awarding Nash the 1994 Nobel Economics Prize (which he shared with Harsanyi and another game theorist, Reinhard Selten, who refined Nash's equilibrium analysis), the Royal Swedish Academy noted that 'Nash equilibrium has become an almost standard tool in almost all areas of economic theory'. 'A Game Tool Wins 3 Economists a Nobel', *International Herald Tribune*, 12 October 1994.
9. Nicholson, *Formal Theories in International Relations*, p. 50. Also see Young, *Bargaining*, p. 29.
10. James W. Friedman, *Oligopoly Theory* (Cambridge: Cambridge University Press, 1983), p. 213.
11. For Schelling's acknowledgement of this, see Schelling, *The Strategy of Conflict*, p. 226n12. At a conference which Schelling also attended, Oskar Morgenstern argued that game theorists should accept that unique solutions would not always be available. See Morgenstern, 'On Some Criticisms of Game Theory', p. 453.
12. Elon Kohlberg and Jean-Francois Mertens, 'On The Strategic Stability of Equilibria', *Econometrica*, 54:5 (September 1986), pp. 1003–4. For Schelling's definition of 'weak equilibrium', see Schelling, 'What is Game Theory?', p. 230.
13. The original article is aptly named. See John Nash, 'Non-Cooperative Games', *Annals of Mathematics*, 54:2 (September 1951), pp. 286–95.
14. Nash, 'Non-Cooperative Games', p. 286.
15. For emphasis on the absence of binding agreements, see Friedman, *Oligopoly Theory*, p. 209.
16. The term 'non-cooperative' is confusing because of Schelling's concern for situations involving a mixture of conflict and cooperation. However, the game-theoretical use of 'non-cooperative' in this instance refers to the absence of formal communication and binding agreements, not the extent to which the game is zero-sum or non-zero-sum.
17. Schelling, 'The Strategy of Conflict: Prospectus', p. 215; Schelling, *The Strategy of Conflict*, p. 102.
18. See George J. Mailath, 'Introduction: Symposium on Evolutionary Game Theory', *Journal of Economic Theory*, 57:2 (August 1992), p. 260.
19. Luce and Raiffa, *Games and Decisions*, p. 151.

20. Jeroen Swinkels, 'Evolution and Strategic Stability: From Maynard Smith to Kohlberg and Mertens', *Journal of Economic Theory*, 57:2 (August 1992), p. 337.
21. Schelling and Halperin, *Strategy and Arms Control*, p. 58. Note the reference to the ability to withstand shocks and perturbations cited at the beginning of Chapter 2 above. An 'error in judgement' or a 'mistaken intention' could involve a belief that the utility values of the other side (what one expected the other expected) had changed when no such change had actually occurred. For more analysis of the ideas involved here, see Chapter 6.
22. Schelling, 'The Role of Theory', p. 33; Schelling, 'The Retarded Science', p. 131. This portion of the essay does not appear in the opening chapter of Schelling's *The Strategy of Conflict*.
23. Schelling, *National Income Behavior*, p. 47. This can be compared with the analysis of the mathematical economist Ragnar Frisch in the 1930s: 'If the system, after being exposed to such a small disturbance tends back to the original equilibrium situation, or to another equilibrium situation close to the original one ... then the equilibrium in question is stable. Otherwise it is unstable.' Quoted in E. Roy Weintraub, *Stabilizing Dynamics: Constructing Economic Knowledge* (Cambridge: Cambridge University Press, 1991), pp. 19–20 from R. Frisch, 'On the Notion of Equilibrium and Disequilibrium', *Review of Economic Studies*, 3 (1936), p. 102.
24. See Schelling, *National Income Behavior*, pp. 44–8, 62–5, 74–9, 83–8, 113, 142–3, 162–3, 171–6, 195–204, and his Appendix, 'Derivation of Stability Conditions', pp. 275–87, which deals with stability analysis for dynamic systems.
25. Schelling, 'The Reciprocal Fear of Surprise Attack', p. 1; Schelling, *The Strategy of Conflict*, p. 207.
26. Schelling, 'The Reciprocal Fear of Surprise Attack', p. 21; Schelling, *The Strategy of Conflict*, p. 21.
27. Schelling, 'Raise Profits by Raising Wages?', p. 233. For further analysis of the 'explosion' metaphor in Schelling's work, see Chapter 6 below.
28. Schelling, 'The Reciprocal Fear of Surprise Attack', p. 19; Schelling, *The Strategy of Conflict*, pp. 221–2.
29. Schelling, 'The Reciprocal Fear of Surprise Attack', p. 22; Schelling, *The Strategy of Conflict*, p. 225.
30. For Schelling's description of dominant strategies and equilibrium points at their intersection, see Schelling, 'What is Game Theory?', p. 228. For an earlier reference by Schelling to '"dominated" rows and strategies', see Schelling, 'The Strategy of Conflict: Prospectus', p. 243; Schelling, *The Strategy of Conflict*, p. 155.
31. Luce and Raiffa, *Games and Decisions*, p. 118. One is thus left with those practical bargains which are undominated. Note the importance of the idea of dominance for von Neumann and Morgenstern's analysis of stability. See von Neumann and Morgenstern, p. 42. For further elaboration, see Martin Shubik, *Game Theory in the Social Sciences* (Cambridge, MA: The MIT Press, 1982), pp. 157–63.
32. See Andrew Colman, *Game Theory and Experimental Games: The Study of Strategic Interaction* (Oxford: Pergamon Press, 1982), p. 94.
33. Schelling, 'Assumptions of Enemy Behavior', p. 202.
34. The other particularly interesting game was 'Chicken', a test of nerve consisting of two motorists on course for a head-on collision. To avoid a crash, one of the players must swerve, but in doing so becomes the 'chicken', losing face and therefore suffering a poorer payoff than the player who does not swerve. See Colman, *Game Theory and Experimental Games*, pp. 40–2. For Schelling's analysis of games of Chicken, see Schelling, 'The Threat of Violence in International Affairs', pp. 106–7; Schelling, *Arms and Influence*, pp. 116–25.
35. For Schelling's citation of a piece of Flood's later game theory, see Schelling, 'The Strategy of Conflict: Prospectus', p. 258n38; Schelling, *The Strategy of Conflict*, p. 164.

36. The matrix depicted in Chapter 4 is a Prisoner's Dilemma.
37. Of the many similar descriptions of the Prisoner's Dilemma, see Colman, *Game Theory and Experimental Games*, p. 102, Nicholson pp. 28–9. For a particularly approachable introduction to the Prisoner's Dilemma, see Robert Axelrod, *The Evolution ofCo-operation* (London: Penguin Books, 1990), pp. 7–9. For a clear description of Prisoner's Dilemma and Chicken games and their application by the nuclear strategists, see Freedman, *Evolution*, pp. 185–9.
38. The idea represented by the Prisoner's Dilemma, where individually rational decisions can combine to produce collectively destructive outcomes, is the theme of Schelling's later text, *Micromotives and Macrobehavior*.
39. For example, see Freedman, *Evolution*, pp. 186–7 and Colman, *Game Theory and Experimental Games*, pp. 101–2, 104.
40. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 475. For one of Schelling's early references to the Prisoner's Dilemma, see Schelling, 'The Strategy of Conflict: Prospectus', p. 212.
41. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 476.
42. So too can the river which stabilises limited war. Schelling cites from *The Persian Expedition* Xenophon's tactic of putting his army in front of an impassable gully when they were about to be attacked. Without any means of retreat, Xenophon could thus keep his forces together. See Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 474. The river serves a similar analogous purpose by making it too costly for the two armies not to cooperate – to stabilise the conflict at the river. In this case, the Prisoner's Dilemma game operates *between* the two armies rather than *within* one of them – this illustrates the relevance of Schelling's interest in the integrity or stability of single social organisations to his study of conflict situations involving two or more separate armed forces. See Chapter 6.
43. For the idea that almost all games in nuclear strategy, including crisis stability, can be translated into versions of the Prisoner's Dilemma, see Steven J. Brams and D. Marc Kilgour, *Game Theory and National Security* (New York, Basil Blackwell, 1988), p. 4.
44. Schelling, *The Strategy of Conflict*, p. 213. In describing the Prisoner's Dilemma, Schelling refers the reader to Luce and Raiffa. See ibid., p. 214n4. Schelling's interest in the Prisoner's Dilemma continued after the publication in the 1960s of his main writings on nuclear strategy. One of his main contributions in these subsequent years was in analysing Prisoner's Dilemma games involving more than two players. Such a game, which Schelling calls the 'uniform multi-person prisoner's dilemma', is more complex than the two-person variant. See Thomas C. Schelling, 'Hockey Helmets, Concealed Weapons, and Daylight Saving', *Journal of Conflict Resolution*, 17:3 (September 1973), pp. 381–428.
45. Under cooperation in the Prisoner's Dilemma, the pair of strategies represented by one player confessing and the other not confessing is an implausible outcome. A player would avoid not confessing while the other confesses because he would suffer a greater loss than if he confessed as well, even though this latter outcome still involved considerable losses for both parties.
46. Luce and Raiffa, *Games and Decision*, p. 96.
47. Schelling, 'Experimental Games and Bargaining Theory', p. 62.
48. For further analysis of the repeated Prisoner's Dilemma, a 'supergame', see Nicholson, *Formal Theories in International Relations*, pp. 30–1.
49. Luce and Raiffa, *Games and Decisions*, p. 98.
50. Ibid.
51. Ibid., p. 99.
52. Nicholson, *Formal Theories in International Relations*, p. 104. Colman notes that this makes this equilibrium a 'deficient equilibrium point'. Colman, *Game Theory*, p. 102.

53. Hence there is a real challenge in trying to find Nash equilibria for such games. A search for such equilibria across a wide range of Prisoner's Dilemma and Chicken games which model situations in nuclear strategy is to be found in Brams and Kilgour. It is notable that the authors state that 'the objective of our equilibrium analysis is to demonstrate precisely the conditions under which we might expect stability, and what kind of stability'. Brams and Kilgour, *Game Theory and National Security*, p. viii.
54. It is important to remember that these two aspects are mutually supporting and that one cannot really exist without the other. The first aspect, that stability requires striking a unique bargain from a range of possible bargains, requires the second: i.e. players will be drawn to a particular bargain because both sides can expect no incentives on either side to defect from it: i.e. it is a stable bargain. The second aspect requires the continuation of the first – i.e. that there are no other 'unique' or 'prominent' bargains within the range which make defection likely.
55. Schelling, 'Experimental Games and Bargaining Theory', p. 57. This is the continuation of a line of thinking in Schelling's earlier bargaining theory. To use commitment in bargaining is to 'relinquish further initiative, having rigged the incentives so that the other party must choose in one's favour'. Schelling, 'An Essay in Bargaining', p. 294; Schelling, *The Strategy of Conflict*, p. 37. For a similar description of the same technique, see Schelling, 'The Strategy of Conflict: Prospectus', p. 224.
56. Schelling, 'What is Game Theory?', p. 225.
57. Ibid., p. 213.
58. Schelling, 'Assumptions About Enemy Behavior', p. 216. Also see Schelling, 'The Strategy of Conflict: Prospectus', p. 244; Schelling, *The Strategy of Conflict*, p. 158. It follows that a *poorly* designed set of choices – i.e. where the enemy's intentions are not directed towards one prominent point of accommodation or bargain – is a recipe for instability.
59. Brodie, *The Absolute Weapon*, p. 76.
60. Schelling, 'Strategy, Tactics and Non-Zero-Sum Theory', p. 477. Such a suggestion was attacked by Anatol Rapoport, who argued that Schelling failed to 'escape from the zero-sum trap' which strategists inevitably fell into when they were compelled to seek optimal solutions for Prisoner's dilemmas (where such solutions were unobtainable). Rapoport rejected what he saw as Schelling's attempts to combine the uncombinable, i.e. game theory and psychology, in producing the idea of strategies which are psychologically 'prominent' rather than mathematically 'dominant'. Rapoport implied that, as 'a professional strategist', Schelling's commitment to 'the maxims of Clausewitz', and thus 'to power over the other, not to knowledge of the other', made him inherently unable to possess any reasonable understanding of psychology. See Rapoport, *Strategy and Conscience*, pp. 110–24. Also see Anatol Rapoport, 'The Role of Game Theory in Uncovering Non-Strategic Principles of Decision', in Mensch, *Theory of Games*, pp. 410–31. Rapoport's attack on Schelling is less than convincing. For one thing, Schelling himself found Clausewitz of limited value because of his tendency not to appreciate the non-zero-sum nature of strategy. Interview with Schelling, 24 September 1996.
61. Schelling, 'War Without Pain', p. 474.
62. For a brief reference to the riskiness of manipulation, see Phil Williams, 'Thomas Schelling', p. 131. For a critique of Schelling's analysis of the deliberate creation of risk, see Craig, *Destroying the Village*, pp. 153–59.
63. For the comment that the concept of stability is 'a fuzzy one', see Schelling and Halperin, *Strategy and Arms Control*, p. 50.
64. For the argument that, in comparison with the other social sciences, economics offers a far more rigorous and precise understanding of concepts like 'equilibrium', see Cynthia Eagle Russett, *The Concept of Equilibrium in American Social Thought* (New Haven, CT, and London: Yale University Press, 1966), pp. 5–6.

65. Schelling, 'An Essay on Bargaining', p. 290; Schelling, *The Strategy of Conflict*, p. 32.
66. This is distinct from the argument that the systems of the two sides are different and thus hinder the coincidence of expectations. As will be shown in Chapter 6, Schelling recognises and attempts to reconcile this problem by suggesting that such systems can converge by a process of learning and adaptation. The problem of hazy value systems is in terms of a comparison with economic bargaining where there are 'harder currency' systems of values to fall back on.
67. Schelling, 'What is Game Theory?', p. 235.
68. As Chapter 4 shows, Schelling is opposed to relying on quantitative judgements like these.
69. As an example, Schelling mentions the 'jockeying for limits in a limited war'. Schelling, 'The Strategy of Conflict: Prospectus', p. 215; Schelling, *The Strategy of Conflict*, p. 102.
70. For an attack on Schelling's 'cavalier handling of the "levels-of-analysis" question', see Green, *Deadly Logic*, p. 149. However, Green's critique is not only overdrawn, it is also contradicted by his later suggestion that Schelling used 'military conflict' as a 'paradigm for conflict in general'. See ibid., p. 155. One cannot have it both ways. For a brief but thoughtful assessment of the 'hazards of transference' from economic theory to international political settings, see Russett, *Concept of Equilibrium*, pp. 7–10.
71. For similar thoughts relating to Schelling's work on bargaining, see Simon, 'Theories of Decision-Making', p. 266.
72. See Young, 'Strategic Interaction', p. 4.

6

Strategy as a Social Science

The last two chapters have examined the close links between Thomas Schelling's approach to stability and fundamental aspects of microeconomic theory and game theory. These influences make a significant contribution towards explaining the consistency in Schelling's approach across a wide range of conflict situations: a framework where stability is a question of resolving indeterminacy by striking and sticking to a bargain.

But the examination of these literatures does not provide the full picture in understanding the origins of Schelling's strategic thought, even in combination with the strategic studies influences noted in Chapter 2. The ideas from economic and game theory explain the prerequisites for stability in any given situation including the absence of incentives to defect from a cooperative outcome which stands out qualitatively, but they do not explain why certain features (or solutions) satisfy these requirements. These ideas serve Schelling well in explaining the bargaining situation and the challenges confronting the search for stable outcomes, but they do not really say much about the idea of symbolic focal points at which expectations are meant to converge. There is a theory of perception here in Schelling's work which economics and game theory do not seem to offer. Nor does this literature account for Schelling's interest in making comparisons between stability in conflict situations and stability in social organisations or for his interest in 'feedback' as a crucial concept for understanding destabilising processes.

It is therefore necessary to examine influences on Schelling from other portions of contemporary American social-science theory – to identify the missing pieces of the jigsaw. Schelling himself provides an indication of the potential breadth of his interests when he states that a 'general theory of strategy' might consist of 'a mixture of game theory, organization theory, communication theory, theory of evidence, theory of choice, and theory of collective decision'.[1] This chapter will show that the net needs to be drawn wide enough to encompass such areas of study as Gestalt and social psychology, group dynamics, communication and

information theory, all of which Schelling uses to understand the prospects for stability in processes of strategic interaction.

CO-ORDINATION IN SOCIAL GROUPS

Schelling's treatment of stability in strategic situations as a process requiring the convergence of expectations by interdependent participants offers an especially powerful linkage to contemporary social science. It runs in parallel with his strong interest in the way expectations are co-ordinated in social groups. Schelling exploits the potential for this linkage in his analysis of games where the existence of an opposing team is 'suppressed'. This removes any conflict and leaves the single team with a pure co-ordination game.

Such a method ties in with Schelling's critique of the tendency in existing game theory to apply to mixed-motive or bargaining games an approach which derived from the analysis of situations of *pure conflict* – such zero-sum theory is ill-suited for the co-operation which non-zero-sum games involve.[2] Instead, Schelling takes the opposite tack. He applies observations from games of *pure cooperation* to situations involving both conflict and cooperation. Of course, this opens Schelling up to the opposite charge. Is it appropriate for him to rely on theory which applies to the absence of conflict in developing a theory which is, after all, aimed at clarifying the strategy of *conflict*?[3] Perhaps, again, Schelling has overestimated the degree of cooperation which conflict situations involve.[4]

Using the idea of the pure-collaboration game, Schelling argues that 'there is substantial overlap at this point between the non-zero-sum game and organization or communication theory'.[5] This connection is reflected in some of the studies from these social sciences which he cites.[6] In one example, Jacob Marschak notes that the team is 'the simplest form of a group' and that these are much easier to deal with than *coalitions* which satisfy the Pareto-optimality principle but lack common 'group interest'. The result in coalitions is a familiar one for readers of Schelling; 'when any state is reached where no member can be made better off without making another member worse off, further choices are determined by *bargaining*' (emphasis original).[7] A similar connection is to be found in Merrill Flood's research, which Schelling finds interesting in terms of the relationship between communication and co-ordination. Flood's aim was to 'explore the applicability of the non-constant-sum case of the theories of von Neumann and Morgenstern, and others, to the actual behaviour of people in bargaining situations'.[8]

In fact, a connection between game theory and stability in social behaviour can be found in von Neumann and Morgenstern's understanding of the

'imputations' which represent the solutions to games as 'stable "standards of behavior"'[9] in social situations. Each imputation is 'a system of apportionment'[10] and stability is associated with the society's search for a 'dominant' (or 'superior') imputation in terms of 'whether or not to "accept" a static settlement of all questions of distribution' by any particular imputation.[11] Von Neumann and Morgenstern argued that for any given 'physical basis' of a society,

> human beings have a way of adjusting themselves to such a background. This consists of not setting up one rigid system of apportionment, i.e. of imputation, but rather a variety of alternatives … This system of imputations describes the 'established order of society' or 'accepted standard of behavior'.[12]

Von Neumann and Morgenstern's reference to *several* alternative imputations suggests a difference of opinion with Schelling's quest for uniqueness,[13] but the 'standard of behaviour' analogy seems very similar to the sort of thing Schelling is interested in. Indeed, Martin Shubik notes that von Neumann and Morgenstern's 'stable set' is to be viewed as 'a tradition, social convention, canon of orthodoxy, or ethical norm',[14] terms which Schelling himself might easily have used as synonyms for 'patterns' of strategic behaviour.

This idea that Schelling's work is informed by theories of group processes is also reflected in his incorporation of the theory of collective decision and the theory of choice in his description of a general theory of strategy (see above). 'Collective decision' can be seen as the co-ordinating process by which members of the group decide on a common approach. In one article, Schelling argues that:

> The West, as perhaps the Eastern bloc, is a coalition in which the decisions are reached by a complex process of collective decision. The West is an enormous 'committee'. Deterrence is … a set of separate calculations by all those who can affect the decision, each with his own interests and values and his own means of influencing the collective decision.[15]

In other words, the collective decision is a bargain between the various individual interests.[16] Moreover, it is Herbert Simon, a leading contemporary organisational theorist, who helps illuminate the nature of Schelling's interest in theories of decision and choice. According to Simon: 'Decision-making comprises three principal phases; finding occasions for making a decision; finding possible courses of action; and choosing among courses of action.'[17] Of these three phases, Schelling's stability analysis is concerned with the second (assessing the range of alternatives) and the third (choosing one from the range). The third

phase is the theory of choice, or in Simon's words 'choice activity'.[18] In Schelling's theory, choice is a matter of structuring the situation so that there is no choice but to make the intended one. There is clearly a connection here with Schelling's interest in restricting the bargaining range. These two aspects come together in his argument that: 'The motive behind the threat is to coerce or to deter, to constrain the other player's course of action',[19] and in a later version of the same essay, that: 'Like the ordinary commitment, the threat is a surrender of choice, a renunciation of alternatives, that makes one worse off than he need be in the event the tactic fails.'[20]

ORGANISATIONS, ROLES AND THE ORGANIC ANALOGY

This is not the only example where contemporary theory developed in the study of social group processes is relevant to Schelling's analysis of stability. For instance, in his analysis of the types of co-ordination which explain the 'stability of institutions and traditions',[21] Schelling notes that: 'The concept of *role* in sociology … can in part be interpreted in terms of the stability of "convergent expectations"'[22] (emphasis original) – roles allow others to expect certain behaviour which makes co-ordination possible. Here Schelling was drawing on a concept which had grown to prominence in American sociology since the 1930s. Bruce Biddle's description of the role theory as a 'behavior pattern' suggests its particular relevance for Schelling's theory.[23]

Schelling's description of the function of military *esprit de corps* in army units as an example of this sort of co-ordination process is also notable. He describes these units as 'social organisms that are subject to a substantial rate of replacement but that maintain their own peculiar identities' which seem 'to be largely a matter of convergent expectations'.[24] On this point, Schelling is in line with Kenneth Boulding, who was also developing a general theory of conflict making use of communication theory, organisation theory and game theory,[25] and who had encouraged Schelling's early work on bargaining.[26] Boulding makes the same sort of connection between organisations and natural organisms: the former are 'dynamic open systems' (or 'growth systems') to the extent that they are able to maintain their essential character despite changes in the identity and amounts of their constituent parts.[27]

This approach suggests that the organisation and its stability can be considered in almost biological terms. Indeed, in one of the studies of group processes which Schelling cites, Marschak makes a comparison between military (amongst other) organisations and living organisms in the sense that, as 'machines', they are 'built to fulfil a task'.

The biological analogy could hardly be stronger in Marschak's work – unlike natural machines, human organisations had not had the benefit of millions of years of selection to adjust to their environment.[28]

This suggests some common cause between Schelling's understanding of the stability of organisations and the concept of 'homeostasis' – the ability of warm blooded creatures to maintain constancy in crucial variables in the face of changes in the environment.[29] In its more liberal adaptations, homeostasis is synonymous with the maintenance of an 'observable steady state' which is maintained so long as any variations fall within upper and lower thresholds or limits.[30] This allows scope for applying the theory to social questions – indeed the original application of homeostasis to social problems has been attributed to Walter B. Cannon's text, *The Wisdom of the Body*, in which the concept of homeostasis itself was introduced in 1932.[31]

The possible connections with Schelling's stability analysis are clear in the sense that one can view 'patterns' and 'traditions' as steady states. The concept of homeostasis also fits in well with the concept of equilibrium in economic theory which has already been shown to be important to Schelling's understanding of the stability concept. Ervin Laszlo, for example, has mentioned the similarity between homeostasis and 'Pareto's "natural price" of goods and services which impose a high degree of self-regulation in production and consumption'.[32] Indeed, Schelling's treatment of the 'stabilization effect' in the maintenance of the exchange rate within a given range in his text on economics is reminiscent of homeostasis. He compares the stabilisation of the range of exchange between 69 and 71 to the water level in a tank: 'It is as though a water tank had an overflow outlet at a height of 71 and an intake valve that opened when the level fell below 69. The water level could fluctuate anywhere between those levels.'[33]

Homeostasis also fits in with Schelling's wider interests by helping to provide a theory of systems.[34] In short, homeostasis provided an explanation for the way that a 'natural system' was able to achieve stability. As 'goal-oriented, self-maintaining, and self-creating expressions of nature's penchant for order and adjustment',[35] systems could just as easily be seen as a way of explaining the persistence of certain social phenomena. What might be called 'social homeostasis' provided a powerful way for understanding stability in social systems which seemed to suit the dynamics of social situations much more than the older static, mechanical understanding of stability.[36]

Although the connections here are somewhat tenuous, the organic model involving homeostasis as stability in natural systems may provide a further layer of understanding of Schelling's stability concept. For instance, Boulding's reference to 'the limits of homeostatic tolerance'

within which the crucial variables are 'stabilized'[37] can be compared with Schelling's concept of 'tolerance', which appears to reflect an approach to stability in terms of the tendency of systems to maintain steady states.

A prominent and important example is Schelling's discussion of the greater 'tolerance of the system' where both sides have larger numbers of missiles.[38] There is a sense here that by allowing a greater tolerance of change, the limits of the steady state have been increased,[39] and there is less need for countermeasures. The link between the idea of tolerance and the thresholds with which the stability of the system is associated also appears in Schelling and Halperin's discussion of arms-control systems where the probability of violating the system is kept 'within tolerable bounds'.[40] There is a need for such systems to be able to 'take shocks and perturbations into account',[41] to be able to maintain the steady state in the way that a homeostatic process might allow.[42]

Of course, it is also be possible to understand Schelling's notion of 'tolerance' in a more mechanical sense – the ability to return to a position of rest after the shock has disturbed the equilibrium. But the idea of the steady state of an organic system seems more appropriate, especially when considering the stability of an arms-control system which would seem to demand a dynamic element. For this is an equilibrium which is only stable if it is able to adjust and adapt to a changing situation.

The idea of adaptation can be found in various parts of Schelling's work. He uses it as a means to describe the type of interaction which occurs in strategic situations. For instance, he argues that over the long haul, an arms race can be viewed as 'a two-sided adaptive system'.[43] Elsewhere he observes on a more general level that: 'The only safe assumption that we can make is that the enemy will be *adaptive*: To the best of his ability he will adapt his system to what he knows it can predict about ours' (emphasis original).[44]

This view also found its way into Schelling's use of game theory, where he incorporates 'strategies of response or adaptation'.[45] But these are not examples of a blind process of natural selection or self-preservation. Instead, the participants adapt on the basis of their knowledge of the environment and their estimations of the consequences of certain actions. In other words, there is a mental or cognitive process at work. It is thus important to study Schelling's understanding of the nature of this cognitive process.

GESTALT PSYCHOLOGY AS A THEORY OF PATTERNS

The type of cognitive theory that Schelling relies on can be identified by examining his understanding of the patterns of behaviour around which

expectations can converge and stability be provided for in social situations. As Chapter 3 demonstrated, the key to these patterns is their conspicuous, unique nature – they stand out from the background. For example, Schelling views a tradition as the *predominant set of rules* of all 'possible sets of rules that might govern a conflict'; the set 'that everyone can expect everyone else to be conscious of as a conspicuous candidate for adoption'.[46] This conspicuous quality allows for the convergence of expectations, the co-ordination which stability requires.

An important example of a conspicuous pattern can be found in Schelling's notion of an 'idiom' of conflict as a means of stabilising strategic interaction.[47] By 'idiom' Schelling means a recognisable pattern of behaviour with clear boundaries separating the pattern from other behaviours – providing limits which are 'distinctive, finite, discrete, simple, natural, and obvious'.[48]

This idea of a stable pattern can also be seen in Schelling's analysis of situations involving the economics of fewness – linking the discussion back to economic analogies. For example, he notes that: 'A strike settlement or an international debt settlement often sets a "pattern" that is followed almost by default in subsequent negotiations.'[49] But his understanding of the attraction of patterns owes as much to theories of psychology as to bargaining theory. Schelling himself notes in *The Strategy of Conflict* that:

> the concept of the intrinsic magnetism or focusing quality of particular outcomes in a bargaining situation or in a pure coordination problem gets some support and clarification from the very substantial body of experimental evidence provided by the Gestalt psychologists.[50]

This is another instance of Schelling's reliance on bodies of thinking which were informing contemporary American analyses of social processes. The three leading Gestalt psychologists, Max Wertheimer, Wolfgang Köhler and Kurt Koffka had arrived in the United States from Germany in the 1920s and 1930s.[51] Their approach, which laid great emphasis on the role of mental processes, had come increasingly to displace the previously dominant behaviourist psychology, which tended to view behaviour as a matter of a mechanical stimulus and effect with no intervening cognitive process.[52]

Schelling finds in Gestalt psychology a good match for his conclusions about the inherent stabilising power of outcomes which are unambiguous, lumpy, and simple – i.e. those which provide very clear thresholds. He cites Koffka's *Principles of Gestalt Psychology* on the principle of 'psychophysical organization' which holds that 'psychological organization will always be as "good" as the prevailing conditions

allow. In this definition the term "good" is undefined. It embraces such properties as regularity, symmetry, simplicity.'[53] What Schelling's footnote does not indicate is the close connection between this principle and notions of stability. This extract which Schelling has taken from Koffka is part of the author's discussion of the 'Law of Prägnanz'. This term originated in Wertheimer's work in the 1920s on the tendency for perceptions to be organised according to 'Prägnanzstufen', a term which has been translated as 'figural stability'.[54] The connection to stability is confirmed in Koffka's treatment of Prägnanz as a fundamental principle running throughout his Gestalt theory. According to Koffka, it is the Law of Prägnanz which gives sense to Gestalt as 'a product of organization, organization the process that leads to a Gestalt'.[55] For this law proposes such organisation as 'diametrically opposed to mere juxtaposition or random distribution'.[56]

The tendency to form the organisation which is as 'good' as possible (the Law of Prägnanz) is in fact the tendency to form the most 'stable' organisation.[57] The regular, simple and symmetrical shapes are stable ones, and not just for Schelling but for Koffka as well. The same point is made by Carmichael, Hogan and Walter who note that according to Köhler's analysis, 'all patterns tend to become "as good as possible". That is, they tend to achieve greater stability and precision.'[58] By denoting organisation which stands out amongst potential chaos, the stability of Gestalt via the Law of Prägnanz has close similarities with Schelling's understanding of stability in terms of the resolution of indeterminacy. Rather like Schelling, Koffka uses the notion of 'homogeneity' to describe a situation where nothing stands out. On the other hand, where there is a tendency towards 'inhomogeneity', where there is 'articulate organization', there is more likely to be stability – hence 'articulate organization favours stability'.[59]

This provides a valuable insight into what Schelling means when he says of the American behaviour in the Gulf of Tonkin: 'It was articulate. It contained a pattern.'[60] Similarly, the extent to which such a pattern is followed – and thus stability made possible – in a conflict situation where tacit accommodation relies on the successful interpretation of behaviour, depends 'on the capacity of the other player to recognize the formula (Gestalt) of retaliation when he sees a sample of it'.[61]

The plausibility of the connection between Schelling's analysis of patterns and Koffka's work is underlined by Koffka's argument that inhomogeneity allows for 'prominent objects' which 'attract' the actor[62] – it is the 'things', the prominent objects and not the 'holes between them … which regulate our behaviour'.[63] In examining his distinction between things and holes, Koffka cites H. G. Hartgenbusch's study of soccer wherein the goalkeeper, as a prominent object, ' … is more often

hit than can be accounted for by the mere adventitious kicking of the contestants'.[64] This is no mere interesting aside. For in his analysis of the content of bargaining situations where certain outcomes have 'focal power' or magnetism, Schelling quotes Koffka's own quotation of the goalkeeper example.[65]

Clearly, then, there is more than a passing connection between Schelling's interest in stability in terms of the quality of the way in which the situation is structured, and Koffka's interest in stability as a consequence of the quality of organisation.[66] Moreover, there can also be found in the work of the Gestalt psychologists a substantial interest in the idea of restructuring which could be used for problem-solving.[67]

BOULDING'S 'EICONICS'

Ideas similar to Gestalt theory can also be found in Boulding's theory of 'eiconics'.[68] This theory explained the behaviour of different organisations on the basis of their '"view of the universe" or "image"'.[69] Boulding argued that: 'The human imagination can only bear a certain degree of complexity. When the complexity becomes intolerable, it retreats into symbolic images.'[70] This emphasis on symbolic images is very close to the aspect of Schelling's work on stability which is influenced by Gestalt psychology. In fact, Boulding emphasises that in addition to the logical consistency of images:

> There are important qualities of a non-logical nature which also give rise to stability … Even in mathematics … there are important criteria of elegance, beauty, and simplicity which contribute toward the stability of these structures.[71]

Clearly, Boulding's interest in the stability of the image, and in the ability of non-logical symbolic points to provide such stability, sits well alongside Schelling's analysis. However, Boulding argues that while simple, condensed images tend to be favoured, this can be problematic and actually produce conflict[72] – instability is likely because our condensed images cover a multitude of complexity and are thus vulnerable to small variations: 'Small changes in our detailed valuations may make all the difference between preferring one symbol and preferring another.'[73] Schelling's position is essentially a pragmatic one: simple symbols and simple values may not be unproblematic, and they may be arbitrary, but nonetheless they provide the best chances for the co-ordination of expectations.

Hence what Boulding sees as a problem, Schelling takes as his starting point for analysing how systems of preferences are structured. What is remarkable is not the extent to which these two scholars differ on the

question of simple versus complex images, but the extent to which their theories of behaviour based on perception and symbols have so many similarities.

CONVERGENCE OF NORMS THROUGH INTERACTION

Schelling's reliance on conspicuous patterns or Gestalt for the convergence of expectations requires further exploration. How is this convergence meant to take place? How do the participants know how close they are to the norm and how close the other participants are? Schelling's answer to these questions is based on the interaction which occurs between the group members. Once again, his approach reflects his reading of the contemporary theory of group processes.

The extent to which Schelling relies on interaction for the creation of a single norm or pattern is evident in his statement that

> when norms are created for two parties in the same process, each player's developing norm influences the other's. There is a process of genuine learning with respect to *values*; each side adapts its own system of values to the other's, in forming its own (emphasis original).[74]

It is the through the interaction which comes from being part of the same process that such adaptation can take place. The theorist whose work Schelling cites in support of this bold claim is the social psychologist Muzafer Sherif, whose studies of group norms had a major bearing on the understanding of group processes (and related ideas such as the concept of 'role') in American social science.[75] In an early version of the essay which later appeared in *The Strategy of Conflict*, Schelling cites an extract from Sherif's influential *The Psychology of Social Norms*.[76] An examination of Sherif's book, which was first published in 1936,[77] demonstrates a remarkable similarity in the approaches of the two scholars, including similar reference points for understanding stability.

Sherif provides explanations for the existence of different individual norms and also for the process by which they converge in a group setting. For Sherif, individual norms tended to be different because 'there is no point-to-point correlation between the stimulus and what it arouses in us'.[78] A similar point of view is evident in a piece of experimental psychology which Schelling cites – Carmichael, Hogan and Walter argue that 'not the visual form alone, but the method of its apprehension by the subject form determines, at least in certain cases, the nature of its reproduction'.[79]

Sherif's hypothesis, tested by the sort of experimental work which Schelling found especially valuable, was that in a group involving

reciprocal interaction between its members,[80] these individual and different norms would tend to converge into a common group norm. For example, Sherif's experimental studies suggested that different individual judgements about the movement of a point of light in a dark room (the 'autokinetic' phenomenon) would tend to converge when these individuals were placed in a group situation where the various judgements were able to influence each other.[81] Interaction is the key here as it leads to the very types of stabilising patterns which Schelling is interested in: Sherif's 'social norm' includes such things as 'customs, traditions, standards, rules, values, fashions and all other criteria of conduct which are *standardized as a consequence of the contact of individuals*'[82] (emphasis added).

MANAGING DIFFERENCES IN STRATEGIC CULTURE

The insight from Sherif that quite different norms may converge when the actors are part of an interacting group addresses one of the most important criticisms of the type of American strategic thinking of which Schelling's work forms an important part. The criticism is that many Western strategic concepts were developed without allowing much for the existence of different strategic cultures on either side of the deterrence relationship. It has been applied directly to the American concept of stability by Colin Gray, who has argued that: 'The United States seemed to know what it wanted and to believe that what was good for the United States would come to be seen by the Soviet Union as good for it also.'[83] The implication of this criticism is that what appealed to an American audience as a provider of stable deterrence would not necessarily appeal in the same way to a Soviet audience. Yet Schelling's reference to Sherif's theory suggests that there is at least an appreciation that there are differences in strategic cultures. The idea of convergent expectations in Schelling's stability theory is *not* based on the assumption that the parties (i.e. the Soviet Union and the United States) will *naturally* see things in the same way.[84] Instead these differing approaches converge when the parties become part of the same process – when there is interaction.[85] This would seem to offer at least a partial answer to Richard Ned Lebow's criticism that Schelling ignored the findings of Gestalt psychology that different actors had 'different organizing principles' which led to 'different perceptions'.[86]

The key question here is not so much the existence of differences between the two sides, but whether it is appropriate to consider them as members of the same group, as parties to the same process. Clearly, this places an extra premium on the interdependence of the parties – an

assumption which is at the heart of so much of Schelling's theory. The number of parties itself does not seem to be a problem. Only two actors, as in the case of the military relations between Moscow and Washington, would appear to constitute an effective group. Schelling is quite confident on this score, citing Sherif's theory to indicate that 'when norms are created for two parties in the same process, each player's developing norm influences the other's'.[87]

However, even if one is to agree with Schelling's assessment that the group analogy holds for conflict situations, the question of changing group identity with new strategic situations needs to be addressed. For instance, conflict situations involving the nuclear stand-off between the Soviet Union and the United States can be examined in terms of norms held by the same group over a long period of time. This is not to suggest that Schelling's idea of convergence in the norms held by Moscow and Washington was self-evident or unremarkable. In the midst of the Cold War stand-off, the idea that there could be a considerable degree of common interest in the military relations between East and West which could be exploited for the purposes of stability was very challenging. Schelling's use of theories relating to co-ordination processes in social settings in the development of this line of thinking about strategy certainly was not par for the course.

Even so, the prospects for stability based on the development of common norms in conflict situations would appear to be greater in the relatively long-standing relationship between the United States and the Soviet Union than in situations where the United States is faced by a new partner. Examples such as the Korean War and Vietnam would seem to involve new sets of norms in new groups. Certainly, this does not make stability impossible, but it may be more difficult when there is no history of strategic interaction.

There would, however, be some norms which would be independent of group membership. For instance, the taboo against the first use of nuclear weapons would seem to transcend all such groups. But in the case of establishing norms to ensure the stability of conventional warfare in Vietnam, much that was new would need to be manufactured. Once again this suggests the riskiness of trying to develop stability rather than finding it in the situation – of reversing the logarithm.

SCHELLING, SHERIF AND STABILITY

It is notable that Schelling receives support from Sherif for this more ambitious notion of norm creation when there are no existing norms. For Sherif is interested in studying the autokinetic phenomenon where one

has 'a *fluid and ambiguous* situation for which individuals did not have previously established standards' (emphasis added).[88] This appears to be very similar to Schelling's interest in filling the vacuum of indeterminacy. Indeed, Schelling's single reference to Sherif occurs in the former's discussion of the way in which new 'traditions' can be established in strategic situations where the existing traditions are inadequate (for the purposes of stability). In this discussion, Schelling goes on to say: 'When the supply of available "objective" criteria is incapable of yielding a complete set of rules, that is, when the game is "indeterminate", norms of some sort must be developed, mutually perceived, and accepted.'[89]

Indeed, there are quite profound similarities between Schelling and Sherif in terms of their conceptualisation of stability based around theories of cognition influenced by Gestalt theory. Sherif argues that perception was a question of 'the organization of external and internal stimulating factors',[90] so that certain organised forms stood out against the background of a wider field. Likewise norms, whether individual norms or social norms, were organised patterns[91] which stood out against a field of alternative possibilities for behaviour. Moreover, Sherif's statement that 'norms serve as focal points in the experience of the individual, and subsequently as guides for his action'[92] can be compared with Schelling's analysis of 'focal points' as conspicuous outcomes which 'draw expectations to a focus'.[93]

There is a compatibility then between social psychology and Schelling's framework from economics and game theory. In terms of the strategic environment, the 'field' can be compared with the 'range of bargains'. As for stability, finding an organisation, pattern or norm which stands out from the field can be compared with the search for a unique bargain from the range.

In fact, Sherif refers to *stability* itself in a way which is very similar to Schelling's analysis. An unstructured situation was 'objectively unstable' if the actors came upon it without an 'external frame of reference',[94] without a 'stable external pattern'.[95] Sherif's belief in the ability of groups to develop group norms offered a way out of the instability caused by an absence of structure. The group acts so that 'what they were deprived of in the way of a stable external pattern, they provided each other by building up an equilibrium with stable bearings'.[96]

In Sherif's analysis, 'restructuring' could also occur when existing norms were no longer appropriate. The tendency for some social norms to lose the ability to meet the needs of those involved in the process meant that 'social norms are not stable entities'.[97] However, the ability of groups to create their own new norms meant that: 'The outcome is the final emergence or establishment of a stable set of norms having the status of standards.'[98] The idea that stability can be obtained from

restructuring sits well with Schelling's analysis of situations where stability is not so much found as created – for example, in his argument that it is possible to restructure the Prisoner's Dilemma.[99]

LEWIN, BAVELAS AND SIMON ON GROUP INTERACTION

It is not only in Sherif's work that one can find important keys to Schelling's understanding of the importance of interaction in groups. Other very significant work had developed under the influence of Kurt Lewin, a Gestalt theorist who was largely responsible for the emergence of 'group dynamics'. Lewin had been a student of Wertheimer's and a colleague of Köhler's at the University of Berlin's Psychological Institute[100] before joining them in 1935 in the move to American academia.[101] Lewin's early work had not only influenced Sherif, but had contributed to Koffka's understanding of the 'field' as 'a system of stresses and strains which will determine real behaviour'.[102] For Lewin, the field explained the relationship between the person and environment.[103] To understand the field is to understand the relationship between ground and figure – the key to stability in the analyses of Koffka and Sherif.[104]

The idea that Schelling's understanding of what allows for stability has some connection to Lewin's theorising, despite the absence of direct references to Lewin in Schelling's own work, is supported on a number of counts. One important similarity is the strong emphasis upon the 'interdependence of the members' within the group.[105] For Lewin, this point stems from Gestalt psychology in particular, by way of Köhler's treatment of 'Gestalt' as a 'dynamic whole' of interacting parts.[106]

Second, Lewin explained behaviour within the field in terms of the 'valences' of various alternatives – an object had a 'positive' or 'negative' valence to the extent that it attracted or repulsed the actor respectively.[107] The result was that each alternative could be ranked on a scale of values,[108] an idea which is one of the most important ingredients of Schelling's theory. Similarly, Lewin's work was influential in Boulding's analysis of behaviour according to the extent to which it 'will move the organization toward the most highly valued part of its image of the future'.[109] Boulding noted that: 'The idea of behavior as "locomotion" toward the most highly valued part of the field of the image' was due to Lewin's group dynamics.[110]

This theory based on the value of images not only connects Boulding to Lewin but also further highlights the compatibility of Lewin and Schelling's work. Boulding uses this theory to draw a conclusion which is very much in line with Schelling – because the person 'places lower

and lower values on increasing complexity in the image' there is a common attempt to 'escape from complexity into simple, unitary condensed images'.[111]

Third, Lewin placed great importance on the structure of the situation – without 'cognitive structure', the actor has no clear sense of whether any movement is towards or away from his goal. This again relates to Lewin's background in Gestalt psychology, a connection notable in his references to the possibility of 'restructuring' the field as a means of problem solving.[112] Indeed in relation to 'restructuring' he notes that a 'homogeneous' region of a field can be made 'articulate'.[113]

In fact, Lewin's treatment of the question of structure also exposes a link between structure and stability. In the words of Morton Deutsch, a one-time colleague of Lewin, 'the very nature of an unstructured situation is that it is unstable; perception of the situation shifts rapidly and is readily influenced by minor cues and by suggestions from others'.[114] There is thus good reason to connect aspects of Schelling's stability analysis to the 'group dynamics' school which had emerged largely under Lewin's inspiration in the 1930s[115] and which came to prominence when Lewin helped establish the Research Center for Group Dynamics school at MIT in 1945.[116] Lewin's approach to the group is clearly in line with Schelling's interests – the former notes that an individual trying to 'diverge "too much" from group standards' is likely to face group pressure to conform. Hence, 'the group itself acquires value. It becomes a positive valence corresponding to the central force field with the force … keeping the individual in line with the standards of the group'.[117]

By examining these group standards via a concept of 'stable quasistationary equilibrium'[118] (so that 'group decision' is a question of resistance to change[119]), Lewin's group dynamics theory seems especially relevant. The importance of this connection is underlined by some of the studies Schelling cites on the co-ordination game in organisation and communication theory, the most significant of which is by Alex Bavelas,[120] who had been a student of Lewin's in Iowa in the 1940s.[121] Bavelas' study investigated the effects of different patterns of communication upon the organisation developed by groups who needed to share information to achieve a particular goal. This study provides further insights into the type of stability concept that Schelling was developing.

Bavelas judged the efficacy of different communication patterns in terms of whether they lead to *stable* organisations. By 'stable' he meant an organisation which, once established, was 'maintained unchanged throughout the remaining trials'.[122] He found that 'in patterns with a high, localised centrality, organization evolves more quickly and is more stable, and errors in performance are less'.[123] It followed that there was instability when the organisation of the group varied.

In a study which followed on from Bavelas' work, a more explicit treatment of the concept of stability is provided. Harold Guetzkow and Herbert Simon noted the need to 'determine whether there *is* a definite pattern; this is the stability problem … The *stability* of the interaction among the five persons is defined as the extent to which a given pattern persisted over a sequence of trials' (emphasis original).[124]

In an earlier study cited by Schelling, Simon had subjected to mathematical treatment George C. Homans' work in *The Human Group*, which maintained that the 'friendliness' between group members had a direct relationship with the degree of interaction between them.[125] Using the same sort of stability analysis which is to be found in Schelling's algebraic analysis of national income questions,[126] Simon suggested that this approach 'offers an explanation for some of the commonly observed phenomena relating to the stability and dissolution of groups'.[127]

COMMUNICATION AS INTERACTION

It is not only these formal studies which provide Schelling with evidence on the importance of organisation and communication for providing stability. He also relies on examples from contemporary society. For example, he notes that for a group of Harvard students who wish to form a mob on a warm spring night, there is a requirement for a common assembly point, 'a point whose main qualification is that everyone can expect everybody else to recognize it'. At this point of convergence stability is possible: 'To assure the stability of a group, to solidify rather than disperse it, we may help to create or discover a unique focus for their expectations about where to meet, or whom to follow.'[128] The link with organisation and communication theory is made very clear in Schelling's description of what might prevent such stability: 'If we deplore the mob we can try to deny it a focus for their expectations, just as we might try to destroy the communications of an organization we oppose.'[129]

Other examples from social life provide Schelling with raw material from which to understand stability in terms of the role of communication in the convergence of expectations. One example he cites is the phenomenon of 'tipping' in the racial composition of housing areas where the *expectation* that 'an area will "inevitably" become occupied exclusively by Negroes' means that it *will* be exclusively occupied.[130] Here there is 'a faulty communication system that makes it easy to "agree" (tacitly) to move but impossible to agree to stay' – which might be usefully compared with Schelling's analysis of the defection problem in the Prisoner's Dilemma. In such a case there is not much middle ground; there is little chance for an area to remain for any length of

time a combination of white and black residents. In Schelling's words: 'There is no stable focal point except at the extremes.'[131] In other words, contemporary theory of American society had provided an example of the all-or-nothing distinctions which are such an important part of Schelling's approach to stability.

The quality of the communication between participants in the same process is crucial in these instances. Through communication, participants exchange information about the incentives they attach to certain courses of behaviour.[132] Schelling argues that this communication occurred even if the participants were not completely aware of it:

> Any bargaining that the American government does with the Soviet government about force levels is thus quite inarticulate, probably only semiconscious, and of course without any commitments behind it. The Soviet leaders are even less explicit, if only because they are a good deal less communicative to the outside world.[133]

On other occasions, when the participants are more aware of the interaction which is occurring between them, communication can take on a more conscious nature. In either case, the participants are involved in a tacit bargaining process, which consists in exchanging *signals* about the likely consequences of certain courses of action.[134] These are not announced beforehand, they are not diplomatic cables or some other means of *formal* communication. Instead these signals emanate from the strategic activity itself.[135]

Given the connection between bargaining and stability in Schelling's work, it is logical to find that Schelling is concerned about the quality of the signals being sent and received. For if bargaining depends on communicating these signals, then these signals must be of such a sort as to be readily understood.

This explains Schelling's incorporation of the theory of evidence as an element of his general theory of strategy. In a section from 'Surprise Attack and Disarmament', which was not included in *The Strategy of Conflict*, he asks: 'What is the best system for observing, verifying, and transmitting credible and authentic evidence of the truth on the assumption that the other party wishes to convey the truth and will try to submit the kind of evidence that does indeed convey it?'[136] Schelling notes that this would be a particularly important question to answer in a crisis, where efforts to stabilise the situation would depend on each side's ability to trust that the other side was reciprocating. In such a situation,

> both sides would be emphatically eager, desperately eager, to convey the truth if in fact the truth was reassuring … In a crash scheme of disarmament, or arms restraint, or mutual withdrawal

> and tranquilization, both sides would require *positive evidence* of compliance (emphasis original).[137]

Such evidence would need to be understood loud and clear. Schelling's understanding of communication made this a challenge, because the true signal would need to be heard above any 'noise' in the system. For example, he wonders whether the disarmament negotiations in Geneva might actually send signals at odds with the central message which Washington is sending out in less explicit (and more important) forms of bargaining over arms levels: 'Do we get a confused message across to the Soviet leaders, and possibly them to us, because of the noise emanating from Geneva and uncertainty about which is the authentic voice?'[138]

In an earlier version of the same argument, Schelling notes that the Geneva negotiations may 'just add noise to the channels'.[139] This indicates the similarity between his approach and the contemporary theories of communication and information which were laying the foundations for the 'cognitive revolution' – an interdisciplinary project which emphasised the role of 'mental representations' and the similarities between the brain and the computer.[140] For example, Norbert Wiener, the MIT mathematician who founded the new science of 'cybernetics', refers to 'line noise, which blurs the message'.[141] This can be linked back to the original text in information theory in which Claude Shannon refers to 'noisy channels … where the signal is perturbed by noise'.[142] The significance of this thinking for understanding Schelling's approach to stability is underlined by comparing Shannon's analysis of the frequency of 'errors' in noisy channels[143] with Schelling and Halperin's description of stability as a measure of the 'tolerance of the system to errors in judgement or mistaken intentions'.[144]

PATTERNS IN COMMUNICATION

It is thus important to ask why, by the mid-1960s, Schelling had concluded that he was now less worried about the 'noise' from the Geneva negotiations than he had been in earlier years. For his comment in 1965 is that: 'I doubt whether they significantly obstruct the Soviet ability to get the message from Washington unless the Soviet leaders are so ill-attuned that they would not get the message anyway.'[145]

The analogy Schelling uses to support his relative optimism on this score is somewhat striking. He argues that, through a tacit communication process, American cigarette manufacturers and smokers had developed a 'fairly reliable color signal: mentholated cigarettes are to be in green or blue-green packages'; Schelling observes a similar

development whereby 'I think by now the Soviet leaders have discerned that statements date-lined Geneva are mentholated.'[146] The analogy may be a curious one,[147] but it is consistent with Schelling's notion of an idiom of conflict[148] – the signal provided by the green or blue-green packets stands above the 'noise' associated by the 'proliferation' of brands of cigarettes which threatened the smoker's ability to make the distinction between mentholated and non-mentholated cigarettes.[149]

In other words, the readily identifiable packaging colour provides a reliable pattern. The argument here is a familiar theme in Schelling's work. Just as the resolution of the indeterminacy which characterises bargaining situations is to be found in the identification or even the deliberate creation of patterns for stable behaviour, the same applies to the communication or feedback process which characterises strategic bargaining. The implication of this bargaining-communication connection is clear in Schelling's assessment of the disadvantage of a counterforce strategy if the intention was to make sure the opponent could 'perceive the pattern in our action and its implications for his behavior'. The problem in this situation is that: 'The counterforce campaign would be noisy, likely to disrupt the enemy command structure, and somewhat ambiguous in its target selection as far as the enemy could see.'[150] In other words, it would be difficult to discern a clear signal – a discernible pattern – above the 'noise' that a counterforce attack would create. This would make it almost impossible to achieve a stable outcome. Similarly attempts to communicate a pattern of restraint in the use of nuclear weapons would not be helped by taking advantage of the destructive capabilities one might possess. Forcing the issue could be counter-productive, since: 'Extra targets destroyed by additional weapons are not a military "bonus"; they are noise that may drown the message. They are a "proposal" that must be responded to. And they are an added catalyst to general war.'[151]

Given the extreme level of 'noise' which a conflict situation would likely involve,[152] the demand is for a pattern simple enough to be overheard without too much effort: the sort of all-or-nothing distinction that Schelling favours for resolving the indeterminacy in bargaining situations. This can be seen in Schelling's early reference to noise which occurs in his essay 'Bargaining, Communication, and Limited War'. Here, Schelling notes an experiment he undertook to find how two earners on different incomes might come to an agreement on how to divide between them a tax bill when the situation was 'deliberately cluttered up with *additional* data – on family size, spending habits, and so on'. The result confirms the advantage of simple patterns, of a simple 50–50 split instead of attempts to allow for the differences in income. Schelling notes that: 'The refined signal for the income proportionate

split was drowned out by "noise" and the cruder signal was all that came through.'[153]

Hence, it would seem that information can be viewed in terms of its organisation where homogeneity can mean poor prospects for stability. Once again there is a connection between Schelling and contemporary theories of information. Wiener argues that the world 'can be considered to be made up of *patterns*' (emphasis original)[154] and from this insight he treats information in terms of patterns which are distinguishable from alternatives – 'the message is a transmitted pattern, which acquires its meaning by being a selection from a large number of possible patterns'.[155]

The inspiration Schelling draws from Gestalt theory in developing his interest in 'patterns' involves a further connection with cybernetics. It is notable that Wiener himself had a similar interest in the perception of forms, including the tendency for visual systems to focus on 'conspicuous objects'.[156] This involved 'the part of our visual *Gestalt* determination which depends on muscular feedbacks and the use of our normal centering, orienting, focusing, and converging apparatus' (emphasis original).[157]

The importance of being able to detect a particular pattern from a range means that, for Wiener, effective communication – and thus control and order[158] – is a matter of easily discernible patterns of information. The same can be said for Schelling's view of the prospects for stability in conflict situations where the quality of the feedback process depends on 'the fidelity of information and perception'.[159]

FEEDBACK AS THE BASIS OF INTERACTION AND COMMUNICATION

Schelling's own references to 'feedback' indicate a further, and very important, aspect of his understanding of strategic interaction in terms of contemporary theories of communication and information. In an elemental form, 'feedback' is at the heart of any self-regulating system. In homeostasis, for example, the organism possesses sensory mechanisms which provide information on crucial variables in the environment. Should change exceed the acceptable thresholds, and the steady state be disturbed, the organism has regulative mechanisms which are able to restore the steady state.[160]

This process of adjustment is known as *negative* feedback[161] – it is negative because an increase in blood temperature beyond the threshold, to cite one example, is followed by action to reduce the temperature back to the steady state. But the sort of 'feedback' Schelling has in mind is one involving not natural self-regulatory systems, but interaction between self-aware decision-makers. This indicates an overlap between Schelling's work and the 'cognitive revolution' on the idea of feedback

loops in cognitive processes. It is significant that a good number of the studies of group processes, information theory and communication theory which Schelling cites also reflect this approach. Similar thinking is evident in Boulding's argument that: 'each organization is in some sense "aware" of the other and makes this awareness an essential part of its behavior pattern. We think of conflict, then, as a system of interacting systems.'[162]

In fact, Schelling's understanding of feedback in terms of the relationship between interdependent *decision-makers* does much to define his approach to strategic interaction. The idea of 'feedback' as a metaphor for the interaction between strategic actors and their situation pervades his work. For instance, much of Schelling and Halperin's *Strategy and Arms Control* stems from the recognition that: 'There is a feedback between our military forces and the conflicts that they simultaneously reflect and influence.'[163] A powerful example of this sort of thinking can be found in Schelling's comment that

> in viewing 'the arms race' as an interaction between two sides (actually among several sides) – we have to take some account of 'feedback' in our military planning. That is, we must suppose that over an appreciable period of years Soviet programs respond to what they perceive to be the 'threat' to them, and in turn our programs reflect what we perceive to be that 'threat' to us. Then, by the end of the decade, we may be reacting to Soviet decisions that in turn were reactions to our decisions early in the decade; and vice versa.[164]

It follows that the chances of successfully managing strategic interaction depend on the participants being aware that there is a feedback process at work. Indeed, for Schelling the key obstacle to tacit collaboration in the arms race – upon which the prospects for stability rested – was the limited understanding of this feedback process. He contended in 1963 that 'the evidence shows that the Soviets do not understand this interaction process and manipulate it shrewdly'.[165] This suggests that it would take time for a tradition of tacit collaboration to develop, and by implication, that attempts to restructure the strategic situation would be risky if attempted in the absence of a substantial history of strategic interaction.[166] Schelling came to believe, however, that there were prospects for such a tradition between the United States and the Soviet Union being established. In another article he notes that

> there are signs that the dialogue between East and West is becoming more real, more conscious, less like a pair of monologues and more like two-way communication. The second edition of *Soviet Military Strategy* … shows unmistakable signs of response to the Western

> response, a feedback cycle … the Soviets authors at last seem conscious that an important audience for their work is in the Western nations.[167]

Again, a comparison with Boulding's work is useful here. Like Schelling, Boulding has a particular interest in the implications of the interdependence which characterises the problem of oligopoly:

> The image in this case is of peculiar complexion because it has to include not only a simple notion of the consequences of one's acts; it must also include an image of the reactions of others to one's acts, because the consequences of one's acts depend on the reactions of one's competitors.[168]

This explains Boulding's argument that images need to be sophisticated and complex and why the very simplest of images can actually be dangerous. If each party has an image which recognises the significance of the reactions of its competitors, there is likely to be 'price stability' rather than 'price war'. The result is that 'we may have highly stable situations, even without any formal agreement'.[169] Clearly, there is a similarity with Schelling's approach here. In fact, Boulding can see the same sorts of comparisons as Schelling, for he adds that: 'There is an almost exact analogue of this situation in the international arms race'[170] – when each participant has an image which is sufficiently complex to incorporate the interactive nature of the relationship, a less dangerous arms race is likely to result.[171] Again, Schelling's view is to argue that simple, conspicuous patterns can in fact be forces for stability. However, both scholars draw a connection between stability and the participants' awareness of the feedback process.

STRATEGIC LEARNING AND TEACHING

It should also be clear that Schelling's interest in the prospects for strategic 'adaptation' and 'learning' rely on his understanding of feedback processes. Similarly, strategic 'teaching' involves the manipulation of feedback to produce a desired result – i.e. not simply adapting to the environment as one finds it, but manipulating the environment so as to affect the interaction.[172] This is of course analogous to the distinction made above between identifying the suitable bargain to be struck in light of the given conflict situation (adapting to the environment) and restructuring the situation so as to direct the bargaining process towards a desired bargain (manipulating the envrionment). It is the conscious recognition that the conflict situation is a feedback process that makes

the exploitation of bargaining possible.[173] Hence it is no coincidence that so much of Schelling's work involves a combination of bargaining theory and aspects of information and communication theory which reflect the notion of feedback.

This sort of thinking is reflected in Schelling's notion of strategic interaction as a learning process. He comments, for instance, that limited war involves 'a large element of demonstration – of dare and challenge, of learning and teaching'.[174] Schelling also offers the Cuban missile crisis as an example: 'We did, in the Cuba event, engage in a process intended to teach the Soviets something about what to expect of us and to discourage them from making future miscalculations that might be costly for both of us.'[175] That Schelling refers to both learning and teaching is significant here. The idea of 'learning' is fundamental to Schelling's position that members of the same group can come to adopt similar norms, can view a single pattern as a basis for stable behaviour. The rather more ambitious idea of 'teaching' fits in with his belief in the ability of strategic actors to exploit, manipulate, or restructure the environment in such a way as to encourage a favourable settlement.[176]

In his analysis of the potential to manipulate feedback in this purposeful fashion, Schelling is in line with important aspects of 'cybernetics'. Indeed, Wiener had coined the term to signify 'the art of pilot or steersman'.[177] Especially notable in this context is Wiener's interest in *feedback* as 'the control of a system by reinserting into the system the results of its performance',[178] which relates to his understanding of *information* as 'the content of what is exchanged with the outer world as we adjust to it, and make our adjustment felt on it'.[179] On both of these points, connections with Schelling's ideas are not difficult to make.[180]

Indeed, this information theory was an important reference point for the studies of communication and organisational patterns which Schelling uses to support his theory of co-ordination. In one of these studies, Leavitt and Mueller note that, 'the information theories of the cyberneticists and, to some extent, trial and error concepts in learning theory suggest that for A to hit successfully some target B, requires that A be constantly informed of A's own progress'.[181] This quotation demonstrates quite clearly that the problem of convergent expectations, which Schelling expresses as the 'I think that you think that I think … ' series, can be understood in terms of feedback. Moreover, in another of these studies cited by Schelling, Jacob Marschak notes that considerations such as feedback 'make the dynamic team problem similar to those in cybernetics and in sequential analysis'.[182] This confirms the connection between the studies of group processes, which clearly interested and influenced Schelling, and the cognitive revolution.

FEEDBACK, STABILITY AND INSTABILITY

The role of the concept of feedback in Schelling's understanding of stability can be treated as part of a widespread connection being made in the contemporary literature on cybernetics. George Richardson has observed that the versions of the feedback concept which can be found in social-scientific thinking influenced by cybernetics involved a particular interest in the 'stability of the feedback system, and the conditions producing instability'.[183] An important example of this interest can be found in W. Ross Ashby's contributions to cybernetic theory. Ashby introduced the concept of 'ultra-stability' to describe the way that organisms and other learning systems were able to adapt their rules of behaviour to suit new conditions and thus new requirements for stability.[184] This approach is compatible with Schelling's interest in adaptation and learning as discussed above.[185]

However, the idea of an adaptive 'ultra-stable' system where feedback is exploited to maintain *stability* reveals less about Schelling's approach than the notion of a dangerous sort of feedback which threatens *instability*. The most obvious example of this in Schelling's writing is his analysis of the series of compounding expectations which can encourage pre-emption. Particularly notable is Schelling's description of the dangers which may arise when efforts made to increase the security of retaliatory forces are misinterpreted by the other side as 'preparations for attack'. These actions could well

> increase the danger of 'false alarm' on both sides that could lead to a succession of decisions aggravating each side's perception of the need to pre-empt. Thus the things that each side does in the face of uncertainty and instability may, by mutual feedback, aggravate the instability.[186]

Similarly, Schelling refers to 'the possibility that, in a crisis, reciprocal suspicions might be amplified by a feedback process'.[187] In other words, the feedback which characterises strategic interaction, and thus the bargaining process, can be a force for ill as well as for good, especially when a crisis increases the pace of the feedback and the necessity for a decision based on incomplete information.

Here, Schelling's analysis of instability does not suggest a *negative* feedback process where a regulating mechanism returns the variable back towards the steady state. Instead, it is a *positive* (or self-reinforcing) feedback, which makes the conflict situation spiral away further and further from the steady state.[188] It is notable that Lewin perceived a similar phenomenon through the idea of a 'quasi-stationary equilibrium'. While there was a tendency in social situations to return to equilibrium

(locomotion towards higher value) after a disturbance, if the deviation exceeded a certain point Lewin argued that the forces would change to accelerate the movement away from the equilibrium.[189] This certain point in Schelling's theory is the threshold, such as the 'river', beyond which the prospects for stability are very poor.[190]

Such an approach accords with Schon's description of steady states and thresholds in systems theory:

> For any given system, it takes a certain level of energy to overcome the forces involved in the system's dynamic conservatism and to 'break' the stable state. Once the threshold has been reached, *the system goes into exponential change* until it reaches a new zone at which a new dynamic conservatism begins to operate (emphasis added).[191]

Schon's reference to 'exponential change' fits in rather well with Schelling's understanding of the way that feedback works when a threshold is broken in a conflict situation.[192] For example, Schelling refers to 'a situation in which the apprehension by each side that the other may be about to pre-empt *explodes by feedback* into a war by mutual panic' (emphasis added).[193] In other words, if either party receives information which suggests that the other may no longer be attaching the same high value to the status quo (which may itself be stimulated by its own initial behaviour via positive feedback), this feedback may stimulate an anticipatory move. Positive feedback therefore can turn even the mere possibility of divergence into an explosive situation.

What is especially interesting about this idea in relation to Schelling's work is that a version of it can be found in his earliest writings. As shown in Chapter 1, Schelling makes the contrast between a 'stable system' and one which is 'explosive' in his first publication in 1946. In other words, the basic model is established without the formal notion of 'feedback'. An argument can thus be made that the more formal notions of feedback which are to be found in the information and communication theory cited by Schelling in later years fitted neatly on to the foundations which he had established in his economic analysis.

This primacy of Schelling's work in economics is also suggested by his discussion in *International Economics* of the 'explosive situation' when income increases infinitely. The picture of a destabilising spiral of positive feedback is clear when Schelling looks at the effects of intense speculation that depreciation is imminent:

> The result may be extreme 'destabilizing' speculation: the more speculation there is, the more the demand for foreign exchange; the more that demand the faster the government exhausts its reserves; the faster the exhaustion the more inevitable depreciation seems; and so all the more speculation in a vicious circle.[194]

In this economic analysis Schelling also show that such a spiral can be the product of expectations exceeding a particular level. He argues that 'even erroneous expectations of depreciation may be 'self-justifying'; if the speculation is strong enough, the speculative demand for foreign exchange may force the depreciation by exhausting the government's reserves'.[195]

Similarly, Schelling and Halperin's arms-control text is full of metaphors suggesting 'explosions' of 'exponential change' once a stabilising limit has been breached. This applies across a wide range of strategic situations. For example, they refer to the case when 'limited war explodes into general war'.[196] Once provocative activity passes a certain threshold, it may 'escalate and get out of hand' in a 'snowballing effect',[197] an obvious example of the dangers of feedback.

Similar thinking can be found in Wiener's analysis of the dangers of excessive feedback in the operation of a gun-pointer which adjusts the aim of the gun to the prevailing environmental conditions. If the adjustment is too great, 'the gun will swing past its proper position, and will have to be pulled back in a series of oscillations, which may well become wider and wider, and lead to a dangerous instability'.[198] More generally, Wiener refers to feedback which is 'catastrophic … the catastrophe will be that the system will go into unrestrained and increasing oscillation'. The alternative is a situation where 'the feedback is stable'[199] – where any oscillation will tend not to increase. There is a profound similarity with contemporary information theory here.

CONCLUSION

Schelling's understanding of stability in strategic situations owes a considerable amount to social psychology, Gestalt psychology and related ideas in organisation and communication theory. All of these approaches provide Schelling with explanations of how groups of interdependent participants can co-ordinate their perceptions, expectations and behaviour, and so provide for stability. It is only through an analysis of these theories that one can fully understand Schelling's interest in patterns, traditions and focal points as keys to stability.

Indeed, it has been shown here that amongst the scholars working in the areas of social and Gestalt psychology, organisation and communication theory, which help inform Schelling's work, there is a common interest in stability questions. But while their theory helps Schelling understand what sorts of things can provide for stability, the concept of stability used by these other thinkers is often rather undefined. While they help point Schelling to conclude that patterns and similar forms of

organisation are stabilising, it is the game theory and oligopoly theory ideas which provide a tighter sense of what this stability is. Moreover, in the case of the idea of an 'explosive' situation, it is Schelling's early work in economics, rather than his later interest in wider social sciences, which laid the essential foundations.

However, Schelling's use of theories of group processes to understand stability in terms of the stability of social patterns and institutions can be seen to make up for a deficiency. The game-theoretical approach to stability used by Schelling tends to encourage a static, one-off approach to the concept. By implying an ongoing, steady-state, sort of stability, the literature discussed in this chapter allows a more dynamic approach to the concept. What emerges is a more rounded and flexible understanding of stability. This makes it only more likely that Schelling has a truly general concept of stability applicable to a wide range of strategic situations informed by an equally impressive range of contemporary academic disciplines.

NOTES

1. Schelling, 'The Role of Theory', pp. iii-iv; Schelling, *The Strategy of Conflict*, pp. 14–15. The same quote is made in Hassner, *Violence and Peace*, p. 53.
2. Schelling, 'The Strategy of Conflict: Prospectus', p. 203; Schelling, *The Strategy of Conflict*, p. 84.
3. For Wohlstetter's argument that approaches in which conflict is 'treated by assumption or suppressed' are inadequate for studying strategy, see Albert Wohlstetter, 'Strategy and the Natural Scientists', in Robert Gilpin and Christopher Wright, *Scientists and National Policy-Making* (New York: Columbia University Press, 1964), p. 193. Moreover, according to Luce and Raiffa, two-person games where there is no conflict of interest at all collapse into one-person games which are of rather limited theoretical use. Luce and Raiffa, *Games and Decisions*, p. 59. The relevance of Luce and Raiffa's criticism for Schelling's approach is noted in Colman, *Game Theory*, p. 32; Wohlstetter, 'Sin and Games', p. 216.
4. See the analysis of this point in Chapter 3. Note, however, Hassner's perceptive observation that while some 'accuse Schelling of overemphasizing tacit coordination or common interest' others 'accuse him of being trapped in an overly conflictual or rivalrous point of view'. Hassner, *Violence and Peace*, p. 58.
5. Schelling, *The Strategy of Conflict*, p. 85. For an earlier version, see Schelling, 'Prospectus for a Reorientation of Game Theory', p. 5. The influence of game theory on organisation, communication and other social-scientific theories is noted in Hassner, *Violence and Peace*, p. 52.
6. See the list of studies cited in Schelling, 'Prospectus for a Reorientation of Game Theory', pp. 4n–5n; Schelling, *The Strategy of Conflict*, pp. 85–6n1–2.
7. Jacob Marschak, 'Towards an Economic Theory of Organization and Communication' (1954), in Jacob Marschak, *Economic Information, Decision and Prediction, Selected Essays: Volume II, Part II: Economics of Information and Organization* (Dordrecht: D. Reidel Publishing, 1974), p. 31. For Schelling's citation of this article, see Schelling, 'Prospectus for a Reorientation of Game Theory', p. 5n; Schelling, *The Strategy of Conflict*, pp. 85–6n2.

8. Merrill M. Flood, 'Some Experimental Games', *Management Science*, 5:1 (October 1958), p. 5. For Schelling's citation, see Schelling, *The Strategy of Conflict*, p. 164n1. Flood had done much of this work at RAND in the early 1950s. See Flood, 'Some Experimental Games', p. 5n1.
9. Von Neumann and Morgenstern, *Theory of Games*, p. 42. Also see Bernard, 'Theory of Games of Strategy', pp. 417–18.
10. Von Neumann and Morgenstern, *Theory of Games*, p. 41.
11. Ibid., p. 37. Also see Kaysen, 'Revolution in Economic Theory?', p. 7.
12. Von Neumann and Morgenstern, *Theory of Games*, p. 41. The importance of the idea of several imputations is emphasised in Kaysen, 'Revolution in Economic Theory?', p. 7.
13. Morgenstern's criticism of the search for unique solutions is noted in Chapter 5 above.
14. Martin Shubik, *Game Theory in the Social Sciences*, p. 161.
15. Schelling, 'Deterrence: Military Diplomacy in the Nuclear Age', p. 533.
16. Hence, Schelling occupies a position between the extremes of analysing behaviour where either the individual or the group is the sole determinant – these might be seen as sociological analogues of games of pure competition and pure cooperation, respectively.
17. Herbert A. Simon, *The New Science of Management Decision* (New York: Harper & Row, 1960), p. 1. On Schelling's citation of Simon's work on theories of decision-making, see Chapter 4 above.
18. Simon, *The New Science of Management Decision*, p. 2.
19. Schelling, 'The Strategy of Conflict: Prospectus', p. 223.
20. Schelling, *The Strategy of Conflict*, p. 123. For an earlier version, see Schelling, 'The Strategy of Conflict: Prospectus', p. 224.
21. Schelling, 'The Strategy of Conflict: Prospectus', p. 208; Schelling, *The Strategy of Conflict*, p. 91. In an interview with the author, Schelling repeated that what he meant by stability could be understood in terms of the stability of the social system. This was the robustness of this system – a measure of how difficult it was for mischievous actors to disrupt it. Interview with Schelling, 24 September 1996.
22. Schelling, 'The Strategy of Conflict: Prospectus', p. 209; Schelling, *The Strategy of Conflict*, p. 92.
23. See Bruce Biddle, 'Role Theory', in Edgar F. Borgatta and Marie L. Borgatta, *Encyclopedia of Sociology* (New York: Macmillan, 1992), Vol. III, pp. 1681.
24. Schelling, 'The Strategy of Conflict: Prospectus', p. 209; Schelling, *The Strategy of Conflict*, p. 92.
25. Schelling's quite sympathetic review of Boulding's *Conflict and Defense* suggests considerable common ground between the two scholars. See Schelling, 'War Without Pain'. For Boulding's text, see Kenneth E. Boulding, *Conflict and Defense: A General Theory* (New York: Harper & Brothers, 1962; Harper Torchbooks, 1963).
26. For Schelling acknowledgement of Boulding's support for his work, see Schelling, 'Preface' (to 1960 edition), *The Strategy of Conflict*, p. vi.
27. See Boulding, 'Organization and Conflict', p. 123. Boulding defines an 'open system' as 'a structure which is continually taking in something from its environment and giving out something, all the while maintaining its structure in the middle of this flow'. Kenneth E. Boulding, *The Image* (Ann Arbor, MI: University of Michigan Press, 1956), p. 33. A closed system was one which did not interact with the surrounding environment. In his early work Schelling sets up such a system in a bilateral trading arrangement; 'we assume a closed system; i.e., neither country trades with any third country'. Schelling, *National Income Behavior*, p. 159.

28. Jacob Marschak, 'Elements for a Theory of Teams' (1955), in Jacob Marschak, *Economic Information, Decision and Prediction, Selected Essays: Volume II, Part II*, p. 63. An early version of this study by Marschak is cited in Schelling, 'Prospectus for a Reorientation of Game Theory', p. 5n; Schelling, *The Strategy of Conflict*, pp. 85–6n2.
29. See Ervin Laszlo, *The Systems View of the World: The Natural Philosophy of the New Developments in the Sciences* (Oxford: Basil Blackwell, 1972), p. 41.
30. See Ross Stagner, 'Homeostasis', in *International Encyclopedia of the Social Sciences*, Vol. VI, pp. 499–500.
31. See ibid., p. 500. For an interesting comparison between Cannon's concept of homeostasis and the widely used concept of equilibrium in the context of the stability of the balance of power, see Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, 2d edn (New York: Alfred A. Knopf, 1956), p. 156.
32. Laszlo, *Systems View of the World*, p. 45. Also see Stagner, 'Homeostasis', p. 502.
33. Schelling, *International Economics*, p. 76.
34. For Freedman's argument that 'The idea of stability was derived from systems theory' which was itself 'adopted from biological theories', see Freedman, 'Strategic Stability', p. 170, as noted in Chapter 2 above.
35. Laszlo, *Systems View of the World*, p. 118.
36. On the two types of system stability, one mechanical in terms of the seesaw which 'returns to a position of rest after a disturbance' and one which is 'some form of "steady-state" or homeostatic process, in which some variables continually readjust to keep other variables within given limits', see Morton A. Kaplan, *System and Process in International Politics* (New York: John Wiley, 1957; 1964), pp. 6–7. This distinction between the two types of stability marks an important difference between the Newtonian and systems views of the world. See Laszlo, *Systems View of the World*, pp. 5–11. Kaplan's text is cited, although on a point relating to games theory, in Schelling, 'Prospectus for a Reorientation of Game Theory', p. 46n; Schelling, *The Strategy of Conflict*, p. 125n6.
37. Boulding, 'Organization and Conflict', p. 128.
38. See the quotation from 'Surprise Attack and Disarmament' in Chapter 2 above. This system of deterrence might be considered an 'open' system to the extent that it interacts with changes in the military environment, but might be considered 'closed' in relation to the wider political environment.
39. This can be compared with Kaplan's definition of a 'stable system' as one which 'remains within specified limits for arbitrarily defined variables'. Kaplan, *System and Process*, p. 6.
40. Schelling and Halperin, *Strategy and Arms Control*, p. 100.
41. Ibid., p. 128.
42. The notion of stability in terms of self-regulation is suggested in Schelling's description of the tendency for trade balances to act along the lines of a 'self-correcting mechanism'. In the event of a trade deficit, there is a series of effects such that: 'When the combination of price decline and reduced income level have pulled imports down and pushed exports up enough to eliminate the original trade deficit, the credit system becomes stabilized and no further contraction takes place. Thus the "outflow of money" (meaning "inflow of capital") brings the trade balance back into line'. Schelling, *International Economics*, p. 253.
43. Schelling, 'Managing the Arms Race', in Abshire and Allen, *National Security*, p. 616.
44. Schelling, 'Assumptions About Enemy Behavior', p. 199. Similarly, a stable arms-control system would seem to be one which was able to 'adapt' to changes in military technology. There were limits, however, and it would be safer for less rather than more adaptation to be needed. For instance, note Schelling and Halperin's point that

after a substantial programme of disarmament, 'there may be a long and dynamic period of confusion, adaptation, and of trial and error by the military services'. Schelling and Halperin, *Strategy and Arms Control*, p. 136.

45. See Schelling, 'The Strategy of Conflict: Prospectus', p. 242; Schelling, *The Strategy of Conflict*, p. 153.
46. Schelling, 'The Strategy of Conflict: Prospectus', p. 208; Schelling, *The Strategy of Conflict*, p. 91.
47. See Chapter 3 above.
48. Schelling, *Arms and Influence*, p. 138.
49. Schelling, 'Bargaining, Communication and Limited War', p. 28; Schelling, *The Strategy of Conflict*, pp. 67–8.
50. Schelling, *The Strategy of Conflict*, p. 108n18. For an earlier version, see Schelling 'The Strategy of Conflict: Prospectus', p. 248n33. Also see ibid., p. 258n38; Schelling, *The Strategy of Conflict*, p. 164n1.
51. See Jean Matter Mandler and George Mandler, 'The Diaspora of Experimental Psychology: The Gestaltists and Others', in Donald Fleming and Bernard Bailyn (eds), *The Intellectual Migration: Europe and America, 1930–1960* (Cambridge, MA: Harvard University Press, 1969), pp. 385–99.
52. See ibid., pp. 374–5.
53. Koffka, *Principles of Gestalt Psychology*, quoted in Schelling 'The Strategy of Conflict: Prospectus', p. 249n33; Schelling, *The Strategy of Conflict*, p. 108n18. For the original, see K. Koffka, *Principles of Gestalt Psychology* (New York: Harcourt, Brace, 1935), p. 110. Elsewhere Koffka describes it as 'unity, uniformity, good continuation, simple shape, and closure'. Ibid., p. 171.
54. As cited in David J. Murray, *Gestalt Psychology and the Cognitive Revolution* (Hemel Hempstead: Harvester Wheatsheaf, 1995), p. 31. Koffka acknowledges Wertheimer's work on Prägnanz in Koffka, *Gestalt Psychology*, p. 110.
55. Koffka, *Gestalt Psychology*, p. 682.
56. Ibid., p. 683. The concern with order – i.e. orderly organisation as opposed to randomness – is clear here.
57. For the association of Prägnanz with stability, see ibid., pp. 138, 151, 171.
58. L. Carmichael, H. P. Hogan and A. A. Walter, 'An Experimental Study of the Effect of Language on the Reproduction of Visually Perceived Form', *Journal of Experimental Psychology*, 15:1 (February 1932), p. 82. For Schelling's citation, see Schelling, *The Strategy of Conflict*, p. 86n2.
59. Koffka, *Gestalt Psychology*, p. 545. See also ibid., p. 120.
60. Schelling, *Arms and Influence*, p. 145. Note Schelling's contrasting comments about the Soviet Union's earlier failure to read Secretary of State Acheson's comments about America's position on Korea. He argues that the Soviets 'may have miscalculated because the language of deterrence, and an understanding of the commitment process in the nuclear era, had not had much time to develop yet'. Schelling, 'Deterrence: Military Diplomacy in the Nuclear Age', p. 543. In fact, Schelling's very next comment illustrates that even when clear boundaries are set out, they may not be read as such for he notes that the Soviets' 'missile adventure in Cuba suggests that they still make enormous blunders in gauging American reaction'. Ibid.
61. Schelling, 'The Strategy of Conflict: Prospectus', p. 218; Schelling, *The Strategy of Conflict*, p. 107. Note the importance of communication here in the sense that each player must successfully communicate the formula. This suggests a connection between ideas in Gestalt psychology and communication theory, which is confirmed below.
62. Koffka, *Gestalt Psychology*, p. 44.
63. Ibid.

64. Ibid., p. 45. The original is H. G. Hartgenbusch, 'Gestalt Psychology in Sport', *Psyche*, No. 27 (1927), pp. 41–52.
65. See Schelling, 'The Strategy of Conflict: Prospectus', p. 254n37; Schelling, *The Strategy of Conflict*, p. 110n19.
66. For the translation of 'gestaltet' as 'structured' from Wertheimer's work, see Murray, *Gestalt Psychology*, p. 31.
67. See ibid., p. 2.
68. For Schelling's reference to Boulding's eiconic theory in *The Image*, see Schelling, 'War Without Pain', p. 466.
69. Boulding, 'Organization and Conflict', p. 126. See also Boulding, *Conflict and Defense*, p. 96.
70. Boulding, *The Image*, p. 111. Also see Boulding, 'Organization and Conflict', p. 126.
71. Boulding, *The Image*, p. 13. This is very similar to the stability of Prägnanz as discussed above.
72. Boulding, 'Organization and Conflict', p. 128.
73. Boulding, *The Image*, pp. 111–12.
74. Schelling, 'Prospectus for a Reorientation of Game Theory', p. 121; Schelling, *The Strategy of Conflict*, p. 168.
75. On Sherif's contributions to the evolving study of group dynamics, see Dorwin Cartwright and Alvin Zander, 'Origins of Group Dynamics', in Dorwin Cartwright and Alvin Zander (eds), *Group Dynamics: Research and Theory*, 2d edn (London: Tavistock Publications Limited, 1960), p. 23.
76. For Schelling's citation of Sherif's essay on social norms, see Schelling, 'Prospectus For a Reorientation of Game Theory', p. 121. The essay was an extract from Muzafer Sherif, *The Psychology of Social Norms* (New York: Harper, 1936; Harper Torchbooks, 1966). In the corresponding chapter of *The Strategy of Conflict*, there is a reference to Sherif but not to his writing. See Schelling, *The Strategy of Conflict*, p. 168.
77. *The Psychology of Social Norms* was an extension of Sherif's doctoral thesis at Columbia. He had earlier completed his masters at Harvard, having left his native Turkey in 1929. See Donald Granberg and Gian Sarup, 'Muzafer Sherif: Portrait of a Passionate Intellectual', in Donald Granberg and Gian Sarup (eds), *Social Judgement and Intergroup Relations: Essays in Honor of Muzafer Sherif* (New York: Springer-Verlag, 1988), pp. 3–15.
78. Sherif, *Psychology of Social Norms*, p. 31.
79. Carmichael, Hogan and Walter, 'An Experimental Study', p. 83. Similar thinking is apparent in Boulding's distinction between 'objective' and 'perceived' hostility, and Simon's interest in situations 'when perception and cognition intervene between the decision-maker and his environment'. Boulding, 'Organization and Conflict', p. 132; Simon, 'Theories of Decision-Making', p. 272. By way of contrast, Lewis Richardson treats hostility as a direct result of the amount of armaments held by the other side. This suggests a much cruder stimulus-response approach to psychology.
80. See Sherif, *Psychology of Social Norms*, p. 75.
81. See ibid., pp. 91–109.
82. Ibid., p. 3. This speaks to the idea of a non-authoritarian form of order; one that does not need to be imposed from above but can be managed by participants in the same process.
83. Gray, 'Strategic Stability Reconsidered', p. 137. For a similar argument directed at Schelling's assumptions, see Lebow, 'Thomas Schelling and Strategic Bargaining', p. 569.
84. Schelling's acknowledgement in his 'Assumptions of Enemy Behavior' of the likelihood of differences in Soviet and American attitudes to such things as civilian casualties is cited in Chapter 2 above.

85. Not all would agree that interaction allowed for the convergence of norms. Wohlstetter's systems analysis approach to stability is based around a high level of strategic interdependence, as discussed in Chapter 2. However, his argument that a totalitarian state might be willing to take greater risks is made in such a way as to suggest a fundamental divergence in value systems between the two participants which would not be easily surmounted.
86. Lebow, 'Schelling's Strategic Bargaining', p. 568.
87. Schelling, 'Prospectus For a Reorientation of Game Theory', p. 121; Schelling, *The Strategy of Conflict*, p. 168. Compare the results in Sherif's experiments for the development of norms between groups of two and groups of three. Sherif, *Psychology of Social Norms*, pp. 102–3.
88. Sherif, 'Introduction to the Torchbook Edition' (1966), in *The Psychology of Social Norms*, p. ix.
89. Schelling, 'Prospectus For a Reorientation of Game Theory', p. 121; Schelling, *The Strategy of Conflict*, p. 168.
90. Sherif, *Psychology of Social Norms*, p. 32.
91. For Sherif's reference to this process as 'perceptual patterning', see ibid., p. 143.
92. Ibid., p. 85.
93. Schelling, 'Bargaining, Communication, and Limited War', p. 28; Schelling, *The Strategy of Conflict*, p. 68.
94. Sherif, *Psychology of Social Norms*, p. 90.
95. Sherif, 'Introduction to the Torchbook Edition', p. xiii.
96. Ibid.
97. Sherif, *Psychology of Social Norms*, p. 66.
98. Ibid., p. 86.
99. See Chapter 5.
100. See Kurt Lewin, *A Dynamic Theory of Personality: Selected Papers*, trans. Donald K. Adams and Karl E. Zener (New York: McGraw-Hill, 1935), p. 240; Shelley Patnoe, *A Narrative History of Experimental Social Psychology: The Lewin Tradition* (New York: Springer-Verlag, 1988), p. 3.
101. See Mandler and Mandler, 'The Diaspora of Experimental Psychology', p. 402.
102. Koffka, *Gestalt Psychology*, p. 42.
103. See Morton Deutsch, 'Field Theory', *International Encyclopedia of the Social Sciences* (New York: Macmillan and The Free Press, 1968), Vol. V, p. 406.
104. For Sherif's acknowledgement of Lewin's contribution to the ground-figure distinction of the Gestalt theorists, see Sherif, *Psychology of Social Norms*, pp. 39–40.
105. See Kurt Lewin, *Field Theory in Social Science: Selected Theoretical Papers*, ed. Dorwin Cartwright (London: Tavistock Publications, 1952), p. 146. Also see Deutsch, p. 412.
106. See Kurt Lewin, *Principles of Topological Psychology*, trans. Fritz Heider and Grace M. Heider (New York: McGraw-Hill, 1936), p. 64.
107. See Lewin, *A Dynamic Theory of Personality*, pp. 51, 81. Also see Deutsch, 'Field Theory', p. 409; Ronald Lippitt, 'Kurt Lewin', in *International Encyclopedia of the Social Sciences*, Vol. 9, p. 268.
108. Lewin's work on valences in studies of child psychology were used by Sherif to help explain the origins of value systems. See Sherif, *Psychology of Social Norms*, p. 131.
109. Boulding, 'Organization and Conflict', p. 126. Also see Boulding, *The Image*, p. 10; Boulding, *Conflict and Defense*, p. 6. The importance of the value system in determining the way that the image is perceived is highlighted by Boulding's statement that 'for any individual organism or organization, there are no such things as "facts". There are only messages filtered through a changeable value system.' Boulding, *The Image*, p. 14.

110. Boulding, *The Image*, pp. 151-2. For Lewin on 'locomotion', see Lewin, *Principles of Topological Psychology*, pp. 47-50. Simon's idea of 'satisficing' (see Chapter 4) makes use of Lewin's work on 'aspiration levels'. See Simon, 'Theories of Decision-Making', p. 263.
111. Boulding, 'Organization and Conflict', p. 128.
112. Lewin relied on Köhler's treatment of 'restructuring'. See Lewin, *A Dynamic Theory of Personality*, p. 83.
113. See Lewin, *Principles of Topological Psychology*, p. 155.
114. Deutsch, 'Field Theory', p. 409. This is a state of 'psychological conflict'. Ibid. Lewin cites the 'affectivity of the small child when he first awakens from sleep' as an example of 'the instability of the field'. Lewin, *Principles of Topological Psychology*, p. 160. For Schelling's reference to Deutsch's own work on cooperation within groups, see Schelling, 'Prospectus for a Reorientation of Game Theory', p. 122n; Schelling, *The Strategy of Conflict*, p. 169n4. Like Schelling, Deutsch used game theory in analysing the mixture of cooperation and competition which occurs within groups.
115. See Cartwright and Zander, 'Origins of Group Dynamics', pp. 9–15.
116. See Patnoe, *A Narrative History*, p. 8. Among the researchers at the Center was Morton Deutsch.
117. Kurt Lewin, 'Group Decision and Social Change', in Theodore M. Newcomb and Eugene L. Hartley (eds), *Readings in Social Psychology* (New York: Henry Holt, 1947), p. 342.
118. See Lewin, 'Group Decision and Social Change', p. 341.
119. Ibid., p. 344.
120. Alex Bavelas, 'Communication Patterns in Task-oriented Groups', in Dorwin Cartwright and Alvin Zander (eds), *Group Dynamics: Research and Theory* (Evanston, IL: Row, Paterson, 1953), pp. 443–506 (Cartwright and Zander also worked with Lewin). This article is cited in Schelling, 'Prospectus for a Reorientation of Game Theory', pp. 5n, 125n; Schelling, *The Strategy of Conflict*, pp. 86n2, 172n7.
121. See Patnoe, *A Narrative History*, p. 31. Also see Lippitt, 'Kurt Lewin', p. 267. According to Cartwright and Zander, in the early years of the Second World War Bavelas 'suggested to Lewin the cluster of ideas known as "group decision"'. Cartwright and Zander, 'Origins of Group Dynamics', p. 29. For Lewin's citation of Bavelas' group work, see Lewin, 'Group Decision and Social Change', pp. 335, 344.
122. Bavelas, 'Communication Patterns', p. 502. This seems closest to the second aspect of Schelling's stability concept – the ability to maintain the bargain. However, Bavelas' approach also suggests the first aspect as well – the initial determination of the bargain – in the sense that a particular form of organisation must first be established.
123. Ibid., p. 505.
124. Harold Guetzkow and Herbert Simon, 'The Impact of Certain Communication Nets Upon Organization and Performance in Task-Oriented Groups', *Management Science*, 1:1 (October 1954), p. 243.
125. Herbert A. Simon, 'A Formal Theory of Interaction in Social Groups', *American Sociological Review*, 17:2 (April 1952), pp. 202–11. For Schelling's reference to Simon's mathematical treatment of Homans' work in this article, see Schelling, 'War Without Pain', pp. 465–6.
126. See Chapter 1.
127. Simon, 'A Formal Theory of Interaction', p. 211.
128. Schelling, 'Strategic Analysis and Social Problems', p. 373.
129. Ibid., p. 373.
130. Schelling, 'Prospectus for a Reorientation of Game Theory', p. 12; Schelling, *The Strategy of Conflict*, p. 91. His reference is Morton Grodzins, 'Metropolitan Segregation', *Scientific American*, 197:4 (October 1957), p. 34. Schelling also discusses 'tipping' in

Schelling, *Micromotives and Macrobehaviour*, pp. 101–2**.** Also see Chapter 1 above.

131. Schelling, 'Prospectus for a Reorientation of Game Theory', p. 13; Schelling, *The Strategy of Conflict*, p. 91. The analysis below reveals that 'tipping' can be seen as an example of positive (self-reinforcing) feedback.
132. On the idea of supplying information in a bargaining process, see Young, *Bargaining*, p. 305.
133. Schelling, 'Signals and Feedback', p. 8.
134. On the use of signals in the tacit collaboration needed to deal with games of 'chicken', see Schelling, 'The Threat of Violence in International Affairs', pp. 106-8. On the signals sent by the United States in the tacit bargaining with the Soviet Union over arms levels, see Schelling, 'Signals and Feedback', pp. 6-7.
135. Here Schelling drew on the work of Erving Goffman, the Canadian sociologist, who described face-to-face communication as 'tacit cooperation'. See Erving Goffman, 'On Face Work: An Analysis of Ritual Elements in Social Interaction', *Psychiatry: Journal for the Study of Interpersonal Processes*, 18:3 (August 1955), p. 224. For Schelling's citation and praise of Goffman's paper, see Schelling, 'Prospectus for a Reorientation of Game Theory', pp. 35n, 49n, 77n; Schelling, *The Strategy of Conflict*, pp. 116n20, 128n8, 149n22. For comments on the similarity between Goffman's and Schelling's work, see Philip Manning, *Erving Goffman and Modern Sociology* (Cambridge: Polity Press, 1992), pp. 60–62; Randall Collins, *Sociology since Midcentury: Essays in Theory Cumulation* (New York: Academic Press, 1981), pp. 240–5.
136. Schelling, 'Surprise Attack and Disarmament', p. 30. Also see Schelling, *The Strategy of Conflict*, p. 124n5.
137. Schelling, 'Proposal for a Special Surveillance Force', p. 7.
138. Schelling, 'Signals and Feedback', p. 8; Schelling, *Arms and Influence*, p. 279.
139. Schelling, 'Managing the Arms Race', p. 608.
140. See Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution* (New York: Basic Books, 1985), p. 6. Von Neumann's contribution here is notable. He spent the last years of his life on studies closely derived from the similarity between the computer and brain. See Shannon's description of von Neumann's work on automata theory in S. Ulam, H. W. Tucker and Claude E. Shannon, 'John von Neumann, 1903–1957', in Donald Fleming and Bernard Bailyn (eds), *The Intellectual Migration Europe and America, 1930–1960* (Cambridge, MA: Harvard University Press, 1969), pp. 255–62. Wiener notes that von Neumann and Morgenstern's game-theory text 'represents a most interesting study of social organization from the point of view of methods closely related to, although distinct from, the subject matter of cybernetics'. Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*, 2d edn (Cambridge, MA: MIT Press, 1948; 1961), p. 19. Also see Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston, MA: Houghton Mifflin, 1950), p. 206. Morgenstern had in fact been an adviser to Wiener and other scholars working on the early cybernetics studies: see Wiener, *Cybernetics*, p. 18.
141. Norbert Wiener, *The Human Use of Human Beings*, p. 6. Also see Wiener, *Cybernetics*, p. 10. On Wiener's contribution to the cognitive revolution, see Gardner, *Mind's New Science*, pp. 19–21. Schelling does not cite the cybernetic theory of Wiener as an influence on his own work, but notes Wiener's influence on Rapoport, and refers to cybernetics in a fashion which suggests some degree of familiarity with this new science. See Schelling, 'War Without Pain', p. 466. There is also some common ground between cybernetics and Wohlstetter's analysis in terms of a shared interest in modern communications systems. For Wohlstetter, the systems engineering applied to the Bell Telephone System has applications for the analysis of conflict systems, despite the fact that such a communication system lacks

the crucial element of conflict. See Wohlstetter, 'Strategy and the Natural Scientists', pp. 188–93. For Wiener's comments on modern telephony, see Wiener, *The Human Use of Human Beings*, pp. 5–6, 69–70.

142. Claude E. Shannon, 'The Mathematical Theory of Communication', in Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (Urbana, IL: University of Illinois Press, 1949; 1962), p. 34. On Shannon and the cognitive revolution, see Gardner, *Mind's New Science*, p. 21.
143. Ibid., p. 39.
144. Schelling and Halperin, *Strategy and Arms Control*, p. 58.
145. Schelling, 'Signals and Feedback', p. 9; Schelling, *Arms and Influence*, p. 279.
146. Ibid.
147. Although note that this is an early instance of Schelling interest in smoking as a research topic.
148. See Chapter 3.
149. See Schelling, 'Signals and Feedback', p. 9; Schelling, *Arms and Influence*, p. 279.
150. Schelling, 'Controlled Response', p. 6. Also see Chapter 1 above on Schelling's antipathy towards 'counterforce'.
151. Schelling, 'Nuclear Weapons in Europe', p. 427.
152. Schelling's description of the sorts of factors which would add to the noise comes very close to Clausewitz's idea of 'friction'. Schelling argues that: 'Violence, especially war, is a confused and uncertain activity, highly unpredictable, depending on decisions made by fallible human beings organized into imperfect governments, depending on fallible communications and warning systems, and on the untested performance of people and equipment.' Schelling, 'The Threat of Violence in International Affairs', p. 105.
153. Schelling, 'Bargaining, Communication, and Limited War', p. 26. On the deliberate addition of 'noise' to drown out a strong signal which points to an outcome one does not find acceptable, see ibid., p. 29n8. Also see Schelling and Halperin, *Strategy and Arms Control*, pp. 81–2.
154. Wiener, *The Human Use of Human Beings*, p. 3.
155. Ibid., p. 8. This draws on Shannon's argument that 'the actual message is one *selected from a set* of possible messages' (emphasis original). Shannon, 'Mathematical Theory of Communication', p. 3.
156. Wiener, *Cybernetics*, p. 134. Wiener notes in his introduction to the 1948 edition that Lewin was among the authorities who contributed to his understanding of the psychological side of cybernetics. See ibid., p. 18. Murray has noted the similarity between the Gestalt psychologists' interest in restructuring for problem solving and the work of Herbert Simon and others who were involved in the 'cognitive revolution'. See Murray, *Gestalt Psychology*, pp. 134–63. Also see Gardner, *Mind's New Science*, pp. 111–14.
157. Wiener, *Cybernetics*, p. 139.
158. Wiener equates 'homogeneity' with the 'greatest disorder possible'. Wiener, *The Human Use of Human Beings*, p. 22.
159. Schelling, *Arms and Influence*, p. 274.
160. Stagner, 'Homeostasis', pp. 499–500. On regulative mechanisms, see Laszlo, *Systems View of the World*, p. 41.
161. See Stagner, 'Homeostasis', p. 500.
162. Boulding, 'Organization and Conflict', p. 122.
163. Schelling and Halperin, *Strategy and Arms Control*, p. 4.
164. Schelling, 'Managing the Arms Race', p. 609.
165. Ibid., p. 610. For similar complaints, see Schelling, *Arms and Influence*, p. 274.
166. For the same point made in terms of prospects for the convergence of differing strategic cultures, see Chapter 5 above.

167. Schelling, 'Signals and Feedback', p. 10.
168. Boulding, *The Image*, p. 92.
169. Ibid., p. 93.
170. Ibid.
171. Ibid., p. 113.
172. See Chapter 5 on Schelling's idea of manipulating the parameters in Prisoner's Dilemma situations. On the idea of 'teaching' the Soviets about 'the extent to which Western programmes are a reaction to theirs', see Schelling, 'Managing the Arms Race', p. 611.
173. This helps explain Schelling's treatment of the three types of arms races as bargaining situations which is examined at the end of Chapter 2.
174. Schelling, 'Comment', in Knorr and Read (eds), *Limited Strategic War*, p. 249.
175. Schelling, Managing the Arms Race', p. 613.
176. Note this places Schelling in a position midway between the extremes of individualism and structuralism: the individual has the ability to affect the situation by choices made, but the prospects for stability rely on the exploitation of group processes.
177. Wiener, *The Human Use of Human Beings*, p. 9.
178. Ibid., p. 71. For Wiener's comments on 'learning' as a form of feedback which also fits in with Schelling's approach, see ibid., p. 69.
179. Ibid., p. 124.
180. Boulding compares his eiconic theory to a 'cybernetic or homeostatic process' involving variables 'which the organization is concerned to maintain at some equilibrium values'. Boulding, 'Organization and Conflict', p. 125. Also see Boulding, *The Image*, pp. 20–21.
181. Harold J. Leavitt and Ronald A. H. Mueller, 'Some Effects of Feedback on Communication', in A. Paul Hare, Edgar F. Borgatta and Robert F. Bates (eds) *Small Groups: Studies in Social Interaction*, rev. edn (New York: Alfred A. Knopf, 1966), p. 435. For Schelling's citation of this essay (in the 1955 edition of the same text), see Schelling, 'Prospectus for a Reorientation of Game Theory', p. 5n; Schelling, *The Strategy of Conflict*, p. 86n2.
182. Marschak, 'Elements for a Theory of Teams', p. 75. For Marschak's citation of Wiener and Shannon see ibid., p. 64. For a further connection between cybernetics and the literature on groups cited by Schelling, note Wiener's acknowledgement of Bavelas' role in the development of his theory. See Wiener, *The Human Use of Human Beings*, p. 196. Also note Lewin's influential role in the development of feedback thinking in social sciences. See George P. Richardson, *Feedback Thought in Social Science and Systems Theory* (Philadelphia, PA: University of Pennsylvania Press, 1991), pp. 99–100. The influence of Wiener's cybernetics on Lewin's thinking is noted in ibid., p. 3.
183. G. Richardson, *Feedback Thought*, p. 128.
184. See W. Ross Ashby, *Design for a Brain: The Origin of Adaptive Behaviour*, 2d edn, rev. (London: Chapman & Hall, 1960), pp. 80–99 (the first edition was published in 1952). Also see G. Richardson, *Feedback Thought*, pp. 109–10; Etcheson, *Arms Race Theory*, p. 9.
185. Also note that Morton Kaplan applied Ashby's thinking to describe 'attempts to find new patterns of stable behaviour after the old patterns have been proved unstable for some reason' as the characteristics of an 'ultrastable system'. M. Kaplan, *System and Process in International Politics*, p. 7.
186. Schelling, 'Proposal for a Special Surveillance Force', p. 4. On the question of misinterpretation in relation to the theory of evidence, note Schelling's observation that feedback relies on 'opinions based on incomplete evidence' rather than 'true facts and beliefs'. Schelling, *Arms and Influence*, p. 276.
187. Schelling, 'Signals and Feedback', p. 5.

188. On the importance of the distinction between the two types of feedback, see Cynthia Russett, *Concept of Equilibrium*, p. 169.
189. See Deutsch, 'Field Theory', p. 413.
190. Similar thinking can be seen in Michael Brecher and Hemda Ben Yehuda's definition of stability as 'change within explicit bounds' and instability as 'change beyond a normal fluctuation range'. They also define 'equilibrium' as 'the steady state of a system, denoting change below the threshold of reversibility'. Michael Brecher and Hemda Ben Yehuda, 'System and Crisis', in Michael Brecher and Jonathan Wilkenfeld (eds), *Crisis, Conflict and Instability* (Oxford: Pergamon Press, 1989), p. 16.
191. Donald A. Schon, *Beyond the Stable State: Public and Private Learning in a Changing Society* (Harmondsworth: Penguin Books, 1973), p. 52. ('Dynamic conservatism' is Schon's metaphor for homeostasis in social systems.) In the strategic situations of the nuclear age, the 'exponential change' would take such a destructive form that the identity of the new stable state would be scarcely worth considering. However, even if completely undesirable, this latter state could still be considered 'stable'. In an interview with the author, Schelling noted that the First World War could be considered a 'stable' war in the sense that it was an ongoing, uninterrupted conflict involving stable front lines, a continuous advantage for the defence, and political conditions which meant that leaders could not afford to surrender. Interview with Schelling, 24 September 1996.
192. Schelling's analysis of 'tipping' suggests a similar process – see above.
193. Schelling, 'Surprise Attack and Disarmament', p. 31; Schelling, *The Strategy of Conflict*, pp. 246–7. For Schelling's comparison of the dangers of feedback in the late 1950s and in the mobilisation which preceded the First World War, see Schelling, *Arms and Influence*, pp. 260–1, and see the discussion of Schelling's use of this mobilisation model in Chapter 1. Clearly, Schelling's mutual fear of surprise attack analysis can also be understood in terms of the dangers of positive feedback. It is instructive to note Schelling's assessment of the 'arms race' concept: 'The basic idea seems to be that of a dynamic feedback system' which may 'accelerate into an explosion' or may 'reach a stable stopping place'. Schelling then cites Lewis Richardson's model of this process. Schelling, 'The Role of Theory', p. 32. For analysis of Lewis Richardson's arms-race model as a precursor to later feedback thinking, see G. Richardson, *Feedback Thought*, pp. 38–41.
194. Schelling, *International Economics*, pp. 95-6. Here is the basic pattern of thinking without the 'feedback' metaphor actually being used. This suggests the primacy of Schelling's work in economics. Feedback theory fitted neatly onto the model which Schelling had already established.
195. Schelling, *International Economics*, p. 96.
196. Schelling and Halperin, *Strategy and Arms Control*, p. 15. The use of the 'explodes' metaphor to refer to the consequences of passing thresholds is also interesting on other grounds: the explosion of a nuclear device occurs when a critical limit has been exceeded. For analysis of the capacity for explosion, see Jervis, *The Meaning of the Nuclear Revolution*, pp. 82-94.
197. Schelling and Halperin, *Strategy and Arms Control*, p. 33. Also see their reference to the danger of war rising above a 'threshold'. Ibid., p. 64. The reference to 'snowballing' as part of an obviously unstable process can be compared to Russett's analysis of the idea of unstable equilibrium in the theory of social systems. She notes that 'the effect of an unstable equilibrium may be "snowballing" in the sense that the system moves farther and farther away from the initial position until a new equilibrium is reached'. Russett, *Concept of Equilibrium*, p. 155.
198. Wiener, *The Human Use of Human Beings*, p. 14. For Schelling's reference to the idea of 'feedback related artillery fire-control', see Schelling, 'War Without Pain', p. 465.
199. Wiener, *Cybernetics*, p. 102.

Conclusion

The preceding chapters have identified the concept of stability as the key to unlocking and understanding the strategic thinking of Thomas Schelling. This applies both to appreciating the very nature of his strategic thought and to discovering its origins.

First, the finding that Schelling has a 'general' concept of stability, illuminates the potentially widespread applicability of his strategic thinking. It underlines that Schelling was interested not only in the stability of the deterrence of general war involving nuclear weapons; the central concern of the time which preoccupied the group of strategic thinkers with which he is rightly associated. Instead, it demonstrates the importance of Schelling's interest in other strategic situations and problems from the challenge of finding stable limits in limited war to the stability of different types of 'arms races', to the stability of disarmament. The general concept also highlights the importance of Schelling's interest in a number of situations which lack a military element such as the phenomenon of 'tipping' between groups and other social processes.

Indeed, it is the general concept of stability which highlights the essential unity of Schelling's thinking, and which constitutes his main contribution to the quest for a general social-scientific theory. This is the second main finding which stems from this study: the consistency of the analytical framework which is applied to all of these situations. The consistent question here is whether there is a particular point at which the expectations of the parties can converge and remain converged. The original settlement at this point constitutes the first tier of Schelling's general concept of stability and its maintenance constitutes the second tier.

The origin of this consistent question is Schelling's treatment of conflict situations as processes of bargaining. Stability in each situation is a product of a process of bargaining between the participants whose interdependence creates an inherent challenge – indeterminacy within the wide range of potential bargains which are on offer. It is the consistent quest for stability which creates the need for a single, mutually

accepted outcome, which stands out from other outcomes because of its symbolic nature. Stability in bargaining is thus all about identifying and maintaining (the two aspects of the general concept) such qualitatively unique resting places.

The bargaining Schelling has in mind is usually tacit rather than explicit, and the parties involved may not always be aware that they are involved in such a process. However, if they are aware of the interdependence which characterises their actions, they are able to exploit the bargaining relationship. According to Schelling's theory, it is possible to structure the expectations in a strategic relationship so that they are more likely to converge on a favourable outcome – to achieve stability at a preferred location within the possible range of bargains. Hence there is a unity in Schelling's strategic theory where his interest in bargaining, in coercion based on the exploitation of bargaining, and in stability all fit together to form a coherent whole.

ON THE ORIGINS OF THE THEORY

Understanding Schelling's approach to the concept of stability also illuminates what is distinct about the origins of his strategic thinking. His interest in the search for stable deterrence against the danger of general war links him to the work of the other American civilian strategic analysts with whom he helped oversee the 'golden age' of nuclear strategy. As Chapter 2 of this book has confirmed, the significance of the work of Bernard Brodie and Albert Wohlstetter for Schelling's own understanding of the stability of deterrence requires continuing acknowledgement.

But Schelling's interest in stability in a whole range of other cases, i.e. his general concept, points to other traditions. This is not to deny the importance of the strategic context in supplying him with quite a range of examples for fruitful theorising: the Korean War was an especially profitable source of different varieties of symbolic resting places around which stability could be established and maintained. But neither individually nor in combination do these examples explain why Schelling saw fit to apply a single coherent theory to each of them.

In Schelling's case, theory enjoys primacy over strategic context. A study of Schelling's interest in stability, stretching back to his early work on economic problems, reveals that by the time he came to look at questions of military strategy in any depth, Schelling had already developed his analytical framework. The problems of the nuclear age – of limited war, surprise attack and arms control – were mainly important in providing him with a series of interesting problems around which to test and refine his pre-existing theory.

To unpick Schelling's stability analysis reveals the range of sources for this theory which treats strategy as a social science. First, Schelling's formulation of the problem of indeterminacy in bargaining situations can be linked back to discussions of the same question in the economics literature. In this literature one can detect the association of stability with the ability to strike a bargain.

Second, game theory provides Schelling with invaluable insights into both bargaining situations and the nature of stable equilibria. The distinction between the first and second tiers of Schelling's stability concept highlights the importance of these influences: in its first tier, Schelling's concept can be seen as the question: given situation *a*, what is the stable equilibrium *b*? In terms of its second aspect, the logarithm is reversed: given stable equilibrium *b*, what aspects of situation *a* are necessary to maintain it? Moreover, it is through key game-theoretical concepts such as defection and the Prisoner's Dilemma that this study is able to offer a general definition for Schelling's stability concept: the absence of incentives to defect from a co-operative outcome to an outcome involving great loss for both players.

Third, understanding the centrality of Schelling's stability analysis helps to highlight the influence of other portions of contemporary social-scientific theory upon his thinking. These areas include aspects of social psychology, organisation theory and communication theory in which one would not necessarily expect an economist or strategist to have much interest. In particular, the comparison Schelling makes between stability in social situations and stability in strategy helps provide his general concept with a dynamic, adaptive element. This wider social-scientific theory also adds much to Schelling's identification of the sort of qualitative distinctions which make for stable bargains – namely, the 'patterns' whose stabilising attributes are discussed in Gestalt psychology and related literatures.

As many of the ideas he draws on from these fields are amenable to bargaining theory, their inclusion supports the unity and coherence of his overall analytical framework. An especially good example is the idea of 'feedback' found in much of the literature on organisation and communication theory with which Schelling was aquainted. Feedback, which provides such a good explanation for the 'explosive' tendencies which characterises potentially unstable situations, is a description of the interdependence which characterises bargaining processes. Manipulating the feedback in strategic situations is equivalent to manipulating the incentives and expectations involved in bargaining. Similarly, communication is itself a means by which the bargaining takes place.

LIMITATIONS

But despite its theoretical richness and analytical coherence, Schelling's approach to strategy is not without its faults. His general stability concept is revealing here because it seems to work better in some situations and less well in others. Schelling's theory of bargaining-based stability appears to work best in a limited-war situation when nuclear weapons are in the background, and are recognised by the various parties involved as putting a premium on the need to find some compromise short of a destabilising spiral towards mutual harm. There is of course a very strong logic to this point, since few things could be more effective than nuclear weapons at reminding participants in a conflict situation of the interdependence which links them.

However, nuclear weapons do not appear to be quite so suitable for bargaining purposes in and of themselves. Schelling makes a strong case that the 'tradition' against the use of nuclear weapons as a good example of the sort of qualitative distinction which allows for stability. But the extreme consequences of the use of any number of these weapons suggests that there is no real range of bargains from which to select. In fact, it is the very qualitative distinction (real in terms of their consequences and symbolic in terms of how those consequences are viewed) which makes tacit bargaining with nuclear weapons such a difficult prospect to grasp. Schelling's advocacy of the observation of clear patterns of behaviour and the maintenance of an ability to communicate should deterrence fail – by holding cities hostage in a nuclear war – represents a logical extension of his general theory of strategy and his general concept of stability, but it is so much more difficult to contemplate than stopping a limited war at a river. In this sense Schelling falls victim to the sense of unreality which afflicts aspects of nuclear strategy.

Additionally, some strategic situations may not be nearly as non-zero-sum, and thus amenable to bargaining, as he might hope. While there may be obvious potential for interdependence in the *military* relationship, in some cases the broader *political* motivations behind the conflict, which tend to be excluded in Schelling's analysis, may suggest an unwillingness to entertain any bargain. It may be a rare thing for a state not to want a stable resting point in a conflict and instead be satisfied only with the complete removal of its opponent from the scene. However, North Vietnam's apparent attitude to France and then the United States indicates that such stumbling blocks to Schelling's approach can occur.

On a similar subject, Schelling makes a strong case for rejecting the notion that conflict should be seen in terms of zero-sum games. But in turn he runs the risk of overestimating the extent of cooperation in some situations. This is particularly so when Schelling draws on theories of

pure co-ordination, such as some experimental games in communication and organisation theory, where conflict is entirely absent from the picture. These objections do not make his strategic theory less coherent. But in some cases the assumptions behind its application may not always hold.

A USEFUL STRATEGIC THEORY TODAY?

These strengths and limitations, which arise from a close study of Schelling's concept of stability, are helpful in considering the contemporary utility of his approach to strategy. If his thinking was to be viewed as a direct product of the Cold War, and restricted largely to East–West strategic relations, it would be easy to regard it as having been completely overtaken by events. It is over a decade since the end of the Cold War, during which the world was dominated by the relationship between two superpower rivals. Bargains between them (either tacit in the form of norms of behaviour preventing the escalation of tensions and limited conflict or explicit in terms of formal nuclear arms-control agreements) no longer seem so central to international security.

Instead of an oversimplified strategic equation where almost every local conflict could be seen as connected to the East–West balance, it is now much harder to argue that there is a threat of general war attached to many of the world's conflict situations. This leaves much less room, for example, for arguments that the background presence of nuclear weapons increases the importance of seeking stability in a range of local conflicts.

In the early twenty-first century the United States enjoys a position of pre-eminence which would appear to significantly reduce the imperative to seek bargains in potential conflict situations. Instead, the solitary superpower is much more free to pursue old-fashioned notions of victory in a largely zero-sum environment against 'rogue' states and transnational enemies.

This logic suggests that the 'war on terror' must be fought to avoid future carnage rather than be avoided because of the dangers of escalation. It is not portrayed as a battle against groups who have limited political goals which makes bargains possible, and who are reasonably rational actors who can be coerced into limits. The targets of that war tend to be portrayed as evil fanatics who have no interest in stability of any sort. (Of course, in Schelling's own pattern of strategic thinking it might be argued that this reputation for fanaticism can contribute to bargaining power.) A stable environment exists only when such groups have been eliminated. Schelling's assumption of restrained competition seems out of place here.

In addition, many of the established rules of the game (the precedents and patterns in international conflict behaviour much sought after by Schelling) appear to have been seriously eroded. The obvious proliferation of nuclear weapons in light of the 1998 nuclear weapons tests by India and Pakistan signalled a further weakening of the norms (the standards of behaviour) behind the Nuclear Non-Proliferation Treaty. The challenging of the norms of non-intervention in the name of humanitarian operations also seems to suggest an important challenging of the old rules. The George W. Bush administration's explicit consideration of pre-emption (more properly, prevention) is another important sign that the existing tacit bargains affecting international conflict behaviour are being significantly challenged.

This all makes for a fascinating mix. On the one hand, global concerns about the spread of weapons of mass destruction, terrorism on the scale of the 11 September attacks and a single superpower facing few obvious checks and balances in the one-sided international system would appear to heighten the need for stability of many kinds. On the other hand, there seems to be great uncertainty about whether new or revised norms of behaviour can be fashioned to provide the focal points around which stable bargains can be established.

By the same token, the sort of strategic behaviour which Schelling so richly describes is in clear evidence on many fronts. The United States and its allies have used the threat of force in attempts to coerce the behaviour of Iraq and North Korea. Kim Jong-Il in turn is well known for using threats involving North Korea's nuclear weapon's programme to extract concessions from the international community. The macroterrorism of the al-Qaeda network is a demonstrated capacity of the power to hurt. The periodic rise and fall of tensions in India–Pakistan relations against the prospect of a nuclear weapons exchange on the subcontinent is another important contemporary example. This on again–off again crisis between New Dehli and Islamabad speaks volumes in terms of the need for stability in the arms-race behaviour between the two sides, in the use reciprocal threats and in their limited proxy conflict over Kashmir. There also seems to be a need for an ongoing bargain precluding the use of major force between China and the United States over potential crises in the Taiwan Straits.

An overall appraisal suggests therefore that there are some circumstances in which Schelling's approach would seem applicable and others where his stability-bargaining framework and the assumptions behind it are less relevant. In that sense, it is an extension of the argument made over some Cold War crises where some cases also seemed a better fit than others. But in the early twenty-first century, there is probably increasing recognition of the *diversity* of conflict situations. In an age buffeted by the

winds of postmodern thinking, there is a corresponding reluctance to entertain notions of a single, broadly applicable, theory of conflict. This would seem to be the greatest challenge facing any attempt to apply Schelling's approach in the present era. His general concept of stability was central to an attempt to derive a general theory of strategy, and the current strategic environment does not seem especially conducive to overarching frameworks. The idea of strategy as a general social-scientific theory is therefore open to question.

But Schelling's notion of conflict as lying between pure conflict and pure cooperation may itself offer a powerful way of thinking about the value of his approach to strategy. It may be rare to find the stability-bargaining framework operating in pure form, but this is not to deny the prospect of a mixture with other approaches to strategy. Rather than a purely competitive, zero-sum relationship between Schelling's way of thinking and approaches which treat conflict in different ways, there may be the prospect of a grand bargain between them. Whether this can result in a stable overall strategy to resolve the indeterminacy in strategic studies remains to be seen.

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