Learning from Schelling's *Strategy of Conflict*, by Roger Myerson

Journal of Economic Literature 47.4 (2009), https://www.jstor.org/stable/40651534

Thomas Schelling's *Strategy of Conflict* (1960) is an important classic of social theory which has fundamentally influenced the development of game theory.

Ch 2 "An essay on bargaining" [commitment], https://www.jstor.org/stable/1805498

Ch 3 "Bargaining, communication, and limited war" [coordination], https://www.jstor.org/stable/172548

Von Neumann (1928) defined games in general dynamic ***extensive form***, then reduced them to a one-stage ***normal form*** where players choose strategies simultaneously.

Nash (1951) suggested ***equilibrium*** as a general solution concept for games.

A ***Nash equilibrium*** is a complete prediction, specifying a strategy for each player, such that each player's strategy is a best response to the others' predicted strategies.

A complete prediction can be generally believed and rationally fulfilled only if it is such an equilibrium. (*Nonequilibrium theories would lead to their own falsification!*)

In games with a unique equilibrium, it must be the only rational prediction.

But what if a game has multiple equilibria? Economists have an interest in economic determinism, but Schelling saw pervasive reality of games with multiple equilibria.

Schelling's focal point effect*:* When a game has **multiple equilibria**, anything in the shared **culture** or history or environment that focuses people's attention on one Nash equilibrium can generate expectations that people will behave as this equilibrium predicts, so that it becomes rational for everyone to fulfill this prediction.

Ch 2 "Essay on bargaining": ***to commit credibly to promise/threat, stake a relationship***.

Payoffs (u_1,u_2) in the ***stag hunt****:*

	2 friendly	2 aggressive
1 friendly	**5, 5**	0, 4
1 aggressive	4, 0	**2, 2**

Both-friendly is a Nash equilibrium that gives both players the best payoff 5.
Both-aggressive is also a Nash equilibrium, giving worse payoffs for both (2,2).
People playing this bad equilibrium have a ***social problem***, a bad relationship, which could they escape only with leadership or coordination (jointly affirming friendship).

Payoffs (u_1,u_2) in the ***prisoners' dilemma****:*

	2 friendly	2 aggressive
1 friendly	3, 3	0, 5
1 aggressive	5, 0	**2, 2**

Here the only equilibrium yields (2,2). Suggestions of friendship cannot be trusted!

Now suppose they ***play the prisoners' dilemma first, then play the stag hunt***.
This extensive game has an equilibrium where both play the strategy:
"be friendly until someone is aggressive, but thereafter be aggressive."
Each is deterred from aggression in the prisoners' dilemma because the current gain 5-3 would be less than the future cost 5-2 of losing friendship in the stag hunt.
A similar logic could could deter them from aggression in a longer sequence of ***repeated prisoners' dilemmas***, followed by one final instance of the stag hunt.
*Repeated games with patient players generally have a wide range of different equilibria, each supported by an expectation that any unjustified deviation would be punished by switching to another equilibrium that is worse for the deviator (****Folk Theorem****).*

Chapter 3: ***"Bargaining, communication and limited war"***

Finding foundations of social order in limited war.

First consider shared interests, no communication...

Tacit coordination: • couple separated in big store;

- 2 parachutists want to meet in terrain of Fig 1.

Tacit bargaining (2 players with divergent interests):

- one "X" gets $3 & other $2 (status quo), else $0;
- each can demand $0 to $100, get if sum ≤$100;
- commanders of armies at x & y want their troops to occupy maximal terrain without conflict.

...**Coordinating power of salient focal points**.

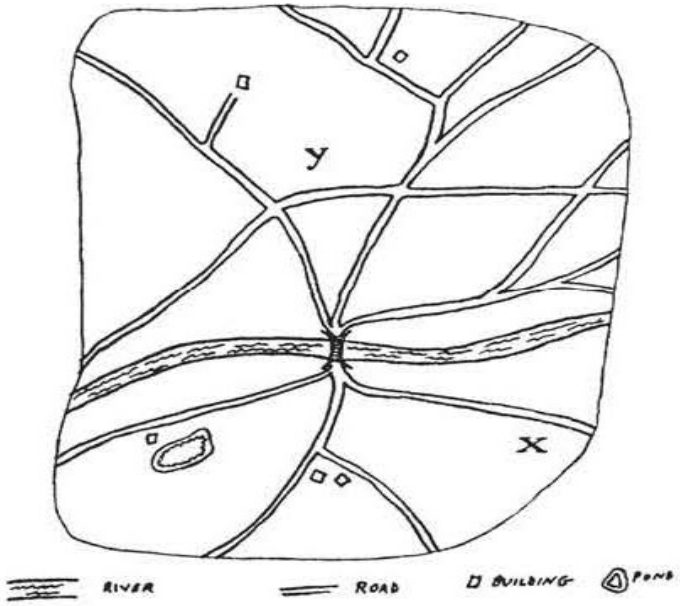

FIG. 1

Explicit bargaining (with communication):

- A retreating army may be expected to make a determined stand at the river, which is the one line to which they can retreat without being expected to retreat further; an advancing army's push beyond it could raise expectations of insatiable demands.

The power of focal points, which may be the main principle in tacit bargaining, remains significant in bargaining with communication (precedent, mediation).

Limited war: limits of Korean conflict 1950-53, gas & nuclear taboos (tactical nucs?), the sanctity of internationally recognized borders (Munich 1938).

Each holds at a ***mutually recognized line***, to avoid mutual expectations of wider conflict.

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Consider an island where every day different matched pairs play the following **rival-claimants** game in various places on the island:

Payoffs (u_1,u_2):	2 claims	2 defers
1 claims	-1, -1	**9, 0**
1 defers	**0, 9**	0, 0

Nash equilibria:

- (1 claims, 2 defers) → (u_1,u_2) = (9,0). [***player 1 is recognized as owner***]
- (1 defers, 2 claims) → (u_1,u_2) = (0,9). [***player 2 is recognized as owner***]
- each claims with independent probability 9/10 → each $Eu_i = 0 = 0.9\times-1 + 0.1\times9$.

[*If both do same, they might repeat the symmetric (0,0) eqm until one player claims.*]

A model of self-enforcing ownership, which could be transferred by a handshake.
Economists' assumptions of negligible transaction costs depend on multiple equilibria.

Social equilibria: anarchy; traditional ownership, *legislation* of ownership principles; focal arbitration by a *recognized leader* (duly elected, with limited authority); *divination*.
Constitutional rules can effectively constrain a leader when a violation of these rules would be generally seen as disqualifying the violator from leadership.

Politics as a game with multiple equilibria to solve all multiple-equilibrium problems.
[*Rents from focal arbitration could provide resources to reward those who supported the leader in a contest for power/recognition (my APSR 2008).*]

Herodotus's story about the initial establishment of a state:

Deioces had always been a man of note, and now he set himself to practice justice ever more and more keenly. The Medes in his own village, seeing the manner of the man's life, chose him to be a judge among them. And he, since it was power he was courting, was always straight and just. Indeed, people in other villages learned that Deioces was the one man for judging according to the rule of right, and at last they would entrust their suits to none but him.

Deioces came to realize that now everything hung on himself. Whereupon he refused to sit as judge anymore and said he would serve no longer. So robbery and lawlessness grew even more in the villages than before.

The Medes all came to a meeting place, and they persuaded one another to be ruled by a king. Then at once the question was proposed as to whom to make king. Deioces was so much in everyone's mouth that all ended by agreeing that he should be their king.

He bade them to build him houses worthy of royalty and to strengthen him with a bodyguard. He compelled the Medes to make one great fortress. When he had ordered these matters and had strengthened himself in royal power, he was very exact in his observance of justice.

[Herodotus, ***The Histories***, c. 440 BCE.]

(See also Thucydides's ***Melian Debate***, about focal equilibria in a repeated game.)

https://home.uchicago.edu/~rmyerson/research/stratofc_notes.pdf