

Bargaining, communication, and limited war

THOMAS C. SCHELLING

Yale University

Limited war requires limits; so do strategic maneuvers if they are to be stabilized short of war. But limits require agreement or at least some kind of mutual recognition and acquiescence. And agreement on limits is difficult to reach, not only because of the uncertainties and the acute divergence of interests but because negotiation is severely inhibited both during war and before it begins and because communication becomes difficult between adversaries in time of war. Furthermore, it may seem to the advantage of one side to avoid agreement on limits, in order to enhance the other's fear of war; or one side or both may fear that even a show of willingness to negotiate will be interpreted as excessive eagerness.

The study of tacit bargaining—bargaining in which communication is incomplete or impossible—assumes importance, therefore, in connection with limited war, or, for that matter, with limited competition, jurisdictional maneuvers, jockeying in a traffic jam, or getting along with a neighbor that one does not speak to. The problem is to develop a *modus vivendi* when one or both parties either cannot or will not negotiate explicitly or when neither would trust the other with respect to any agreement explicitly reached. The present paper will examine some of the concepts and principles that seem to underlie tacit bargaining and will

attempt to draw a few illustrative conclusions about the problem of limited war or analogous situations. It will also suggest that these same principles may often provide a powerful clue to understanding even the logically dissimilar case of explicit bargaining with full communication and enforcement.

The most interesting situations and the most important are those in which there is a conflict of interest between the parties involved. But it is instructive to begin with the special simplified case in which two or more parties have identical interests and face the problem not of reconciling interests but only of co-ordinating their actions for their mutual benefit, when communication is impossible. This special case brings out clearly the principle that will then serve to solve the problem of tacit "bargaining" over conflicting preferences.

Tacit Co-ordination (Common Interests)

When a man loses his wife in a department store without any prior understanding on where to meet if they get separated, the chances are good that they will find each other. It is likely that each will think of some obvious place to meet, so obvious that each will be sure that the other is sure that it is "obvious" to both of them. One does not

simply predict where the other will go, since the other will go where he predicts the first to go, which is wherever the first predicts the second to predict the first to go, and so ad infinitum. Not "What would I do if I were she?" but "What would I do if I were she wondering what she would do if she were I wondering what I would do if I were she . . . ?" What is necessary is to co-ordinate predictions, to read the same message in the common situation, to identify

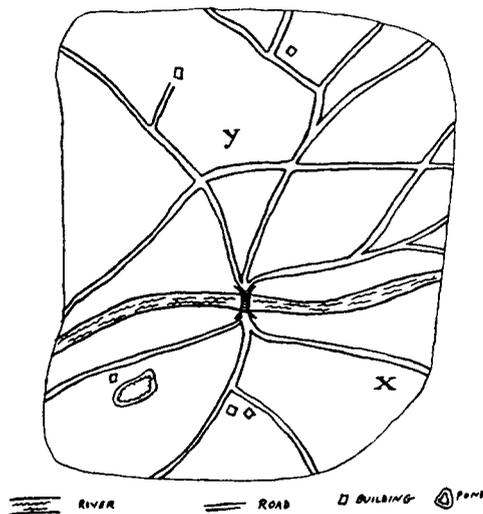


FIG. 1

the one course of action that their expectations of each other can converge on. They must "mutually recognize" some unique signal that co-ordinates their expectations of each other. We cannot be sure they will meet, nor would all couples read the same signal; but the chances are certainly a great deal better than if they pursued a random course of search.

The reader may try the problem himself with the adjoining map (Fig. 1). Two people parachute unexpectedly into the area shown, each with a map and knowing the other has one, but neither knowing where the other has dropped or able to communi-

cate directly. They must get together quickly to be rescued. Can they study their maps and "co-ordinate" their behavior? Does the map suggest some particular meeting place so unambiguously that each will be confident that the other reads the same suggestion with confidence?

The writer has tried this and other analogous problems on an unscientific sample of respondents; and the conclusion is that people often can co-ordinate. The following abstract puzzles are typical of those that can be "solved" by a substantial proportion of those who try. The solutions are, of course, arbitrary to this extent: any solution is "correct" if enough people think so. The reader may wish to confirm his ability to concert in the following problems with those whose scores are given in a footnote.¹

¹ In the writer's sample, 36 persons concerted on "heads" in problem 1, and only 6 chose "tails." In problem 2, the first three numbers were given 37 votes out of a total of 41; the number 7 led 100 by a slight margin, with 13 in third place. The upper left corner in problem 3 received 24 votes out of a total of 41, and all but 3 of the remainder were distributed in the same diagonal line. Problem 4, which may reflect the location of the sample in New Haven, Connecticut, showed an absolute majority managing to get together at Grand Central Station (information booth), and virtually all of them succeeded in meeting at 12 noon. Problem 6 showed a variety of answers, but two-fifths of all persons succeeded in concerting on the number 1; and in problem 7, out of 41 people, 12 got together on \$1,000,000, and only 3 entries consisted of numbers that were not a power of 10; of those 3, 2 were \$64 and, in the more up-to-date version, \$64,000! Problem 8 caused no difficulty to 36 out of 41, who split the total fifty-fifty. Problem 9 secured a majority of 20 out of 22 for Robinson. An alternative formulation of it, in which Jones and Robinson were tied on the first ballot at 28 votes each, was intended by the author to demonstrate the difficulty of concerting in case of tie; but the respondents surmounted the difficulty and gave Jones 16 out of 18 votes (apparently on the basis of Jones's earlier position on the list),

1. Name "heads" or "tails." If you and your partner name the same, you both win a prize.

2. Circle one of the numbers listed in the line below. You win if you all succeed in circling the same number.

7 100 13 261 99 555

3. Put a check mark in one of the sixteen squares. You win if you all succeed in checking the same square.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. You are to meet somebody in New York City. You have not been instructed where to meet; you have no prior understanding with the person on where to meet; and you cannot communicate with each other. You are simply told that you will have to guess where to meet and that he is being told the same thing and that you will just have to try to make your guesses coincide.

5. You were told the date but not the hour of the meeting in No. 4; the two of you must guess the exact minute of the day for meeting. At what time will you appear at the meeting place that you elected in No. 4?

6. Write some positive number. If you all write the same number, you win.

7. Name an amount of money. If you all name the same amount, you can have as much as you named.

8. You are to divide \$100 into two piles,

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proving the main point but overwhelming the subsidiary point in the process. In the map most nearly like the one reproduced here (Fig. 1), 7 out of 8 respondents managed to meet at the bridge. These and other results of the experiment and the results of subsequent tests will be analyzed more fully in this *Journal* in a later article.

labeled A and B. Your partner is to divide another \$100 into two piles labeled A and B. If you allot the same amounts to A and B, respectively, that your partner does, each of you gets \$100; if your amounts differ from his, neither of you gets anything.

9. On the first ballot, candidates polled as follows:

Smith	19	Robinson	29
Jones	28	White	9
Brown	15		

The second ballot is about to be taken. You have no interest in the outcome, except that you will be rewarded if someone gets a majority on the second ballot and you vote for the one who does. Similarly, all voters are interested only in voting with the majority, and everybody knows that this is everybody's interest. For whom do you vote on the second ballot?

These problems are artificial, but they illustrate the point. People *can* often concert their intentions or expectations with others if each knows that the other is trying to do the same. Most situations—perhaps every situation for people who are practiced at this kind of game—provide some clue for coordinating behavior, some focal point for each person's expectation of what the other expects him to expect to be expected to do. Finding the key, or rather finding *a* key—any key that is mutually recognized as the key becomes *the* key—may depend on imagination more than on logic; it may depend on analogy, precedent, accidental arrangement, symmetry, aesthetic or geometric configuration, casuistic reasoning, and who the parties are and what they know about each other. Whimsy may send the man and his wife to the "lost and found"; or logic may lead each to reflect and to expect the other to reflect on where they would have agreed to meet if they had had a prior agreement to cover the contingency. It is not being asserted that they will always find an ob-

vious answer to the question; but the chances of their doing so are ever so much greater than the bare logic of abstract random probabilities would ever suggest.

A prime characteristic of most of these "solutions" to the problems, i.e., of the clues or co-ordinators or focal points, is some kind of prominence or conspicuousness. But it is a prominence that depends on time and place and who the people are. Ordinary folk lost on a plane circular area may naturally go to the center to meet each other; but only one versed in mathematics would "naturally" expect to meet his partner at the center of gravity of an irregularly shaped area. Equally essential is some kind of uniqueness; the man and his wife cannot meet at the "lost and found" if the store has several. The writer's experiments with alternative maps indicated clearly that a map with many houses and a single crossroads sends people to the crossroads, while one with many crossroads and a single house sends most of them to the house. Partly this may reflect only that uniqueness conveys prominence; but it may be more important that uniqueness avoids ambiguousness. Houses may be intrinsically more prominent than anything else on the map; but if there are three of them, none more prominent than the others, there is but one chance in three of meeting at a house, and the recognition of this fact may lead to the rejection of houses as the "clue."²

But in the final analysis we are dealing with imagination as much as with logic; and the logic itself is of a fairly casuistic kind. Poets may do better than logicians at this

game, which is perhaps more like "puns and anagrams" than like chess. Logic helps—the large plurality accorded to the number 1 in problem 6 seems to rest on logic—but usually not until imagination has selected some clue to work on from among the concrete details of the situation.

Tacit Bargaining (Divergent Interests)

A conflict of interest enters our problem if the parachutists dislike walking. With communication, which is not allowed in our problem, they would have argued or bargained over where to meet, each favoring a spot close to himself or a resting place particularly to his liking. In the absence of communication, their overriding interest is to concert ideas; and if a particular spot commands attention as the "obvious" place to meet, the winner of the bargain is simply the one who happens to be closer to it. Even if the one who is farthest from the focal point knows that he is, he cannot withhold his acquiescence and argue for a fairer division of the walking; the "proposal" for the bargain that is provided by the map itself—if, in fact, it provides one—is the only extant offer; and, without communication, there is no counterproposal that can be made. The conflict gets reconciled—or perhaps we should say ignored—as a by-product of the dominant need for co-ordination.

"Win" and "lose" may not be quite accurate, since both may lose by comparison with what they could have agreed on through communication. If the two are actually close together and far from the lone house on the map, they might have eliminated the long walk to the house if they could have identified their locations and concerted explicitly on a place to meet between them. Or it may be that one "wins" while the other loses more than the first wins: if both are on the same side of the

² That this would be "correct" reasoning, incidentally, is suggested by one of the author's map experiments. On a map with a single house and many crossroads, the eleven people who chose the house all met, while the four who chose crossroads all chose different crossroads and did not even meet one another.

house and walk to it, they walk together a greater distance than they needed to, but the closer one may still have come off better than if he had had to argue it out with the other.

This last case illustrates that it may be to the advantage of one to be unable to communicate. There is room here for a motive to destroy communication or to refuse to collaborate in advance on a method of meeting if one is aware of his advantage and confident of the "solution" he foresees. In one variant of the writer's test, A knew where B was, but B had no idea where A was (and each knew how much the other knew). Most of the recipients of the B-type questionnaire smugly sat tight, enjoying their ignorance, while virtually all the A-questionnaire respondents grimly acknowledged the inevitable and walked all the way to B. Better still may be to have the power to send but not to receive messages: if one can announce his position and state that his transmitter works but not his receiver, saying that he will wait where he is until the other arrives, the latter has no choice. He can make no effective counteroffer, since no counteroffer could be heard.³

The writer has tried a sample of conflict-interest games on a number of people, including games that are biased in favor of one party or the other; and, on the whole, the outcome suggests the same conclusion that was reached in the purely co-operative games. All these games require co-ordination; they also, however, provide several alternative choices over which the two parties' interests differ. Yet, among all the available options, some particular one usually seems

to be the focal point for co-ordinated choice, and the party to whom it is a relatively unfavorable choice quite often takes it simply because he knows that the other will expect him to. The choices that cannot co-ordinate expectations are not really "available" without communication. The odd characteristic of all these games is that neither rival can gain by outsmarting the other. Each loses unless he does exactly what the other expects him to do. Each party is the prisoner or the beneficiary of their mutual expectations; no one can disavow his own expectation of what the other will expect him to expect to be expected to do. The need for agreement overrules the potential disagreement, and each must concert with the other or lose altogether. Some of these games are arrived at by slightly changing the problems given earlier, as we did for the map problem by supposing that walking is onerous.

1. A and B are to choose "heads" or "tails" without communicating. If both choose "heads," A gets \$3 and B gets \$2; if both choose "tails," A gets \$2 and B gets \$3. If they choose differently, neither gets anything. You are A (or B); which do you choose? (Note that if both choose at random, there is only a 50-50 chance of successful coincidence and an expected value of \$1.25 apiece—less than either \$3 or \$2.)

2. You and your two partners (or rivals) each have one of the letters A, B, and C. Each of you is to write these three letters, A, B, and C, in any order. If the order is the same on all three of your lists, you get prizes totaling \$6, of which \$3 goes to the one whose letter is first on all three lists, \$2 to the one whose letter is second, and \$1 to the person whose letter is third. If the letters are not in identical order on all three lists, none of you gets anything. Your letter is A (or B, or C); write here the three letters in the order you choose:

—, —, —.

³ This is an instance of the general paradox that what is impotence by ordinary standards may, in bargaining, be a source of "strength." The general principle is illustrated at length in a previous article (3).

3. You and your partner (rival) are each given a piece of paper, one blank and the other with an "X" written on it. The one who gets the "X" has the choice of leaving it alone or erasing it; the one who gets the blank sheet has the choice of leaving it blank or writing an "X" on it. If, when you have made your choices without communicating, there is an "X" on only one of the sheets, the holder of the "X" gets \$3 and the holder of the blank sheet gets \$2. If both sheets have "X's" or both sheets are blank, neither gets anything. Your sheet of paper has the original "X" on it; do you leave it alone or erase it? (*Alternate*: your sheet of paper is the blank one; do you leave it blank or write an "X"?)

4. You and your partner (rival) are to be given \$100 if you can agree on how to divide it without communicating. Each of you is to write the amount of his claim on a sheet of paper; and if the two claims add to no more than \$100, each gets exactly what he claimed. If the two claims exceed \$100, neither of you gets anything. How much do you claim? \$_____.

5. You and your partner are each to pick one of the five letters, K, G, W, L, or R. If you pick the same letter, you get prizes; if you pick different letters, you get nothing. The prizes you get depend on the letter you both pick; but the prizes are not the same for each of you, and the letter that would yield you the highest prize may or may not be his most profitable letter. For you the prizes would be as follows:

K	\$4	L	\$2
G	\$3	R	\$5
W	\$1		

You have no idea what his schedule of prizes looks like. You begin by proposing to him the letter R, that being your best letter. Before he can reply, the master-of-ceremonies intervenes to say that you were not supposed to be allowed to communicate and

that any further communication will disqualify you both. You must simply write down one of the letters, hoping that the other chooses the same letter. Which letter do you choose? (*Alternate* formulation shows schedule of K-\$3, G-\$1, W-\$4, L-\$5, R-\$2, and has the "other" party make an initial proposal of the letter R before communication is cut off.)

6. Two opposing forces are at the points marked X and Y in a map similar to the one in Figure 1. The commander of each force wishes to occupy as much of the area as he can and knows the other does too. But each commander wishes to avoid an armed clash and knows the other does too. Each must send forth his troops with orders to take up a designated line and to fight if opposed. Once the troops are dispatched, the outcome depends only on the lines that the two commanders have ordered their troops to occupy. If the lines overlap, the troops will be assumed to meet and fight, to the disadvantage of both sides. If the troops take up positions that leave any appreciable space unoccupied between them, the situation will be assumed "unstable" and a clash inevitable. Only if the troops are ordered to occupy identical lines or lines that leave virtually no unoccupied space between them will a clash be avoided. In that case, each side obtains successfully the area it occupies, the advantage going to the side that has the most valuable area in terms of land and facilities. You command the forces located at the point marked X (Y). Draw on the map the line that you send your troops to occupy.

7. A and B have incomes of \$100 and \$150 per year, respectively. They are notified of each other's income and told that they must begin paying taxes totaling \$25 per year. If they can reach agreement on shares of this total, they may share the annual tax bill in whatever manner they agree

on. But they must reach agreement without communication; each is to write down the share he proposes to pay, and if the shares total \$25 or more, each will pay exactly what he proposed. If the proposed shares fail to add up to \$25, however, each will individually be required to pay the full \$25, and the tax collectors will keep the surplus. You are A (B); how much do you propose to pay? \$_____.

8. A loses some money, and B finds it. Under the house rules, A cannot have his money back until he agrees with the finder on a suitable reward, and B cannot keep any except what A agrees to. If no agreement is reached, the money goes to the house. The amount is \$16, and A offers \$2 as a reward. B refuses, demanding half the money for himself. An argument ensues, and the house intervenes, insisting that each write his claim, once and for all, without further communication. If the claims are consistent with the \$16 total, each will receive exactly what he claims; but if together they claim more than \$16, the funds will be confiscated by the house. As they sit pondering what claims to write, a well-known and respected mediator enters and offers to help. He cannot, he says, participate in any bargaining, but he can make a "fair" proposal. He approaches A and says, "I think a reasonable division under the circumstances would be a 2-1 split, the original owner getting two-thirds and the finder one-third, perhaps rounded off to \$11 and \$5, respectively. I shall make the same suggestion to him." Without waiting for any response, he approaches the finder, makes the same suggestion, and says that he made the same suggestion to the original owner. Again without waiting for any response, he departs. You are A (B); what claim do you write?

The outcomes in the writer's informal sample are given in the footnote.⁴ In those

problems where there is some asymmetry between "you" and "him," i.e., between A and B, the A formulations were matched with the B formulations in deriving the "outcome." The general conclusion, as given in more detail in the footnote, is that the participants can "solve" their problem in a substantial proportion of the cases; they certainly do conspicuously better than any chance methods would have permitted, and even the disadvantaged party in the biased games permits himself to be disciplined by the message that the game provides for their co-ordination.

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⁴ In the first problem, 16 out of 22 A's and 15 out of 22 B's chose heads. Given what the A's did, heads was the best answer for B; given what the B's did, heads was the best answer for A. Together they did substantially better than at random; and, of course, if each had tried to win \$3, they would all have scored a perfect zero. Problem 2, however, which is logically similar to 1 but with a more compelling structure, showed 9 out of 12 A's, 10 out of 12 B's, and 14 out of 16 C's, successfully co-ordinating on ABC. (Of the remaining 7, incidentally, 5 discriminated against themselves in departing from alphabetical order, all to no avail.) Problem 3, which is structurally analogous to 1, showed 18 out of 22 A's concerting successfully with 14 out of 19 B's, giving A the \$3 prize. In problem 4, 36 out of 40 chose \$50. (Two of the remainder were \$49 and \$49.99.) In problem 5 the letter R won 5 out of 8 votes from those who had proposed it, and 8 out of 9 votes from those who were on the other side. In problem 6, 14 of 22 X's and 14 of 23 Y's drew their boundaries exactly along the river. The "correctness" of this solution is emphatically shown by the fact that the other 15, who eschewed the river, produced 14 different lines. Of 8×7 possible pairs among them, there were 55 failures and 1 success. Problem 7 showed 5 out of 6 of those with incomes of \$150 and 7 out of 10 of those with incomes of \$100 concerting on a 15-10 division of the tax. In problem 8 both those who lost money and those who found it, 8 and 7 persons, respectively, unanimously concerting on the mediator's suggestion of an even \$5 reward.

The "clues" in these games are diverse. Heads apparently beat tails, though not very regularly on the first test, through some kind of conventional priority, similar to the convention that dictates A, B, C, though not nearly so strong. The original X beats the blank sheet, apparently because the "status quo" is more obvious than change. The letter R wins because there is nothing to contradict the first offer. Roads might seem, in principle, as plausible as rivers, especially since their variety permits a less arbitrary choice. But, precisely because of their variety, the map cannot say *which* road; so roads must be discarded in favor of the unique and unambiguous river. (Perhaps in a symmetrical map of uniform terrain, the outcome would be more akin to the 50-50 split in the \$100 example—a diagonal division in half, perhaps—but the irregularity of the map rather precludes a geometrical solution.)

The tax problem illustrates a strong power of suggestion in the income figures. The abstract logic of this problem is identical with that of the \$100 division; in fact, it could be reworded as follows: each party pays \$25 in taxes, and a refund of \$25 is available to be divided among the two parties if they can agree on how to divide it. This formulation is logically equivalent to the one in problem 7, and, as such, it differs from problem 4 only in the amount of \$25 instead of \$100. Yet the inclusion of income figures, just by suggesting their relevance and making them prominent in the problem, shifts the focal point substantially to a 10-15 split rather than 12.5-12.5. And why, if incomes are relevant, is a perfectly *proportional* tax so obvious, when perhaps there are grounds for graduated rates? The answer must be that no *particular* graduation of rates is so obvious as to go without saying; and, if speech is impossible, by default the uniquely simple and recognizable prin-

ciple of proportionality has to be adopted. First, the income figures take the initial plausibility away from a 50-50 split; then the simplicity of proportionality makes 10-15 the only one that could possibly be considered capable of tacit recognition. The same principle is displayed by an experiment in which question 7 was deliberately cluttered up with *additional* data—on family size, spending habits, and so on. Here the unique attraction of the income proportionate split apparently became so diluted that the preponderant reply from both the high-income and the low-income respondents was a simple 50-50 division of the tax. The refined signal for the income proportionate split was drowned out by "noise," and the cruder signal was all that came through.

Finally, problem 8 is again logically the same as problem 4, the amount being \$16 available for two people if they can write claims that do not exhaust the amount. But the institutional arrangement is discriminatory; finder and loser do not have a compelling equality in any moralistic or legalistic sense, so the 50-50 split seems not quite obvious. The suggestion of the mediator provides the only other signal that is visible; its potency as a co-ordinator is seen even in the rounding to \$11 and \$5, which was universally accepted.

In each of these situations the outcome is determined by something that is fairly arbitrary. It is not a particularly "fair" outcome, from either an observer's point of view or the points of view of the participants. Even the 50-50 split is arbitrary in its reliance on a kind of recognizable mathematical purity; and if it is "fair," it is so only because we have no concrete data by which to judge its unfairness, such as the source of the funds, the relative need of the rival claimants, or any potential basis for moral or legal claims. Splitting the difference in an argument over

kidnap ransom is not particularly "fair," but it has the mathematical qualities of problem 4.

If we ask what determines the outcome in these cases, the answer again is in the co-ordination problem. Each of these problems requires co-ordination for a common gain, even though there is rivalry among alternative lines of common action. But, among the various choices, there is usually one or only a few that can serve as co-ordinator. Take the case of the first offer in problem 5. The strongest argument in favor of R is the rhetorical question, "If not R, what then?" There is no answer so obvious as to give more than a random chance of concerting, even if both parties wanted to eschew the letter R after the first offer was made. To illustrate the force of this point, suppose that the master-of-ceremonies in that problem considered the first offer already to have spoiled the game and thought he might confuse the players by announcing the reversal of their prize schedules. A will get whatever prize B would have gotten, and B will get the prizes shown in A's schedule in problem 5. Does the original offerer of R have any reason to change his choice? Or suppose that the master-of-ceremonies announced that the prizes would be the same, no matter what letter were chosen, so long as they both picked the same letter. They will still rally to R as the only indicated means of co-ordinating choices. If we revert to the beginning of this game and suppose that the original proposal of R never got made, we might imagine a sign on the wall saying, "In case of doubt always choose R; this sign is visible to all players and constitutes a means of co-ordinating choices." Here we are back at the man and his wife in the department store, whose problems are over when they see a conspicuous sign that says, "The management suggests that all persons who become separated

meet each other at the information booth in the center of the ground floor." Beggars cannot be choosers about the source of their signal or about its attractiveness compared with others that they can only wish were as conspicuous.

The irony would be complete if, in game 5, your rival knew your prize schedule and you did not know his (as was the case in a variant of question 5 used in some questionnaires). Since you have no basis for guessing his preference and could not even do him a favor or make a "fair" compromise if you wished to, the only basis for concerting is to see what message you can both read in your schedule. Your own preferred letter seems the indicated choice; it is hard to see why to pick any other or which other to pick, since you have no basis for knowing what other letter is better for him than R itself. His knowledge of your preference, combined with your ignorance of his and the lack of any alternative basis for co-ordination, puts on him the responsibility of simply choosing in your favor. (This, in fact, was the preponderant result among the small sample tested.) It is the same situation as when only one parachutist knew where the other was.⁵

Explicit Bargaining

The concept of "co-ordination" that was developed previously for tacit bargaining does not seem directly applicable to explicit bargaining. There is no apparent need for intuitive rapport when speech can be used; and the adventitious clues that co-ordinated thoughts and influenced the outcome in the tacit case revert to the status of incidental details.

Yet there is abundant evidence that some

⁵ And it is another example of the power that resides in "weakness," which was commented on in an earlier footnote.

such influence is powerfully present even in explicit bargaining. In bargains that involve numerical magnitudes, for example, there seems to be a strong magnetism in mathematical simplicity. A trivial illustration is the tendency for the outcomes to be expressed in "round numbers"; the salesman who works out the arithmetic for his "rock-bottom" price on the automobile at \$2,507.63 is fairly pleading to be relieved of \$.63. The frequency with which final agreement is precipitated by an offer to "split the difference" illustrates the same point, and the difference that is split is by no means always trivial. More impressive, perhaps, is the remarkable frequency with which long negotiations over complicated quantitative formulas or *ad hoc* shares in some costs or benefits converge ultimately on something as crudely simple as equal shares, shares proportionate to some common magnitude (gross national product, population, foreign-exchange deficit, etc.), or the shares agreed on in the previous negotiation.⁶

Precedent seems to exercise an influence that greatly exceeds its logical importance or legal force. A strike settlement or an international debt settlement often sets a "pattern" that is followed almost by default in subsequent negotiations. Sometimes, to be sure, there is a reason for a measure of uniformity, and sometimes there is enough similarity in the circumstances to explain similar outcomes; but more often it seems that there is simply no heart left in the bargaining when it takes place under the

⁶ From a great variety of formulas proposed for the contributions to UNRRA, the winner that emerged was a straight 1 per cent of gross national product—the simplest conceivable formula and the roundest conceivable number. This formula was, to be sure, the preferred position of the United States during the discussion; but that fact perhaps adds as much to the example as it detracts from it.

shadow of some dramatic and conspicuous precedent.⁷ In similar fashion, mediators often display a power to precipitate agreement and a power to determine the terms of agreement; their proposals often seem to be accepted less by reason of their inherent fairness or reasonableness than by a kind of resignation of both participants. "Fact-finding" reports may also tend to draw expectations to a focus, by providing a suggestion to fill the vacuum of indeterminacy that otherwise exists: it is not the facts themselves, but the creation of a specific suggestion, that seems to exercise the influence.

There is, in a similar vein, a strong attraction to the *status quo ante* as well as to natural boundaries. Even parallels of latitude have recently exhibited their longevity as focal points for agreement. Certainly, there are reasons of convenience in using rivers as the agreed stopping place for troops or using old boundaries, whatever their current relevance; but often these features of the landscape seem less important for their practical convenience than for their power to crystallize agreement.

These observations would be trivial if they meant only that bargaining results were *expressed* in simple and qualitative terms or that minor accommodations were made to round off the last few cents or miles or people. But it often looks as though the ultimate focus for agreement did not just reflect the balance of bargaining powers but provided bargaining power to one side or the other. It often seems that a cynic could have predicted the outcome on the basis of some "obvious" focus for agreement, some strong suggestion contained in the situation itself, without much regard to the merits of

⁷ This and the preceding paragraph are illustrated by the speed with which a number of Middle Eastern oil-royalty arrangements converged on the 50-50 formula a few years after World War II.

the case, the arguments to be made, or the pressures to be applied during the bargaining. The "obvious" place to compromise frequently seems to win by some kind of default, as though there is simply no rationale for settling anywhere else. Or if the "natural" outcome is taken to reflect the relative skills of the parties to the bargain, it may be important to identify that skill as the ability to set the stage in such a way as to give prominence to some particular outcome that would be favorable. The outcome may not be so much conspicuously fair or conspicuously in balance with estimated bargaining powers as just plain "conspicuous."

This conclusion may seem to reduce the scope for bargaining skill, if the outcome is already determined by the configuration of the problem itself and where the focal point lies. But perhaps what it does is shift the locus where skill is effective. The "obvious" outcome depends greatly on how the problem is formulated, on what analogies or precedents the definition of the bargaining issue calls to mind, on the kinds of data that may be available to bear on the question in dispute. When the committee begins to argue over how to divide the costs, it is already constrained by whether the terms of reference refer to the "dues" to be shared or the "taxes" to be paid, on whether a servicing committee is preparing national-income figures or balance-of-payments figures for their use, on whether the personnel of the committee brings certain precedents into prominence by having participated personally in earlier negotiations, on whether the inclusion of two separate issues on the same agenda will give special prominence and relevance to those particular features that they have in common. Much of the skill has already been applied when the formal negotiations begin.⁸

If all this is correct, as it seems frequently to the author to be, our analysis of tacit

bargaining may help to provide an understanding of the influence at work; and perhaps the logic of tacit bargaining even provides a basis for believing it to be correct. The fundamental problem in tacit bargaining is that of *co-ordination*; we should inquire, then, what has to be co-ordinated in explicit bargaining. The answer may be that explicit bargaining requires, for an ultimate agreement, some co-ordination of the participants' expectations. The proposition might be as follows:

Most bargaining situations ultimately involve some range of possible outcomes within which each party would rather make a concession than fail to reach agreement at all. In such a situation any potential outcome is one from which at least one of the parties, and probably both, would have been willing to retreat for the sake of agreement, and very often the other party knows it. Any potential outcome is therefore one that either party could have improved by insisting; yet he may have no basis for insisting, since the other knows or suspects that he would rather concede than do without agreement. Each party's strategy is guided mainly by what he expects the other to accept or insist on; yet each knows that the other is guided by reciprocal thoughts. 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. Somehow, out of this

⁸ Perhaps another role for skill is contained in this general approach. If one is unsuccessful in getting the problem so formulated that the "obvious" outcome is near his own preferred position, he can proceed to confuse the issue. Find multiple definitions for all the terms and add "noise" to drown out the strong signal contained in the original formulation. The technique may not succeed; but in one of our income tax problems it certainly did.

fluid and indeterminate situation that seemingly provides no logical reason for anybody to expect anything except what he expects to be expected to expect, a decision is reached. 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.

If we then ask what it is that can bring their expectations into convergence and bring the negotiation to a close, we might propose that it is the intrinsic magnetism of particular outcomes, especially those that enjoy prominence, uniqueness, simplicity, precedent, or some rationale that makes them qualitatively differentiable from the continuum of possible alternatives. We could argue that expectations tend not to converge on outcomes that differ only by degree from alternative outcomes but that people have to dig in their heels at a groove in order to make any show of determination. One has to have a reason for standing firmly on a position; and along the continuum of qualitatively undifferentiable positions one finds no rationale. The rationale may not be strong at the arbitrary "focal point," but at least it can defend itself with the argument "If not here, where?"

There is perhaps a little more to this need for a mutually identifiable resting place. If one is about to make a concession, he needs to control his adversary's expectations; he needs a recognizable limit to his own retreat. If one is to make a finite concession that is not to be interpreted as capitulation, he needs an obvious place to stop. A mediator's suggestion may provide it; or any other element that qualitatively distinguishes the new position from surrounding positions. If one has been demanding 60 per cent and recedes to 50 per cent, he can get his heels in; if he recedes to 49 per cent, the other will assume that he has hit the skids and will keep sliding.

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 unlimited retreat. There is stability at the river—and perhaps nowhere else.

This proposition may seem intuitively plausible; it does to the writer, and in any event some kind of explanation is needed for the tendency to settle at focal points. But the proposition would remain vague and somewhat mystical if it were not for the somewhat more tangible logic of tacit bargaining. The latter provides not only an analogy but the demonstration that the necessary psychic phenomenon—tacit co-ordination of expectations—is a real possibility and even, in some contexts, a reliable one. The "co-ordination" of expectations is analogous to the "co-ordination" of behavior when communication is cut off; and, in fact, they both involve nothing more nor less than intuitively perceived mutual expectations. Thus the empirically verifiable results of some of the tacit-bargaining games, as well as the more logical role of co-ordinated expectations in that case, prove that expectations can be co-ordinated and that some of the objective details of the situation can exercise a controlling influence when the co-ordination of expectations is essential. *Something* is perceived by both parties when communication is absent; it must still be perceptible, though undoubtedly of lesser force, when communication is possible. The possibility of communication does not make 50-50 less symmetrical or the river less

unique or A B C a less natural order for those letters.

If all we had to reason from were the logic of tacit bargaining, it would be only a guess and perhaps a wild one that the same kind of psychic attraction worked in explicit bargaining; and if all we had to generalize from were the observation of peculiarly "plausible" outcomes in actual bargains, we might be unwilling to admit the force of adventitious details. But the two lines of evidence so strongly reinforce each other that the analogy between tacit and explicit bargaining seems a potent one.

To illustrate with the problem of agreeing explicitly on how to divide \$100: 50-50 seems a plausible division, but it may seem so for too many reasons. It may seem "fair"; it may seem to balance bargaining powers; or it may, as suggested in this paper, simply have the power to communicate its own inevitability to the two parties in such fashion that each appreciates that they both appreciate it. What our analysis of tacit bargaining provides is evidence for the latter view. The evidence is simply that *if* they had to divide the \$100 without communicating, they could concert on 50-50. Instead of relying on intuition, then, we can point to the fact that in a slightly different context—the tacit-bargaining context—our argument has an objectively demonstrable interpretation.

To illustrate again: the ability of the two commanders in one of our problems to recognize the stabilizing power of the river—or, rather, their inability not to recognize it—is substantiated by the evidence that if their survival depended on some agreement about where to stabilize their lines *and communication were not allowed*, they probably could perceive and appreciate the qualities of the river as a focus for their tacit agreement. So the tacit analogy at least demonstrates that the idea of "co-ordinating expectations" is meaningful rather than mystical.

Perhaps we could push the argument further still. Even in those cases in which the only distinguishing characteristic of a bargaining result is its evident "fairness," by standards that the participants are known to appreciate, we might argue that the moral force of fairness is greatly reinforced by the power of a "fair" result to focus attention, if it fills the vacuum of indeterminacy that would otherwise exist. Similarly, when the pressure of public opinion seems to force the participants to the obviously "fair" or "reasonable" solution, we may exaggerate the "pressure" or at least misunderstand the way it works on the participants unless we give credit to its power to co-ordinate the participants' expectations. It may, to put it differently, be the power of *suggestion*, working through the mechanism described in this paper, that makes public opinion or precedent or ethical standards so effective. Again, as evidence for this view, we need only to suppose that the participants had to reach ultimate agreement without communicating and visualize public opinion or some prominent ethical standard as providing a strong suggestion analogous to the suggestions contained in our earlier examples. The mediator in problem 7 is a close analogy. Finally, even if it is truly the force of moral responsibility or sensitivity to public opinion that constrains the participants, and not the "signal" they get, we must still look to the source of the public's own opinion; and there, the writer suggests, the need for a simple, qualitative rationale often reflects the mechanism discussed in this paper.

But, if this general line of reasoning is valid, any analysis of explicit bargaining must pay attention to what we might call the "communication" that is inherent in the bargaining situations, the signals that the participants read in the inanimate details of the case. And it means that tacit and ex-

licit bargaining are not thoroughly separate concepts but that the various gradations from tacit bargaining up through types of incompleteness or faulty or limited communication to full communication all show some dependence on the need to co-ordinate expectations. Hence all show some degree of dependence of the participants themselves on their common inability to keep their eyes off certain outcomes.

This is not an argument for expecting explicit outcomes as a rule to lean toward those that would have merged if communication had been impossible; the focal points are certainly different when speech is allowed, except in some of the artificial cases we have used in our illustrations. But what may be the *main* principle in tacit bargaining apparently may be at least *one* of the important principles in the analysis of explicit bargaining. And, since even much so-called "explicit" bargaining includes maneuver, indirect communication, jockeying for position, or speaking to be overheard, or is confused by a multitude of participants and divergent interests, the need for convergent expectations and the role of signals that have the power to co-ordinate expectations may be powerful.

Perhaps many kinds of social stability and the formation of interest groups reflect the same dependence on such co-ordinators as the terrain and the circumstances can provide: the band wagon at political conventions, that often converts the slightest sign of plurality into an overwhelming majority; the power of constitutional legitimacy to command popular support in times of anarchy or political vacuum; the legendary power of an old gang leader to bring order into the underworld, simply because obedience depends on the expectation that others will be obedient in punishing disobedience. The often expressed idea of a "rallying point" in social action seems to reflect the

same concept. In economics the phenomena of price leadership, various kinds of non-price competition, and perhaps even price stability itself appear amenable to an analysis that stresses the importance of tacit communication and its dependence on qualitatively identifiable and fairly unambiguous signals that can be read in the situation itself. "Spontaneous" revolt may reflect similar principles: when leaders can easily be destroyed, people require some signal for their co-ordination, a signal so unmistakably comprehensible and so potent in its suggestion for action that everyone can be sure that everyone else reads the same signal with enough confidence to act on it, thus providing one another with the immunity that goes with action in large numbers. (There is even the possibility that such a signal might be provided from outside, even by an agent whose only claim to leadership was its capacity to signal the instructions required for concerted action.)

Tacit Negotiation and Limited War

What useful insight does this line of analysis provide into the practical problems of tacit bargaining that usually confront us, particularly the problems of strategic maneuver and limited war? It certainly suggests that it is *possible* to find limits to war—real war, jurisdictional war, or whatever—without overt negotiation. But it gives us no new strong sense of *probability*. War was limited in Korea, and gas was not used in World War II; on the possibility of limited war these two facets are more persuasive than all the suggestions contained in the foregoing discussion. If the analysis provides anything, then, it is not a judgment of the probability of successfully reaching tacit agreement but a better understanding of where to look for the terms of agreement.

If there are important conclusions to be drawn, they are probably these: (1) tacit

agreements or agreements arrived at through partial or haphazard negotiation require terms that are qualitatively distinguishable from the alternatives and cannot simply be a matter of degree; (2) when agreement must be reached with incomplete communication, the participants must be ready to allow the situation itself to exercise substantial constraint over the outcome; specifically, a solution that discriminates against one party or the other or even involves "unnecessary" nuisance to both of them may be the only one on which their expectations can be co-ordinated.

Gas was not used in World War II. The agreement, though not without antecedents, was largely a tacit one. It is interesting to speculate on whether any alternative agreement concerning poison gas could have been arrived at without formal communication (or even, for that matter, with communication). "Some gas" raises complicated questions of how much, where, under what circumstances: "no gas" is simple and unambiguous. Gas only on military personnel; gas used only by defending forces; gas only when carried by vehicle or projectile; no gas without warning—a variety of limits is conceivable; some may make sense, and many might have been more impartial to the outcome of the war. But there is a simplicity to "no gas" that makes it almost uniquely a focus for agreement when each side can only conjecture at what rules the other side would propose and when failure at co-ordination on the first try may spoil the chances for acquiescence in any limits at all.

The physical configuration of Korea must have helped in defining the limits to war and in making geographical limits possible. The area was surrounded by water, and the principal northern political boundary was marked dramatically and unmistakably by a river. The thirty-eighth parallel seems to

have been a powerful focus for a stalemate; and the main alternative, the "waist," was a strong candidate not just because it provided a shorter defense line but because it would have been clear to both sides that an advance to the waist did not necessarily signal a determination to advance farther and that a retreat to the waist did not telegraph any intention to retreat farther.

The Formosan Straits made it possible to stabilize a line between the Communist and National government forces of China, not solely because water favored the defender and inhibited attack, but because an island is an integral unit and water is a conspicuous boundary. The sacrifice of any part of the island would have made the resulting line unstable; the retention of any part of the mainland would have been similarly unstable. Except at the water's edge, all movement is a matter of degree; an attack across water is a declaration that the "agreement" has been terminated.

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. No definition of size or target is so obvious and natural that it goes without saying, except for "no size, on any target." American assistance to the French forces in Indochina was persuasively limited to material, not people; and it was appreciated that an enlargement to include, say, air participation could be recognized as limited to air, while it would not be possible to establish a limited *amount* of air or ground participation. 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.

The strategy of retaliation is affected by the need to communicate or co-ordinate on limits. Local aggression defines a place; with luck and natural boundaries, there may be tacit acceptance of geographical limits or types of targets. One side or both may be willing to accept limited defeat rather than take the initiative in breaching the rules and to act in a manner that reassures the other of such willingness. The "rules" may be respected because, if they are once broken, there is no assurance that any new ones can be found and jointly recognized in time to check the widening of the conflict. But if retaliation is left to the method and place of the retaliator's own choosing, it may be much more difficult to convey to the victim what the proposed limits are, so that he has a chance to accept them in his counter-retaliation. In fact, 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. Thus the problem of finding mutually recognized limits on war is doubly difficult if the definition implicit in the aggressor's own act is not tolerable.

In sum, the problem of limiting warfare involves not a continuous range of possibilities from most favorable to least favorable for either side; it is a lumpy, discrete world that is better able to recognize qualitative than quantitative differences, that is embarrassed by the multiplicity of choices, and that forces both sides to accept some dictation from the elements themselves. The writer suggests that the same is true of restrained competition in every field in which it occurs.

Prior Arrangements

While the main burden of this paper has been that tacit bargaining is possible and is susceptible of systematic analysis, there is

no assurance that it will succeed in any particular case or that, when it succeeds, it will yield to either party a particularly favorable outcome compared with alternatives that might have been available if full communication had been allowed. There is no assurance that the next war, if it comes, will find mutually observed limits in time and of a sort to afford protection, unless explicit negotiation can take place. There is reason, therefore, to consider what steps can be taken before the time for tacit bargaining occurs, to enhance the likelihood of a successful outcome.

Keeping communication channels open seems to be one obvious point. (At a minimum, this might mean assuring that a surrender offer could be heard and responded to by either side.) The technical side of this principle would be identification of who would send and receive messages, upon what authority, over what facilities, using what intermediaries if intermediaries were used, and who stood in line to do the job in what fashion if the indicated parties and facilities were destroyed. In the event of an effort to fight a restrained nuclear war, there may be only a brief and busy instant in which each side must decide whether limited war is in full swing or full war has just begun; and twelve hours' confusion over how to make contact might spoil some of the chances for stabilizing the action within limits.

Thought should be given to the possible usefulness of mediators or referees. To settle on influential mediators usually requires some prior understanding, or at least a precedent or a tradition or a sign of welcome. Even if we rule out overt arrangements for the contingency, evidences by each side of an appreciation of the role of referees and mediators, even a little practice in their use, might help to prepare an instrument of the most extreme value in an awful contingency.

But all such efforts may suffer from the unwillingness of an adversary to engage in any preparatory steps. Not only may an adversary balk at giving signs of eagerness to come to agreement; it is even possible that one side in a potential war may have a tactical interest in keeping that war unrestrained and aggravating the likelihood of mutual destruction in case it comes. Why? Because of the strategy of threats, bluffs, and deterrents. The willingness to start a war or take steps that may lead to war, whether aggression or retaliation to aggression, may depend on the confidence with which a nation's leaders think a war could be kept within limits. To be specific, the willingness of America to retaliate against local aggression with atomic attack depends—and the Russians know that it depends—on how likely we consider it that such retaliation could itself remain limited. That is, it depends on how likely it is in our judgment that we and the Russians, when we both desperately need to recognize limits within which either of us is willing to lose the war without enlarging those limits, will find such limits and come to mutually recognized acquiescence in them. If, then, Russian refusal to engage in any activity that might lead to the possibility of limited war deters our own resolution to act, they might risk forgoing such limits for the sake of reducing the threat of American action. One parachutist in our example may know that the other will be careless with the plane if he is sure they can meet and save themselves; so if the first abstains from discussing the contingency, the other will have to ride quietly for fear of precipitating a fatal separation in the terrain below.

Whether this consideration or just the usual inhibitions on serious negotiation make prior discussion impossible, there is still a useful idea that emerges from one of our earlier games. It is that negotiation or com-

munication for the purpose of co-ordinating expectations need not be reciprocal: unilateral negotiation may provide the co-ordination that will save both parties. Furthermore, even an unwilling member cannot necessarily make himself unavailable for the receipt of messages. Recall the man who proposed the letter R in one of the bargaining games: as long as the partner heard—and it is obvious that he heard—the letter R is the only extant proposal, and, being unchallenged, it may co-ordinate in default of any counterproposal nearly as well as if it had been explicitly accepted. (Even *denial* of it by the other party might not manage to dislodge its claim to prominence but rather simply prove his awareness of it, as long as no rival claim was made that created ambiguousness.) If one of our parachutists, just before the plane failed and while neither of them dreamed of having to jump, idly said, "If I ever had to meet somebody down there, I'd just head for the highest hill in sight," the other would probably recall and know that the first would be sure he recalled and would go there, even though it had been on the tip of his tongue to say, "How stupid," or "Not me, climbing hurts my legs," when the plane failed. When some signal is desperately needed by *both* parties and both parties know it, even a poor signal and a discriminatory one may command recognition, in default of any other. Once the contingency is upon them, their interests, which originally diverged in the play of threats and deterrents, substantially coincide in the desperate need for a focus of agreement.

Two years ago the *Manchester Guardian* suggested that the Western powers consider declaring unilaterally that, in the event of major atomic war, they would not use nuclear weapons against large cities unless the enemy did so first (1, 2). It proposed making a distinction between the massive bomb-

ing of cities and the more restricted use of atomic weapons on a battlefield or on strictly military targets such as airfields. The notion was not that the Soviets would agree overtly or even bother to disagree but that, if war came, both we and they would be so eager to find some limits to the bombing of civilian cities that we both might possibly manage to observe limits—even quite crude limits or discriminatory ones—if there were a proposal in existence as a focus for agreement. Each might at least honor the proposal tentatively, to see whether the other would too; and the result might be a stable mutual acquiescence. This proposal illustrates negotiation with incomplete communication or, to put it differently, tacit negotiation with the help of a prior suggestion. A number of difficulties come to mind: What is a civilian city? What is a military target? What kinds of weapons are ruled out on the former? What margin for error is to be allowed? etc. Could the Western powers possibly find definitions and criteria acceptable enough to the Russians to permit such tacit agreement?

Our analysis of tacit bargaining contains two suggestions on this problem. One is to adopt criteria that are as qualitative and discrete as possible, avoiding reliance on matters of degree or judgment. The other is simply that unilateral suggestions, even if not tested for “acceptability” to the Russians in any sense analogous to explicit agreement, may serve the desperate purpose when there is no alternative but mutual destruction. In fact, the analogous feature of explicit negotiation suggests that negotiated agreement might be more quickly achieved if there were some prior suggestion around which mutual expectations could crystallize when quick agreement was required.⁹

REFERENCES

1. *Manchester Guardian Weekly*, LXXII, No. 19 (May 12, 1955), 1.
2. *Ibid.*, Vol. LXXIII, No. 2 (July 14, 1955).
3. SCHELLING, T. C. “An Essay on Bargaining,” *American Economic Review*, Vol. XLVI, No. 3 (1956).

⁹ The questionnaire experiments referred to in this paper will be discussed more fully in a later article in this *Journal*.