Mediation as Signal

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Abstract   This paper analyzes mediation as a signal. Starting from a stylized case, a game theoretical model of one-sided incomplete information, taken from Cho and Kreps (1987), is applied to discuss strategic effects of mediation. It turns out that to reject mediation can be interpreted as a "negative signal" while the interpretation of accepting or proposing mediation is ambiguous and does not necessarily change the prior beliefs of the uninformed party. This asymmetry suggests that, in equilibrium, there is an excess of mediation.

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Mediation as Signal

This paper discusses mediation as signal and the effect that this interpretation has on its application in dispute resolution.

In general, there appears to be some reservation in turning to mediation as a means of dispute resolution. The reason, it seems, has to do with the fact that the parties involved in the dispute expect the information that they have disclosed as part of the mediation process will be exploited by the other party should mediation fail and the dispute has to be settled by the courts. It is therefore standard practice that parties engaging in mediation declare that they will refrain from outside use of any information obtained in the course of the mediation process. It is of course difficult to assure that the parties *will* stick to this declaration in the event that the mediation fails. The problem is that even if we assume that parties will honour their word, and even if each party expects the other to honour their word, the mere fact of disclosure changes the bargaining game that underlies the mediation process.

Although the most obvious, the disclosure problem is not the only informational issue at stake in mediation. There is a more subtle, and possibly more significant, informational aspect of mediation that has to be considered: the call for, and acceptance of mediation is a signal in the sense of Spence (1974), i.e. it possibly gives away information about the sender, irrespective of its particular informational content. This is the focus of this paper.

In section 2 we provide a stylised case of mediation. In section 3 we present our analytical apparatus in the form of a game of incomplete information. This apparatus is applied to the mediation game in section 4 where it is shown that it can be to the advantage of a "weaker" party to a conflict to neither call for nor accept mediation even if equilibrium selection suggests mediation. Section 5 generalizes the analysis and discusses the welfare effects from interpreting mediation as a signal.

1. The Mediation Story

This paper has been partly motivated by the one of the author's experience of an introductory workshop to mediation organized by the Hamburg Chamber of Commerce in February 2001. The event was centred on a general introduction to the main ideas and concepts of mediation and a

case study in the form of a role playing session. In this paper we will make use of the case which the workshop participants were asked to consider.

On 30 September 1999, the US based firm Biovirus signed a contract with the German Ingenieur GmbH for the delivery of a highly sophisticated and specialized apparatus for the detection of viruses in human blood. The price of the apparatus was $800,000.

Ingenieur GmbH had planned to integrate the Biovirus apparatus into its own and more complex system for which it had a sales contract with a pharmaceutical company, Europa AG. The Biovirus apparatus had two components: the Virus Analytical System Application (VASA) and the Central Electronic Device (CED). The latter supports the integration of VASA into existing medical software.

On 21 March 2000, Biovirus gave notice to Ingenieur GmbH for termination of the contract on the grounds that it could not deliver the CED component within the contractually stipulated time because its own subcontractor was unable to deliver an essential part in time. Biovirus defended its position on the basis of a clause in the contract that permitted termination in the event of "inability to obtain necessary labor or materials from usual sources or other courses beyond the reasonable control of Biovirus." The clause excluded compensatory damages for such circumstances.

Ingenieur GmbH's response was to order their lawyer to decline the notice of termination immediately. It saw no reason why Biovirus should be granted this possibility. Ingenieur GmbH therefore claimed breach of contract and threatened a damage suit in the order DM 1.6m to cover development costs, costs of delay, and of finding a replacement apparatus in the event that Biovirus would stick to its position. In response, Biovirus argued that VASA and CED are themselves projects under development and this was known by Ingenieur GmbH. Further, Biovirus argued that the contract was designed to share the risk in the project because Biovirus itself had substantial development costs to cover and thus excluded the possibility of compensation.

The contract included an arbitration clause which stipulated that in the event of a dispute jurisdiction would be with a court of arbitration in Michigan, USA. Before turning to this means, Ingenieur GmbH's lawyers proposed mediation. Following a short delay, Biovirus accepted the proposal and on 12 May 2000, the parties, their lawyers, and a mediator met in Hamburg.

Let's return to the workshop of 1 February 2001. Having provided the details of the case, which turned out to be fictitious but with all the ingredients of a real dispute that happened to

have been successfully resolved by mediation, the participants were divided up into four groups. Each group was to play out the Biovirus-Ingenieur GmbH dispute and was made up of representatives of the respective parties and their lawyers. Attached to each group was a senior and a junior certified mediator whose task it was to help resolve the conflict.

The author of this paper who participated in the workshop volunteered to be a Biovirus rep. At this point the participants had no information regarding the background and details relevant to the execution of the contract. Such information was given "in private" to the various parties. For example, the Biovirus rep and his lawyer were told that the delivery of CED was not delayed because of the inability of a subcontractor to deliver the essential component but because (a) the system as such was not mature enough for production and, (b) Biovirus had substantial managerial problems that necessitated restructuring of production. This private information to the Biovirus party also indicated that there is an alternative means of producing the CED component; however, it was not clear when it would be ready for delivery, and that Biovirus cannot really afford to have costly conflict with Ingenieur GmbH. In fact, it seemed that Biovirus was in need of business in order to overcome its internal crisis.

Given the available public and the private information, representatives of the two firms started their negotiations with the support of their lawyers. The mediators stood by and tried to structure the dialogue. Both parties attempted to find a means to continue business but - naturally - neither wanted to agree to anything that appeared less favourable than the status quo. However, given that the status quo was only partly disclosed by the public description of the case, both parties tried to glean additional information about the other party, its bargaining position, and its willingness to agree to a compromise. The Ingenieur GmbH rep and its lawyer repeatedly asked why Biovirus accepted mediation. Obviously, they wanted to hear that Biovirus is not sure that the termination of the contract is without financial repercussions if Ingenieur GmbH decides to bring the case before the court. On the other hand, the Biovirus rep repeatedly explained that he is certain that his firm has sure legal footing in terminating the contract and thus can afford to participate in the mediation. Mediation, for the Biovirus, was an opportunity to find a solution that would be more profitable for both parties than the termination of the contract and an end to business relationships.

At this point no private information was disclosed and neither of the parties insisted on clarifying the details which led to the termination of the contract and the pursuit of damages. The parties simply bargained about modifying the old contract without analysing the conflict point.

On the one hand, it seemed that both parties were afraid that such an analysis could produce immediate and irreducible conflict; while on the other, they seemed to agree that the old contract was already history and that it merely functioned to define certain rights but could not be used as a means for future cooperation.

Unfortunately, after about 30 minutes of bargaining and mediating the workshop organizers stopped the role-playing and opened a general discussion about the mediations, its effect on the bargaining, on the outcome, and on the psychological experience and state of the conflicting parties. The bargaining results of the role play became secondary.

2. The Signalling Game

Possibly the experience of the author who participated in the mediation workshop was different to that of the others given his background in game theory. When he sat down to analyze the effect of mediation as a signal he found out that the corresponding game was strategically equivalent to that of the signaling game in Figure 1 to be found in Cho and Kreps (1987).

Figure 1

Let us say that Biovirus, its representative and its lawyer are summarized by player A, while player B represents Ingenieur GmbH. Player B does not know whether A is in a sound legal and financial position or whether its is weak and unsound. In Harsanyi's (1967/68) terms of incomplete information, player A may be strong t_s or weak t_w. Irrespective, however, of what type player A is, A has two options: either to accept B's invitation for mediation or to reject it. B has the option to claim an action of damage (litigate) by initiating a court proceeding or to accept A's notice of termination (not litigate). The resulting outcomes are as follows. B's claim for compensation will be successful if A is weak, but not if A is strong. B's acceptance of the termination of the contract (not litigate) results in a new contract at the mediation table or implies the end of the story if no mediation takes place, i.e. the matter is let rest. We assume that the offer of mediation is not costly. Therefore any explicit modelling of alternative actions of player B - going to court immediately or let the matter rest without offering mediation - would represent superfluous information: he can always come back to these "outside options" after having observed the signal of player A .

Following Cho and Kreps (1987), we state the utility of A as a sum of separate signal and

"fighting" costs. Mediation always bears the risk of information disclosure. This is costly for a weak *A* as disclosure implies weakening of bargaining power or the position in front of court. Therefore the costs of the signal accepting mediation cover both the discounted risk as well as effort - if *A* is weak he will probably spend more on legal counselling or charge the legal department of Biovirus to develop a strategy. The strong *A*, however, does not have to fear information disclosure by accepting mediation. On the contrary, *A* can only gain from demonstrating a strong position both at the mediation table or in court. We can, therefore, refer to accepting mediation as the "strong" signal and rejecting mediation as a "weak" signal and interpret a true signal to be costless, whereas a false signal costs 1 unit. Further, we assume that both types of *A* lose 2 whenever there is a confrontation. If *B* decides to seek a court solution to extract compensatory damages, he earns a payoff of 1 if *A* is weak and 0 if *A* is strong. If, however, *B* does not file for damages, *B* earns a payoff of 0, if *A* is weak and 1 if *A* is strong. Figure 2 summarizes the strategies and the payoffs.

	litigate	not litigate		litigate	not litigate
accept med.	(-3, 1)	(-1, 0)	*accept med.*	(-2, 0)	(0, 1)
reject med.	(-2, 1)	(0, 0)	*reject med.*	(-3, 0)	(-1, 1)
	Weak *A*			Strong *A*	

Figure 2

The reader might be tempted to criticize the exact payoff levels of Figure 2. E.g. it could be argued that in case of no litigation the payoffs of player *B* should be the same for both types of *A*. However, as long as the payoff orderings are maintained in either scenario - with weak or strong *A* - the results are qualitatively similar. The payoffs of Figure 2 can therefore be seen as "quasi-parametric". We have chosen the scalation as in Figure 2 for two reasons: first, any rescalation seems somehow arbitrary and leads only to a distortion of the game theoretic solution without giving new insights. Second, the model coincides with the famous model of Cho and Kreps (1987) and it's strategic equivalence will prove useful for further conceptual discussions in later sections.

Note, however, that the payoff matrices in Figure 2 do not represent the information structure of the game.

The dotted lines in Figure 1 indicate that player B does not know whether he is in node B_1 or B_2. This transforms B's incomplete information about the payoffs of player A into a situation of imperfect information in which B does not know whether "nature" has chosen A to be of type t_w or t_s. The latter situations are, in principle, solvable by assigning probabilities to the choice of nature. Following Cho and Kreps (1987) we assume that B expects A to be of types t_w or t_s with probabilities 0.1 and 0.9, respectively, but the results are in fact insensitive to changes in this probability assumption. (The results remain the same with every distribution in which A is more likely to be strong than weak.)

Given these priors, B should try to avoid a damage suit if there is no further information. But there is further information: B can observe whether or not A accepts mediation. In our workshop case, the mediation was accepted and this raises the question as to whether this is rational within the bounds of our model.

If Biovirus wants to evaluate whether or not it should accept mediation then it has to form expectations about whether Ingenieur GmbH will ultimately litigate. The answer to this question is by backward induction. If, in the course of the dispute, Ingenieur GmbH has to decide whether or not to put an end to mediation and litigate, then it has to form expectations about whether Biovirus is "strong" or "weak". A game theoretic understanding of Biovirus's acceptance of mediation could be helpful in this respect on the grounds that acceptance can be interpreted as a signal. However, as we shall see, there are problems with this.

It is assumed that player A knows his type, i.e. t_w or t_s, and that this information is private. It reflects the additional information which the representative of Biovirus received before the mediation exercise started. Although ideally we should also model Ingenieur GmbH's private information, i.e. the incomplete information which A has with respect to B, this would complicate matters without really adding to the argument. A more elaborate analysis is given in Holler and Lindner (2002).

3. Sequential Equilibria

In the course of the mediation, the Ingenieur GmbH rep asked the Biovirus rep why mediation was accepted. The question was returned by the other party asking why did Ingenieur GmbH offer mediation. These two questions summarize the problem which we want to discuss in

the following.

The extensive game in Figure 1 has two Nash equilibria. Equilibrium I is a pooling equilibrium which is characterized by the fact that A accepts mediation, irrespective of his type, and B does not file for damages (chooses not to litigate) since u_B(not litigate) $= 0.9 \cdot 1 + 0.1 \cdot 0 > u_B$(litigate) $= 0.9 \cdot 0 + 0.1 \cdot 1$. To prevent A being identified as weak, if he is weak, we assume that B litigates with a probability $q \geq 0.5$ if A rejects mediation. Rejection of mediation is taken as a signal that A is weak. As a consequence B updates his priors. If B's posterior beliefs are such that he expects A to be weak with probability, p, greater than 0.5 then B prefers litigation. Obviously, u_B(not litigate) $= (1-p) \cdot 1 + p \cdot 0 < u_B$(litigate) $= (1-p) \cdot 0 + p \cdot 1$, if p > 0.5. At p = 0.5 B is indifferent between litigating and not litigating.

Equilibrium II is also a pooling equilibrium in which A rejects mediation irrespective of his type. In this case B learns nothing: his posterior equals his prior belief. Consequently, B will not litigate. To keep the strong type, t_w, of A from preferring mediation it suffices that A knows that B will claim damages with probability 0.5 or more if B experiences that A accepts mediation. But how can we rationalize B's intention to litigate in this scenario? We simply assume that B believes A to be weak with probability 0.5 or greater, if A accepts mediation. This assumption is possible (i.e. consistent) because accepting mediation is out of Equilibrium II. Note that we assumed a prior belief $p° = 0.1$, although the above reasoning holds for any $p° \leq 0.5$. At $p° = 0.5$ B is indifferent between litigating and not litigating.

If the prior belief that A is weak is greater than 0.5, i.e., $p° > 0.5$, then there exists a well-defined separating Equilibrium III: a strong A will always accept mediation; and B will litigate if A rejects mediation. If, however, A accepts mediation, B will randomize (with probability q = 0.5) on litigating or not, such that a weak A will be indifferent between accepting and rejecting mediation. Note that in the case of rejection of mediation there will be litigation which results in a payoff of -2 for a weak A. Correspondingly, a weak A will randomise (with probability r = (1-$p°$)/$p°$) on accepting and rejecting mediation such that B is indifferent between litigating and not litigating, if A accepts mediation.

On the one hand, Equilibrium III contains the incentive problems of mixed strategy equilibrium: the equilibrium strategy of a weak A depends exclusively on the payoffs of B and the equilibrium strategy of B depends exclusively on the payoffs of a weak A. Consequently, the equilibrium behaviour of, for instance, B will not change if B's payoffs change as long as a mixed

strategy equilibrium exists (see Holler, 1990). On the other hand, there is no equilibrium selection problem involved. These are two reasons why it might be more interesting to focus further analysis on Equilibria I and II which are characterized by pure strategies. Another reason, of course, is that we assumed a prior $p° = 0.1 < 0.5$.

Equilibrium II (reject mediation, not litigate) demonstrates that it could be to the advantage of a "weaker" party to a conflict not to call for, or to accept, mediation. But are B's beliefs reasonable for this equilibrium? Cho and Kreps (1987, p. 185) provide an argument that they are not. A weak A will get a payoff of 0 in equilibrium. By accepting instead of rejecting mediation, the best he could get reduces to a payoff of -1. The acceptance of mediation makes no sense if A is weak, although it will if A is strong: t_s receives a payoff of -1 in the equilibrium by rejecting mediation but can *conceivably* get 0 from accepting it. If B follows his *intuition* and puts no probability weight on a weak A if B observes a willingness to mediate, then an A who is prepared to mediate would be expected to be strong and B would not opt for litigation. If a strong A realizes this argument he will never reject mediation - which "breaks" Equilibrium II.

This equilibrium selection is also confirmed by the results for very low $p°$. In the absence of a weak A, i.e. $p° = 0$, there is no asymmetric information and the strong A will accept mediation. We would not expect this scenario to significantly differ from the one for very low $p°$. This enforces the selection of Equilibrium I.

4. Discussion of the Equilibria

It is notable that for $p° < 0.5$ both equilibria suggest that B will not litigate. For the given priors, this result coincides with the rational decision of B, if B cannot gain information about A's willingness to accept mediation. Thus, it seems that, in the given case, mediation does not have any influence on the decision of B, irrespective of whether it is accepted, rejected, or neglected. Moreover, the analysis of Equilibrium II demonstrates that it could be to the advantage of the "weaker" party of a conflict not to call for or not to accept a mediation: this applies to a weak A. By the logic of this equilibrium, not to litigate is a best reply of B consistent with the priors.

Yet, if we accept the Cho and Kreps' (1987) *intuitive criterion*, then Equilibrium I will be selected and we would expect A to accept mediation, irrespective of his type, and B does not litigate. Consequently, B will identify A as weak, if A rejects mediation, and thus litigate. Hence, Equilibrium I does not provide B with any information as regards A's type, but it forces A to

accept mediation and rationalizes *B*'s renunciation of litigation as a best reply to the perceived equilibrium behaviour of *A*.

The *intuitive criterion* has been critized because of the logical difficulties which arise when interpreting disequilibrium messages as signals (see Mailath et al., 1993). In our case, the argument is as follows: both a strong and weak *A* could choose to accept mediation, which is a deviation from Equilibrium II, in order not to be identified as weak by an application of the *intuitive criterion*. The point is that if *A* is weak his choice is based on understanding the inference that will be drawn if he chooses his favoured strategy. Equally forward looking he would also choose the disequilibrium strategy in order not to be identified as weak. Therefore accepting mediation cannot be interpreted as a signal coming unambiguously from a strong *A*. This breaks the argument of the *intuitive criterion*. Neither a strong nor weak *A* will reject mediation.

But Equilibrium II is still not convincing: if *A* accepts mediation then the beliefs of *B* are inconsistent - *A* being weak with probability 0.5 or larger if *A* accepts mediation. A criterion for drawing conclusions can only be consistent if the resulting beliefs correspond to a sequential equilibrium. Note that the out-of-equilibrium strategies (with respect to Equilibrium II) are *rationalizable* inasmuch as they are the strategies in Equilibrium I. The corresponding beliefs of Equilibrium I cannot, therefore, be rejected as implausible if we accept the priors given in the outset.

Equilibrium II can also be excluded by applying the concept of *strategically stable equilibria* by Kohlberg and Mertens (1986) which selects a subset of the equilibria which fulfils the *intuitive criterion*. Briefly, this concept is axiomatic and further requires the solutions to be stable under perturbations in a well-defined sense. Due to its axiomatic character it is beyond the criticism of the intuitive criterion because it does not refer to beliefs, i.e. it is not linked to possible behaviour. However, this is not the place to go into game theoretical intricacies. It is our hunch that we can expect Equilibrium I: *A* accepts mediation, irrespective of his type, and *B* does not litigate. This corroborates the strategic importance of accepting mediation in this model setting which, however, does not carry over in increasing the information for the other party - or for the public.

5. Effects of Mediation

It is quite clear that we should bear caution about making generalizations from these results: the assumptions of the model are very specific and minor variations in them could generate quite different outcomes. On the other hand, as long as the preference ordering in Figure 2 are maintained, the payoffs can be changed without any effect on the qualitative results. For $p° \leq 0.5$, there are two pooling equilibria and for $p° > 0.5$ we have a separating equilibrium where a weak A and B choose mixed strategies. There are no further (sequential) equilibria.

However, due to the rather basic character of the model, it is probably the case that it is relevant to more complex scenarios. From the above analysis we can conclude that to reject mediation can be interpreted as a "negative signal", indicating that A is weak, while the interpretation of accepting or proposing mediation is ambiguous and provides no clear information. This implies that accepting or proposing mediation does not necessarily induce changes of the prior beliefs of the uninformed party. Thus it does not come as a surprise that B's decision after observing mediation, i.e., not to litigate, is identical to the result which prevails if mediation is not available at all. However, if mediation is available (and observable) then A can afford to reject mediation irrespective of his type. Consequently, it might be A who proposes mediation because, if not, B might conclude that A is weak and revise his priors accordingly.

This suggests that, in equilibrium, we can expect a high level of mediation. This level is likely to be inefficient, compared to a first-best solution in a world of complete information. However, information tends to be incomplete in real world and excess mediation is part of the price which we pay for its incompleteness. This argument parallels the result of social waste of education which derives from the signalling model by Spence (1974).

It could be argued that education is more likely to increase productivity, and thus to be of higher social value than a mere signalling device as assumed in the Spence model. However, mediation is likely to increase cooperation which, in general, also augments the level of productivity if it is not directed towards the exploitation of a third party (like in cartelisation). This effect is not taken into account in the above analysis which focuses only on the signalling effect of mediation. There seems to be trade-off between the social waste of mediation as a signal and the positive effect it has on cooperation. It could well be that we are still far away from the equilibrium level of mediation and its marginal social value of cooperation is larger than its marginal disutility of social waste of signalling.

In cases of conflict, mediation is frequently proposed as a means of cost saving. However, a possible (and rationalizable) outcome of our analysis is that there might be mediation and an action of damages. This result is more costly to a weak Biovirus than not to have mediation.

Mediation is often searched for in the hope that the other party discloses information which can be used to improve one's bargaining power or even one's position in court. However, in the course of the role-play mediation described above, no private information was disclosed. This supports our interpretation of mediation as a signal.

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