A Cheap Take on Orchestration Theory

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Summary

The following work applies the game of Cheap Talk, originally devised by Crawford and Sobel, to Orchestration Theory within a context of Legitimation Politics . The work sheds light on the ability of an intermediary, guided by an IGO orchestrator, to change the direction of a target organisations governance design so that it aligns more closely with an idealised IGO determined design.

Background 1.0

The following model looks at the relationship between orchestrator, intermediary and target though the lense of Cheap Talk. The cheap talk model considered is of infinite sender types, contains an infinite action space, and an infinite number of messages. The rest of section 1 outlines the actors, action space & sets, along with the payoffs, sequence of pay and the Bias function definition. Section 2 describes and discusses the solution theories given the assumption that actors are rational and utility maximising. The appendix provides an overview of Orchestration theory and Legitimation politics for reader clarity.

Actors: 1.1

Sender - Intermediary (I)

Receiver - Target (T)

Action Space: 1.2

The action space exists is bound by the set [0,1]. It refers to the governance design of a voluntary program, and is defined in terms of the number of stakeholders considered. A value of zero denotes a purely business led initiative whilst a value of 1 is the 'perfect' MSI style governance structure.

Action Sets: 1.3

Nature - $X \sim U(0,1], \quad i.e. \ 0 > X \geq 1$; the state of the world is determined by 'nature', in the case of PRI this would be the UN - more generally it may be the IGO orchestrator. They possess knowledge the ideal type of governance structure for voluntary programs, long term divergence from this can be punished. For example due to; future soft law, tacit coercion, or negative media attention. Therefore it is in the interest of the target to conform to some extent.

Intermediary - M containing $k \in [0,1], \quad k > 0$. This is the message that the Intermediary sends to the Target, this message contains a value of k where $0 < k \leq 1$. The message indicates how much a business led initiative should alter its behaviour, however first, to avoid truly revealing preferences and biases, and second, to reflect the reality of complex discourse and debate, the message is clouded so does not directly reveal X.

Target - $Y \in [0,1]$; this is the decision the target then makes based on the message and its k value.

Payoffs: 1.4

The payoffs for the target and the intermediary are described by their respective utility functions:

Intermediary - $U_T(x, y) = -(x - y - b)^2$

Target - $U_I(x, y) = -(x - y)^2$

Sequence of Play: 1.5

The intermediary knows the state of the world from its affiliation with a powerful orchestrative IGO. The intermediary sends a message M containing a value k, to the target. This message contains some information about how the target should adopt its governance structure, the accuracy of the information flow is affected by the credibility of the intermediary in the eyes of the target- this is the bias. The receiver makes a decision based of off this clouded information and chooses a $Y \in [0,1]$.

Bias Definition: 1.6

B denotes the bias or conflict of interest between the two parties. The traditional cheap talk bias function generally relates to how closely aligned the two agents interests are. In this model the function is slightly adapted so that it refers to how credible and legitimate the intermediary is in the eye of the target. The value $b \to 1$ indicates zero credibility and $b = 0$ infinite and thus de facto perfectly aligned interests.

The message contains a bias $b \in [0,1 - x]$, consequently the messages value is $k = X + b$

Later it is shown how a high bias function (indicating low credibility and legitimacy) results in no partially separating equilibria forming. This reflects a situation where the messenger has low legitimacy, for example, if an IGO were to directly send signals to voluntary programmes.

Solution theories: 2.0

The solutions will look into three specific scenarios.

- First where the advisor sends a message above the state of the world $x < k$, i.e. when the intermediary manages to convey a message to the target convincing them to revise their governance design upwards.
- Second where he sends a message below this $x > k$.
- And finally the third, where the target, after evaluating the intermediary message and the wider situation does not think the intermediary/orchestrator is sincere in its future coercive power.

Partially Separating Equilibria: 2.1

When the target receives a credible trusted message from the intermediary they will seek to revise their governance structure accordingly by maximising their utility function in light of the new information:

$$yMax\{\int_0^k -(x-y)^2 dx\} = \int_0^k -x^2 + 2xy - y^2 dx = \left[-\frac{1}{3}x^3 + x^2y - y^2x\right]_0^k = -\frac{1}{3}k^3 + k^2y - y^2k$$

$\frac{d}{dy}[-\frac{1}{3}k^3 + k^2y - y^2k] = k^2 - 2ky$ setting this equal to zero and factoring returns,

$k^2 - 2ky = 0 = k - 2y$ and by simplifying we see that $ymax = \frac{k}{2}$

The second partially separating equilibria occurs when $x > k$. In this case the target maximises;

$$ymax\{\int_k^1 -(x-y)^2 dx\} = \int_k^1 -x^2 + 2xy - y^2 dx = \frac{\left(3k-3\right)y^2 + \left(3-3k^2\right)y + k^3 - 1}{3}$$

To find $ymax = \frac{k+1}{2}$

Given our definition of bias as between 0 and 1-x, we can say that the second partially separating equilibria does not exist. If the bias function were permitted to be negative - indicating that the intermediary was acting against its own interest - then $ymax = \frac{k+1}{2}$ would hold as an equilibrium solution. This is not considered as a reasonable assumption for a rational agent and therefore, $ymax = \frac{k}{2}$ is the only partially separating equilibrium solution.

De facto Babbling Equilibria: 2.2

It is useful to compare the solutions of $ymax = \frac{k+1}{2}$ and $ymax = \frac{k}{2}$ to the following equilibria where the target receives a meaningless message. In a case where the target, after evaluating the intermediaries message and the wider situation does not think the intermediary/orchestrator is sincere in its future coercive power, any message will be

disregarded. This results in the creation of a de facto babbling equilibria with the prior beliefs of the target the same as their posterior ones.

In this case when $ymax\{\int_0^1 -(x-y)^2 dx\}$ is solved, it returns the babbling equilibrium solution $ymax = \frac{1}{2}$.

In this case the targets "strategy is independent of signal" (Sobel, 2007)

The key point of interest is that this solution will, for all k, return a y value further from x than is the case in the partially separating equilibria.

A final point on Bias: 2.3

Only when there is some degree of similarity in utility functions is a message received sincerely and acted upon. This relates to the idea that certain institutions are illegitimate in the eyes of targets and only through careful orchestration can an intermediary build up the necessary levels of legitimacy to reduce the bias function. It can be shown that when the bias exceeds a certain level, i.e. when the legitimacy of the sender is low, there is no partially separating equilibrium,

for any $x < x^*$:

$$-(x - \frac{x^*}{2} - b)^2 > -(x - \frac{1 + x^*}{2} - b)^2$$

and for any $x \geq x^*$:

$$-(x - \frac{x^*}{2} - b)^2 \leq -(x - \frac{1 + x^*}{2} - b)^2$$

Since both functions are continuous, it must be that

$$-(x^* - \frac{x^*}{2} - b)^2 \leq -(x^* - \frac{1 + x^*}{2} - b)^2$$

i.e.

$x^* = \frac{1}{2} + 2b$ and therefore is only an equilibrium when be is relatively small $b < 1/4$