Strategic decisions, motivation, and leadership styles∗

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October, 2005

Abstract

Should decision–making in organisations be internally transparent? We investigate this question in a model of teamwork in which the leader’s information consists of two components; verifiable “hard” evidence and unverifiable “soft” information. The disclosure of verifiable evidence permits subordinates to adjust their effort to the team’s prospects. On the other hand it distorts decision–making. It gives the leader an incentive to base his decisions on hard rather than soft information even though the latter might be more accurate. We show that self–confidence and charisma improve the leader’s decision–making. As a result a leader with these traits can gain most from implementing a policy of internal transparency. Paradoxically a self–confident leader sometimes fails to implement such policy even if it is in his interest to do so.

∗We are grateful to Michele Piccione and Andrea Prat for their guidance during our PhD studies at the London School of Economics. We also thank Leonardo Felli, Gilat Levy, Margaret Meyer, Sujoy Mukerji and participants of the PIPPS conference in Bristol, 2003 for valuable suggestions.

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1 Introduction

“A little knowledge is a dangerous thing.” Amartya Sen

This paper investigates the need for internal transparency in the decision making process of organizations. Examples of organisations facing this issue abound. Political parties must decide whether the arguments advocated by the different members of the manifesto advisory committee should be shared with the rank–and–file. Private companies taking strategic decisions must decide whether the recommendations of external consultants should be posted on the company’s internal web site. A president in an EU country deciding whether to back the candidacy of another country to join the EU must determine whether an independent report about the candidate’s human rights record should be disclosed to the general public.

An important consideration in these situations, on which we concentrate in this paper, is that the motivation of subordinates can be strongly affected by the information they have access to. Rank-and-file party members, for instance, are more likely to be motivated to canvass votes door to door when they understand and agree with the reasons for choosing a particular political manifesto than when they are kept in the dark. Similarly, support for the candidacy of a prospective EU member is likely to be significantly stronger if the public receives an independent assurance that its human rights record is gradually improving. Transparency can of course backfire, and cause significant demoralisation if it reveals information that is in conflict with the leadership’s final decision on the matter. In our examples above this would be the case if some (or all) of the arguments put forward by the manifesto committee were disregarded by the party leadership or if the president ignored the human rights report presented to him. Indeed, an important mechanism central to our analysis is that revealing only some of the evidence to subordinates can make it more difficult for the leadership of an organisation to reach necessary decisions that are in conflict with that evidence. Our objective in this paper is to link the optimal level of transparency in an organisation with its leadership ability to take difficult decisions that might not be easily understood by partially informed subordinates.

We examine this issue in a model of teamwork which we introduce in Section 2. In our model positive production requires both taking the right decision (the team leader’s responsibility) and putting effort into implement-
ing it (the subordinate’s responsibility).\footnote{In other words, effort and decision-making are complementary factors.} Consistently with the team production and decision rights literatures (see for instance Holmstrom [14] and Aghion and Tirole [1]) we assume that neither the subordinate’s effort nor the leader’s decision are contractible variables. As a result effort is inefficiently low and it is affected by the subordinate’s belief about whether or not the leader took the right decision (i.e. his motivation or “morale”). The main advantage of a policy of transparency in which the evidence observed by the leader is publicly disclosed is that it allows the subordinate to implement the decision more effectively by adjusting his effort to the likelihood that it will turn out to be the correct decision.

An important assumption in our model is that it is not possible to disclose every piece of evidence surrounding a decision. In particular, we assume that the information set of the leader contains both hard and soft information. Along with Faure–Grimaud et al. [7] and Stein [26] we define hard (soft) information as information that can (can not) be credibly communicated to another agent. To illustrate, consider the example of the president deciding whether to back the candidacy of a neighbouring country. The conclusions of an independent committee reporting on the record of the neighbour would fall in the category of hard information that can be credibly disclosed to the general population. The reason is that attempts to misrepresent or misquote the committee’s conclusions can be easily disallowed by members of the committee. On the other hand, the “gut feeling” obtained by the president in one-to-one meetings with the neighbour’s ruler about the other’s commitment to improve the human rights situation would clearly be soft information which cannot be credibly shared with those not present at those meetings. In practice, information that is produced by third parties is more likely to be “hard”, since these parties can in principle be requested to sanction whether or not they are being misrepresented. Information strongly linked to the perceptive abilities of the leader herself (i.e. her intuition or instincts) is more difficult to be credibly disclosed and thus more “soft”.

It would seem evident that, if not everything can credibly communicated, the team should at least set up procedures such that the leader’s “hard” information can be shared with the subordinate. We show in Section 4, however, that publicising only part of the leader’s information set can damage the quality of her decision-making. The reason is precisely that the subordinate’s motivation depends on his perception that the right decision is being
taken. If the soft information is of higher quality and points in a different direction from the hard (now public) information, the leader can face a dilemma. While “following her instinct” would be the right thing to do, it would also contradict the public information, thus sending a contradictory message and damaging subordinate’s morale. Instead, the leader might find it better to ignore her private information and send a reassuring message with a suboptimal decision that is at least consistent with the information available to the subordinate.

Decision-making can be impaired by a policy of transparency, but is equilibrium’s motivation higher? We show in Section that, from an ex ante perspective, this is not the case. The logic is similar. In equilibrium the subordinate is aware of the fact that the leader’s private information is being ignored, which provokes poor decision-making. As a result his motivation suffers. Indeed, the team’s ex ante payoff will be smaller under a policy of transparency than when the subordinate is completely kept in the dark.

An important objective in this paper is to understand what kind of leadership traits might be associated with a higher ability to taking difficult decisions, which can improve team’s efficiency. We concentrate on two traits that have been widely discussed in the management literature on leadership: overconfidence and charisma.\(^2\) We find first in Section that the team’s payoff can be higher when it is lead by an agent with an inflated belief of his own personal ability. Overconfident leaders are obviously reluctant to discard their personal “soft” information, to which they allot a high value. By improving decision-making and subordinate’s motivation this can make a policy of transparency significantly more attractive. Paradoxically, Section 5 shows that an overconfident leader might not always be willing to implement a policy of transparency even if it is in his own (and in the team’s) interest to do so. The reason is that she overestimates the team’s payoff when the subordinate is completely uninformed and she can make full use of her soft information. An overconfident leader therefore implements a transparency policy less often than it would be efficient, although more often than a “realistic” leader.

Lastly, we study in Section 6 optimal transparency policy under charismatic leaders, which we define as those who have an overoptimistic view of their own ability and convey this view to their subordinates. Predictably,

we find that decision-making can be more efficient and that subordinates’ motivation is higher under charismatic leaders. However we also find that when subordinate’s effort is already high under a realistic leader (i.e. the moral hazard problem is not very strong), it can become inefficiently high in a team head by a charismatic leader.

Current economic studies on teamwork have focused mostly either exclusively on effort (Holmstrom [14], Rayo [23]) or exclusively on joint decision-making (Aghion and Tirole [1], Li, Rosen and Suen [18]). To the best of our knowledge, the only attempt to understand how decision-making and motivational aspects in teams interrelate and sometimes conflict with each other is Zabojnik [33]. He shows that informed subordinates might be more motivated to implement their own decision than their superior’s decision, even if their superior is better informed. However, Zabojnik is not concerned with the optimal information set available to the subordinate, which is central to our work.

In an important paper Hermalin [13] extends the team’s effort canonical model by assuming that a leader is privately informed about the team’s productivity. As he benefits from any extra effort incurred, the leader cannot credibly transmit to the rest of the team that the productivity of the project is high. Hermalin’s focus is on the leader’s signaling of this fact when he exerts high effort himself, a mechanism that he calls “leading by example”. While we share with Hermalin the assumption that the leader holds private information, we focus on the effect of this on the decisions she takes, rather than on her role in the implementation process. Hermalin’s “leading by example” mechanism is probably important in small teams where subordinates can observe a leader’s effort and the possibility of signaling is therefore present. Our assumptions are perhaps more realistic in large organizations where subordinates and leaders cannot monitor each other and may not even know each other personally.

A small literature studies optimal leadership traits in organizations. Rotemberg and Saloner focus on innovative organizations where subordinates can create ideas and the leader can choose to test them. They show that leader’s empathy for her subordinates or her “vision” in favor of certain projects can serve as a commitment device to test more of these ideas, reinforcing sub-

\[3\]This is in stark contrast with the management literature, where the trade-off between decision-quality and implementation effort has been studied widely (see for instance Amason [2], Burgelman, and Korsgaard, Schweiger and Sapienza [16]).
ordinates’ innovative incentives. Van den Steen (2005) finds that visionary leaders (i.e. those with strong beliefs about the right decision to make) tend to attract subordinates who are intrinsically motivated to implement that “vision”. We differ from these studies by focusing on different leadership traits and by studying their interaction with the optimal transparency in organizations.

Lastly, a few studies, such as Prendergast [22] or Branderburger and Ben-Polak [4] find that a decision maker may avoid the project that she regards best in favor of a different project that another agent who is less informed regards highly. Prendergast shows that the use of subjective compensation by firms rewards workers if they line with their superiors’ views. Branderburger and Ben-Polak find that the fixation of managers with the share price can lead them to disregard their own private information and adopt instead the strategies that are preferred by investors.

2 Setup

Consider a team consisting of two agents; a leader and a worker. The leader is in charge of making decisions and the worker exerts effort to implement them. More specifically, the leader chooses between two alternative and mutually exclusive projects, $d \in \{0, 1\}$ and the worker picks an effort level, $e \geq 0$. There are two states of the world $X \in \{0, 1\}$. The project’s revenue depends on the amount of effort exerted and on whether the decision matches the state of the world. If the leader’s decision matches the state of the world, $d = X$, and the worker exerts effort $e$, then the project creates a revenue of $eV$, otherwise revenue is zero. Using a dummy variable $D(d, X)$ which equals 1 when $X = d$ and 0 otherwise revenue can be written as $R = D(X, d)eV$. Both agents are assumed to be risk neutral. We adopt an incomplete contracting approach by positing that restrictions on the form of contracts make it unfeasible to fully compensate the worker for his effort. In other words, it is not possible to “sell the firm to the worker”. Instead we assume that the worker receives a fixed share $\beta \in (0, 1)$ of the project’s revenue. It follows that the leader’s payoff is $\Pi_L = (1 - \beta)R$. We further assume that the worker’s cost of exerting effort $e$ is $\frac{1}{2}e^2$ so that his payoff is $\Pi_W = \beta R - \frac{1}{2}e^2$. Total surplus is given by $S = R - \frac{1}{2}e^2$.

Information. The state of the world, $X$, is initially unknown, but it is common knowledge that both states are equally likely to occur. There exists
a verifiable signal $s_p \in \{0, 1\}$ about the state of the world. This signal has precision $p \in (\frac{1}{2}, 1)$ and is observed by both agents. Moreover, there exists an unverifiable signal $s_q \in \{0, 1\}$ with precision $q \in (\frac{1}{2}, 1)$ which is observed only by the leader. Whereas $s_p$ represents “hard evidence”, the signal $s_q$ is meant to represent valuable but “soft” insider information which the leader obtains from being in a leadership position. We restrict attention to interesting the case where $s_q$ is more precise than $s_p$, i.e. $q > p$. It will become clear in the following section that for $q \leq p$ decision-making is trivial.

**Timing.** The timing of events is as follows. (1) Nature determines the state of the world, $X$, and the values of the public and the private signals, $s_p$ and $s_q$. (2) The leader chooses the project $d$. (3) The worker picks his effort level $e$ and finally the project’s revenue is shared.

**Overconfidence.** One objective of this paper is to investigate the implications of appointing an overconfident leader. We therefore allow for the possibility that the leader believes the precision of his private signal to be $o \geq q$. A leader with $o = q$ is a “realistic” leader and a leader with $o > q$ will be called “overconfident”. We assume that $o$ and $q$ are common knowledge.

## 3 Equilibrium

This section derives a complete characterization of equilibrium behaviour. We use Perfect Bayesian Equilibrium as the equilibrium concept and start by considering the worker’s incentives to exert effort. After the worker has observed the public signal $s_p$ and the leader’s project choice $d$ he forms a belief about the project’s probability of success. Depending on whether $d$ matches $s_p$ or not this belief is denoted as $p_\|=\neq$ respectively. $p_\|=\neq$ depend on the leader’s equilibrium strategy and will be derived below. Given some $p_w(d, s_p) \in \{p_\|=\neq\}$ the worker’s problem is

$$
\max_{e \geq 0} p_w(d, s_p) \beta e - \frac{1}{2} e^2.
$$

The effort level that maximizes this objective is

$$
e(d, s_p) = p_w(d, s_p) \beta V.
$$

---

4Common knowledge here implies that the leader knows that the worker believes that the private signal’s precision is $q$ and that the worker knows that the leader believes that the signal’s precision is $o$. 

7
It depends positively on the worker’s belief about the project’s probability of success. This gives the leader an incentive to strengthen this belief. The leader needs to “motivate” the worker.

To understand the consequences for the leader’s decision-making, consider the leader’s project choice. If \( s_q = s_p \) it is immediate that choosing \( d = s_q = s_p \) maximizes the leader’s expected payoff. This project is more likely to succeed and it also raises the worker’s motivation as it matches the public signal and \( p = p_\neq > p_\neq \). In contrast, if \( s_q \neq s_p \) the leader is facing a trade-off. On one hand the project \( d = s_q \) is more likely to succeed as the private signal is more precise than the public signal. On the other hand the project \( d = s_p \) induces the worker to exert more effort. Note that for \( p \geq o \) this trade-off would be absent and the leader would trivially choose \( d = s_p \) no matter the signals’ realisation.

Now suppose that \( s_q \neq s_p \) and consider the three possible candidates for the leader’s equilibrium behaviour; choosing the project according to the public signal \( d = s_p \), following his private information \( d = s_q \), or mixing between the two. Let \( b \) denote the leader’s probability of choosing \( d = s_p \). First suppose that \( b = 0 \). Bayesian updating then implies that the worker’s beliefs are \( p_\neq = \frac{(1-p)q}{(1-p)q + (1-q)p} \) and \( p_n = \frac{pq}{pq + (1-p)(1-q)} \). Obviously \( p_\neq > p_\neq \).

Following the equilibrium is optimal for the leader if and only if

\[
\frac{(1-p)q}{(1-p)q + (1-q)p} p_\neq \geq \frac{p(1-o)}{(1-p)o + (1-o)p} p_\neq.
\]

It follows that \( d = s_q \) is an equilibrium if and only if

\[
\frac{(1-p)^2oq}{(1-p)q + (1-q)p} \geq \frac{p^2(1-o)q}{pq + (1-p)(1-q)}.
\] (1)

Now consider the possibility that \( b = 1 \). Then the worker’s belief is \( p_\neq = p \) if the leader follows the equilibrium. In a Perfect Bayesian Equilibrium, beliefs off the equilibrium path can be chosen arbitrarily. Here we use the Intuitive Criterion as a selection device. Strictly speaking, such criterion is defined for signaling games but its extension to our case is straightforward and its definition is omitted. As the leader never has an incentive to choose \( d \neq s_p \) after observing \( s_p = s_q \), the only belief that survives the Intuitive Criterion is \( p_\neq = \frac{(1-p)q}{(1-p)q + (1-q)p} < p \). Given these beliefs, following the equilibrium is optimal for the leader if and only if

\[
\frac{p(1-o)}{(1-p)o + (1-o)p} p_\neq \geq \frac{(1-p)o}{(1-p)o + (1-o)p} p_\neq.
\]
An equilibrium in which \( d = s_p \) thus exists if and only if
\[
p^2(1 - o) \geq \frac{(1 - p)^2 o q}{(1 - p) q + (1 - q) p}
\]  
(2)

Finally suppose that \( b \in (0, 1) \). The worker’s beliefs can be derived by Bayesian updating:
\[
p_\ast = \frac{pq + bp(1 - q)}{pq + (1 - p)(1 - q) + b(p(1 - q) + q(1 - p))}
\]
\[
p_\# = \frac{q(1 - p)}{q(1 - p) + p(1 - q)}.
\]

As \( 0 < b < 1 \) the leader has to be indifferent between \( d = s_q \) and \( d = s_p \) so that
\[
\frac{o(1 - p)}{o(1 - p) + p(1 - o)} p_\# = \frac{(1 - o)p}{o(1 - p) + p(1 - o)} p_\ast.
\]

From the last equality we get
\[
b = b(o) = \frac{o(1 - p)^2 q[pq + (1 - p)(1 - q)] - (1 - o)p^2 q[1 - q + p(1 - q)]}{(p^2(1 - q)(1 - o) - o(1 - p)^2 q)[q(1 - p) + p(1 - q)]}.
\]

Note that \( b \in (0, 1) \) if and only if (1) and (2) are both violated. Substituting \( b \) back into \( p_\ast \) gives
\[
p_\ast = \frac{oq(1 - p)^2}{p(1 - o)[p(1 - q) + q(1 - p)]}.
\]

Note that \( p_\ast > p_\# \) if and only if \( o(1 - p) > p(1 - o) \) which holds as \( p < q \leq o \).

The following Lemma characterizes the leader’s equilibrium behaviour in dependence of the public signal’s precision, \( p \).

**Lemma 1** There exist \( p_0(o) \) and \( p_1(o) \) such that \( \frac{1}{2} < p_0(o) < p_1(o) < o \) and the following holds:

- If \( p \leq p_0(o) \) then there exists a unique equilibrium. The leader always chooses \( d = s_q \).
- If \( p \in (p_0(o), p_1(o)) \) then there exists a unique equilibrium that survives the Intuitive Criterion. The leader chooses \( d = s_p \) with probability 1 if \( s_q = s_p \) and with probability \( b(o) \) if \( s_q \neq s_p \).
• If \( p \geq p_1(o) \) then in every equilibrium the leader always chooses \( d = s_p \).
The thresholds \( p_0(o) \) and \( p_1(o) \) are strictly increasing in the level of overconfidence \( o \) whereas \( b(o) \) is strictly decreasing.

4 Efficiency

In this section we derive total surplus as a function of the public signal’s precision \( p \). We first discuss the special case of a realistic leader. Comparison with the full information benchmark helps us to understand the sources of inefficiency. Finally we show that overconfidence improves efficiency by mitigating one of these sources. Expected surplus \( E[S] \) can be written as

\[
E[S] = Pr(s_q = s_p)E[S|s_q = s_p] + Pr(s_q \neq s_p)E[S|s_q \neq s_p].
\]

According to Lemma 1, \( E[S|s_q = s_p] \) and \( E[S|s_q \neq s_p] \) depend on the public signal’s precision and we have to distinguish three cases. Suppose first that \( p \leq p_0(o) \). In this case the leader chooses \( d = s_q \) in equilibrium and

\[
E[S|s_q = s_p] = V^2(\beta - \frac{1}{2}\beta^2) \left( \frac{pq}{pq + (1 - p)(1 - q)} \right)^2
\]

\[
E[S|s_q \neq s_p] = V^2(\beta - \frac{1}{2}\beta^2) \left( \frac{1 - p)q}{(1 - p)q + (1 - q)p} \right)^2.
\]

If instead \( p \in (p_0(o), p_1(o)) \) then the leader chooses \( d = s_p \) with probability \( b(o) \) when he observes \( s_q \neq s_p \) and \( d = s_q \) otherwise so that

\[
E[S|s_q = s_p] = \beta V^2 \left( \frac{pq}{pq + (1 - p)(1 - q)} \right) p_\star - \frac{1}{2}\beta^2 V^2 p_\star^2
\]

\[
E[S|s_q \neq s_p] = b \left( \beta V^2 \left( \frac{p(1 - q)}{p(1 - q) + q(1 - p)} \right) p_\star - \frac{1}{2}\beta^2 V^2 p_\star^2 \right)
\]

\[
+ (1 - b) \left( \beta V^2 \left( \frac{(1 - p)q}{p(1 - q) + q(1 - p)} \right) p_\star - \frac{1}{2}\beta^2 V^2 p_\star^2 \right).
\]

Finally, if \( p \geq p_1(o) \) then the leader chooses \( d = s_p \) in equilibrium and it is immediate that \( E[S] = V^2(\beta - \frac{1}{2}\beta^2)p^2 \). In summary, expected total surplus is given by

\[
E[S] = V^2(\beta - \frac{1}{2}\beta^2) \begin{cases} 
q^2 l(p, q) & \text{if } p \leq p_0(o) \\
m(p, q, o) & \text{if } p_0(o) < p < p_1(o) \\
p^2 & \text{if } p \geq p_1(o).
\end{cases}
\]
with the function \( l \) and \( m \) defined by

\[
\begin{align*}
l(p, q) &= \frac{p^2}{pq + (1-p)(1-q)} + \frac{(1-p)^2}{(1-p)q + (1-q)p} \\
m(p, q, o) &= \frac{q(1-p)^2((q + b(1-q))(1-o) + (1-b)q)}{p(1-q) + q(1-p)}.
\end{align*}
\]

The continuity of the leader’s equilibrium behavior, i.e. the continuity of \( b \) in \( p \), and the fact that \( \lim_{p \to p_0} b(o) = 0 \) and \( \lim_{p \to p_1} b(o) = 1 \), implies that \( E[S] \) is a continuous function of the public signal’s precision. Further note the following properties of the functions \( l \) and \( m \):

\[
\begin{align*}
\frac{dl(p, q)}{dp} &= \frac{(1-q)^2(2p-1)}{(2pq1 + -q - p)^2(2pq - q - p)^2} > 0 \\
\frac{dm(p, q, o)}{dp} &= \frac{(1-p)((2q - 1)p - 1)}{(1-q)((2q - 1)p - q)^2} < 0.
\end{align*}
\]

Together with the fact that \( \lim_{p \to \frac{1}{2}} l(p, q) = 1 \) this implies that expected surplus for a realistic leader, \( E[S]\), looks as in Figure 1. Interestingly for \( p \in (p_0(q), p_1(q)) \) expected surplus is decreasing in the public information’s precision. The gain in information due to an increase in \( p \) is not sufficient to compensate for the loss from the leader’s increased incentive to choose the project \( d = s_p \) even when it is less likely to succeed than \( d \neq s_p \).

### 4.1 Benchmark

There are two sources of inefficiency. First, the worker’s effort choice tends to be inefficiently low. This is because he only receives a share \( \beta \) of the project’s revenue but pays the entire cost of effort. Second there exists an informational asymmetry between the leader and the worker. As the leader fails to internalize the worker’s cost of effort he is generally unable to communicate his private information credibly. As we have seen above, this leads to inefficient decision-making; the probability that the leader chooses \( d = s_p \) after observing \( s_p \neq s_q \) might be positive although \( s_p \) is less accurate than \( s_q \). Whereas the first source of inefficiency is well understood since the seminal work of Holmstrom [14] on moral hazard in teams, this paper is the first to explicitly model the second.

In order to focus on this effect we choose as a benchmark the case of symmetric information in which the leader and the worker observe both
Figure 1: The case of a realistic leader, $o = q$: Expected surplus $E[S]_r$ as a function of the public signal’s precision $p$.

signals. In this case the leader chooses $d = s_q$ in equilibrium and the worker is able to adjust his effort to the true probability of success. Expected surplus in the benchmark is

$$E[S]^* = V^2 (\beta - \frac{1}{2} \beta^2) q^2 l(p, q).$$

Comparing with $E[S]_r$ we see that the realistic leader can credibly communicate his information by choosing $d = s_q$ only if $p \leq p_0(q)$. For all $p > p_0(q)$ surplus is lower than in the benchmark. For all $p > p_0(q)$ there exists a probability $b(q) > 0$ that the leader chooses $d = s_p$ after observing $s_p \neq s_q$. If $s_p = d = s_q$, then knowing the leader’s behaviour, the worker “discounts” the positive news of $d = s_p$ and his equilibrium belief $p_-$ is smaller than the true probability of success $p_0(q)$. If on the other hand $s_p \neq d = s_q$ then the worker “discounts” the bad news $d \neq s_p$ and his belief $p_+$ is larger than the true probability of success $p_0(q)$. Increasing $p$ from $p_0(q)$ towards $p_1(q)$ raises $b(q)$ and thus decreases the amount of information which is transmitted in equilibrium. The beliefs $p_-$ and $p_+$ become more and more similar and the worker’s ability to adjust his effort to the true probability of
success decreases. When $p$ reaches $p_1(q)$ the leader’s equilibrium behaviour ceases to transmit any information at all. Decision making and effort choice are as if based on the public signal only.

### 4.2 Overconfidence

Let $E[S]_o$ denote expected surplus for the case of an overconfident leader, $o > q$. The efficiency implications of overconfidence are depicted in Figure 2. As shown in Lemma 1 overconfidence shifts the interval of $p$-values for which the leader mixes to the right. Both thresholds $p_0(o)$ and $p_1(o)$ are strictly increasing in the leader’s level of overconfidence, $o$. Furthermore for all $p \in [p_0(o), p_1(o)]$ surplus depends directly on $o$. As can be seen in Figure 2 overconfidence improves efficiency, no matter the precision of the public signal, $p$. Proposition 1 states this result formally.
Proposition 1 Overconfidence improves efficiency. For all \( o > q \) it holds that \( E[S]_o \geq E[S]_r \) with strict inequality for all \( p \) such that \( p_0(q) < p < \min(p_1(o), q) \).

Overconfidence raises expected surplus because it improves the efficiency of the leader’s decision-making. Overconfidence decreases the leader’s probability of choosing \( d = s_p \) after observing \( s_p \neq s_q \). This is because overconfidence changes the trade-off faced by the leader when observing \( s_p \neq s_q \). An overconfident leader considers the probability that \( d = s_p \) will succeed as lower than it actually is and therefore has a stronger incentive to choose \( d = s_q \).

Numerous empirical studies in the management literature have shown that self-confidence is considered to be one of the most important traits of a leader (see Stogdill [27] for a survey). However, these studies fail to explain why self-confident leaders are more successful. Our analysis provides an explanation for the positive relation between self-confidence and performance. It shows that self-confidence improves a leader’s decision making through its positive effect on the leader’s credibility.

5 Information sharing

We now turn to the two main questions of this paper. First, how much information should be shared between leaders and followers? And second, do leaders have the right incentives to share information? The answers to these questions have important implications for an organization’s institutional design. The first issue concerns the optimal distribution of information within an organization. It determines for example, whether workers should be kept informed about the reasons that motivated the decisions of their leader through weekly meetings or internal reports? The second issue determines whether such decisions can be left to the leader himself.

In order to shed some light on these questions we now allow for the possibility that the leader might exclude the worker from the observation of the hard evidence \( s_p \). More specifically, we will extend our model by adding an initial stage (0). In this stage the leader chooses the institutional design. In particular he decides whether the worker will have access to the verifiable information \( s_p \) or not. If he allows access the worker will observe \( s_p \) as before. Otherwise he will observe nothing. Consider first the case in which the worker is allowed access to the signal \( s_p \). Expected total surplus in this case is given by (3). We now derive the payoff the leader expects. In
order to distinguish from realistic expectations $E$ we denote the expectations of the possibly overconfident leader by $\tilde{E}[\Pi_L]$. The leader’s decision making is given by Lemma 1. If $p \leq p_0(o)$ the leader chooses $d = s_q$ in equilibrium and

$$\tilde{E}[\Pi_L|s_q = s_p] = (1 - \beta)\beta V^2 \frac{po}{po + (1 - p)(1 - o)} \frac{pq}{pq + (1 - p)(1 - q)}.$$  

$$\tilde{E}[\Pi_L|s_q \neq s_p] = (1 - \beta)\beta V^2 \frac{(1 - p)o}{(1 - p)o + (1 - o)p} \frac{(1 - p)q}{(1 - p)q + (1 - o)p}.$$  

If $p \in (p_0(o), p_1(o))$ then the leader chooses $d = s_q$ when $s_q = s_p$ and mixes otherwise so that

$$\tilde{E}[\Pi_L|s_q = s_p] = (1 - \beta)\beta V^2 \frac{pop}{po + (1 - p)(1 - o)}$$  

$$\tilde{E}[\Pi_L|s_q \neq s_p] = (1 - \beta)\beta V^2 \frac{bp(1 - o)p + (1 - b)(1 - p)op}{p(1 - o) + o(1 - p)}.$$  

Finally, if $p \geq p_1(o)$ then the leader chooses $d = s_p$ and it is immediate that

$$\tilde{E}[\Pi_L] = (1 - \beta)\beta V^2 p^2.$$  

In summary the leader expects the payoff

$$\tilde{E}[\Pi_L] = (1 - \beta)\beta V^2 \left\{ \begin{array}{ll} oq(l(p, q)) & \text{if } p \leq p_0(o) \\ \hat{m}(p, q, o) & \text{if } p_0(o) < p < p_1(o) \\ p^2 & \text{if } p \geq p_1(o) \end{array} \right.$$  

with the function $\hat{m}$ defined by

$$\hat{m}(p, q, o) = \frac{oq(1 - p)^2}{(1 - o)(p(1 - q) + q(1 - p))}.$$  

If the leader decides to exclude the worker from the observation of $s_p$ then decision making becomes trivial. The leader simply chooses his most precise signal $d = s_q$ and the worker’s belief about the project’s likelihood of success is equal to the precision of this signal, $q$. Expected total surplus is given by

$$E[S]_{ex} = V^2(\beta - \frac{1}{2}\beta^2)q^2$$  

and the leader expects his payoff to be

$$\tilde{E}[\Pi_L]_{ex} = (1 - \beta)\beta V^2 oq.$$
In order to compare the leader’s incentives to disclose information with the incentives of a social planner we denote by $A^*(o) \subset (\frac{1}{2}, q)$ the set of precisions of the public signal $s_p$ for which expected surplus is higher when the worker is allowed access to the signal. Similarly we denote by $A(o) \subset (\frac{1}{2}, q)$ the set of precisions for which the leader prefers to allow access. Our next result is a direct consequence of the fact that $m(p, q, q) = \hat{m}(p, q, q)$ which implies that for a realistic leader expected payoff is proportional to expected total surplus.

**Proposition 2** If the leader is realistic, information should be shared for all $p \in A^*(q) = (\frac{1}{2}, p_A)$ where

$$p_A = 1 - (1 - q) \left( q - \frac{1}{2} + \sqrt{1 + (q - \frac{1}{2})^2} \right)$$

and $p_A \in (p_0(q), p_1(q))$. A realistic leader shares information efficiently, $A(q) = A^*(q)$.

When deciding upon the disclosure of information the leader faces the following trade–off. On one hand he might benefit from the signal’s motivational effects. The signal $s_p$ might provide verifiable support for the leader’s decisions and therefore increase the worker’s motivation and thus his effort. On the other hand the worker’s ability to observe $s_p$ might distort the leader’s decision making. As this distortion becomes more severe for high precisions of $s_p$ the leader prefers the worker to have access to $s_p$ as long as $p$ is sufficiently small.

So far we have established that a realistic leader prefers the worker to have access to $s_p$ if and only if this access leads to an increase in expected surplus. Our next result therefore identifies a drawback of overconfidence. Although an overconfident leader has a greater incentive to allow public information than a realistic leader this incentive is still inefficiently low as long as he is not sufficiently confident.

**Proposition 3** An overconfident leader shares more information than a realistic leader, $A(q) \subset A(o)$ and $A(q) \neq A(o)$ for all $o > q$. If the leader’s level of overconfidence $o$ is such that $o \geq \frac{3q - 1}{2q}$ he always shares information and $A(o) = A^*(o) = (\frac{1}{2}, q)$. For $o \in (q, \frac{3q - 1}{2q})$ the leader’s information sharing is insufficient, i.e. $A(o) \subset A^*(o)$ and $A(o) \neq A^*(o)$. 

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Taken together with Proposition 1 these results implies that it is efficient to appoint an overconfident rather than a realistic leader even if the leader has discretion over the subordinate’s access to information. This is because although the overconfident leader’s incentives to share information might be suboptimal they are still stronger than the incentives of the realistic leader. In particular, for all $p$ for which the realistic leader shares information, the overconfident leader does so as well and (weakly) raises expected surplus through improved decision–making. And as $A(o) \subset A^*(o)$ the overconfident leader would never allow access to the signal if this was detrimental for efficiency.

6 Charisma

So far we have considered the case of a leader who might consider himself more able than he actually is but who is unable to convince his subordinate about this fact. We now allow for the possibility that the leader manages to make the worker share his belief? As before we assume that the private signal $s_q$ has precision $q$ and that the leader believes this precision to be $o$. If the worker believes that the signal’s precision is $o$ rather than $q$ the leader is said to have “charisma”. As the distinction between a leader with and without charisma makes no sense when $o = q$, in the reminder we assume that $o > q$. It is immediate that the equilibrium behaviour of an overconfident leader with charisma is identical to the one of a realistic leader whose private information has precision $o$ rather than $q$. It is given by Lemma 1 if we substitute $q$ by $o$. Using this insight we can derive the influence of charisma on the quality of the leader’s decision–making. Lemma 1 has shown that the leader’s decision–making can be completely characterized by the probability of choosing $d = s_p$ after observing $s_p \neq s_q$. For $p \leq p_0(o)$ this probability is zero, for $p \geq p_1(o)$ it is equal to one and for all $p \in (p_0(o), p_1(o))$ it is given by $b$. The lower this probability the higher is the likelihood of choosing the right project.

**Proposition 4** Charisma improves decision–making. For all $p \in (\frac{1}{2}, q)$ a leader with charisma is more likely to choose the right project than a leader without.

Although charisma improves the leader’s decision–making one cannot simply conclude that it has a positive effect on efficiency. The problem is that a
leader with charisma induces his subordinate to have unrealistically optimistic beliefs. The worker considers the project’s chances of success as higher than they actually are. If the worker’s share of the team’s benefit $\beta$ is sufficiently high then the equilibrium level of effort is close to first best. Charisma might then raise the worker’s effort above its first best level and thus create a new type of inefficiency which is absent for a leader without charisma. An overconfident leader raises the worker’s effort level because he makes him believe (correctly) that his confidence improves his decision making. Without charisma he does not make the worker believe (incorrectly) that the chances of success are higher than they actually are. Whether charisma increases or decreases the total surplus of the team thus depends on the worker’s share of benefit, $\beta$. Our next result formalizes this intuition.

**Proposition 5** There exists a $\beta \in (0, \frac{2q}{o+q})$ such that for all $\beta \leq \beta$ charisma improves efficiency, i.e. $E[S]_c > E[S]$ for all $p \in \left(\frac{1}{2}, q\right)$. For all $\beta > \frac{2q}{o+q}$ charisma might be detrimental for efficiency, i.e. $E[S]_c < E[S]$ for some $p \in \left(\frac{1}{2}, q\right)$.

Note that the threshold $\frac{2q}{o+q}$ is decreasing in $o$. The more confident the leader the greater is the range of $\beta$ for which charisma decreases total surplus.

7 Conclusion

In this paper we have shown that transparency might not always be an optimal feature in an organization and that this is especially the case when it is combined with the leadership’s unwillingness to take unpopular decisions. Furthermore, we have emphasized that the style of the leadership can make a policy of transparency more attractive for an organization. While the purpose of our research is mostly normative, the question of whether leadership style can be a predictor of the amount of information shared with subordinates, remains. In this area further empirical investigation would undoubtedly be helpful. It is interesting however to note the existence of several studies in management science emphasizing that self-confident leaders are more likely to use logic and reason to gain compliance and motivate subordinates (see for instance Goodstat and Kipnis [10] and Mowday [21]). “Logic” and “reason” are not necessarily equivalent to “hard” verifiable information. Still, these studies do suggest the possibility of a connection between the characteristics
of the leadership and the transmission of information, which we hope future work will help to elucidate.

Appendix

Proof of Lemma 1

Consider the equilibrium conditions (1) and (2). As

$$\frac{d}{dp} \left[ \frac{(1-p)^2 q_o (1-p)q + (1-q)p}{(1-p)q + (1-q)p} \right] = \frac{(1-p)q_o ((2q-1)p - 1)}{(2q-1)p - q)^2} < 0$$

$$\frac{d}{dp} \left[ \frac{p^2(1-o)q}{pq + (1-p)(1-q)} \right] = \frac{p(1-o)q((2q-1)p + 2(1-q))}{(2q-1)p + 1 - q^2} > 0$$

and $p^2(1-o)$ is strictly increasing in $p$, the thresholds $p_0(o)$ and $p_1(o)$ are implicitly and uniquely defined as the precisions $p$ which make (1) and (2) binding. That $\frac{1}{2} < p_0(o) < p_1(o) < o$ follows from

$$\frac{p^2(1-o)q}{pq + (1-p)(1-q)} > p^2(1-o) \iff 2q > 1$$

and the fact that (1) and (2) hold with strict inequality for $p = \frac{1}{2}$ and $p = o$ respectively. To see that $p_0(o)$ and $p_1(o)$ are strictly increasing in $o$ note that $\frac{(1-p)^2 q_o}{(1-p)q + (1-q)p}$ is strictly increasing whereas $\frac{p^2(1-o)q}{pq + (1-p)(1-q)}$ and $p^2(1-o)$ are strictly decreasing in $o$. Finally note that

$$\frac{db}{do} = \frac{qp^2(p-1)^3(2q-1)}{(p^2(1-o - q) - (1-2p)qo)^2(q - (2q-1)p)} < 0.$$

which completes the proof. □

Proof of Proposition 1

There are three cases to consider. Suppose first that $p \leq p_0(o)$ so that the overconfident leader chooses $d = s_q$ and $E[S]_o = V^2(\beta - \frac{1}{2}\beta^2)q^2l(p,q)$. If $p \leq p_0(q)$ then the realistic leader also chooses $d = s_q$ so that $E[S]_r = E[S]_o$. If $p \in (p_0(q), p_1(q))$ then the realistic leader mixes and $E[S]_o >$
Consider first the leader’s incentive to allow the public signal for the general case $o \geq q$. The leader prefers to disclose $s_p$ if and only if $\bar{E}[\Pi_L] \geq \bar{E}[\Pi_L]_{ex}$. It
follows from \( \lim_{p \to 1/2} q_\text{ll}(p, q) = q, \frac{d}{dp} > 0, \frac{d}{dp} < 0 \) and \( \lim_{p \to p_1(o)} \tilde{m}(p, q, o) = p^2 < q_\text{l} \) that \( A(o) = \left( \frac{1}{2}, \min(p_A(o), q) \right) \) where

\[
p_A(o) = 1 - (1 - o)(q - \frac{1}{2} + \sqrt{\frac{1 - q}{1 - o} + (q - \frac{1}{2})^2}).
\]

Note that

\[
\frac{d p_A}{d o} = \frac{(q - \frac{1}{2})(q - \frac{1}{2} + \sqrt{\frac{1 - q}{1 - o} + (q - \frac{1}{2})^2}) + \frac{1 - q}{2(1 - o)}}{\sqrt{\frac{1 - q}{1 - o} + (q - \frac{1}{2})^2}} > 0
\]

and

\[
q - p_A(q) = (1 - q)(q - \frac{3}{2} + \sqrt{1 + (q - \frac{1}{2})^2}) > (1 - q)(q - \frac{1}{2}) > 0.
\]

This implies that \( A(q) \subset A(o) \) for all \( o \geq q \) and \( A(q) \neq A(o) \) for all \( o > q \). Moreover note that \( p_A(\frac{3q - 1}{2q}) = q \) and \( \frac{3q - 1}{2q} \in (q, 1) \). This implies that \( A(o) = (\frac{1}{2}, q) \) for all \( o \geq \frac{3q - 1}{2q} \).

Now compare \( A(o) \) with the set of precisions \( A^*(o) \) for which a social planner would allow the public signal. As \( \tilde{m}(p, q, q) = m(p, q, q) \) a realistic leader’s expected payoff is proportional to expected surplus when the worker has access to \( s_p \), in particular

\[
E[\Pi_L]_r = \frac{1 - \beta}{1 - \frac{1}{2} \beta} E[S].
\]

The same relation holds when the worker cannot observe \( s_p \). This implies that a realistic leader’s decision with respect to the worker’s access to the signal \( s_p \) is efficient. A realistic leader prefers the worker to have access to \( s_p \) if and only if this access leads to an increase in expected surplus. For an overconfident leader with \( o > q \) expected payoff is no longer proportional to expected surplus when the worker observes \( s_p \). For \( o < \frac{3q - 1}{2q} \), \( p = p_A(o) \) solves the equation

\[
\frac{q(1 - p)^2}{(1 - o)(q(1 - p) + p(1 - q))} = q.
\]

It follows from \( \lim_{p \to 1/2} q^2 l(p, q) = q^2, \frac{d}{dp} > 0 \) and the continuity of expected surplus that \( (\frac{1}{2}, \min(p^*(o), q)) \subset A^*(o) \) where \( p = p^*(o) \) is the smallest solution of the equation

\[
\frac{(1 - p)^2(\text{Max}(q + b(1 - q)o + (1 - b)q(1 - o))}{(1 - o)(q(1 - p) + p(1 - q))} = q
\]
As \((q + b(1-q))o + (1-b)q(1-o) > q\) for all \(b \in [0,1]\) and \(\frac{d}{dp} \left[ \frac{(1-p)^2}{p(1-q) + q(1-p)} \right] = \frac{(1-p)(p(2q-1)-1)}{(p-2pq+q)^2} < 0\) it follows that \(p^*(o) > p_A(o)\) which implies that \(A(o)\) is a strict subset of \(A^*(o)\). If \(o \geq \frac{3q-1}{2q}\) then the same argument implies that \(A^*(o) = \left( \frac{1}{2}, q \right) = A(o)\). ■

**Proof of Proposition 4**

Without charisma the mixing thresholds \(p_0(o)\) and \(p_1(o)\) are implicitly defined by the equations \(\frac{o-1}{1-o} = f(p_0(o), q)\) and \(\frac{1-o}{o} = g(p_1(o), q)\) respectively where

\[
f(p, x) = \frac{p^2(x(1-p) + p(1-x))}{(1-p)^2(px + (1-p)(1-x))}
\]

\[
g(p, x) = \frac{(1-p)^2x}{p^2(x(1-p) + p(1-x))}.
\]

For a leader with charisma the respective thresholds \(p_0(o)\) and \(p_1(o)\) are implicitly defined by \(\frac{o-1}{1-o} = f(p_0(o), o)\) and \(\frac{1-o}{o} = g(p_1(o), o)\). As

\[
\frac{\partial f}{\partial x} = \frac{p^2(1-2p)}{(1-p)^2(px + (1-p)(1-x))^2} < 0
\]

and

\[
\frac{\partial f}{\partial p} = \frac{p((2x-1)(4x-3)p(p-1) + 2x(x-1))}{(p-1)^3(px + (1-p)(1-x))^2}
\]

\[
> \frac{p(x-1)(4(2x-1)p(p-1) + 2x)}{(p-1)^3(px + (1-p)(1-x))^2}
\]

\[
> \frac{p(x-1)}{(p-1)^3(px + (1-p)(1-x))^2} > 0
\]

the Implicit Function Theorem implies that \(p_0(o) > p_0(o)\). Moreover, as

\[
\frac{\partial g}{\partial x} = \frac{(1-p)^2x}{p^2(x(1-p) + p(1-x))^2} > 0
\]

and

\[
\frac{\partial g}{\partial p} = \frac{(1-p)x(p(p-1) - 2x(1-p(1-p)))}{p^3(p(1-x) + x(1-p))^2} < 0
\]
the Implicit Function Theorem implies that $p_1^c(o) > p_1(o)$. Charisma thus
shifts the interval of precisions for which the leader is mixing to the right.

We now argue that there cannot exist a $p$ for which a leader with charisma
and a leader without charisma use the same equilibrium probability of mixing.
By contradiction, suppose that $b' = b \in (0, 1)$ for some $p' \in (p_0^c(o), p_1(o))$.
The leader’s indifference between $d = s_q$ and $d = s_p$ implies

$$
(1 - p')o p_{p'} = (1 - o)p' p_{p'}
$$

$$
(1 - p')o p_{p} = (1 - o)p' p_{p}.
$$

It follows that

$$
p_c - p = \frac{(1 - p')o}{(1 - o)p'} (p_{p} - p_{p'}) > p_{p} - p_{p'}.
$$

As $b' = b$ the difference $p_c - p$ is determined entirely by the partial derivative
of $p_c$ with respect to $q$ which is given by

$$
\frac{\partial p_c}{\partial q} = \frac{(1 - p')p'(1 - b^2)}{(1 - (p'(1 - q) + q(1 - p'))(1 - b))} > 0.
$$

The difference $p_{p} - p_{p'}$ is determined by

$$
\frac{dp_{p}}{dq} = \frac{(1 - p')p'}{(p'(1 - q) + q(1 - p'))^2} > 0.
$$

Note that $\frac{dp_{p}}{dq} > \frac{dp_{p}}{dq}$ if and only if

$$
1 - 2(1 - b)(p'(1 - q) + q(1 - p'))(1 + b(p'(1 - q) + q(1 - p'))) > 0.
$$

As $p'(1 - q) + q(1 - p') \leq \frac{1}{2}$ and $1 - (1 - b)(1 + \frac{b}{2}) = \frac{1}{2}b(1 + b) > 0$ this inequality
is satisfied. This implies that $p_c - p < p_{p} - p_{p'}$ so that we have derived a contradiction. Thus $b'$ cannot cross $b$ in the interval $p \in (p_0^c(o), p_1(o))$.
Together with the continuity of $b'$ and $b$ and the fact that $p_0^c(o) > p_0(o)$ this implies that $b' < b$ for all $p$ in this interval. We have thus shown that the probability of choosing $d = s_p$ after observing $s_p \neq s_q$ is smaller for a leader with charisma than for a leader without for all $p$, with strict inequality for all $p \in (p_0^c, p_1^c)$.
Proof of Proposition 5

For the first part we can consider the limit as $\beta$ goes to zero and then use the fact that total surplus is continuous in $\beta$. As the project’s revenue is linear in $\beta$ whereas costs of effort are quadratic, expected surplus converges towards expected revenue when $\beta \to 0$. Expected revenue depends positively on the quality of decision–making and the worker’s belief about the likelihood of success. For $p \leq p_0(o)$ charisma has no influence on decision–making but increases the worker’s motivation and thus revenue as

$$p^e_\beta = \frac{p_0}{p_0 + (1-p)(1-o)} > \frac{pq}{pq + (1-p)(1-q)} = p^e$$

$$p^e_\beta = \frac{(1-p)o}{(1-p)o + p(1-o)} > \frac{(1-p)q}{(1-p)q + p(1-q)} = p^e.$$

For $p \in (p_0(o), p_1(o))$ charisma improves the worker’s motivation and decision making. Note that

$$p^e_\beta = \frac{(1-p)o}{(1-p)o + p(1-o)} > \frac{(1-p)q}{(1-p)q + p(1-q)} = p^e.$$

If $p \leq p_0(o)$ then

$$p^e_\beta = \frac{p_0}{p_0 + (1-p)(1-o)} > \frac{pq}{pq + (1-p)(1-q)}$$

$$> \frac{pq + bp(1-q)}{pq + (1-p)(1-q) + b(p(1-q) + q(1-p))} = p^e.$$

Otherwise

$$p^e_\beta = \frac{o^2(1-p)^2}{p(1-o)(p(1-o) + o(1-p))}$$

$$> \frac{oq(1-p)^2}{p(1-o)(p(1-q) + q(1-p))} = p^e.$$

Finally suppose that $p \geq p_1(o)$. If $p < p_1^2(o)$ then

$$E[R]_c - E[R] = \beta V^2(m(p, o, o) - p^2) > 0$$

follows from $\frac{dm(p, o, o)}{dp} < 0$ and the continuity of expected revenue in $p$ which implies that $\lim_{p \to p_1^2(o)} m(p, o, o) = p^2$. Otherwise

$$E[S]_c - E[S] = (\beta - \frac{1}{2}\beta^2)V^2(p^2 - p^2) = 0.$$
For the second part suppose that $p \leq p_0(o)$ so that the leader chooses $d = s_q$ no matter whether he has charisma or not. We find that

$$E[S|s_p = s_q]_c - E[S|s_p = s_q] = V^2 \beta \left( \frac{pq}{po + (1 - p)(1 - o)} - \frac{pq}{pq + (1 - p)(1 - q)} \right) \cdot \left( \frac{pq}{pq + (1 - p)(1 - q)} - \frac{1}{2} \beta \left( \frac{pq}{po + (1 - p)(1 - o)} + \frac{pq}{pq + (1 - p)(1 - q)} \right) \right)$$

which implies that $E[S|s_p = s_q]_c < E[S|s_p = s_q]$ if and only if

$$\beta > \beta_0 = 2qo \left( \frac{pq + (1 - p)(1 - q)}{po + (1 - p)(1 - o)} + \frac{q}{o} \right)^{-1}.$$ 

Substituting $p$ through $1 - p$ we find that $E[S|s_p \neq s_q]_c < E[S|s_p \neq s_q]$ if and only if

$$\beta > \beta_0 = 2qo \left( \frac{(1 - p)q + p(1 - q)}{(1 - p)o + p(1 - o)} + \frac{q}{o} \right)^{-1}.$$ 

As $\beta > \beta_0$ it follows that $E[S]_c < E[S]$ for all $\beta > \beta_0$. The claim follows from the fact that $b_0$ is strictly increasing in $p$ and $\lim_{p \to 1/2} b_0 = \frac{2q}{o+q} < 1$. ■

References


