Organisational structure, communication and group ethics[†]

Matthew Ellman
Institut d'Anàlisi Econòmica (CSIC)
Barcelona, Spain

Paul Pezanis-Christou
BETA, Université de Strasbourg
Strasbourg, France

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Abstract: This paper investigates experimentally how organisational structure affects ethics inside a firm. Maximising firm profits harms outsiders. In a "vertical" treatment, one insider unilaterally sets the harm-reduction strategy; the other accepts or quits. In a "horizontal" treatment, the insiders decide by consensus. Communication treatments create a 2-by-2 design. In the data, communication makes vertical firms more ethical; with voice, subordinates feel responsible for what their firms do – voice mitigates their "responsibility-alleviation". Vertical firms are then more ethical than horizontal firms for which bargaining data reveal a dynamic form of responsibility-alleviation and chat data indicate a strong "insider-outsider" effect.

Keywords: experimental economics, group decision-making, organisational structure, communication, ethics, responsibility-alleviation and responsibility-diffusion.

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Email addresses: Ellman: matthew.ellman@iae.csic.es   [Corresponding author]
                     Pezanis-Christou: ppc@cournot.u-strasbg.fr

1. Introduction

Compared to the vast literature on how hierarchy and communication affect profits, economics has neglected the impact of organisational structure on ethics. In this paper, we study experimentally the simple ethical dilemma that faces a group, such as a firm, which can increase its profits by harming a third party. We show that the group's decision-making processes and communication channels can affect its agents' moral motivations and therefore group decisions.

Champions of corporate reform and radical activists share common ground in believing that it is important to involve more people in organisational decision-making processes – either via control rights or voice or both.[1] Implicit in the introductory quotation, Dahl takes the view that workers and middle managers only feel morally responsible for what their firms do when they have a significant say in decision-making. Dahl (1985) argues that this is why the middle managers in General Motors' hierarchy did not feel personally responsible when selling the unsafe '65 Chevrolet Corvair (see also Nader (1965)). Empirical evidence is very limited, but Askildsen, Jirjahn and Smith (2006) find that firms forced (by Germany's codetermination laws) to involve workers in management pollute less than comparable, unaffected firms.

Within an experimental framework, two well-known studies in psychology provide relevant evidence. In 1963, Stanley Milgram shocked the public by showing how readily subordinates abandon their personal ethics to obey a highly unethical authority; the hierarchy *alleviated* individuals' feelings of responsibility. In Milgram (1963) and related studies, the authority is unethical by design. By contrast, in a business setting, the ethical stance of bosses may depend on factors such as how many people share authority. In 1968, Darley and Latané's experimental evidence (on the "passive bystander" pathology) showed that increasing the number of people involved in decision-making can sharply *diffuse* each individual's sense of personal

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[1] On participation and corporate social responsibility, see Cludts (1999). On communication channels inside firms, see Mirvis's (2000) study of Shell and Hills and Welford's (2006) case study of Disney.

responsibility. So perhaps increasing worker involvement will decrease their bosses' senses of responsibility? Unfortunately, there is no experimental work assessing how *change* in organisational structure affects ethical outcomes. Our goal is to investigate the impact of changes in the control and communication structures that govern decision-making by a fixed number of individuals.

To formulate predictions, we distinguish two necessary conditions for someone inside a firm to push for ethical decisions: the person must feel responsible (for what the firm does) and care (about relevant ethical principles or potential victims). Control and communication structures affect both.

Control structures affect perceived responsibility, because actors only feel morally responsible for a firm's behaviour when they consider themselves sufficiently 'involved' in the firm's decision process. Based on a wide range of experimental studies (see section 2) and supported by psychological theory on salience of involvement (see section 3), we conjecture that flattening a hierarchy will increase the perceived responsibility of subordinates (whose "responsibility-alleviation" falls), but decrease that of superiors (owing to "responsibility-diffusion").

Communication structures affect perceived responsibility, because voice represents an indirect but non-trivial form of involvement. We predict that subordinates will feel a greater sense of responsibility for firm behaviour when able to communicate their views to their bosses.

Control structures affect social preferences (caring), because people tend to identify most with those to whom they feel most similar. Mutual identification is particularly high for insiders in a horizontal structure with identical roles. This implies a low relative concern for outsiders.[2]

Communication exacerbates this "insider-outsider" effect of horizontal structures since insiders can "bond" together. On the other hand, absent bonding, communication can favour socially responsible behaviour (apparent caring), particularly if people feel ashamed to voice self-centred arguments.[3]

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[2] Sims (1992) extends Janis and Mann's (1977) concept of "groupthink" to explain unethical behaviour in tightly-knit groups; see evidence below and see Brewer (1979) and Tajfel (1970) on how simple distinctions can shift categorisation between in- and out- groups.

[3] Social comparison theory (see Brown (1986)) suggests people prefer to make more virtuous statements than average. Consistent with this, we find that subjects advocating other-regarding choice chat more than those making group-centric arguments (see Appendix). Moreover, standard norms of efficiency and fairness encourage kindness to the third party in our setting; see e.g., Cialdini, Reno, and Kallgren (1990) on norms generating pro-social behaviour and Palazzo and Scherer (2007) on the deliberative, Habermasian approach to corporate social responsibility.

These considerations generate two main predictions. (1) With unrestricted insider communication, the strong insider-outsider effect in horizontal firms makes them less ethical than vertical firms (i.e. they are more likely to harm outsiders).[4] (2) Communication makes vertically-structured firms more ethical, since subordinates with voice feel involved – voice limits their responsibility-alleviation and facilitates social pressure.

We put these ideas to a test using a simple, one-shot three-player game that captures, in a very stylised way, the type of dilemma faced by a firm when its profit-maximising strategy causes harm to third parties. In our experiment, two of the three subjects jointly determine the "firm's" production strategy, while the third subject is a passive third party with no power to respond (not even voice). To isolate the shared ethical dilemma over how to treat the third party outsider, we impose an exogenous rule for insider sharing of the firm's profits: each insider receives half the profits in all experimental treatments. Our control structure treatments vary how the firm's two insiders determine its strategy. In the horizontal structure, the firm's control rights are allocated symmetrically between the insiders: they decide the firm's strategy by consensus. In the vertical structure, the firm has a boss who sets the production strategy; the subordinate cannot change this strategy, but can prevent production by quitting. Our communication treatments simply allow the firm's insiders to send each other written messages, creating a 2-by-2 design.

The results confirm our two main predictions: (1) with communication, insiders of a vertically structured firm are less likely to harm outsiders than are the insiders of a horizontally structured firm; (2) communication significantly improves ethical outcomes in vertical structures – without communication, they are no more ethical than horizontal ones. We also report on the dynamics of bargaining, the use of persuasive messages and the time needed to reach agreement. We find that the insider proposing the most generous strategy is quicker to compromise downwards (as if letting the less ethical partner take responsibility) than is the less ethical partner to compromise upwards. This dynamic "responsibility-alleviation" disappears when the insiders can communicate verbally, consistent with the idea that people like to use voice to argue for virtuous behaviour (see footnote 3). Our analysis of the communication data reveals (i) greater mutual identification (bonding) in horizontal

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[4] Also, while responsibility is diffused in horizontal firms, superiors have concentrated responsibility and subordinates with voice feel partially responsible.

than vertical firms, (ii) less kindness by groups where insiders 'bond' and (iii) more chatting in groups that predominantly voice pro-social norms and plans. Finally, our delays data (see Appendix) show that vertical firms implement plans more quickly than horizontal ones, but that adding communication removes this possible advantage.

The paper is organised into six sections. In the next section, we describe the related experimental work that motivates our conjectures and our design. In section 3, we detail the experimental procedures. We present a simple model to formalise the conjectures in section 4. We present our results in section 5 and conclude with a discussion in section 6.

2. Related Experimental Literature

Psychological considerations. Milgram's (1974) studies offer early evidence on how involvement in decision-making affects perceived responsibility: subjects were dramatically more likely to reject their unethical task when they were involved in selecting the degree of harm (the size of the electric shock) and when physically involved in creating the harm (placing the hand on the electric plate). Subjects also feel less responsible when their involvement is low *relative* to others, especially for others who appear to be legitimate "authorities" as in Milgram (1963 and 1974). Charness (2000) defines "responsibility-alleviation" as a "shift of [moral] responsibility to an external authority" and finds that a worker in a gift-exchange game is more pro-social if no other human actor has an active role;[5] he also notes that much of the evidence that external controls and incentives reduce intrinsic motivation can be interpreted in terms of responsibility-alleviation (see e.g. Barkema (1995), Campbell (1935), Deci and Ryan (1985), Frey and Jegen (2001)).

The evidence on responsibility-diffusion (see Darley and Latané (1968) and Latané and Nida (1981)) bolsters our general claim about control and responsibility, because sharing control decreases each individual's (absolute and relative) control. The recent literature comparing group to individual behaviour in games is broadly consistent. For instance, Bornstein and Yaniv (1998) and Robert and Carnevale (1997) find that groups make less generous offers in the ultimatum game; Schopler and Insko (1992) find that groups are more competitive; Cox (2002) finds that groups

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[5] Charness (2000) varies whether a neutral third party or a randomisation device sets the wage. He argues that actors in the worker role can more easily rationalise shifting responsibility (for effort outcomes) onto a (neutral) human third party than onto an inanimate randomisation device.

are less trustworthy in the investment game. Dana, Weber and Kuang (2005) find that groups are less generous in the dictator game (but see next paragraph on Cason and Mui (1997)). Dana et al. (2005) also find that dictators are less generous when a random factor reduces their direct control over outcomes; the random factor appears to alleviate individual responsibility, just as random factors reduce the responsibility attributed to others in Blount's (1995) experiment. In sum, these papers suggest that actors feel more involved and hold themselves more responsible for outcomes over which they have more direct and salient control (relative to others and to random effects).

There are fewer related experimental papers on **communication**. It is intuitive that communication with the third party should limit unkindness to this party - see e.g. Bohnet and Frey (1999) and Greiner, Güth and Zultan (2006). Less is known about the impact of *internal* communication on how groups treat outsiders, but Cason and Mui (1997) argue that mutual observation within a group may generate Hoffman, McCabe, Shachat and Smith's (1994) "observer effect" where actors behave more sociably in pursuit of approval of the observer/experimenter. Cason and Mui (1997) allow free-form communication between insiders. This enhances the proximity of internal observers and may explain why groups are more generous in Cason and Mui (1997) than in Dana et al. (2005) (where there is no communication).[6]

Related Designs. In experimental terminology, the firm plays a variant on the "dictator game" with the third party as a dummy receiver.[7] Most experiments (and, to the best of our knowledge, *all* prior variants on the dictator game) adopt horizontal rules for aggregating individual choices. Our vertical structure is similar to the group-with-a-dictator structure adopted in recent work on representatives (see e.g. Bornstein, Schram and Sonnemans (2006)), but it is less extreme, because subordinates are not

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[6] On the other hand, friendly insiders may not judge each other. More generally, Kerr and Kaufman-Gilliland (1994) note that communication can enhance norms of benevolence, but concur with Dawes' (1990) claim that discussions mostly enhance group identity (and generate within-group contribution commitments (not an issue in our context)); see also Bornstein's (2003) survey of team games. Crawford (1998) surveys evidence that communication can facilitate coordination and recent advances study strategic bilateral games; e.g. Charness and Dufwenberg (forthcoming) and Ellingsen and Johannesson (2004) find that communication facilitates commitments that can resolve trust problems.

[7] The firm's problem differs slightly from the dictator game in that: (i) the pie size is not fixed (mostly decreasing with harm level); (ii) the firm has a non-production option that reduces the pie but avoids harming the dummy. These differences reflect common aspects of real-world production settings and ensure that efficiency norms prescribe the same kind play as standard fairness norms.

entirely powerless – they can quit (which is why their ethical stance always matters).[8] We only know of two other papers that compare decision-aggregation rules. In Messick, Allison and Samuelson's (1988) ultimatum game, recipient group responses are set at either the maximum or minimum of the individual proposals. In both these treatments, the groups are horizontal, but Bornstein et al. (2006) compare dictatorial representatives (extreme vertical groups) with democratic groups (where the three members make proposals and then select by majority vote). Bornstein et al. (2006) observe no decision-rule effects at the group-level; also their underlying (2-stage chicken) game triggers strategic conflict rather than ethical considerations.[9] In sum, we believe this paper is the first to analyse the impact of organisational structure on ethical behaviour.

3. Experimental design and procedures

3.1. Basic set-up

In all treatments, an independent set of actors play a one-shot three-player game. Two of the players, A and B are active. One player, C, has no decision to take. A and B are the "insiders" of a "firm" whose production generates an externality on the third player C "outside" the firm. The firm's production plan $0 \leq y \leq 10$ generates profits $10 - y$ and an externality of $1.2 \times \text{Min}\{y, 6\} - 6$; y is effectively the firm's expenditure on mitigating the -6 production externality.[10] A and B each receive half the firm's profits, so $\pi_A = \pi_B = 5 - 0.5y$. The externality falls on C so $\pi_C = 1.2 \times \text{Min}\{y, 6\} - 6$. Figure 1 plots each party's payoff and the total surplus from each production plan. If
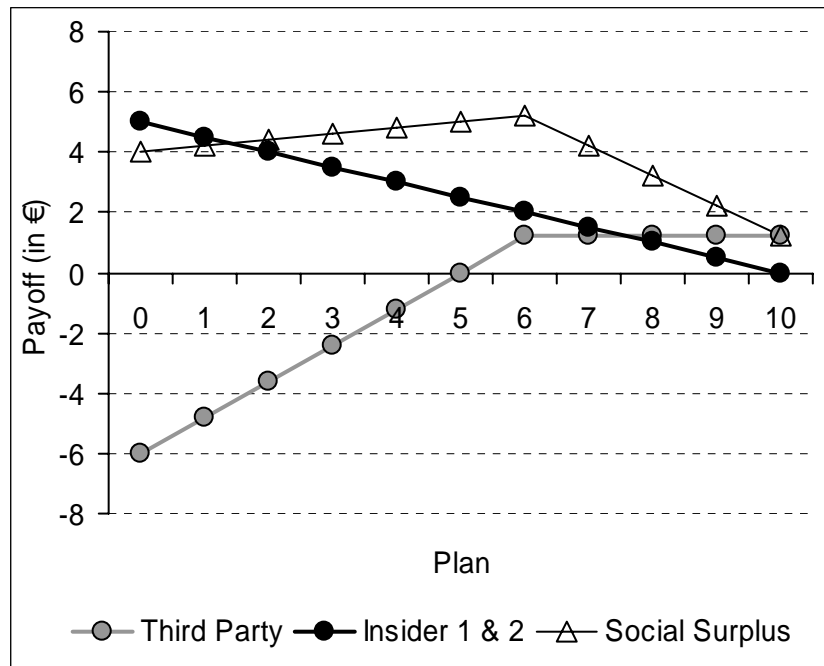
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[8] The quit option links our vertical treatment to Güth and van Damme (1998) and Okada and Riedl (2005). These authors study three party ultimatum games with a proposer, one active recipient and one powerless recipient (a dummy). They find that the active players tend to fully neglect the dummy. We attribute this to the conflict between the active players over pie sharing which appears to monopolise their attention; by contrast, in our set-up, profit-sharing is fixed in advance, i.e. the boss (proposer) is obliged to give the same share of profits to the subordinate (active recipient) as s/he keeps for him/herself.

[9] Van der Heijden, Potters and Sefton (2005) explicitly study hierarchy, but they look at productive efficiency, not group ethics; also, they define hierarchy as asymmetric allocation of team profits so they vary cash-flow rights while we vary control rights.

[10] Notice that the marginal return on harm-reduction (y) is decreasing: it falls from 1.2 to 0 at $y = 6$. Notice also that $1.2 \times \text{Min}\{y, 6\} - 6 > 0$ for $5 < y \leq 10$; i.e. the firm can choose a plan that benefits the outsider (e.g. de-contaminating others' pollution or precluding entry by a harmful competitor). This is not important to our results, but it allows us to distinguish among alternative ethical motivations.

either A or B quits or the firm fails to fix a production plan (see below), there is no production and all parties get a payoff of zero: $\pi_A = \pi_B = \pi_C = 0$.

Figure 1 : Individual Payoffs

3.2. The decision-making process

The decision-making process has two components: setting the strategic plan y and deciding whether to implement it. Our organisational treatments only affect the process for setting the plan. In all treatments, both A and B can unilaterally prevent implementation (production).[11] What varies is the decision-making process that determines the firm's plan, y. We consider horizontal and vertical structures. We also control the communication structure that complements the formal decision process.

Horizontal structures

The basic property of a horizontal structure is that the power to select y is distributed symmetrically between (the insiders) A and B. We study the horizontal structure in which A and B have ten minutes to propose strategies y_A and $y_B \in \{0,1,2,...,10\}$ until they reach a consensus, in which case $y = y_A = y_B$ is implemented;[12] if they run out

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[11] This is methodologically valuable, since it generates information about B's moral motivations even when only A can set the firm's strategy. Empirically, both insiders might have critical human capital or whistle-blowing, or organisationally-assigned, veto power.

[12] A and B are required to first validate any apparent consensus in case one hit the wrong key.

of time or either A or B quits, the game ends in no agreement and there is no production. During this bargaining process, A and B only observe each other's new proposals when *both* have made a new proposal.[13]

Vertical structures

In the vertical structure, the power to set y is distributed asymmetrically: A sets y unilaterally; B can only reject A's decision by quitting. Here the timing is very simple: (1) A sets $y \in \{0, 1, 2, ..., 10\}$ or chooses to quit; (2) B chooses whether or not to quit; (3) Production plan y is implemented unless either A or B chose to quit.

Communication

In the communication treatments, we enhanced the above two games by allowing A and B to send each other written (electronic) messages throughout their interaction.[14]

In what follows, we refer to the four resulting games as H, V, HwC and VwC where H and V denote Horizontal and Vertical structures and wC denotes "with Communication".

3.3. Experimental procedures

The experiments were conducted at the Laboratoire d'Economie Expérimentale of the Université de Strasbourg (LEES). Participants were undergraduate students in Business Administration, Economics, Law, Humanities, Science and Engineering. 192 subjects were recruited online by advertisement on campus. This gave 16 observations on groups of 3 subjects in each of the four treatments: H, V, HwC and VwC. At the start of each session, subjects were randomly assigned to cubicles equipped with computer terminals and given instructions that were read aloud.[15] Groups and roles (A, B and C) within groups were randomly assigned in each session once subjects had sat in their cubicles. After responding to requests for clarification, we conducted a ten-

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[13] This is game-theoretically equivalent to requiring simultaneous proposals and has two advantages. First, it maximally differentiates our horizontal and vertical treatments by preventing the "endogenous hierarchy" in which one insider makes proposals before the other has time to think, or repeatedly drums its proposal onto the other's screen. Second, it generates data indicative of A and B's preferences prior to mutual influence: the first proposals of A and B are fully independent in the no chat case.

[14] Some organisations restrict internal communication (e.g. to limit rent-seeking or even ethical debate). In others, relevant insiders simply have too little time and incentive to listen or talk. Controlling for communication is also important, because H necessarily allows partial communication lacking in V.

[15] See the Appendix for a literal translation of the full set of instructions.

question quiz to check subjects had understood the instructions and we explained all the errors uncovered by the quiz.

To avoid framing effects, we presented the game to subjects in neutral language by referring to participants A, B and C and by asking them to choose or accept a plan numbered between 0 and 10 or to quit (see screenshots in the Appendix). The procedures followed in each treatment exactly reproduce the description given in section 3.2.[16] At the end of the experiment, the payoffs earned within each group were revealed to the participants of that group. As C (third-party) participants could lose a maximum of €6, each member of a group was given a capital balance of €7 to ensure a positive payoff from participating in the experiment. Subjects could participate in only one session and their average earnings (which include a €5 show up fee delivered at the end of an experimental session) were €13.37 (€15.97 for insiders and €8.18 for third parties). Each session (including time needed to read the instructions) lasted for about thirty minutes.

4. Psychological conjectures

This section formalises the above insights from social psychology. An insider (A or B) will only act to help C if positively disposed towards C *and* feeling responsible for what happens to C, so we consider the stylised utility function, $u = \pi_A + r.w.\pi_C$, where $r \geq 0$ represents A's feeling of responsibility for the decision; equivalent statements hold for B and $w \geq 0$ represents A's disposition towards the outsider C *relative* to A and the other insider B.[17] Before analysing how these parameters vary with the decision-making process, we record the simplest economic benchmark.

Conjecture 0: *If actors are homogenous with consequentialist preferences (e.g. all self-interested) then, in equilibrium, structure and communication have no effect on outcomes: H = V = HwC = VwC.*

In particular, standard, purely self-interested actors set $y = 0$ and do not quit. More generally, for any common preference function of insiders, their identical material preferences imply identical outcome preferences that are independent of the treatment (by consequentialism) and the firm can trivially implement this common preference in

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[16] Subjects were asked not to reveal their identities or use rude language; all complied.

[17] $\pi_B = \pi_A$, so the normalised weight (unity) on π_A is the sum total of A's concern for A and B; *w* is therefore lower when A cares more about B. Notice that, for fixed *r* and *w, u* is simply a reduced-form of a linear impure utilitarian preference function; see Appendix, also for fairness-based derivation.

all treatments. In the Appendix, we study heterogeneous consequentialist actors; clear prediction is difficult and the data contradicts the most convincing prediction about communication. Here, we focus on the psychological insights.

Perceived responsibility (r)

The introductory evidence suggests that people tend to only feel morally responsible for outcomes over which they have a clear and salient causal responsibility. This might be formalised by assuming people internalise social norms that evolved in a society averse to making false accusations.[18] B's subordination in the vertical structure (treatment V) reduces the salience of B's involvement in choosing y relative to A in V and also relative to A or B in the horizontal structure (treatment H); so (for homogeneous perceived responsibility) we predict that $r^B(V) < r^B(H)$. This responsibility-alleviation is limited in VwC since voice is a form of involvement, so we predict $r^B(V) < r^B(VwC)$. Finally, responsibility diffusion in H implies A's perceived responsibility in V (where A controls y unilaterally) is higher than in H (where A and B share control over y), so we predict $r^A(H) = r^B(H) < r^A(V)$. In sum, the perceived responsibility weights satisfy:

$$r^B(V) < r^B(H) = r^A(H) < r^A(V) \text{ and } r^B(V) < r^B(VwC) \tag{1}$$

Assuming subject homogeneity, subordinate B is always less concerned for C and therefore irrelevant, since quit threats cannot credibly influence A into lowering y. The effective concern for C in V is therefore $w.r^A(V)$, while in H it is immediate that A and B act on their common concern, $w.r^A(H)$ for C. The latter is lower owing to responsibility-diffusion, so C may be worse off in H.[19] On the other hand, with subject heterogeneity, when w^B exceeds w^A, B may influence A, so B's alleviated sense of responsibility in V can hurt C. C can then be worse off in V (see Appendix for a concrete example). In sum, responsibility-alleviation in V counteracts responsibility-diffusion in H, so we cannot make a prediction.

Conjecture 1: *H versus V ambiguous (in terms of C's welfare).*

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[18] E.g. responsibility is diffused if social observers outside a horizontal firm only observe its final action and refrain from blaming either insider in case only the other was to blame. Note: self-serving bias may similarly enable individuals to escape self-judged responsibility when causality is ambiguous.
[19] Assuming $y \leq 6$ simplifies (it only rules out extreme altruism of A and B); we can then substitute $\pi_A = \pi_B = 5 - y/2$ and $\pi_C = 1.2y - 6$. Then $u^A = 5 - y/2 + (6/5)r^A w^A(y-5)$ and A prefers $y = 0$ if $r^A w^A = 5/12$ and $y = 6$ if $r^A w^A > 5/12$; so A prefers $y(r.w) = 6.I_{\{r.w>5/12\}}$. Now if $r^A(H) < 5/12w < r^A(V)$, then $y = 0$ in H and $y = 6$ in V, so C is better off in V than in H.

Communication allows B to try to influence A even in a vertical firm. So responsibility-alleviation should be weaker for B in VwC than in V. (A remains central, so responsibility-diffusion remains low.) Using the shorthand, "V kinder than H" to indicate that on average, A and B treat C better in treatment V than H, this reduced alleviation $(r^B(V) < r^B(VwC))$ generates the "voice as responsibility" conjecture:

Conjecture 2: *Vertical with chat (VwC) kinder than vertical (V).*

Context-dependent social preferences (*w*)

We represent the ideas on social identification and social pressure as shifts in the value of *w* (the preference weight on C's payoff relative to firm profits); for simplicity, we treat homogeneous actors with $r = 1$. **Social identification:** A and B are more likely to identify with each other in H where their roles are identical, than in V where the insider-outsider distinction is less salient; in V, B may even identify more with the powerless outsider C than the superior A. Since actors tend to want to help those with whom they identify to the exclusion of others, the stronger insider-outsider effect in H implies $w^A(H) = w^B(H) < \min(w^A(V), w^B(V))$. Social identification is weak in abstract contexts, so Conjecture 1 remains, but verbal communication enhances initial social attitudes (see Caporeal et al. (1989)). In particular, communication catalyses bonding between A and B in H, whereas power inequality in VwC acts as a partial barrier to friendship. This suggests a dominant insider-outsider effect in HwC: [20]

Conjecture 3: *VwC kinder than HwC.*

Social pressure: Communication facilitates social pressure and the pursuit of social approval which tend to have a positive effect on *w* (see footnote 3 on norms and virtuous voice); also communication can reduce "social distance" within the group and (absent bonding) increase the "observer effect" discussed in section 2. This reinforces Conjecture 2 about vertical structures, but communication also catalyses the insider-outsider effect in HwC so:

Conjecture 4: *HwC versus H ambiguous.*

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[20] B's voice involvement in VwC reinforces this prediction.

On bargaining dynamics and chats

In H, A and B's perceived responsibility can depend on each other's proposals. We predict a *dynamic responsibility-alleviation*: suppose A's first proposal of *y* is higher than B's, then A can self-justify "compromising" downwards to B's proposal on the grounds that "it was B who suggested being unkind to C".
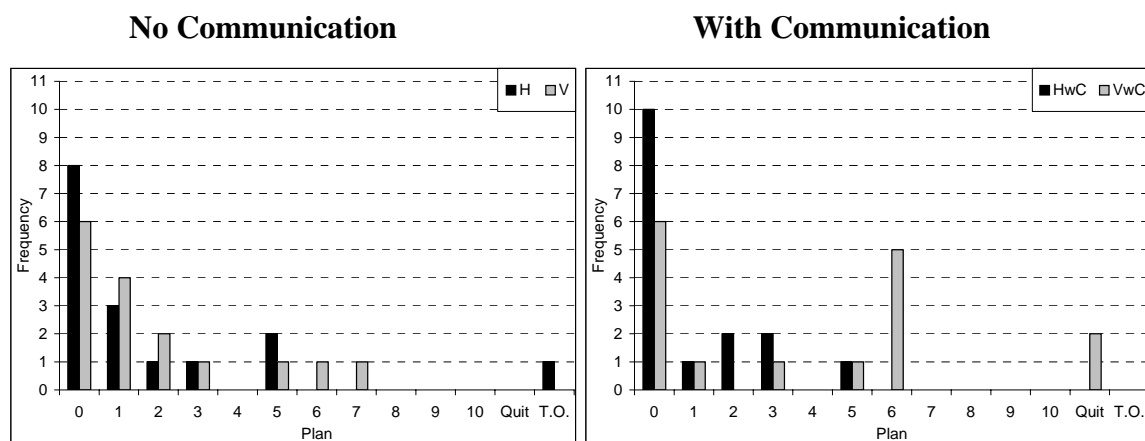
Conjecture 5: *In H but not in HwC, A and B's proposals exhibit downward convergence (the high-y proposer compromises down more than the low-y proposer compromises up).*

We do not predict downward convergence in HwC. Persuasion effects may counteract dynamic alleviation; the virtuous voice argument suggests kinder proposers will argue 'louder' than less kind proposers and the desire to match words with action reduces susceptibility to dynamic responsibility-alleviation.[21]

5. Results

Most of our conclusions are based on the outcomes of randomisation and binomial or Fisher exact tests, so the tests do not rely on any parametric assumptions.[22] We use the $\alpha = .10$ significance level, but report p-values so readers can draw conclusions for other significance levels.

Figure 2 : Frequency of implemented plans

No Communication	With Communication

Note: T.O. = Timed Out

Figure 2 reports frequency plots of the implemented plans in each of the four treatments considered. The samples look similar except that vertical with chat, VwC,

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[21] Note also that dynamic adjustments may occur through chatting before making first proposals.
[22] We use randomisation tests for independent or related samples, since they exploit *all* the information contained in the samples studied (see Siegel and Castellan (1988)).

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appears to be kinder to C than other treatments. Table 1 reports, for each treatment, the average foregone payoffs of insiders, A and B, and average payoffs of third parties, C.[23] A global comparison of the four treatments indicates no significant difference in the outcomes, neither for insiders nor third parties (p-values > .1491 according to Kruskal-Wallis tests), so we cannot reject Conjecture 0 immediately. Moreover, the two pair-wise comparisons suggested by Conjectures 1 and 4 reveal insignificant cross-treatment differences. However, structure does matter when communication is allowed. Concretely, we test for equivalence in pair-wise comparison of treatments in terms of insider foregone payoffs and then in terms of third party payoffs. Two-tailed randomisation tests do not reject the null of payoff equality between H and V (p-values > .7000, two-tailed), nor between H and HwC (p-values > .4246, two-tailed), but they do reject the null of equality between HwC and VwC (p-values ≤ .0192, two-tailed).

Table 1 : Average (Insider) Foregone Payoffs and (Third-Party) Actual Payoffs

	H	V	HwC	VwC
A & B (foregone)	0.87	0.91	0.50	1.84
	(1.40)	(1.14)	(0.77)	(1.81)
C (actual)	-4.28	-3.90	-4.80	-2.33
	(2.36)	(2.57)	(1.86)	(3.22)

Note: Average values in Euros; Standard deviations in brackets.

Another natural measure of 'kindness' to C simply distinguishes *harmful* outcomes (plans with $y < 5$) from *harmless* outcomes ($y \geq 5$ or non-production, denoted "Quit"). This permits tests that essentially reinforce the payoff-based tests throughout. Two-tailed binomial tests reject the null hypothesis that *harmful* and *harmless* outcomes are equally likely in H, V and HwC (p-values ≤ .0212, two-tailed) but not in VwC (p = 1.00, two-tailed). Two-tailed Fisher 2×2 exact tests find no significant difference in the likelihoods of observing harmful and harmless plans between H and V (p = 1.00, two-tailed) nor between H and HwC (p = .3503, two-tailed), but do reject the null of equal harmfulness of HwC and VwC (p = .0082, two-tailed). So we conclude:

Observation 1: *The homogeneous consequentialist Conjecture 0, that H=V=HwC=VwC in terms of payoffs to insiders and third parties, holds only partially: in particular, we observe H = V and HwC=H but HwC ≠ VwC.*

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[23] Cross-treatment comparisons of insider foregone payoffs do not exactly mirror those of third party payoffs, because the linear relationship is broken by quits and by selection of $y > 6$.

Two points follow immediately: the data are fully consistent with Conjecture 1 (that responsibility-alleviation and responsibility-diffusion counteract) and Conjecture 4 (that communication can have positive (e.g. virtuous voice) and negative (bonding) effects in horizontal structures). More importantly, the data provide strong support for Conjecture 3, that the enhanced insider-outsider effect in HwC makes HwC less kind than VwC. The above rejection of HwC=VwC is strengthened in one-tailed tests of the null (equivalence) against the alternative hypothesis that VwC is kinder than HwC: insider foregone payoffs are significantly greater in VwC than in HwC and third parties lose significantly less in VwC than in HwC (p = .0066 and p =.0092 respectively, according to one-tailed randomisation tests); moreover, plans are more likely to be *harmful* in HwC than in VwC (p = .0077, according to a one-tailed 2×2 Fisher exact test). In sum:

   Observation 2: *As predicted by Conjecture 3, VwC generates more ethical outcomes than HwC.*

An analysis of the chat data in HwC and VwC corroborates Observation 2 and the mutual identification (bonding) idea behind Conjecture 3.[24] In the Appendix, we categorise discussions as group- or other-regarding (or neutral) and as bonding or not (using a measure of mutual identification). Using one-tailed 2×2 Fisher exact tests (on Table 3 in Appendix), we reject the null of no relationship in favour of the following alternative hypotheses: (i) *bonding* is more likely in HwC than VwC (p = .0595); (ii) in HwC, groups with *bonding* are significantly more likely to have *group-regarding* discussions (p = .0163); (iii) in HwC, groups with *bonding* are significantly more likely to generate the *profit-maximising* outcome (p = .0163).

The data also provide some support for Conjecture 2, that communication increases social responsibility in vertical structures, i.e. that VwC is kinder to third parties than V. In terms of payoffs, V leads to significantly lower insider foregone payoffs and significantly lower third party payoffs than VwC (p = .0500 and p = .0804 respectively, one-tailed randomisation tests). In terms of harmfulness, we reject the null of communication independence in favour of the alternative that plans are more likely to be *harmful* in V than VwC (p = .0675, one-tailed 2×2 Fisher exact test). So the data is supportive by all three tests:[25]

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[24] See Appendix for literal English translations of the French transcripts of chat data in HwC and VwC.
[25] The data on decisions to quit is potentially useful for directly testing the voice as responsibility idea. We do observe two quits by subordinates in VwC and no quits in V. This suggests that voice indeed

Observation 3: *As predicted by Conjecture 2, in a vertical structure, communication between insiders favours ethical outcomes: VwC generates more ethical outcomes than does V.*

The repeated interaction between insiders in horizontal treatments provides valuable data for studying the dynamics of responsibility-alleviation. Negotiation length varies across groups, so we focus on how the last proposals compare to the first ones. Excluding immediate consensus, one insider makes a higher first foregone payoff proposal than the other; we call the high proposers, the *kind* proposer, and the low proposer, the *unkind* proposer. To capture how strongly insiders resist compromising towards each other's first proposal, we then define resistance index, $\rho_i = \left| y_{iN} - y_{j1} \right| / \left| y_{i1} - y_{j1} \right|$ with $i \neq j = \{kind, unkind\}$; N indicates final proposal round.[26] The index is 0 if the proposer ends up compromising fully to the other's first proposal and the index is 1 if resistance is maximal (the proposer insists on its initial proposal, so $y_{iN} = y_{jN} = y_{i1} = 0$). By construction, ρ_{unkind} and ρ_{kind} add to unity, so we simply test for a deviation from 0 of $\rho_{unkind} - \rho_{kind}$ (within treatment comparisons).

Table 2 : Average ρ_{unkind} and $\rho_{unkind} - \rho_{kind}$.

	H	HwC
ρ_{unkind}	0.70	0.55
	(0.31)	(0.48)
$\rho_{unkind} - \rho_{kind}$	0.40	0.10
	(0.62)	(0.95)

Note: Standard deviations in brackets.

Table 2 reports index averages and Figure 3 the histograms of differences $\rho_{unkind} - \rho_{kind}$ in H and in HwC. We test the null that these differences have mean 0. For the H sessions only, we reject this null in favour of the alternative that the differences are positive (p = .0488 while in the HwC sessions, p = .3420; one-tailed one-sample randomisation tests). According to this test, *unkind* proposers resist more
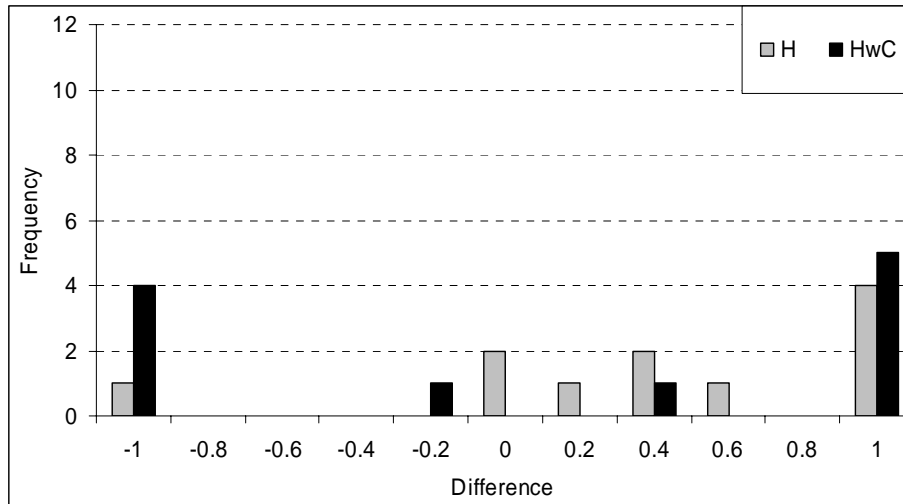
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makes them feel more responsible in VwC than in V (even controlling for the proposal by superiors), but the difference in quit rates is not significant; equilibrium quits are rare since quitting has high implicit costs for both insiders.

[26] Identical results obtain from defining the index using insider foregone payoffs or third-party losses instead of the plan proposals *y*. Immediate consensus ($y_{i1} = y_{j1}$) occurred in Groups 3, 8, 14 and 16 of H, and 2, 5, 9 and 16 of HwC). We also excluded groups (Group 2 of H and 13 of HwC) where either insider's final proposal failed to lie between the initial proposals.

than do *kind* ones when verbal communication is impossible, but there is no significant asymmetry in resistance when communication is allowed.[27]

> **Observation 4:** *As predicted by Conjecture 5, horizontal structures display dynamic responsibility-alleviation (i.e. unkind proposers resist compromising more than do kind proposers), but not when communication is allowed.*

Figure 3 : Histograms of ρ_{unkind} -ρ_{kind} in H and HwC

6. Conclusion

Our experimental analysis shows that decision-making processes can have significant effects on distributive outcomes. Our first main finding is that, with communication, vertical structures generate greater social responsibility than do horizontal structures. Mutual identification between insiders in horizontal structures leads to a strong insider-outsider effect (to the detriment of outsiders), because communication often leads to bonding between insiders.[28] Without communication, however, vertical and horizontal structures cannot be distinguished in terms of social responsibility, because horizontal structures generate less insider bonding and vertical structures generate more responsibility-alleviation of subordinates.

Our second main result is that communication among insiders leads to significantly more ethical behaviour in vertical structures. Subordinates without voice

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[27] See Appendix on further tests, including a cross-treatment test.
[28] Though salient power differences appear to inhibit mutual identification (and the tendency towards bonding) in our vertical treatment, insider-outsider effects may apply in real-world vertically-structured firms. First, there may be many subordinates at a common level and multiple superiors (e.g. on a board of directors). Second, other factors (not present in the experiment) may drive social identification.

seem happy to let their bosses be socially irresponsible, while voice appears to make subordinates feel responsible for what their group does. Voice is a form of involvement and it limits responsibility-alleviation.

Communication also allows participants to verbalise ethical norms.[29] For instance, communication counteracts the "dynamic alleviation of responsibility" whereby kinder proposers readily "compromise" to the less kind proposals of colleagues, letting the colleagues take the blame for the unkindness. On the other hand, communication increases the insider-outsider effect in horizontal structures by catalysing the tendency of insiders to care for each other to the exclusion of outsiders.

Our study represents a first attempt to shed light on how organisational structure and communication can affect the ethical behaviour of a group such as a firm. It shows that economics and psychology can help analyse the intuitions of corporate reformists like Robert Dahl. Our data supports the idea that giving voice to subordinates (internal debate) can improve ethical outcomes. Our finding of more ethical outcomes under vertical structures with communication appears to contradict Dahl's specific hierarchy claim, but one must exercise caution in extrapolating from our data. For instance, in many firms, a flatter hierarchy may be needed to ensure that workers can communicate with bosses. Indeed, our voice result can then explain Askildsen et al.'s (2006) field evidence that worker representation in governance lowers pollution. Further experimental investigations could introduce other real-world factors, such as hiring and promotion processes that select (e.g. profit-focussed) actors for superior positions. Nonetheless, we believe our study already provides valuable insights and results. We hope it will entice further research in this field.

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[29] Norms of self-interest (e.g. Ayn Rand's objectivist ethics) or profit-maximisation (see Friedman (1970)) might encourage group egoism, but our chat data suggest that verbal communication encourages individuals to express support for generous norms or remain silent. Notice also that Friedman's (1970) norm of profit-maximisation does not apply to business contexts in which the law must be broken to increase profits (e.g. unobservable but illegal pollution or accounting manipulation).

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