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# Organisational structure, communication and group ethics<sup>†</sup>

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**Abstract:** This paper investigates experimentally how organisational decision processes affect the moral motivations of actors inside a firm that must forego profits to reduce harming a third party. In a “vertical” treatment, one insider unilaterally sets the harm-reduction strategy; the other can only accept or quit. In a “horizontal” treatment, the insiders decide by consensus. Our 2-by-2 design also controls for communication effects. In our data, communication makes vertical firms more ethical; voice appears to mitigate “responsibility-alleviation” in that subordinates with voice feel responsible for what their firms do. Vertical firms are then more ethical than the horizontal firms for which our bargaining data reveal a dynamic form of responsibility-alleviation and our chat data indicate a strong “insider-outsider” effect.

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

**JEL Classification Numbers:** C91, C92, D21, D63, D64, D70.

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“The structure of American Corporate Enterprise narrows the domain of moral responsibility down to the vanishing point.”

Robert Dahl (1985)

## 1. Introduction

Compared to the vast literature on how hierarchy and communication affect profits, economics has essentially 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 have powerful effects on its agents’ moral motivations and therefore on 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.<sup>1</sup> 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’ hierarchical structure 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 (2003) find suggestive evidence supporting this view: 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 useful related evidence. In 1963, Stanley Milgram shocked the public by showing how readily subordinates abandon their personal ethics to obey a highly unethical authority. The perceived hierarchy *alleviates* individuals’ sense of responsibility. In Milgram (1963) and related studies, the authority is unethical by design, but in a business setting, the ethical stance of potential bosses is endogenous. In particular, their ethical

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<sup>1</sup> On participatory approaches to corporate social responsibility (CSR), see Cludts (1999). On communication channels inside firms, see Mirvis’s (2000) study of Shell and see Hills and Welford’s (2006) case study of Disney.

stance may depend on how many people share authority. In 1968, Darley and Latané's experimental evidence (on the social pathology of the "passive bystander") showed that increasing the number of people involved in decision-making can sharply "diffuse" each individual's sense of personal responsibility. So perhaps increasing worker involvement will decrease their bosses' sense of responsibility? Unfortunately, there is no experimental work assessing how *change* in organisational structure affects ethical outcomes. In this paper, 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 structure the theoretical issues, we distinguish two necessary conditions for an individual (with power inside a firm) to insist on an ethical decision by that firm: the person must (1) feel responsible (for what the firm does) *and* (2) care about ethical behaviour (e.g. care about the firm's potential victims or place value on a relevant ethical principle). 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 (described in section 2) supported by a theoretical intuition on the role of salient involvement (described in section 3), we conjecture that flattening a hierarchy will increase the perceived responsibility of subordinates ("responsibility-alleviation" falls), but decrease the perceived responsibility of superiors ("responsibility-diffusion" rises).

Communication structures affect perceived responsibility, because voice represents an indirect but non-trivial form of involvement (if communication channels give access to those with control rights). We predict that subordinates will feel a greater sense of responsibility for firm behaviour when able to communicate their views to their bosses.

It is natural to expect control and communication structures to also affect social objectives, because social preferences and social pressure are notoriously context-dependent. Communication within a group tends to reduce "social distance" between members and therefore to increase the "observer effect" whereby members behave more sociably in pursuit of observers' (i.e. each others') approval – see the section 2 discussion of Cason and Mui (1997). Furthermore, communication permits the expression of social

norms. This can favour socially responsible behaviour, particularly if people feel ashamed to voice self-centred arguments.<sup>2</sup> So channels allowing verbal communication may increase the social responsibility of individuals in groups and therefore of groups.

Control structures also affect social preferences. First, the allocation of control rights affects the level of organisational communication (e.g. consensus-based horizontal structures require intensive communication between insiders), so the previous paragraph applies. Second, organisational structures affect social relations, because actors tend to identify with and care for those to whom they feel similar. In a horizontal structure where insiders have identical roles, their mutual identification or sense of group identity is particularly high and implies a low relative concern for outsiders.<sup>3</sup> (This “insider-outsider” effect is exacerbated by communication.<sup>4</sup>)

Even when expanded to allow for altruism or to capture fairness concerns, simple game-theoretic models do not permit clear predictions of why the process for decision-making should affect ethical outcomes. We apply the modelling techniques of Fehr and Schmidt (1999) and discuss Rabin (1995).<sup>5</sup> Heterogeneity in fairness concerns or altruism can lead to interesting interactions involving moral suasion, threats and signalling, but to draw clear predictions we rely on the above social psychology ideas with preferences that depend on decision processes as well as material consequences.

We derive two main predictions. (1) With unrestricted insider communication, vertical firms are more ethical (less likely to harm outsiders) than horizontal firms because: (a) the central decision-maker’s responsibility is not diffused; (b) subordinates can use voice to apply influence and therefore feel responsible; (c) subordinates identify less with their superiors and more with the third party outsider. (2) Communication raises

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<sup>2</sup> See Cialdini, Reno, and Kallgren (1990) on the power of norms to generate pro-social behaviour. In our setting, most norms (efficiency, fairness, etc.) encourage generosity to the third party (though we discuss self-interest norms in the conclusion). Norms should certainly benefit the third party if actors prefer to make more virtuous statements than average (see Brown (1986) on “social comparison theory”). See also the Habermasian approach to corporate social responsibility (e.g. Palazzo and Scherer (2007)).

<sup>3</sup> 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.

<sup>4</sup> Caporeal et al. (1989) show that discussion often enhances initial group distinctions.

<sup>5</sup> In our simple setting the related models of Bolton and Ockenfels (2000), Charness and Rabin (2002), and Cox, Friedman, and Gjerstad (2004) generate similar predictions.

the average social responsibility of vertically-structured firms, since it ensures that subordinates feel involved and facilitates social pressure.<sup>6</sup>

We put these ideas to a test using a simple 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). In experimental terminology, the third party is a dummy and the firm plays a variant on the “dictator game”.<sup>7</sup> Our control structure treatments vary how the firm’s two insiders determine its strategy. In our horizontal structure, the firm’s control rights are allocated symmetrically between the insiders: they decide the firm’s strategy by consensus. In our vertical structure, the firm has a boss who sets the production strategy; the subordinate cannot change the strategy, but can prevent production by quitting. (E.g. the subordinate might have critical human capital or the “quit” could represent “blowing the whistle” on an illegal productive practice.) The boss cannot affect the share of profits between him/herself and the subordinate; in all our experimental treatments, the firm’s insiders each receive half the profits. The exogeneity of the sharing rule isolates the shared ethical dilemma over how to treat the outsider. It also has direct relevance, because insiders do not renegotiate profit-sharing every time their firm faces a strategic decision. (See also section 2.)

Our main results are two-fold. First, with unrestricted insider communication, vertical structures favour more ethical outcomes: the insiders of a vertically structured firm are less likely to harm outsiders than are the insiders of a horizontally structured firm. Second, the communication channel between subordinates and superiors is vital for this ethical result; communication significantly increases the ethical nature of vertical structures; without communication, vertical structures are no more ethical than horizontal ones. We also report on the dynamics of bargaining, the verbal statements sent in communication treatments and the time needed to reach agreement. For instance, we find

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<sup>6</sup> Communication has an ambiguous impact on horizontal firms, because verbal communication catalyses bonding between insiders thereby raising the exclusionary insider-outsider effect (see above).

<sup>7</sup> The firm’s problem differs slightly from the dictator game in that: (i) the pie size is not fixed (initially, it increases when the harm level is reduced); (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 generous play as standard fairness norms.

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 2). We also confirm the simple intuition that decision-making delays are greater in horizontal structures, but we find that adding a communication channel largely removes this disadvantage.

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 present a model to formalise the conjectures. We detail the experimental procedures 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). Feelings of responsibility also appear to be weaker when an actor’s involvement is low *relative* to that of others (especially when the others 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 gives evidence that a worker in a gift-exchange game is more pro-social when no other human actor has an active role;<sup>8</sup> he also notes that much of the evidence that external controls can reduce intrinsic motivation can be interpreted in terms of responsibility-alleviation (see e.g. Barkema (1995), Campbell (1935), Deci and Ryan (1985) and 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

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<sup>8</sup> Charness (2000) varies whether a neutral third party or a randomisation device sets the wage. He claims that actors in the worker role can more easily rationalise shifting responsibility for effort onto a (neutral) human third party than onto an inanimate randomisation device.

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 are less trustworthy in the investment game; Bosman, Hennig-Schmidt and van Winden (2005) find that groups rarely discuss fairness considerations in the power-to-take game. Dana, Weber and Kuang (2005) find that groups are less generous in the dictator game, unlike Cason and Mui's (1997) earlier finding that groups are *more* generous (as discussed immediately below). 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, this work suggests 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. Cason and Mui (1997) extend Hoffman, McCabe, Shachat and Smith's (1994) notion of the "observer effect" (behaving more sociably in pursuit of observers' approval) to the case of mutual observation by group members. The free-form communication between group members (who meet face-to-face in Cason and Mui (1997) but not in Dana et al. (2005)) enhances the perceived proximity of these observers (see Sally (1995)), so the observer effect could explain the greater generosity of groups in Cason and Mui (1997).

Kerr and Kaufman-Gilliland (1994) discuss how communication may enhance general norms of benevolence, but end up concurring with Dawes et al.'s (1990) conclusion that discussions mostly serve to enhance group identity and allow parties to elicit commitments to contribute. However, these papers study team games where discussion affects individual contributions to the group as well as the inter-group strategy; see Bornstein's (2003) recent survey. Other recent advances in understanding the role of communication 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 and Cooper and Kagel (2005) and Brandts and Cooper (2006) find that communication facilitates coordination.

**Related Designs.** 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) on the 2-stage chicken game), but it is less extreme, because subordinates are not entirely powerless – they can quit (which is why their ethical stance always matters).<sup>9</sup> We 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; their underlying (2-stage chicken) game always triggers strategic conflict rather than ethical considerations.<sup>10</sup> Finally, Potters, Sefton and van der Heijden (2005) explicitly study the impact of hierarchy, but they look at productive efficiency and not group ethics; furthermore, they define hierarchy by the asymmetric allocation of team profits; i.e. they vary cash-flow rights while we vary control rights. In sum, we believe this paper is the first to analyse the impact of organisational structure on ethical behaviour.

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<sup>9</sup> 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.

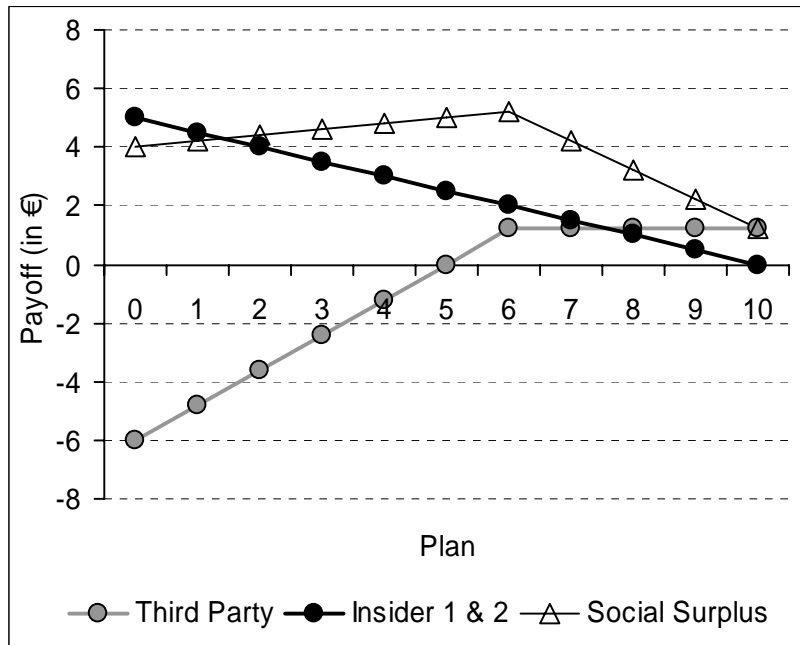
<sup>10</sup> Democratic groups have a greater signalling opportunity, since all individual proposals are observed by the competing group.

### 3. Theoretical framework and predictions

#### 3.1. Set-up

In all treatments, an independent set of actors play a three-player game. Two of the players, A and B are active. One player, C, has no decisions 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  $1.2 \times \text{Min}\{6, y\} - 6$ ;  $y$  is effectively the firm’s expenditure on mitigating the  $-6$  production externality. 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  $6 \leq y \leq 10$ ; i.e. the firm can choose a plan that benefits the outsider (e.g. by decontaminating others’ pollution or because non-production triggers entry by a harmful competitor). This is not important to our results, but it allows us to distinguish among alternative ethical motivations.

Figure 1 : Individual Payoffs



A and B each receive half of the firm’s residual profits, so  $\pi_A = \pi_B = 5 - 0.5y$  (see footnote 9). 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 either A or B quits or the firm fails to fix a production plan (see next subsection), there is no production and all parties get a payoff of zero:  $\pi_A = \pi_B = \pi_C = 0$ .

### 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).<sup>11</sup> 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 repeatedly propose strategies  $y_A$  and  $y_B$  until they reach a consensus, in which case  $y = y_A = y_B$  is implemented.<sup>12</sup> During this process, A and B only observe each other’s new proposals when *both* have made a new proposal. This is game-theoretically equivalent to requiring simultaneous proposals. Simultaneity 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, we observe 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.

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<sup>11</sup> 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 whistleblowing, or organisationally-assigned, veto power.)

<sup>12</sup> The experiment requires A and B to first validate any apparent consensus in case one hit the wrong key.

Each game consists of  $N$  rounds where  $N$  depends on when consensus is reached (if at all); if in each round  $n$ , A and B make proposals  $y_A^n$  and  $y_B^n$  after a delay of  $t_A^n$  and  $t_B^n$ , the round- $n$  delay is  $t^n = \text{Max}\{t_A^n, t_B^n\}$ ; if the game ends in an agreement in round  $N$ , i.e.  $y_A^n \neq y_B^n$  for all  $n < N$  and  $y_A^N = y_B^N$ , the total time delay is  $t = \sum_{n=1}^N t^n$ . We impose a time constraint of ten minutes. If A and B exceed this limit or if either A or B quits, the game ends in no agreement and there is no production.

- **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  $y \in \{0, 1, 2, \dots, 10\}$  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 structures**

In the horizontal structure, A and B can use proposals during early rounds of bargaining to signal their preferences, but organisations often permit much richer communication. We therefore compare the games implied by the above structures with the enhanced games in which A and B can send each other written (electronic) messages throughout their interaction.<sup>13</sup>

**Labelling.** We refer to the four games as H, V, HwC and VwC where H and V denote Horizontal and Vertical structures and wC denotes “with Chat/Communication).

### 3.3. Theoretical predictions

We begin by considering homogeneous insiders with consequentialist preferences. Then we allow for heterogeneity and then we consider preferences that depend on the decision-making process. We focus on this last issue (psychological considerations), since it

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<sup>13</sup> Controlling for communication allows sharper tests of the theory. Furthermore, some organisations do restrict internal communication (e.g. to limit rent-seeking or perhaps moral influence) and in others, the relevant insiders simply have too little time to listen or talk.

generates the clearest predictions. Recall that in all vertical treatments, A is the superior and B is the subordinate.

- **Equilibrium with homogeneous consequentialist preferences**

Homogeneity implies that the two insiders have the same type of preference function. Since they have identical material payoffs, their preferences over outcomes are identical. The firm always implements the commonly preferred strategy, since it is trivial to propose and agree on this commonly known strategy. Furthermore, under the standard assumption of consequentialism, the decision process has no effect on this preferred strategy, so outcomes are independent of our treatments.

**Hypothesis 0a:** *If actors are homogenous and have consequentialist preferences then, in equilibrium, structure (horizontal, H, or vertical, V) and communication (with chat, wC, or without) make no difference to outcomes:  $H = V = HwC = VwC$ .*

For future reference, we record the exact outcomes predicted by common preference functions (restricting for simplicity to utility functions that are quasi-linear in money).

- (i) *Egoists* (standard, purely self-interested actors) set  $y = 0$  (and do not quit).
- (ii) *Utilitarians* maximise the sum of monetary payoffs, so they set  $y = 6$ .
- (iii) *Egalitarians* would set  $y = 7.6$ , but round to  $y = 7$  or  $8$  under our integer restriction.
- (iv) *Rawlsians* set  $y = 6$ ; this maximises the minimum of the three payoffs.
- (v) *Moral Rule* actors who pursue self-interest subject to the moral rule of not harming others (“do not take benefits at the expense of others”) would set  $y = 5$ ; see Rabin (1995).
- (vi) *Impure utilitarians* maximise a weighted sum of payoffs. In the quasi-linear case, they set  $y = 0$  or  $6$ ; concave valuations of money would generate intermediate choices. We pursue this case in the next subsection, linking to fairness concern models.

- **Equilibrium with heterogeneous consequentialist types**

To analyse the heterogeneous case, we use superscripts A and B to distinguish A and B’s (impure utilitarian) preference weights. So A’s utility function is  $u^A(\pi_A, \pi_B, \pi_C) = w_A^A \pi_A + w_B^A \pi_B + w_C^A \pi_C$  with  $w_A^A, w_B^A, w_C^A \geq 0$  and similarly for B. Given the restriction  $y \leq 6$  which simplifies the exposition (and only binds if A or B is

extremely other-regarding), we can substitute  $\pi_A = \pi_B = 5 - y/2$  and  $\pi_C = 1.2y - 6$ . Normalising  $w_A^A + w_B^A$  to unity and defining the relative out-group weight,  $w^A = w_C^A / (w_A^A + w_B^A)$ , A's preference is characterised by  $u^A = 5 - y/2 + 1.2w^A(y - 5)$  (and similarly for B). For future reference, note that the insider-outsider effect (increasing A and B's relative concerns for each other) raises  $w_A^A + w_B^A$  relative to  $w_C^A$  and similarly for B, so it lowers the relative out-group weights  $w^A$  and  $w^B$ .

We can interpret values of  $w$  exceeding unity as inequality aversion, because the fairness concerns model of Fehr and Schmidt (1999) reduces to this formulation in our setting: fairness-motivated actors maximise a direct utility from personal material benefits minus a disutility from inequality; since C's payoff is always weakly below A and B's common payoff (for the undominated options with  $y \leq 7$ ), we only need one of Fehr and Schmidt's (1999) two inequality aversion parameters; A's utility is then  $u^A = \pi_A - g(\pi_A - \pi_B)$ , for some  $0 \leq g \leq 1$ ; this is equivalent to  $\pi_A + g\pi_C / (1 - g)$ , i.e. to  $w = g / (1 - g)$ .

We now study strategic interactions between A and B. Each actor's preferred outcome is  $y = 0$  if that actor has  $w = 5/12$  and  $y = 6$  if the actor has  $w > 5/12$ ; we denote this ideal point by  $y(w) = 6 \cdot I_{\{w > 5/12\}}$ . These preferences conflict if A and B's altruism parameters ( $w$ ) lie on different sides of  $5/12$ . In a vertical firm, A proposes a take-it-or-leave-it plan to B to maximise A's utility given A's beliefs about B's preference parameter  $w^B$ .<sup>14</sup> In a horizontal firm, there are many equilibria. A and B face a coordination problem, similar to the asymmetric "battle-of-the-sexes" in that there is always at least one agreement that dominates the non-production, disagreement outcome. Precise prediction is difficult, but the following class of equilibria always exist and are particularly attractive owing to their simplicity: A and B coordinate on the best option available to either A or B by following the protocol in which either A or B makes a take-

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<sup>14</sup> A sets  $y = y(w^A)$  if the quit threat is low and otherwise raises  $y$  to reduce expected quits. B prefers to acquiesce and not quit if  $y \geq 20(6w^B - 5) / (12w^B - 5)$ ; we define  $\underline{y}(w^B) = 20(6w^B - 5) / (12w^B - 5)$ . If A knew B's preference type, A would set  $y = \text{Max}\{y(w^A), \underline{y}(w^B)\}$ . (Notice that  $\underline{y}(w^B) < 0$  for any  $w^B < 5/6$ ; in this case A faces no credible threat of a quit and implements A's preferred strategy,  $y(w^A)$ .)

it-or-leave-it proposal to the other. Assuming A and B cannot signal their preferences to each other, the resulting equilibria replicate the equilibrium in the vertical treatment, except that sometimes A and B's roles may be reversed. Since we assign roles and treatments at random, for these equilibria, the distribution of payoff outcomes in V and H are identical. Admittedly, there is greater room for A and B to engage in signalling in H than in V, but when communication is allowed, the signalling possibilities are similar and there exist identical signalling equilibria. This theory of play implies that HwC and VwC will generate the same distribution of payoffs.

**Hypothesis 0b:** *Under the simplest game-theoretic model of bargaining in HwC (horizontal with chat), the equilibrium outcomes of HwC (horizontal with chat) and VwC (vertical with chat) should be the same.*

Our point is not that our hierarchy treatments should have no impact under the enhanced game-theoretic assumptions of altruistic and fairness-motivated actors, but that there is no obvious reason to expect bias in a particular direction; multiple equilibria and dependence on preference distributions make prediction very difficult.

Predicting the impact of communication also requires strong assumptions about the distribution of preference types and specific equilibrium refinements, but for completeness we give a simple example where cheap-talk is likely to have an impact on vertical structures. Suppose that  $w=1$  with probability  $p$  and  $w=0$  with probability  $1-p$ . In V, if  $w^A=1$ , then  $y=6$  since B can never pressure A to reduce  $y$ . So we restrict attention to the contingency with  $w^A=0$ . In V, if  $p$  is low ( $p < 1/5$ ), A risks provoking a quit by setting  $y=0$ . In VwC, any deviation from the putative pooling equilibrium with  $y=0$  is dominated for the low type subordinate (B with  $w^B=0$ ), but it is “self-signalling” for the high type (B with  $w^B=1$ ) to threaten to quit if  $y < \underline{y}(1) = 10/7$ . So, given that our setting permits “rich-language” communication – see Farrell and Rabin (1996), we predict the separating equilibrium in which A (restricted to integer values) sets  $y=2$  when B is high type and otherwise  $y=0$ . Since  $y$  equals 0 always in V, the average  $y$  in VwC is higher. However, in V, the high type B ends up

quitting, so C's average payoff is actually lower in VwC.<sup>15</sup> Meanwhile, if  $p$  is high ( $p > 1/5$ ), A with  $w^A = 0$  sets  $y = 2$  in V (where pooling is forced), and this pooling outcome is again broken by a self-signalling separation message, now coming from the low type subordinate, that lowers  $y$  to 0. The average  $y$  is therefore lower in VwC and it does not induce any quits, so C's average payoff is again lower in VwC relative to V. In sum, for this example, communication makes vertical firms behave less sociably.<sup>16</sup>

- **Psychological considerations**

The insights from social psychology allow us to derive much clearer predictions. For expositional coherence, we do so by extending the above model.

**A. Perceived responsibility**

In the introduction, we argued that A (and similarly for B) will only act to help C if A is positively disposed towards C *and* feels responsible for what happens to C. Denoting the feeling of responsibility by  $r$  and the disposition by  $w$ , A's effective preference is captured by the utility function,  $u = \pi_A + r.w.\pi_C$  with  $r, w \geq 0$ . (One can derive very similar results by supposing that Rabin's (1995) "moral rule" actors only obey their moral rules when feeling 'sufficiently responsible' for outcomes.) The psychological insights indicate how these preference parameters depend on organisational processes.

Control and communication structures can affect both  $r$  and  $w$ . We discuss them in turn. The evidence described in the introduction suggests that people tend to only feel morally responsible for outcomes over which they have a clear and salient causal responsibility. One possible explanation is that social norms only hold individuals responsible when causal responsibility is obvious, because society seeks to avoid making mistaken accusations; self-serving biases in individual's self-judgements allow a related explanation. The vertical structure V emphasises A's central role in choosing plan  $y$ , so subordinates are less likely to feel responsible for what their firms do than are superiors

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<sup>15</sup> For  $p < 1/5$ , C's average payoff given  $w^A = 0$  is  $(1-p)(-6) + p(-3.6)$  in VwC and  $(1-p)(-6) + p(0)$  in V.

<sup>16</sup> The opposite effect is possible; e.g. type separation could force A to raise  $y$  above 5 in the more extreme case where  $w$  sometimes exceeds 5/4.



and we predict  $r^B(V) < r^A(H)$ . Furthermore, B's subordination in the vertical treatment reduces the salience of B's involvement in choosing  $y$  relative to B's involvement in the horizontal firm (treatment H), so we predict  $r^B(V) < r^B(H)$ . In addition to these responsibility-alleviation effects, there is a responsibility-diffusion effect in H: A should have a higher perceived responsibility in V (where A controls  $y$  unilaterally) than in H where A and B share control over  $y$ . So we predict  $r^A(H) < r^B(H) < r^A(V)$ .<sup>17</sup> In sum, the perceived responsibility weights satisfy:

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

**Implications in the homogeneous case:** In a homogeneous subject pool,  $w$  is fixed but the effective weight  $w.r$  on C varies with  $r$ . Since  $r^B(V) < r^A(V)$  and  $w^B = w^A$ , B never influences A's choice (B's threat of quitting does not restrict A). The effective concern for C in V is therefore  $w.r^A(V)$ , while in H it is  $w.r^A(H)$  which is lower by responsibility-diffusion. If  $w.r^A(H) < 5/12 < w.r^A(V)$ ,  $y = 0$  in H and  $y = 6$  in V, so C is better off in V than in H.

**Implications in the heterogeneous case:** In the case with heterogeneous subjects,  $w^B$  can exceed  $w^A$  so B's alleviated sense of responsibility in V can hurt C. To see why consider the above example where  $w$  equals 0 and 1 with probability  $1/2$  and where the perceived responsibilities are:  $r^B(V) = 0$ ,  $r^B(H) = r^A(H) = 0.9$ ,  $r^A(V) = 1$  (which satisfy 1, particularly responsibility-alleviation). In V, B has no upward pressure on A's choice since  $r^B = 0$  so  $w^B.r^B = 0$ . By contrast, if one actor is kinder than the other in H, the kinder actor can have a positive influence by threatening to quit. It is easy to see that C may therefore be worse off in V than in H.<sup>18</sup>

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<sup>17</sup> Note that in contrast to Darley and Latané (1968) and others, we fix the number of actors, but changing the organisational structure from V to H does shift the number of actors *directly* involved in choosing  $y$ . The above explanation suggests that social observers outside the firm often refrain from blaming either insider, in case only the other was to blame. (Recall that in the experiment, C cannot observe A and B's bargaining process; C only observes the firm's final action.)

<sup>18</sup> To show this explicitly, consider the equilibrium of H in which one of A and B (probability  $1/2$  for each) makes a take-it-or-leave-it proposal to the other. If initial interactions allow A and B to signal their types

The example with homogeneity demonstrates how C is better off in treatment V when responsibility-diffusion dominates and the second example demonstrates how C is better off in H when responsibility-alleviation dominates. Both examples are trivial to generalise and we state the two factors separately, using the shorthand, “V kinder than H” to indicate that on average, A and B treat C better in treatment V than H (and so on):

**Factor 1a:** *Vertical (V) kinder than horizontal (H) -- responsibility-diffusion.*

**Factor 1b:** *Horizontal (H) kinder than vertical (V) -- responsibility-alleviation.*

Communication allows B to try to influence A even in a vertical firm. This means that responsibility-alleviation should be much weaker for B in VwC than in V. A remains central, so increasing B’s voice should not have a strong responsibility-diffusion effect on A. We therefore expect to observe the following:

**Factor 1c:** *Vertical with chat (VwC) kinder than vertical (V) -- voice and responsibility.*

Finally, we suggest that perceived responsibility in H will depend on A and B’s *relative* proposals (and messages). In particular, we predict what we call *dynamic responsibility-alleviation*: if say A proposes a higher plan than B in the first round of proposals, then A can self-justify “compromising” downwards to/towards B’s proposal on the grounds that “it was B who first suggested and insisted on being unkind to C”. (See below for our nuanced prediction in HwC.)

**Factor 1d:** *In the horizontal treatment (H), A and B’s proposals converge asymmetrically with the high-y proposer compromising downwards more than the low-y proposer compromises upwards.*

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(see above), the average outcome is  $y = \frac{1}{2}(6) + \frac{1}{4}(2+0) = 3.5$  (because  $y = 6$  when the proposer has  $w = 1$  (probability  $\frac{1}{2}$ ),  $y = 2$  when the proposer has  $w = 0$  and the responder has  $w = 1$  (probability  $\frac{1}{4}$ ) and  $y = 0$  if both proposer and responder have  $w = 0$  (probability  $\frac{1}{4}$ )). In the (less plausible) case of a pooling equilibrium,  $y = \frac{1}{2}(6) + \frac{1}{2}(2) = 4$  (because a proposer with  $w = 0$  sets  $y = 2$  when uninformed about the responder’s type. By contrast in V, when A has  $w = 0$ , A sets  $y = 0$  (rather than the compromise value  $y = 2$ ) even if A knows that  $w^B = 1$ , because B does not feel responsible in V;  $r^B = 0$  so  $w^B r^B = 0$ . So the expected outcome in V is lower at  $y = 3$  ( $= \frac{1}{2}(6)$ ) and C is worse off.

## B. Context-dependent social preferences

We represent the ideas from the introduction by shifts in the value of  $w$ ; recall that  $w$  represents the weight assigned to  $C$ 's payoff relative to firm profits, whether from altruism or in pursuit of social approval. (The judging eye and admonishing voice of one's peers is a powerful motivation underlying much ethical behaviour.) We argued that communication between  $A$  and  $B$  has a positive "observer effect" on their consideration for  $C$ , particularly in  $V$  (since  $A$  and  $B$  already communicate to a reasonable extent (via their ongoing proposals) in  $H$ ). So our communication treatments should raise actors' kindness to  $C$ ; we predict  $w^A(VwC) > w^A(V)$  and  $w^A(HwC) > w^A(H)$  and similarly for  $B$  from which we immediately infer:

**Factor 2a:**  *$VwC$  kinder than  $V$ ;  $HwC$  kinder than  $H$ .*

This effect is reinforced by the verbalisation of social norms if people tend to prefer to vocalise their sociable views as opposed to their egocentric views. Furthermore, the high proposers are then more likely to speak up (justifying their proposal) than the low proposers, so persuasion effects in  $HwC$  mitigate and may even reverse the asymmetric dynamic convergence in  $H$  (see factor 1d):<sup>19</sup>

**Factor 2b:** *The convergence of proposals in  $HwC$  could be biased towards either the higher or the lower proposal.*

Control structure also matters. First, the need for consensus may engender more communication (via the sequence of proposals) in  $H$ ; this implies kinder behaviour in  $H$  than in  $V$  (as a corollary of the argument underlying factor 2a), but communication in  $H$  is highly restricted so we do not expect this factor to be particularly strong. Second, we pointed out that  $A$  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 and disempowered  $B$  may even identify more with powerless  $C$  than with the superior  $A$ ). Since actors tend to want to help those with whom they identify to the exclusion of

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<sup>19</sup> Additionally, the opportunity to influence makes it harder for high proposers to alleviate themselves of responsibility by self-servingly blaming the other; many feel obliged to "match their words with action."

others, this insider-outsider effect implies  $w^A(H) < w^A(V)$  and similarly for B (as explained on page 12). Clearly this has negative consequences for C:

**Factor 2c:** *V kinder than H (insider-outsider effect).*

Verbal communication tends to enhance initial social attitudes. For instance, communication may catalyse bonding between A and B in HwC where they interact as equals, meanwhile the power inequality in VwC may act as a barrier to friendly communication. So the insider-outsider effect is particularly strong in HwC:

**Factor 2d:** *HwC less kind than VwC and H (enhanced insider-outsider effect).*

We draw these ideas together in the following conjectures. Responsibility-diffusion (factor 1a) and the (moderate) insider-outsider effect (factor 2c) in H countervail against B's responsibility-alleviation, which is particularly severe in V (factor 1b).

**Hypothesis 1:** *H versus V ambiguous.*

The strong insider-outsider effect in HwC (factor 2d), A's central role in VwC ruling out responsibility-diffusion (factor 1a) and B's (verbal) involvement in VwC limiting responsibility-alleviation (factor 1c mitigates factor 1b) all make VwC more favourable to C; note also that the positive effect of A's concentrated responsibility in vertical structures is amplified since A then has the power to raise  $y$  as high as A wishes.

**Hypothesis 2:** *VwC kinder to C than is HwC.*

Communication enhances ethical outcomes in the vertical firms, because of the mutual reinforcement of factors 1c and 2a; communication makes B feel involved, enhances A and B's concerns for social approval and permits verbalisation of social norms.

**Hypothesis 3:** *VwC kinder than V*

We cannot draw a clear comparative prediction for the impact of communication on horizontal firms. The increase in the insider-effect (factor 2d) countervails against the increase in social pressure (factor 2a); furthermore, factor 1c (particularly important to hypothesis 1) does not apply.

**Hypothesis 4:** *HwC versus H ambiguous.*

Our final prediction combines factor 1d suggesting dynamic alleviation of high initial proposers in H, with factor 2b recognising the countervailing tendency for actors to be ashamed to voice anti-social thoughts in HwC.

**Hypothesis 5:** *We expect downward convergence in H but not in HwC.*

## 4. Experimental Procedures

The experiments were conducted at the Laboratoire d'Economie Expérimentale de Strasbourg (LEES) of the Université Louis Pasteur. 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.<sup>20</sup> Groups (of 3) and roles within groups (A, B and C) were randomly assigned in each session once subjects had sat in their cubicles. After responding to requests for clarification about the game to be played, we conducted a ten 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 the experiment (see screenshots in the Appendix). The procedures followed in each treatment exactly reproduce the description given in section 2.2.<sup>21</sup> At the end of the experiment, the payoffs earned within a 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

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<sup>20</sup> See the Appendix for a literal translation of a set of instructions.

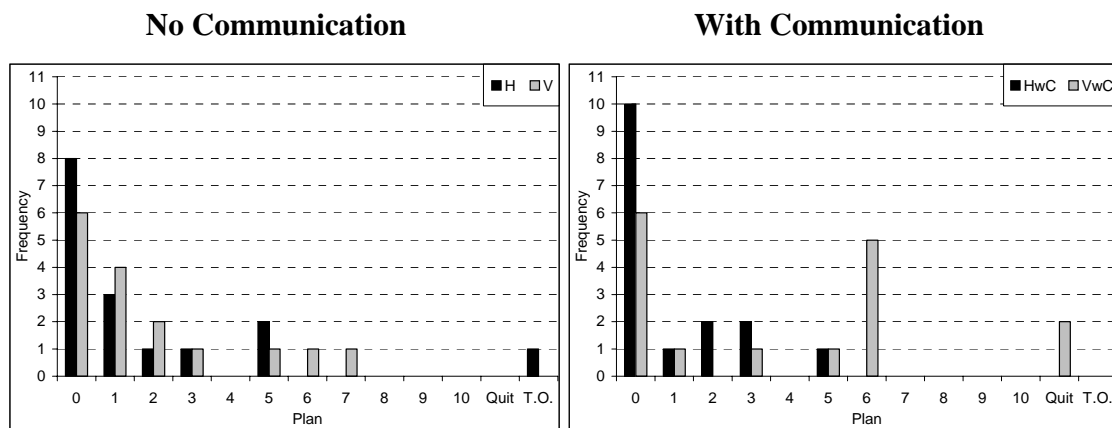
<sup>21</sup> The experiment requires A and B to validate any apparent consensus in H treatments, in case of mistaken key hits. Subjects were also asked not to reveal their identities or use rude language (and all complied).

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.

## 5. Results

Most of our conclusions are based on the outcomes of nonparametric randomisation and binomial or Fisher exact tests.<sup>22</sup> We use the  $\alpha = .10$  significance level, but report each test's p-value so the reader can draw conclusions for other significance levels.

**Figure 2 : Frequency of implemented plans.**



Note: T.O.: Timed Out

### 5.1. Consequentialist preference theories

Figure 2 reports frequency plots of the implemented plans in each of the four treatments considered. The samples look similar in H and V but different in HwC and VwC. The bimodal distribution of plans implemented in VwC suggests that actors are heterogeneous so we do not expect full support of Hypothesis 0a (that  $H = V = HwC = VwC$ ); see below for our test in terms of payoffs. The modes are at the profit-maximising ( $y = 0$ ) and welfare-maximising ( $y = 6$ ) plans. We check to what extent observed behaviour deviates from invariable implementation of the most frequent plan  $y = 0$  (as predicted for rational profit-maximisers). Labelling plans with  $y > 0$  and “Quit” decisions as *non-profit-*

<sup>22</sup> We motivate the use of randomisation tests for independent or related samples by the fact that they use *all* the information contained in the samples studied (cf. Siegel and Castellan, 1988).

*maximising plans*, we test the null that *profit-maximising* and *non-profit-maximising* plans are equally likely to be implemented in each treatment, against the alternative that *profit-maximising* plans are more likely. In no treatment can we reject the null according to one-tailed binomial tests ( $p$ -values  $> .2000$ ), so the data do not support the profit-maximising hypothesis.<sup>23</sup>

Another natural division is between *harmful* outcomes (plans with  $y < 5$ ) and *harmless* outcomes ( $y \geq 5$  or non-production, denoted “Quit”). According to one-tailed binomial tests, we reject the hypothesis that *harmful* and *harmless* outcomes are equally likely in favour of the alternative that *harmful* plans are more likely to be observed in H, V and HwC ( $p$ -values  $\leq .0106$ ) but not in VwC ( $p = .5982$ ). Notice that this appears to contradict the prediction from the game-theoretic analysis of section 2.3, summarised in Hypothesis 0b, that the distribution of equilibrium outcomes will be the same in HwC and VwC. We now test whether we can attribute this difference to the treatment.

Table 1 reports (treatment-) average foregone payoffs of an insider and average payoffs of third parties. Notice that 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  $y > 6$ . We therefore report tests on both insider and third party outcomes.

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

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

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

A global comparison of the four treatments indicates no significant difference in the outcomes, whether for insiders or for third parties ( $p$ -values  $> .1914$  according to Kruskal-Wallis tests), so we cannot reject Hypothesis H0a immediately. However, pairwise comparisons reveal some significant cross-treatment differences. First, when no communication is allowed, horizontal and vertical structures are equivalent in terms of

<sup>23</sup> If we assume that the probability of observing a profit-maximising behaviour is  $p = .95$ , then the probability of observing a non-profit-maximising behaviour 8 times out of 16 or more is .0000003497.

insider foregone payoffs and in terms of third party payoffs: in both cases we cannot reject the null of equality (p-values > .7000, two-tailed randomisation tests). Second, when communication is allowed, we reject the null in favour of the alternative that the outcomes (for insiders and third parties) are different (p-values  $\leq$  .0192): HwC leads to lower foregone payoffs of insiders and higher losses by third parties than VwC. We summarise this in the following observation.

**Observation 1:** *The prediction of Hypothesis 0a - that for homogeneous actors with consequentialist preferences,  $H=V=HwC=VwC$  in terms of payoffs to insiders and third parties - holds only partially: we observe  $H = V$  but  $HwC \neq VwC$ . The prediction H0b that  $HwC=VwC$  even for heterogeneous actors does not hold either.*

## 5.2. Psychological considerations

Psychological considerations do not predict a clear-cut difference between horizontal and vertical structures in the absence of communication, so the above result ( $H=V$ ) is consistent with Hypothesis 1. Furthermore, a comparison of the effect of communication on outcomes in horizontal and vertical organisational structures strongly supports our predictions. First, to follow up on our above finding that *harmful* outcomes are significantly more likely than *harmless* outcomes in HwC but not in VwC, we assess the null hypothesis that changing from the organisational structure HwC to VwC has no impact on the probability of *harmful* outcomes. We reject this null in favour of the alternative that plans are more likely to be *harmful* in HwC than in VwC ( $p = .0077$ , according to a one-tailed  $2 \times 2$  Fisher exact test). Second, payoff comparison across structures show that 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). In sum:

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

An analysis of the chat data in HwC and VwC corroborates Observation 2.<sup>24</sup> We categorise discussions into three types: a discussion is *group-regarding* if insiders made

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<sup>24</sup> See the Appendix for literal English translations of the French transcripts of chat data in HwC and VwC.



arguments or comments in favour of a group-centred approach (e.g. “Let’s ignore the third party”); a discussion is *other-regarding* if insiders argue in favour of an other-regarding approach (e.g. “Let’s maximise social welfare”); we categorise a discussion as *unclassified* if neither argument is discernible or if both arguments are raised (i.e. one insider favours group-egoism while the other favours altruism). Table 2 reports the frequencies (and group identities) of each type of discussion along with the average number of words used by each type of insider – groups where no communication took place are labelled “*no communication*”. The four upper cells of Table 2 indicate that *group-regarding* discussions are relatively more frequent in HwC than in VwC, but the difference just fails to be significant ( $p = .1109$ , one-tailed  $2 \times 2$  Fisher exact test); see bonding analysis below for stronger results.<sup>25</sup>

**Table 2 : Chat data – average number of words**

	HwC	VwC
Group-regarding	8 groups {#1, 3, 4, 7, 9, 11, 12, 16} A: 24.9 (25.6) B: 29.1 (51.1)	4 groups {#4, 7, 11, 12} A: 14.5 (10.1) B: 9.5 (16.3)
Other-regarding	1 group {#10} A: 48.0 (n.a.) B: 70.0 (n.a.)	4 groups {#2, 3, 5, 9} A: 89.8 (94.7) B: 87.5 (68.9)
Unclassified	4 groups {#5, 6, 14, 15} A: 6.8 (3.0) B: 7.5 (7.6)	3 groups {#1, 8, 14} A: 5.0 (5.0) B: 10.7 (7.8)
No Communication	3 groups {#2, 8, 13}	5 groups {#6, 10, 13, 15, 16}

*Note:* Group identities in braces; standard deviations in parenthesis; n.a.: not applicable.

A comparison of the number of words used by each insider in groups with other- and group-regarding discussions (c.f. Table 2) reveals that in VwC, insiders of other-regarding groups with use more words than insiders of groups with group-regarding

<sup>25</sup> We tried several other more refined codings of subjects’ conversation files to identify differences across organisational structures but we only report those that revealed significant differences; see below on “bonding”: among *group-regarding* discussions, A and B appear to be friendlier towards each other in HwC than in VwC (e.g. in Group 4 of HwC, B jocularly adopts Master Yoda’s (Star Wars) grammar to support A’s suggestion to adopt the most harmful plan); this is consistent with our idea that horizontal structures facilitate bonding among insiders and we test it using Table 3 below.

discussions ( $p = .0571$  for bosses and  $p = .0286$  for subordinates, one-tailed randomisation tests; in HwC, the p-values equal .2222 for A and B). This is in line with the idea that insiders who plan to be kind enjoy expressing their kind thoughts while cynical insiders avoid discussions that might trigger a guilty conscience.

**Table 3: Bonding and group/other-regarding discussions**

		<i>Group- regarding</i>	<i>Other- regarding</i>	Unclassified
HwC	Bonding	1(0); 4(0); 9(0); 11(0); 12(0);16(0)		
	No bonding	3(0); 7(2)	10(5)	5(0); 6(2); 14(3); 15(3)
	No comm.	2(0); 8(1); 13(0)		
VwC	Bonding	7(0)		
	No bonding	4(0); 11(0); 12(0)	2(6); 3(6); 5(6); 9(6);	1(1); 8(Q); 14(0)
	No comm.	6(0); 10(Q); 13(6); 15(3); 16(5)		

*Note:* Group identities and (in parenthesis) implemented plan number, with Q standing for Quit.

To study the extent of bonding between insiders, we define discussions with “bonding” as those where the insiders demonstrate a clear predisposition towards mutual identification by using the word “we” to refer to only themselves (not themselves plus the third party) and by not distinguishing internal preference differences (c.f. “your” versus “my” interest). This (admittedly imperfect) definition of bonding gives the classification reported in Table 3 on which we conduct three simple tests based on simple counts of: (i) the number of groups with *bonding* instead of *no bonding* in HwC and VwC (6 out of 13 and 1 out of 11, respectively); (ii) the number of groups that have *group-regarding* instead of *other-regarding* or *unclassified* discussions among the *bonding* and *no bonding* groups of HwC (6 of 6 and 2 of 7, respectively); (iii) the number of groups that generate *profit-maximising* instead of *non-profit-maximising* outcomes among the *bonding* and *no bonding* groups of HwC (6 of 6 and 2 of 7, respectively). In each case, using one-tailed 2×2 Fisher exact tests, we reject the null of no relationship in favour of the following alternative hypotheses: (i) *bonding* is more likely in HwC than VwC ( $p = .0595$ );<sup>26</sup> (ii) in

<sup>26</sup> We classify neutral communications as *no bonding* unless both parties are friendly and relaxed with each other (group 12 of HwC is affected). If instead we proxy for *bonding* by friendly and relaxed (humorous)

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 ( $p = .0163$ ).

As for the ethical superiority of VwC over V, we first test this hypothesis in terms of implemented plans. We reject the null that the probability of *harmful* outcomes in a vertical structure is independent of whether communication is allowed in favour of the alternative that plans are more likely to be *harmful* in V than in VwC ( $p = .0675$ , according to a one-tailed  $2 \times 2$  Fisher exact test). Second, in terms of payoffs, we find that V leads to significantly lower insider foregone payoffs and significantly lower third party payoffs than VwC ( $p = .0500$  and  $p = .0804$  respectively, according to one-tailed randomisation tests). So by all three tests, the data supports our hypothesis that a vertical structure without communication is less kind to third parties than a vertical structure where communication is allowed:

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

In line with Hypothesis 4, the conduct of similar tests on the data of treatments with horizontal structures indicates no sharp differences between H and HwC. Indeed, we find no significant difference between H and HwC in the likelihoods of observing harmful and harmless plans ( $p = .3503$ , according to a two-tailed Fisher  $2 \times 2$  exact test), nor in terms of payoffs ( $p = .4246$  for insider foregone payoffs and  $p = .2689$  for third party payoffs, according to two-tailed randomisation tests). So we conclude:

**Observation 4:** *As predicted by Hypothesis 4, in a horizontal structure, communication between insiders does not affect ethical outcomes: HwC generates neither more nor less ethical outcomes than H.*

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. We

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discussions, the counts are almost identical. Arguably, one could categorise non-communication as *no bonding*; the results are then even more significant (we would then reject the null at  $p = .0415$ ).

need an index that measures the extent to which a participant's final proposal resists compromising towards the other's first proposal. Unless consensus is immediate, one participant 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. Excluding cases with immediate consensus, we then define the resistance indices of *kind* and *unkind* proposers as  $\rho_i = |y_{iN} - y_{j1}| / |y_{i1} - y_{j1}|$  with  $i \neq j = \{kind, unkind\}$  and where  $N$  denotes the last proposal.<sup>27</sup> The index is 0 if there is no resistance at all (the proposer ends up compromising fully to the other's first proposal) and the index is 1 if resistance is maximal (the proposer keeps insisting on its initial proposal, so that  $y_{i1} - y_{iN} = 0$ ). By construction,  $\rho_{unkind}$  and  $\rho_{kind}$  add to unity, so it is only meaningful to test whether the difference  $\rho_{unkind} - \rho_{kind}$  is significantly different from 0 (within treatment comparisons).

**Table 4 : Average  $\rho_{unkind}$  and  $\rho_{unkind} - \rho_{kind}$ .**

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

*Note:* Standard deviations in brackets.

<sup>27</sup> These comparisons are not affected by the measure used (i.e. plan numbers, insider foregone payoffs or third-party losses), so to avoid additional notation, we use plan proposals  $y$ . Immediate consensus ( $y_{i1} = y_{j1}$ ) occurred in Groups 3, 8, 14 and 16 of H, and Groups 2, 5, 9 and 16 of HwC). We also excluded groups (Group 2 of H and Group 13 of HwC) where one insider's final proposal was more extreme than either initial proposal (i.e. outside the range described by the initial proposal pair).

**Figure 2 : Histograms of  $\rho_{unkind} - \rho_{kind}$  in H and HwC.**

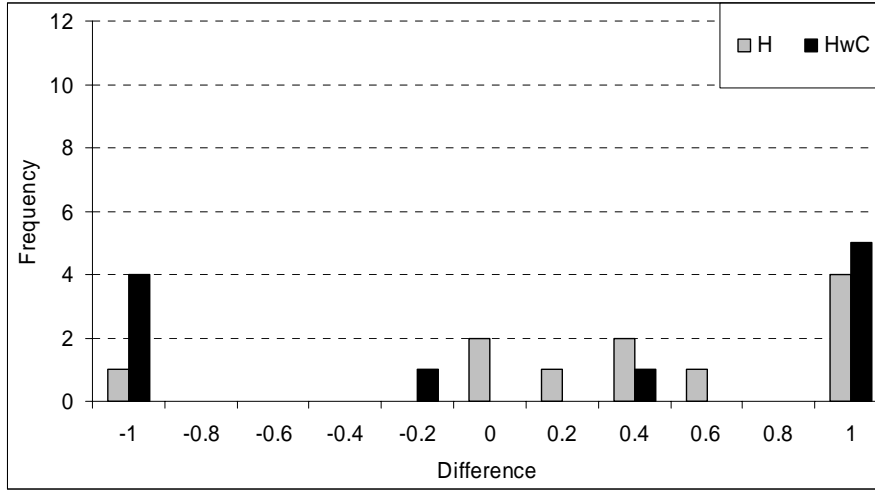


Table 4 reports average statistics of these indices and Figure 2 the histograms of differences  $\rho_{unkind} - \rho_{kind}$  in H and in HwC. We test the null that these differences have mean 0. For the H sessions only, we reject this null in favour of the alternative that the differences are positive ( $p = .0488$  while in the HwC sessions,  $p = .3420$ ; one-tailed one-sample randomisation tests). According to this test, *unkind* proposers resist more than do *kind* ones when (verbal) communication is impossible; with communication, the asymmetry in resistance is insignificant. We also test for cross-treatment differences in the indices of the *kind* (or equivalently *unkind*) proposer. The greater resistance of *kind* proposers in HwC relative to H is consistent with factor 2d, but the difference is insignificant ( $p = .1973$ , one-tailed randomisation test).<sup>28</sup>

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

<sup>28</sup> One could also compare the average of A and B's first proposals with the average of A and B's final proposals (which usually equals a consensus proposal). This is less relevant to our insight, because the degree of cynicism in "letting the other party lead" when initially less kind (and so alleviating of personal responsibility) determines the *fraction* of the initial proposal difference conceded (not the *magnitude*, payoff distance moved). Testing for differences between initial and final averages gives insignificant results in H as well as HwC ( $p$ -values  $> .3828$ , according to one-tailed randomisation tests for related samples); this test puts most weight on cases where A and B initially proposed most distant values, which is precisely where the *kind* proposer is extreme (proposing 6) and less likely subject to cynical dynamic alleviation.

The data on decisions to quit is potentially useful too. There were no quits in either horizontal treatment (neither H nor HwC) – there, both insiders have the power to use their proposals (and refusal to concede) to prevent excessive harm to the third party.<sup>29</sup> More interestingly, we observe two quits in VwC and none in V. The fact that subordinates seem more willing to pay the implied costs of quitting in VwC than in V (even controlling for the proposal by superiors) supports our idea (factor 1c) that voice is a form of involvement and leads subordinates to feel more responsible. However, the difference in quit rates is not significant (equilibrium quit rates are always low, because quitting is costly for quitters and superiors). So this only offers weak evidence in direct support of factor 1c. Nonetheless, we believe that factor 1c is the driving force behind the positive impact of communication on vertical structures (see Observation 3 and Hypothesis 3), because if the alternative contender, factor 2a were strong, HwC would give kinder outcomes than H (c.f., Observation 4) and kind first proposers would resist more in HwC than in H (c.f., insignificance of test just prior to Observation 5).

### 5.3. Time differences

Organisational structure and communication affect how long it takes to implement a plan. Reaching a consensus takes time, so we expect horizontal structures to be more time-consuming than vertical structures. It is not obvious how (verbal) communication should affect total decision-making time in horizontal structures: individuals can substitute rounds of silent bidding with time spent in a conversation. By contrast, proposal-making is one-shot in vertical structures, so communication should certainly increase the total time used to reach a decision in this case.

Our data supports these straightforward conjectures. The first row of Table 5 reports the average total time needed to implement a plan. First, absent communication, the time taken to implement a plan is significantly greater in horizontal than vertical structures ( $p = .0818$ , one-tailed randomisation test). Second, allowing communication significantly increases total time in vertical structures ( $p = .0011$ , one-tailed) but not in

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<sup>29</sup> One group in H (Group 11) did fail to implement a plan in time; they agreed on a plan ( $y = 5$ ), but the time limit just prevented them from validating this consensus. All our results would continue to hold if we had implemented plan 5 for Group 11 instead of non-production.

horizontal structures ( $p = .4270$ , one-tailed); consistent with the substitution idea, in horizontal structures, the average number of proposals falls from 6.23/session to 2.38/session when communication is introduced. Third, the time-advantage of vertical over horizontal structures disappears when communication is allowed ( $p = .1309$ , one-tailed).<sup>30</sup>

**Table 5 : Average total and average individual times**

	H	V	HwC	VwC
Total time	2'55" (2'36")	1'53" (0'55")	3'05" (2'33")	4'35" (4'19")
A actor	2'30" (2'29")	1'06" (0'41")	2'20" (2'22")	3'59" (4'30")
B actor	2'12" (1'21")	0'47" (0'51")	1'48" (0'59")	0'36" (0'28")

*Note:* Average time in minutes and seconds. Standard deviations in brackets.

## 6. Conclusion

Our experimental analysis shows that decision-making processes can have significant effects on distributive outcomes in an abstract economic setting. Great caution should be exercised in applying these results to draw lessons for the impact in real-world organisations, but our conjectures and experimental results identify forces for field-research to look out for.

In our data, communication among insiders has a powerful effect on group ethics. In vertical structures, communication leads to significantly more ethical behaviour. This supports our conjecture that having voice leads subordinates to feel responsible for outcomes instead of blaming anti-social decisions on their bosses (as suggested by earlier

<sup>30</sup> We can also compare the average total time for decision-making by A and B (last two rows of Table 5). In VwC, bosses (A actors) take much longer than subordinates (B actors) to select their decisions, but absent communication (i.e. in V), the difference is insignificant ( $p = .0001$  in VwC and  $p = .1326$  in V, one-tailed). This might reflect the fact that only A actors have a strategic problem (they must anticipate B actor responses), but a more likely explanation is that communication delays are recorded as A's thinking time since all communication generally occurs before A makes a proposal. (Given the symmetry of A and B in H and HwC, it is unsurprising that we find no significant differences in decision times within either treatment ( $p$ -values  $> .4948$ , two-tailed).)

evidence of responsibility-alleviation). Communication also appears to increase social approval concerns (the “observer effect”) and it permits verbalisation of norms.

Norms of self-interest (e.g. Ayn Rand’s objectivist ethics) or profit-maximisation (see Friedman (1970)) might encourage group egoism, but our bargaining data suggest that verbal communication encourages individuals to express support for generous norms or remain silent (as in social comparison theory); indeed, communication counteracts the dynamic alleviation of responsibility in horizontal structures (whereby kinder proposers readily “compromise” to the less kind proposal of their colleagues, apparently blaming these colleagues for the unkindness). 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, as with illegal but safely hidden pollution or intentional accounting distortions (that hurt passive shareholders).

In our horizontal structures, communication neither increases nor decreases group kindness. We attribute this to the insider-outsider effect: communication catalyses the tendency for insiders to care about each other to the exclusion of outsiders. In vertical structures by contrast, the sharp difference in power of superior and subordinate appears to inhibit mutual identification and the tendency towards bonding.<sup>31</sup>

Our second main finding is that, with communication, vertical structures generate greater social responsibility than do horizontal structures. Vertical structures concentrate control in the hands of the superior who suffers neither responsibility-alleviation nor responsibility-diffusion. In the horizontal structures, the sharing of control among insiders leads to responsibility-diffusion so that neither insider feels as responsible as does the superior in a vertical structure. Without communication, however, our comparison of these two control structures reveals no significant difference – absent communication, the insider-outsider effect has less impact (on horizontal structures) and responsibility-alleviation of subordinates has greater impact (in vertical structures).

One should be careful about extrapolating from this data. The bargaining data are particularly instructive, but we still cannot unambiguously determine exactly which of the factors described drives each specific result. In particular, this study cannot answer the

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<sup>31</sup> Notice, however, that insider-outsider effects may apply in real-world vertically-structured firms, because there are usually many workers at the same level and sometimes multiple superiors at the same level (as when a board of directors makes a decision); furthermore, other factors may drive social identification.



question of whether the intuitions of corporate reformists, such as Dahl, are valid or not. The ethical outcomes under vertical structures *with communication* might appear to contradict their specific intuitions about hierarchy, but as we noted, hierarchies often restrict subordinates' abilities to communicate with bosses. Furthermore, a myriad of issues remain to be covered; for instance, in our study, the selection of superiors and subordinates is random, whereas in reality, hiring and promotion processes are likely to select profit-focussed actors into superior positions. Nonetheless, our study represents a first attempt to shed light on the role of organisational structure and communication in the determination of the ethical behaviour of a group such as a firm. As such, we believe it already provides interesting new results and insights that may entice further research.

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## Appendix

### INSTRUCTIONS (Horizontal Treatment)

**General Information:** Welcome! You are about to participate in a social science experiment. Each of you received the same instruction sheet.

**Group:** Each of you belongs to a group of three participants. No participant knows the identity of the two other members of his/her group.

**Roles:** At the outset of the experiment, each participant is identified by a letter (A, B or C) when s/he is randomly assigned to a computer terminal. Each group consists of a participant A, a participant B and a participant C. Participants A and B can either agree to adopt a plan numbered 0 to 10 or quit the experiment. C participants have no decision to take.

**Participants A and B** have a 600 seconds delay (10 minutes) to reach an agreement on the plan to adopt. For this to happen, each participant A and B must make a plan proposal by clicking the plan's number in the bottom row of the computer screen, and by validating the choice made. As soon as a participant (A or B) has validated his/her choice, the other participant (B or A) will be informed that a decision has been taken, but s/he will not be informed about the content of this decision. For the proposal to be displayed on the subjects' screens, both participants must have submitted and validated their respective proposals.

To each plan corresponds :

1. a gain which is the same for participants A and B,
2. a gain for participant C which may represent a loss (a negative gain).

Participants A, B and C know the gains associated to each plan.

- If the plan proposals are not identical, there is no agreement between participant A and B and each can submit a new proposal.
- If the proposals are identical, an agreement is possible. Each participant can then either confirm that an agreement has been reached by clicking the "Confirm" button, or reject the agreement by clicking the "Cancel" button.
  - If both A and B choose "Confirm", then the proposed plan is adopted and the corresponding gains are distributed to participants A, B and C. The experiment is then finished.
  - If A or B chooses to reject the agreement, then both can then submit a new plan proposal.

At any time during the 600 seconds of play, each participant (A or B) can quit the experiment either by clicking the “Quit” button, or by clicking the “Stop the experiment and quit”. In either case, the experiment stops and the gains are equal to zero for the three participants A, B et C.

The computer displays the proposal of participant A in dark blue and that of participant B in dark red. The next-to-last proposals of A and B appear light blue and light red, respectively.

The experiment continues as long as the 600 seconds time delay has not been reached or as long as no participant chooses to quit. If no agreement has been reached within this time delay, the experiment ends and the gains of the three participants A, B and C are equal to zero.

At any time during the experiment, the time left to agree on a plan is displayed in the upper left corner of the computer screen. The count-down starts as soon as the first propositions of A and B are displayed on their respective computer screens.

**Participant C** has no decision to take and does not know the proposals made participants A and B. S/he is only asked to answer the questions that appear on his/her computer screen. Answering these questions has no effect on gains nor on the experiment’s results.

**Communication (only in treatment « with Communication »):** Participants A and B can choose to verbally communicate through an electronic mail system. To do so, one has to write a message in the appropriate space and to send the message. Each participant A and B can shut the electronic mail system down, and each participant can re-open it after having shut it down. When the electronic mail system is shut down, participants A and B cannot communicate.

You are not allowed to use the electronic mail system to send insulting messages, or messages that identify you (name, surname or nickname) or which help to identify you (age, ethnic origin, religion, profession, etc.).

**Total Gain:** The gains associated to each plan are expressed in Euros (€). At the outset of the experiment, each of you will receive a capital balance of 7 Euros. Your total reward for participating in this experiment will be equal to 7 Euros plus the gain made in this experiment or to 7 Euros minus the loss made in this experiment.

**Questionnaire :** Before starting the experiment, and once you will be assigned to a computer terminal, we will ask you to answer a questionnaire about these instructions. Answering this questionnaire does not interfere with the experiment.

If you have a question, ask it to one of the administrator in the laboratory, not to another participant. In this experiment, you are not allowed to communicate with the other participants.

## **INSTRUCTIONS (Vertical Treatment)**

**General Information:** Welcome! You are about to participate in a social science experiment. Each of you received the same instruction sheet.

**Group:** Each of you belongs to a group of three participants. No participant knows the identity of the two other members of his/her group.

**Roles:** At the outset of the experiment, each participant is identified by a letter (A, B or C) when s/he is randomly assigned to a computer terminal. Each group consists of a participant A, a participant B and a participant C.

**Participant A** has two options. S/he can :

- 1) Propose participant B to adopt a plan numbered 0 to 10 by clicking the plan's number in the bottom row of the computer screen, and by validating the choice made.  
To each plan corresponds :
  - a gain which is the same for participants A and B,
  - a gain for participant C which may represent a loss (a negative gain).

or

- 2) Quit the experiment by clicking the "Quit" button and by validating the choice made. In this case, the experiment ends and the gains are equal to zero for the three participants A, B and C.

**Participant B** has two options. S/he can :

- 1) Accept the plan proposed by participant A by clicking the "Accept" button. In this case, the plan is implemented, the experiment ends and the corresponding gains are distributed to participants A, B and C.

or

- 2) Quit the experiment by clicking the "Quit" button and by validating the choice made. In this case, the experiment ends and the gains are equal to zero for the three participants A, B and C.

**Participant C** has no decision to take and does not know the proposals made participants A and B. S/he is only asked to answer the questions that appear on his/her computer screen. Answering these questions has no effect on gains nor on the experiment's results.

Participants A, B and C know the gains associated to each plan.

**Communication (only in treatment « with Communication »):** Participants A and B can choose to verbally communicate through an electronic mail system. To do so, one has to write a message in the appropriate space and to send the message. Each participant A and B can shut the electronic mail system down, and each participant can re-open it after having shut it down. When the electronic mail system is shut down, participants A and B cannot communicate.

You are not allowed to use the electronic mail system to send insulting messages, or messages that identify you (name, surname or nickname) or which help to identify you (age, ethnic origin, religion, profession, etc.).

**Total Gain:** The gains associated to each plan are expressed in Euros (€). At the outset of the experiment, each of you will receive a capital balance of 7 Euros. Your total reward for participating in this experiment will be equal to 7 Euros plus the gain made in this experiment or to 7 Euros minus the loss made in this experiment.

**Questionnaire:** Before starting the experiment, and once you will be assigned to a computer terminal, we will ask you to answer a questionnaire about these instructions. Answering this questionnaire does not interfere with the experiment.

If you have a question, ask it to one of the administrator in the laboratory, not to another participant. In this experiment, you are not allowed to communicate with the other participants.



## Screenshots (V and VwC)

FormHPlayerProp A

**Tableau des gains**

Plan	Quitter	0	1	2	3	4	5	6	7	8	9	10
Votre Gain	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de B	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de C	0	-6	-4,8	-3,6	-2,4	-1,2	0	1,2	1,2	1,2	1,2	1,2

**Votre décision**

Vous êtes le participant **A**

Quitter

*Veuillez choisir votre plan en cliquant sur l'un des boutons, puis validez votre choix en cliquant sur le bouton 'valider'*

FormHPlayerProp A

**Tableau des gains**

Plan	Quitter	0	1	2	3	4	5	6	7	8	9	10
Votre Gain	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de B	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de C	0	-6	-4,8	-3,6	-2,4	-1,2	0	1,2	1,2	1,2	1,2	1,2

Vous êtes le participant **A**

**Votre décision**

Quitter

*Veuillez choisir votre plan en cliquant sur l'un des boutons, puis validez votre choix en cliquant sur le bouton 'valider'*

Vous pouvez envoyer des messages à B

```

-A: >Bonjour !
-B: >Bonjour !
-A: >Je propose le plan 0, ok?
-B: >Je ne suis pas d'accord
-A: >Et le plan 2?
    
```

Votre message

*Tapez votre message dans la case blanche ci-dessus et cliquez sur 'envoyer' pour l'envoyer*

# Screenshots (H and HwC)

FormCoopPlayer A

Temps restant **577 s**

**Vous êtes le participant A**

Tableau des gains : — Décision de B

Plan	Quitter	0	1	2	3	4	5	6	7	8	9	10
Votre Gain	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de B	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de C	0	-6	-4,8	-3,6	-2,4	-1,2	0	1,2	1,2	1,2	1,2	1,2

**Décision de B**

Quitter 0 1 2 3 4 5 6 7 8 9 10

Légendes : — Actuelle — Précédente

**Votre décision**

Quitter 0 1 2 3 4 5 6 7 8 9 10

Légendes : — Actuelle — Précédente

Veillez choisir votre décision en cliquant sur l'un des boutons, puis validez votre choix en cliquant sur le bouton 'valider'

**Valider**

FormCoopPlayer A

Temps restant **422 s**

**Vous êtes le participant A**

Tableau des gains : — Décision de B

Plan	Quitter	0	1	2	3	4	5	6	7	8	9	10
Votre Gain	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de B	0	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
Gain de C	0	-6	-4,8	-3,6	-2,4	-1,2	0	1,2	1,2	1,2	1,2	1,2

**Décision de B**

Quitter 0 1 2 3 4 5 6 7 8 9 10

Légendes : — Actuelle — Précédente

**Votre décision**

Quitter 0 1 2 3 4 5 6 7 8 9 10

Légendes : — Actuelle — Précédente

Veillez choisir votre décision en cliquant sur l'un des boutons, puis validez votre choix en cliquant sur le bouton 'valider'

**Valider**

Fermer la messagerie

**Vous pouvez envoyer des messages à B**

-B: >Bonjour  
-A: >Bonjour  
-A: >Ok pour le plan 2?  
-B: >je prefere le plan 4 ou le 5

Votre message  **Envoyer**

Tapez votre message dans la case blanche ci-dessus et cliquez sur 'envoyer' pour l'envoyer

## Transcripts of Chat log files in HwC

<p><b>HwC, Group 1</b></p> <p>-A: &gt;should it be a plan such that the payoffs are the same for all ?</p> <p>-A: &gt;or the one that makes us earn most ?</p> <p>-B: &gt;doesn't matter if he earns less</p> <p>-A: &gt;so we choose plan 0</p> <p>-A: &gt;or 2 as you've put ?</p> <p>-B: &gt;i think so too, even if that's not very cool for him</p> <p>-A: &gt;we choose 0 then ?</p> <p>-B: &gt;yes</p> <p>-A: &gt;ok</p>	<p><b>Plan 0</b></p>
<p><b>HwC, Group 2 (no communication)</b></p>	<p><b>Plan 0</b></p>
<p><b>HwC, Group 3</b></p> <p>-B: &gt;if I have 5 and you 5, we earn 5 euros ?</p> <p>-B: &gt;?</p> <p>-B: &gt;0</p> <p>-B: &gt;are you there</p> <p>-A: &gt;yes but that's not nice for the person 'cause he came as we did</p> <p>-B: &gt;so we can do this</p> <p>-A: &gt;what</p> <p>-B: &gt;5 euros each and we divide the gains in three</p> <p>-B: &gt;that's better than 2 2 and 1.2</p> <p>-B: &gt;3.3!</p> <p>-A: &gt;yes but we don't know who is C</p> <p>-B: &gt;in any case he cannot decide</p> <p>-A: &gt;that's true</p> <p>-B: &gt;he has the choice between -6 and 1.2</p> <p>-B: &gt;1.2 is not much!</p> <p>-B: &gt;instead of having 1.2, he'll have 0</p> <p>-B: &gt;so are you ok with this</p> <p>-A: &gt;no he won't have 0, he'll have 6 instead of the starting 7</p> <p>-B: &gt;it's better than 0</p> <p>-B: &gt;you don't know him at all</p> <p>-B: &gt;and if it happens that you know him</p> <p>-B: &gt;then we divide in three</p> <p>-A: &gt;i don't know</p> <p>-B: &gt;there are 280 seconds left</p> <p>-B: &gt;5 each</p> <p>-A: &gt;5 minutes</p> <p>-B: &gt;:)</p> <p>-A: &gt;it's a matter of conscience</p> <p>-B: &gt;and too bad for him that he chose to be C</p> <p>-A: &gt;poor him, he hasn't chosen</p> <p>-B: &gt;destiny</p> <p>-B: &gt;which makes that we are here</p> <p>-B: &gt;5 is better than 2 no</p> <p>-B: &gt;ok</p> <p>-A: &gt;what a difference!!! lol [= lots of laughs]</p> <p>-B: &gt;3 euros difference</p> <p>-B: &gt;for each plan</p> <p>-B: &gt;that makes 30 euros at the end of the experiment</p> <p>-B: &gt;each</p> <p>-B: &gt;person</p> <p>-B: &gt;A and B</p>	<p><b>Plan 0</b></p>

-B: >2 minutes left -A: >so well we are going to do it because otherwise we will not agree -B: >1 minutes -B: >ok -B: >gone	
<b>HwC, Group 4</b> -B: > Hello you have already chosen ? -A: >hi! I think that the best solution is to maximize our gains -A: >yes -B: >completely agree, i do	<b>Plan 0</b>
<b>HwC, Group 5</b> -B: >do you understand something? -A: >yes -B: >do i choose a number at random? -A: >if you are naughty you don't care about C -B: >ok	<b>Plan 0</b>
<b>HwC, Group 6</b> -B: >don't you think that it's not very cool to make C lose 4.8 euros? -A: >yeah that's true	<b>Plan 2</b>
<b>HwC, Group 7</b> -B: >1 and we don't talk anymore	<b>Plan 2</b>
<b>HwC, Group 8 (no communication)</b>	<b>Plan 1</b>
<b>HwC, Group 9</b> -A: >what do you think, do we validate? -B: >well that's what is best for us -A: >i agree, i confirm -B: >me too, i confirmed	<b>Plan 0</b>
<b>HwC, Group 10</b> -B: >you're too tough with C who's with us -B: >I suggest a choice between 3 et 5 and not smaller -A: >you're right -B: >so 3 4 or 5 -A: >I suggest 4 -A: >is that ok with you? -B: >if you want but we're ripping him off... if I were him I would be disappointed -A: >i would be disappointed too -B: >So what do we do? -A: >in fact you're right, the three of us earn more with 5 than with 4 -A: >so better 5 -B: >Nice computation... the total is indeed bigger... -A: >thanks...but it's only 20 cents -B: >Still... -A: >So do we agree for the 5? -B: >Did you calculate the other cases? -A: >yes it's the best -B: >then it's fine with me -A: >ok	<b>Plan 5</b>
<b>HwC, Group 11</b> -A: >do we agree for plan 0? -B: >ok -B: >that's not nice for C -A: >that's not cool for C -B: >lol -B: >I confirmed	<b>Plan 0</b>

<b>HwC, Group 12</b> -A: >plan 1, ok? -A: >plan 0 sorry! -B: >ok -A: >ok -A: >not the 0 !! must be better! -A: >so? -B: >i think that player C loses everything no ? -B: >but for me it's ok -A: >nope i think he earns €1 !!! -A: >ok for the 0??? -B: >ok -A: >cool!	<b>Plan 0</b>
<b>HwC, Group 13 (no communication)</b>	<b>Plan 0</b>
<b>HwC, Group 14</b> -A: >it means that C has nothing	<b>Plan 3</b>
<b>HwC, Group 15</b> -A: >1 -B: >3 -A: >ok -B: >what ok -A: >i suggest 3 TOO	<b>Plan 3</b>
<b>HwC, Group 16</b> -A: >I think we must choose the strategy 0 to maximise our gains -B: >i completely agree !	<b>Plan 0</b>

## Transcripts of Chat log files in VwC

<p><b>VwC, Group 1</b></p> <p>-B: &gt;hello good luck with taking your decision...</p> <p>-A: &gt;thank you</p> <p>-A: &gt;two secs, i'm hesitating</p> <p>-B: &gt;sure, i would also hesitate if i were at your place</p> <p>-B: &gt;take your time</p>	<p><b>Plan 1</b></p>
<p><b>VwC, Group 2</b></p> <p>-B: &gt;hello</p> <p>-A: &gt;hello</p> <p>-A: &gt;I haven't finished analysing the different gains</p> <p>-B: &gt;take your time.</p> <p>-A: &gt;thanks</p> <p>-A: &gt;so, we both have the same gain, it can go from 0 to 5</p> <p>-B: &gt;that's correct</p> <p>-B: &gt;what do you choose?</p> <p>-A: &gt;the more we win and less C wins</p> <p>-A: &gt;do you mind if C has a negative gain ?</p> <p>-B: &gt;in general, i prefer equity!</p> <p>-A: &gt;i share your point of view</p> <p>-A: &gt;so, our gains range from 0 to 2.5</p> <p>-B: &gt;yes</p> <p>-B: &gt;the game wants us to give him the maximum gain while trying to maximise our gains too</p> <p>-A: &gt;it's not the game that wants us to give the maximum gain</p> <p>-A: &gt;we could very well be completely selfish</p> <p>-B: &gt;yes we could</p> <p>-B: &gt;but i'm not in favour of this choice</p> <p>-A: &gt;fine</p> <p>-B: &gt;then you choose first</p> <p>-B: &gt;"with peace in your mind"!</p> <p>-A: &gt;would plan 5 be fine with you, given that it's a dry run for C</p> <p>-B: &gt;i have mixed feelings</p> <p>-A: &gt;what would you like for C?</p> <p>-B: &gt;it's the best solution for us but C finds himself at the same point as before the experiment</p> <p>-B: &gt;i think that with more or less 50 cents, we could consider a positive gain for C</p> <p>-B: &gt;by choosing plan 6</p> <p>-A: &gt;"the best solution for us" is not plan 6 but plan 0</p> <p>-B: &gt;of course, but that's not fair.</p> <p>-A: &gt;absolutely, but it's only an experiment ....</p> <p>-B: &gt;we were given these roles at random, we could have been C!</p> <p>-A: &gt;absolutely, i wonder what this player is doing right now...</p> <p>-B: &gt;wonder if we are going to be selfish or if we are going to thinking about him, may be!</p> <p>-A: &gt;would you be ready to refuse again greater than 2, by concern for equity ?</p> <p>-B: &gt;yes</p> <p>-A: &gt;bravo</p> <p>-B: &gt;and you?</p> <p>-A: &gt;if i were at your place ???</p> <p>-B: &gt;yes</p> <p>-A: &gt;yes, i think, i wouldn't like to be C</p> <p>-B: &gt;i agree!</p> <p>-A: &gt;so i suggest plan 6</p> <p>-B: &gt;i agree for plan 6</p> <p>-A: &gt;no regret ??? plan 6 and no other</p> <p>-B: &gt;no, no regret.</p>	<p><b>Plan 6</b></p>

-A: >very good, so, ROOM FOR PLAN 6 !!!! -B: >ok -A: >you don't have anything more to add	
<b>VwC, Group 3</b> -A: >player B i suggest plan 6 -A: >or do you prefer something else???? -B: >all three winners, ok!	<b>Plan 6</b>
<b>VwC, Group 4</b> -B: >suggest 0 -A: >yep, it's a good idea	<b>Plan 0</b>
<b>VwC, Group 5</b> -B: >which strategy are you going to choose ? -A: >plan 5 , no? -B: >poor player C :) i thought that plan 6 was a good compromise, -B: >it yields positive gains to us all -A: >Right I can hardly imagine myself shrinking C's gains to 1euro... -B: >yes, that wouldn't be very « fair play » ! -A: >so do we choose 6?? -B: >you are the decision maker, but i think it's the best. -B: >however, i don't know how many times we are playing, -A: >ok for 6...	<b>Plan 6</b>
<b>VwC, Group 6 (no communication)</b>	<b>Plan 0</b>
<b>VwC, Group 7</b> -A: >hello. I suggest plan 0, which seems to our advantage, although C will be penalised -B: >OK -A: >gone	<b>Plan 0</b>
<b>VwC, Group 8</b> -B: >so ?	<b>B Quits</b>
<b>VwC, Group 9</b> -A: >hi -B: >hello -A: >what do you think about the plans -B: >i wouldn't like to have to choose -A: >it's a bit unfair if we want to get rich, no? -B: >it's all a question of solidarity -A: >yes, i agree -A: >yes -B: >yes -B: >it's also the game -B: >i don't know, the more we win and the more C loses -A: >perhaps i should choose the optimal choice -A: >and then we divide -B: >optimal for whom? -A: >do you agree? -A: >for everybody -B: >for us the optimal choice is plan 0 -B: >the + equitable is plan 7 or 8 -A: >yes -B: >but at the same time, the total gain is inferior to that of plan 0 for example -A: >but with 5 we have a total gain of 5 -B: >no, i haven't taken into account C's losses -A: >with 6 5 -B: >yes -A: >5,2 indeed -A: >i think that it's the best plan	<b>Plan 6</b>

<p>-B: &gt;the global optimum is the 5 i think  -A: &gt;6  -B: &gt;then it depends if you want solidarity or if you are selfish  -B: &gt;yes 6  -A: &gt;yes, of course  -A: &gt;6 gives 5,2  -B: &gt;yes  -A: &gt;do you agree if i choose it  -A: &gt;or 0 if we want to be selfish  -B: &gt;you are the decision maker. In any case it's in my interest to always validate your choice,  -B: &gt;it will always yield more than if i quit  -A: &gt;that's for sure  -B: &gt;(or the same)  -A: &gt;so I choose 6  -B: &gt;ok</p>	
<b>VwC, Group 10 (no communication)</b>	<b>B Quits</b>
<p><b>VwC, Group 11</b>  -B: &gt;hello!  -A: &gt;plan 0 yields more  -A: &gt;bye</p>	<b>Plan 0</b>
<p><b>VwC, Group 12</b>  -A: &gt;which plan do you suggest, i think that 4 would be ok  -B: &gt;why 4 ? I would choose 0 because it would yield 5 euros.  -B: &gt;it doesn't matter if C gets only 1 euro !  -A: &gt;it's true that i haven't thought that way  -B: &gt;so what do you choose ?  -A: &gt;thus we choose 0  -B: &gt;OK !</p>	<b>Plan 0</b>
<b>VwC, Group 13 (no communication)</b>	<b>Plan 6</b>
<p><b>VwC, Group 14</b>  -A: &gt; an idea ?  -B: &gt;erm not really  -B: &gt;but it would be good to try a number  -A: &gt;if i choose 0, that's ok with you?  -B: &gt;yes  -A: &gt;ok</p>	<b>Plan 0</b>
<b>VwC, Group 15 (no communication)</b>	<b>Plan 3</b>
<b>VwC, Group 16 (no communication)</b>	<b>Plan 5</b>