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ON SMILES, WINKS AND HANDSHAKES AS COORDINATION DEVICES*

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In an experimental study we examine a variant of the 'minimum effort game', a coordination game with Pareto ranked equilibria and risk considerations pointing to the least efficient equilibrium. We focus on the question whether simple cues such as smiles, winks and handshakes could be recognised and employed by the players as a tell-tale sign of each other's trustworthiness, thus enabling them to coordinate on the more risky but more rewarding Pareto efficient equilibrium. Our experimental results show that such cues may indeed play a role as coordination devices as their information value is significant and substantial.

Many social interactions can be modelled as coordination games, i.e., games with multiple possible solutions. In such games agents share a common interest in the sense that a desired outcome is only achieved if all agents coordinate on the same solution. If several alternative solutions are available, coordination may be difficult to achieve even when miscoordination is very costly, a situation familiar when for instance trying to meet a friend in a city never visited before without having arranged for a precise meeting point in advance. This problem does not disappear when the various coordinated outcomes (equilibria) are Pareto ranked, so that one meeting point, say, is better for all concerned than another meeting point. In such games the agents face a double coordination problem. First, they want to coordinate on an equilibrium and, second, they prefer to do so at the best equilibrium. Since agents need to choose an action before observing the action(s) of the other agent(s), to go for the Pareto efficient equilibrium, what is crucial in these coordination games is that 'they can trust each other' (Harsanyi and Selten, 1988, p. 89) to do so. In other words, the agents need some shared understanding of the situation and of the appropriate course of action this implies.[1]

There is some game-theoretic as well as experimental literature focusing on the idea that explicit (verbal) preplay communication may (or may not) help to establish such trust; see, e.g., Harsanyi and Selten (1988); Aumann (1990); Farrell and Rabin (1996); Charness (2000) or Clark *et al.* (2001). In this article we pursue a different track. We investigate the idea that trust may be established *without* explicit (verbal) preplay

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[1] 'When we say we trust someone or that someone is trustworthy, we implicitly mean that the probability that he will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him' (Gambetta, 1988, p. 217). See also Coleman (1990), who explains that the issue of trust arises in 'situations in which the risk one takes depends on the performance of another actor' (p. 91).

communication. There is a growing body of (sometimes casual) empirical evidence that simple cues play an important role concerning the perception of trustworthiness.[2] Such cues may be unconscious, hard-wired and shaped through evolution (as seems to be the case for some body language, facial expressions, or tone of voice) but they may also be the result of deliberate choice behaviour. Smiles, winks, handshakes, hairdos, tattoos, clothing and personalised numberplates may fall in the latter category. These simple cues provide a fast and frugal way of signalling a certain attitude or trustworthiness. The fact that they are quick and economical makes these cues effective in situations in which a quick establishment of trust is necessary, such as in casual, anonymous encounters, e.g., in traffic (pedestrian or otherwise), in which no explicit preplay communication is possible. More importantly, however, these simple cues also seem to play a crucial role in many situations where there is scope for extensive communication. The reason for this is that the direction such communication takes may depend to a large extent on the effect of these powerful cues.

For example, if there are two things concerning job interviews about which there is consensus among the specialists, it is that the first minute is the crucial one and that a candidate needs to make eye contact, smile and give a firm handshake. Obviously, major business deals are not based on a smile alone. But the details of such business deals are only worked out and negotiated if trust is present, and this is the main reason why most important business communication tends to be conducted face-to-face, even in the age of the Internet. As London (2001) puts it, 'a good Chardonnay and a firm handshake are still worth a million bytes'. Trust in business dealings is established within a framework of explicit and tacit understandings regarding interaction routines and exchange practices, for which the relevant social norms may differ from country to country. A series of articles in the *Financial Times*, reviewing business methods in various countries, illustrated the importance in this respect of factors such as the decorum that surrounds meeting and greeting, the use of first names or full titles, handshakes and direct eye contact, hugging and kissing versus comfort distances and dressing codes.[3] Establishing trust is equally important in international relationships, and the methods employed are similar too, with a distinguished role for etiquette and chivalry in diplomatic practice. An example showing that simple cues may play a role not only in establishing trust between people who meet for the first time but even in maintaining trust in the case of repeated interactions is the one concerning long-standing doctor–patient relationships. Scheck (2000) suggests the following trust-building mechanism to dermatologists: 'A smile a day keeps the lawsuits away'.

In short, there is ample evidence that common manifestations such as handshakes, smiles or winks can be used to establish trust. This suggests that 'face-to-face' interactions may be vital for establishing trust. According to Argyle (1988), more than 65% of the information exchanged during 'face-to-face' interactions is accounted for by embodied communication. This contrasts with most studies of strategic interactions in laboratory experiments with human subjects in economics. Experimental designs are typically stripped of all embodied communication between the subjects as face-to-face interactions are avoided because of the need for strict between-subjects anonymity and

[2] See, e.g., Snijders (1996) and the references therein.
[3] See Frank (2000, 2001*a*, *b*,*c*, *d*).

experimental control. Therefore, in this study we want to investigate this gap, and ask ourselves the question: What is it in embodied communication through face-to-face interactions that is essential to create trust? In other words, what is it that allows simple signals such as smiles to work in reality (outside the laboratory)?

To answer these questions, we take up the example of two potential business partners who need to work out the details of a deal. We model this as a variation of the 'minimum effort game' (Van Huyck *et al.*, 1990). This is well-known example in the experimental economics literature of a common interest game with Pareto ranked equilibria, in which efficient coordination is not achieved because of lack of trust (either in fixed group versions or in pair-wise random re-matching versions). We organise a laboratory experiment in which this game is played pairwise and repeatedly but each time with a randomly chosen opponent. In each round of the game, both players simultaneously choose an effort level. The payoff of each player depends on his own choice of effort level and the minimum of the two choices. Any coordinated outcome, i.e., any outcome in which both players choose the same effort level, is an equilibrium with symmetric payoffs. The equilibria can be Pareto ranked and the efficient equilibrium is the one in which both players choose the highest effort level. The equilibrium with the lowest effort choices and payoffs, however, is less risky, because each player can be certain not to have chosen a greater effort level than his partner.

This seems a particularly suitable game to study the question how the necessary trust to achieve efficient coordination may be established. In some games such an expectation would be trivial and trust would not be an issue. In other games, such as, for example, a one-shot prisoner's dilemma game, trust would conflict with standard rationality assumptions. The minimum effort game is interesting in this respect because, on the one hand, rationality does not exclude trust but, on the other hand, trust cannot be taken for granted given the tension between payoff and risk considerations, implying that another player might choose an action that he perceives to be beneficial to himself (going for the other equilibrium) but that happens to hurt you.[4]

The focus of our article concerns the moment in which the two businessmen meet, i.e., before they actually decide how much effort to put in to work out the details of a deal. We model the decorum surrounding their meeting and greeting as follows. At the start of each round the players are casually asked to communicate to each other that they are set to play the game. A player can indicate either that his current state is a plain 'ready', or that it is 'smiling'. That is, the simple though novel and rather crucial feature of our experiment is that we replaced the usual 'OK' button that separates one experimental phase from another with the possibility to choose either a 'ready' or 'smiling' button, with no additional explanation of why participants might want to use either of them. Notice that smiles have a relatively well-understood meaning outside the laboratory. To investigate what it is in real life smiles that induces trust, we abstract from many aspects of real life smiles, reducing it to binary signal. What is more, this signal is communicated through the computer interface, allowing us to focus on deliberate, strategic signalling only and to exclude unconscious, uncontrolled smiles.

[4] Understanding how trust is established exactly is clearly an issue of which the relevance goes beyond the minimum effort game, as trust is recognised increasingly as a lubricant enabling organisations and societies to achieve Pareto superior outcomes; see, e.g., Arrow (1974); Gambetta (1988); Fukuyama (1995); La Porta *et al.* (1997) or Kramer (1999).

The question, then, is whether the availability of these simple and vague state messages, which are as such unrelated to the specifics of the game, is sufficient to induce trust and enhance coordination efficiency. That is, whether the players recognise and exploit this as an opportunity to signal their trustworthiness, such that the state reports submitted by the players act as a cue foreshadowing a common understanding that allows them (having aligned their expectations) to feel reassured enough to go for the more risky (but potentially more rewarding) strategy of the Pareto dominant equilibrium.

Varying details of this preplay stage, while playing the same tacit minimum effort game, we examine three different treatments. In the base treatment, the two players report their current state costlessly and simultaneously before they make their effort level choices. In a second treatment, we introduce small costs of reporting a 'smiling' state, to test whether this might separate the 'noisy' from the more serious smilers. In addition to these costs, in a third treatment, the players communicate their current state sequentially, to test whether the players might care about avoiding conflicting signals.

The main findings of our analysis can be briefly summarised as follows.

- *Frequency of smiles.* Smiling is practised by a steady minority of the players. When we introduce a small cost of smiling, the frequency of smiles is significantly lower than with free smiles. When the players are asked to report their state sequentially, the frequency of 'smile-smile' pairs is significantly higher than in the simultaneous treatment.
- *Effort levels.* The average effort levels in 'smile-smile' pairs is significantly greater than in mixed pairs or in non-smiling pairs. The average effort level is significantly greater with costly smiles than with non-costly smiles, both in same signal and mixed signal pairs, whereas the average effort level of pairs without smiles does not differ significantly across treatments.
- *Payoffs.* The average payoff in 'smile-smile' pairs is significantly lower than in other pairs.

In other words, the players realise they can use their state report as a coordination device and the smiles are used and recognised as genuine tell-tale signs of trustworthiness. However, although the information value of the smiles is significant and substantial, the evolution of signalling and effort level choices in our experiment does not prevent inefficient coordination.

The rest of the article is organised as follows. In Section 1 we present the game and the treatments. Section 2 discusses our experiment and its relation to the literature. The details of the experimental procedures are described in Section 3, whereas the hypotheses to be tested are spelled out in Section 4. The results are presented in Section 5; Section 6 concludes.

1. The Game and the Treatments

In this Section we first present the underlying tacit coordination game that we employed throughout the experiment and then explain how our experimental design offered the players the opportunity to develop a 'secret handshake', and the details of the different treatments in this respect.

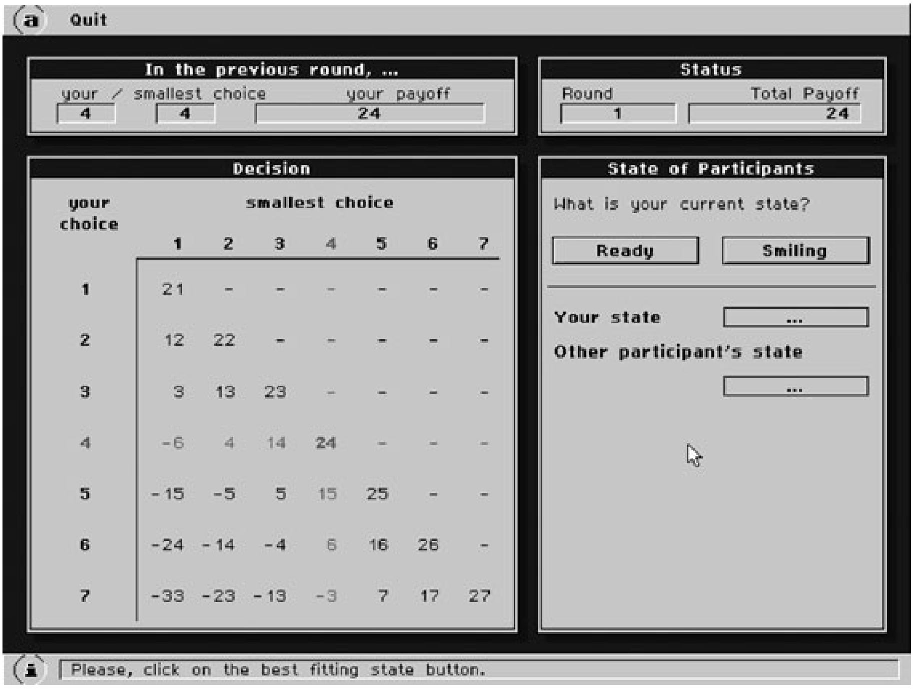

Fig. 1. *Player Interface*

We study a variation of the minimum effort game as presented by Van Huyck *et al.* (1990). This tacit coordination game resembles a typical team situation such as, for example, the one concerning potential business partners who need to work out a deal. First, all players simultaneously choose an individual effort level. The payoff of the deal, then, is determined by the minimum of the chosen levels. Finally, each player receives the payoff of the deal minus the cost of his own effort. In this class of games, two incentives work against one another. On the one hand, each player's additional payoff from increasing the team's minimum effort level is always greater than his own marginal effort. That is, the business deal is one that is worth being worked out. On the other hand, each player has to bear his own effort cost but only the minimum effort level is relevant for the payoff of the project as such. Hence, only combinations of strategies with all players choosing exactly the same effort level are equilibria of the game, with the payoff dominant one being the one in which all players exert the maximum possible effort. The payoffs of the game in the parameter setup we study are presented in the player interface reproduced in Figure 1. In our experiment this game was played pairwise for fifty rounds, with the players being randomly matched in each round.[5]

As can be seen, coordinating on the efficient equilibrium is risky, because the cost of a coordination failure is high for a player choosing a high effort level. For example, a

[5] See Appendix A.1 for the instructions given to the subjects. Notice, in particular, that we do not use the word 'effort' in the experiment.

player who chooses '*7*' when his team mate chooses '*1*', suffers a loss of 54 points compared to having also chosen '*1*'. Furthermore, the advantage of being coordinated is relatively small, since players who coordinate on the efficient equilibrium (both choosing '*7*') earn only 6 points more than playing the safe strategy (choosing '*1*'), for which no coordination is necessary. Therefore, this particular parameterisation of the game implies that, to go for the Pareto efficient equilibrium, a player needs a great deal of trust that his partner will not let him down. Hence it seems well-suited for the examination of the emergence of a cue telling the trustworthy from the others.

We now turn to the preplay phase. At the outset of every new round, before they could go on to play the minimum effort coordination game, each player was asked to report one and only one of two possible states: 'ready' or 'smiling'. These buttons can be seen in the player interface in Figure 1. Each round would start only after all players had pressed one of their state buttons. Hence, a choice had to be made, and no default was given. In all treatments, these states were communicated to both players before they made their effort level choices. Notice that whereas the minimum effort coordination game can be seen as a deal to be struck by two potential business partners, this preplay phase corresponds to the decorum surrounding their meeting and greeting.

In the base treatment (SimFree) both players would indicate a state simultaneously, i.e., each had to select a state before having information on the state choice of the other player. Once they had both received communication of their state decision, they could choose their effort level in the coordination game. What is more, either state could be reported with *no costs*. Our experiment involved two more treatments: a simultaneous costly signal treatment (SimCost) and a sequential costly signal treatment (SeqCost). In the costly signal treatments (SimCost and SeqCost), reporting a 'smiling' state incurred a minor cost of 0.5 points, while reporting 'ready' was free. In the sequential signal treatment (SeqCost), one of the players was randomly chosen (with equal probabilities for both players) to report his state first. The state chosen was transmitted to the other player, who then chose his own state, which in turn was sent to the first player.

Hence, varying our two control variables, signal cost and signal order, allows us to check and to isolate the effects of both control variables in two-way comparisons. Comparing SimFree to SimCost informs us on the effect of introducing a signal cost, while comparing SimCost to SeqCost informs us on the difference between a simultaneous and a sequential signalling mode.

Notice that there are some slight differences in the equilibria of the three treatments. In the SimFree game, the outcome of any subgame-perfect Nash equilibrium consists of any of the Nash equilibria of the minimum effort game combined with any constellation of 'ready' or 'smile' signals. In both the SimCost and SeqCost games, however, the set of outcomes of subgame-perfect Nash equilibria can be characterised as follows. Any constellation of 'ready' or 'smile' signals can occur. If both players signal 'ready', this can be followed by any of the Nash equilibria of the minimum effort game. But if at least one player sends a 'smile', then it is followed by a Nash equilibrium of the minimum effort game with an effort level strictly greater than '*1*'. The explanation for the latter result is in both cases (SimCost and SeqCost) the same. If a player anticipates that his smile will be followed by the least efficient Nash equilibrium of the minimum effort game, he will not smile because it would give him a payoff of 20.5, whereas any equilibrium of any subgame if he sends a 'ready' signal would give him a payoff of at least 21.

2. Our Experiment and Related Literature

As we described in detail in the previous section, our experiment is based on the minimum effort games introduced in Van Huyck *et al.* (1990). Agents have to pick a number (i.e. 'effort'), and their payoff is higher the higher the chosen effort level, provided it is the same for all participants. Miscoordination is costly, the more so to the player attempting to coordinate on the Pareto superior equilibrium. As a consequence, in repeated play with randomly matched opponents, coordination on the Pareto dominant equilibrium generally unravels and subjects end up coordinating on the Pareto inferior outcome. In Van Huyck *et al.* (1990), play evolved to the least efficient equilibrium in a group version of the minimum effort game, whilst coordination on the efficient equilibrium is achieved if agents are paired repeatedly with the same opponent but no coordination is attained when subjects are randomly paired round after round.

The minimum effort game that we use differs from the one used by Van Huyck *et al.* in the sense that coordination on the Pareto superior allocations is more risky and any miscoordination more costly.[6] The reason for deviating from the payoffs used by Van Huyck *et al.* is the following. Our main focus is 'one-shot games'. In order to be able to assess changes in behaviour over time, in our experimental design we consider 50 periods and random re-matching in each period. Within this setup, payoff specifications as in Van Huyck *et al.* are such that the mere opportunity to play 50 rounds of the same game seems sufficient for the players to converge on the Pareto superior equilibrium even without the use of simple cues such as smiles.[7] As these simple cues are the focus of our research, we decided for a setup in which the emergence of trust cannot be taken for granted without the use of simple cues. Clearly, a more systematic study of the use of simple cues in a wider range of games would be interesting but beyond the scope of the current article.

In our experimental design we modify the standard setting by adding a preplay phase in which participants have to indicate that they are set for the next round, reporting their current state, whether 'ready' or 'smiling'. Throughout the article we often use the words 'communication', 'signal' and 'signalling' when referring to this preplay phase but it should be noted that our subjects were just asked to express their mood. We could not tell how they would interpret the request, or how they would react to it. The ambiguity of the signal in the preplay phase of our experiment is an essential difference from the existing literature on cheap talk in coordination experiments, where players are explicitly asked to announce their planned action, which they could possibly do strategically; see, e.g., Cooper *et al.* (1992); Charness (2000); Blume and Ortmann

[6] One could argue that this tougher environment strengthens any evidence we find regarding the incidence of intentional smilers.

[7] See, e.g., Berninghaus and Ehrhart (1998), who show how the convergence of effort levels is sensitive to the number of rounds played, with the coordination problem becoming less severe if the players know that they are going to play a larger number of rounds. See also Goeree and Holt (2001) on minimum effort games with various degrees of riskiness.

(2007) or Clark *et al.* (2001). The game in our experiment is also *not* a signalling (or sender–receiver) game, as all subjects play the same symmetric complete information game (see Figure 1).[8] Blume *et al.* (1998) study the endogenous evolution of the meaning of signals in such sender–receiver games, with the payoffs of each type of sender being common knowledge. The message space is *a priori* meaningless and the question is whether the players can learn to reach a common understanding as to the meaning of the abstract signals, distinguishing the various types of senders.[9] Our experiment complements this study, first, in the sense that the interest of the game in Blume *et al.* lies in the fact that there is incomplete information, whereas in our experiment there is only one type of player, with the coordination problem arising because of the tension between payoff and risk considerations. Second, Blume *et al.* focus on the evolution of the meaning of signals, as there is no doubt as to which signals are available and why they should be used. In our experiment the players are not told that there is any relation between the preplay phase and the coordination game. They need to discover themselves that they could use the state reports as a signalling device to establish trust in the game to be played. What is more, unlike in Blume *et al.*, in our experiment the 'smiling' button has a commonly understood positive connotation, rather than being a completely 'blank' message which could acquire meaning endogenously. In other words, our experiment is focused not so much on whether a meaning as such could arise for the 'smiling' state but rather whether it could acquire a trust-inducing *coordinating role* endogenously.[10]

Explicit communication in the coordination game presented in Figure 1 is self-enforcing in the sense that if a player could signal his intention to choose a certain effort level, then (assuming the other player believes him) he has no incentive to choose a different effort level. This means, for example, that if in the original tacit coordination game a player's risk considerations lead him to choose '*1*', he would have no incentive to signal an intention of choosing any higher effort level.[11]

One other related issue is that we consider a pocket-sized signalling space, which, in particular, is smaller than the action space. The essential reason for this is that the objective of our article is precisely to examine the relevance of simple cues as coordination devices.[12] In this sense our experiment complements the cheap talk experiments that use a much richer language. Notice that the fact that the signalling

[8] Obviously, this is not strictly true to the extent that the subjects' risk-attitudes might not be common knowledge. Although this might play some role, it should be noted that even if we had perfect experimental control of the subjects' preferences, the whole issue of equilibrium selection and the role of trust therein would remain equally relevant. For the same reasons our contribution is only tangent to sender–receiver games in general *à la* Crawford and Sobel (1982).

[9] According to Crawford (1998), this is the only experimental study in which the endogenous determination of the meaning of signals is studied.

[10] Here we eschew the more general theoretical problem of how intrinsically worthless attributes can acquire value because of social institutions. See, e.g., Mailath and Postlewaite (2006).

[11] See, e.g., Harsanyi and Selten (1988), Farrell (1988) or Aumann (1990). Of course this does not rule out equilibria such as 'babbling equilibria', in which players send random messages and the receivers just ignore them. At the theoretical level, inefficient equilibria of this sort can be ruled out by appealing to refinements that presuppose a commonly understood meaning of the signal (which may or may not be believed) – see, e.g., Farrell (1993). However, this is not possible in our experiment, where the meaning of a signal is not clear *a priori* and a player may fail to interpret the signal in the same way as his opponent.

[12] In other words, we move into the opposite direction of Aumann and Hart (2003), who analyse the extension of cheap talk to long cheap talk.

space is smaller than the action space need not prevent efficient coordination. Since all players prefer to coordinate on the same, Pareto efficient equilibrium, to achieve efficient coordination they need only one thing: trust. The signal space in our experiment allows the emergence of a cue telling the trustworthy from the other players. This is different from sender–receiver games, in which typically the number of types of senders corresponds to the number of available actions, with each type preferring to coordinate on a different action (see, e.g., Blume *et al.*, 1998). In those games, the size of the signal space needs to match that of the action space to allow the players to distinguish all types and to coordinate on the efficient equilibrium.[13]

In principle, the reported state in our experiment is a personal, non-interactive trait. The question, then, is whether the players will turn the originally internal state report into an interaction tool, using their report to signal trustworthiness. Notice that the use of buttons to report the states gives us experimental control over the reports (which we would not have using real smiles), allowing us to focus on cues that can be used in a deliberate, strategic manner as they are open to voluntary control.[14] In this sense our study complements the literature examining cues as the result of uncontrollable, emotional trembling of muscles; see, e.g., Ekman (1985) or Frank (1988). Three experimental studies that abstract from the signalling and trust-building as choice behaviour are Ockenfels and Selten (2000), Eckel and Wilson (1998) and Scharlemann *et al.* (2001). The former studies whether an audience is able to detect involuntary truth-signalling by players in a bargaining game, reporting a mainly negative finding. The latter two test the effect of facial expressions, either of stylised icons or of actual photographs taken from a database, in one-shot extensive-form games and find significant (although weak) effects of smiling faces.[15]

In addition, we examine two-way communication, i.e., both players are required to communicate their current state. There is some literature (Cooper *et al.*, 1989) showing that one-way communication may lead to improved coordination. This is due to the fact that two-way communication can lead to signal conflict problems. For example, one party may send a signal suggesting a high effort, without receiving such a signal from the other side. In such a case, it is hard to tell whether the sender will actually stick to the signalled action or not. Since he did not receive a signal, it is not clear why he should expect that the other player will coordinate on the best equilibrium. Hence, for a stable and reliable signal to emerge, the players must first learn to overcome this signal coordination problem. With one-way communication such mis-coordination at the signalling stage cannot arise. The reason for us to consider two-way communication is that we want to focus on signalling as active choice

[13] There is also an extensive evolutionary literature on equilibrium selection in coordination games, establishing conditions under which only efficient equilibria are consistent with various notions of evolutionary stability, and discussing in particular also the issue of the size of the signal space; see, e.g., Robson (1990); Wärneryd (1991, 1993); Blume *et al.* (1993); Weibull (1995); Blume (1998) and Hurkens and Schlag (2003).

[14] As Scheck (2000) recommends in her lawsuit prevention model: 'I don't care what kind of day you are having – fake it' (p. 2).

[15] Our article complements these latter two studies also in the sense, first, that in our common interest game trust does *not* conflict with equilibrium behaviour, and second, that we study the possible *evolution* of the use of a smile.

behaviour, i.e., on whether 'smiling' is used intentionally to signal the will to coordinate on a better outcome.[16]

Brosig *et al.* (2003) study the effect of the communication medium used on the level of cooperation reached in a number of public goods games, including both involuntary and voluntary communication, as well as one and two-way communication. One of their findings is that the communication medium matters more than the contents of the communication and it suggests that simple cues may be more important than extensive verbal communication.

Derks (2007) studies a medium of communication that seems closely related to our binary signals: because of the lack of many non-verbal cues for emotional expressions online, she focuses on the use of emoticons in computer-mediated communication and social interaction.

Our research strategy to study which elements of face-to-face interactions are essential for embodied communication is to reduce such interactions to a binary signal. Dealing with a similar research question, a closely related strategy is followed by Willis and Todorov (2006) and Becker *et al.* (2004). Willis and Todorov study minimal conditions for people to draw trait inferences from facial expressions by drastically reducing the time exposure to a face to fractions of a second. Becker *et al.* investigate what is required for enabling an artificial agent to learn and display human-like embodied communication.

3. Experimental Procedures

The experiment was conducted at the University of Bonn (Laboratorium für experimentelle Wirtschaftsforschung) in Germany between the summer of 2000 and spring of 2001.[17] Our subject pool consisted mainly of students of law and economics. The subjects voluntarily signed up for the experiment one or two weeks before the session. They were given no information concerning the contents or goals of the experiment beforehand. They were randomly assigned to one of the three treatments.

The experiment was computerised using RatImage (Abbink and Sadrieh, 1995). The subjects were seated in closed cubicles throughout the session. Upon arrival at the laboratory, each participant drew a card that determined the cubicle in which he took a seat. After all participants were seated, the written instructions (see Appendix A.1) were read aloud by the experimenter. All questions were answered individually, inside the cubicle.

Sixteen participants took part in each session. The subjects were divided into two independent groups of eight participants in each session. The members of an independent group only interacted with subjects from within that group. The subjects were not informed of the size of the independent groups. They were only told that they would be randomly matched to some other participant in every round. Because

[16] In some sense our sequential signalling treatment encompasses one-way signalling. For suppose that one-way communication would work, in the sense that after a smile both players would trust each other to go for the risky efficient equilibrium. If this were the case, then in our sequential treatment SeqCost it would be straightforward for the second player to confirm this common understanding by replying with a smile.

[17] We ran two extra sessions in 2006 in response to queries raised by an anonymous referee.

subjects within each group played repeatedly with one another, with the subjects being randomly re-matched from round to round, there may be direct as well as indirect interaction effects. Consequently, we cannot consider each play by a subject in a group as an independent observation. Therefore, we have to use the groups instead as our independent observations. For each treatment we have eight of these independent subject groups.[18]

The experiment consisted of fifty rounds, which was known to the players. At the outset of each round, the eight members of each independent group were randomly matched to form four pairs. Then the signalling phase started. In the simultaneous signalling treatments, all signalling decisions were collected and then redistributed to the corresponding pairs. In the sequential signalling treatment, half of the subjects were randomly chosen to be the first movers in the signalling phase. Their signals were collected and sent to their partners. Then the signals of the second movers were collected and transmitted to the corresponding first movers. This procedure had been described to the subjects. It was emphasised that in any given round it would be equally likely for each player to become first or second mover in the signalling phase. The signalling phase was followed by the tacit coordination game, in which all effort level choices of the subjects were collected. After all decisions were made, each subject would be shown his own choice plus the smallest value chosen in his match (but not by subjects in any other pairs) and the next round began.

The final payoffs of the subjects were equal to the sum of their payoffs over the fifty rounds, plus a DM 3.50 show-up fee. The experimental exchange rate was DM 3.50 per 100 points and the average earnings per player was about DM 47.00. The duration of a session was between 70 and 100 minutes, including the time for instructions and post-experimental debriefing. The currency exchange rate at the time of the experiment was approximately \$0.48 or €0.51 for DM 1.00.

4. The Hypotheses

Starting with the basic question, whether a cue of trustworthiness enabling coordination on the efficient equilibrium emerges, and taking into account the two treatment variables (signal cost and signal order), we divide the Hypotheses into three groups. First, if such a cue emerges, a number of predictions can be made about the average effort level choices and resulting payoffs within each treatment. We summarise these predictions in the Hypotheses 1 and 2. While hypothesis 1 conveys what it means for a signal to be reliable, Hypothesis 2 is based on the fact that coordinated play leading to efficient outcomes should increase the payoffs of subjects.

HYPOTHESIS 1. *If a practice of smiling emerges, pairs using the signal will choose higher effort levels on average than non-smiling subject pairs.*

[18] For the statistical analysis of small samples we rely as usual on exact statistical methods, see e.g. Hollander and Wolfe (1999).

HYPOTHESIS 2. *If the smile is used as in Hypothesis 1, then the average payoff of a player in a pair using that signal will be higher than that of other subjects.*

Second, the essential purpose of the introduction of a signalling cost was to deter non-meaningful signalling, so that a small penalty would be enough to break indifferences, leading to a reduction of 'noisy' signals, i.e., smiles that were not intended as coordination devices. This results in our Hypotheses 3 and 4. Note that Hypothesis 4 is congruent with the characterisation of subgame-perfect equilibria given in Section 1, where the lowest effort level of '*1*' was ruled out in pairs with at least one costly smile.[19]

HYPOTHESIS 3. *Costly smiles will be less frequent than non-costly ones.*

HYPOTHESIS 4. *Costly smiles are more likely to be used as coordination devices for high effort level choices than non-costly ones. That is, higher average effort levels will be observed in signalling pairs with costly smiles than in signalling pairs with non-costly smiles.*

Third, the signal order treatment variable was introduced to gain some insight into the effects of the signal conflict problem of the simultaneous two-way communication treatments, as mis-coordinated signals do not really help to achieve coordination in the minimum effort game. Where the players care about using the signals as a coordination device, they would have an easy opportunity to coordinate their signals in the sequential signalling treatment. In particular, it would allow any player who did not plan to smile to revise his choice to 'smiling', after having received a 'smiling' signal from the other player. This inspired the following Hypothesis 5.

HYPOTHESIS 5. *Sequential signalling will lead to fewer signal conflicts than simultaneous signalling, i.e., to a smaller number of mixed signal pairs.*

5. The Results

In this Section we give a detailed analysis concerning the signalling frequency, effort levels, and resulting payoffs separately. We first present a summary for each of the treatments SimFree, SimCost, and SeqCost in Tables 1, 2 and 3 respectively.[20] In each row, the statistics for one of the possible signal constellations is presented. All statistics reported are the average of the corresponding statistics for the independent observations. Since each independent observation consists of eight subjects playing 50 rounds, the frequencies of the different signal constellations sum up to a total of 200 pairwise cases for each independent observation. Notice that in the case of simultaneous signals, i.e., in SimFree and SimCost, a differentiation between 'ready-smile' and 'smile-ready' pairs is meaningless. This distinction is instead relevant in the case of sequential signals, i.e., in SeqCost. Therefore, the two central rows in Table 3 report the relevant statistics

[19] Hypothesis 4 is also based on the same intuitive argument on which the forward induction solution is based.
[20] More detailed Tables can be found in Appendix A.2.

Table 1

Treatment SimFree – Simultaneous and Non-Costly Signals

Signal constellation	% of all cases (number of cases)	Average effort level (standard deviation)	Average payoff (standard deviation)
ready – ready	42.1 (84.1)	1.5 (1.3)	17.7 (10.4)
mixed signals	45.6 (91.3)	1.5 (1.3)	17.5 (10.2)
smile – smile	12.3 (24.6)	2.3 (1.7)	14.2 (14.4)

Averages of the corresponding variables over the 8 independent observations

Table 2

Treatment SimCost – Simultaneous and Costly Signals

Signal constellation	% of all cases (number of cases)	Average effort level (standard deviation)	Average payoff (standard deviation)
ready – ready	82.5 (165.0)	1.6 (1.3)	19.1 (8.0)
mixed signals	16.6 (33.1)	2.3 (1.8)	16.9 (11.7)
smile – smile	0.9 (1.9)	4.9 (2.4)	11.9 (21.2)

Averages of the corresponding variables over the 8 independent observations

Table 3

Treatment SeqCost – Sequential and Costly Signals

Signal constellation	% of all cases (number of cases)		Average effort level (standard deviation)		Average payoff (standard deviation)	
ready → ready	80.6 (161.3)		1.4 (1.0)		18.3 (8.0)	
ready → smile	5.3 (10.5)	13.0	2.3 (1.7)	2.0	13.3 (13.6)	14.2
smile → ready	7.8 (15.5)	(26.0)	1.8 (1.4)	(1.6)	15.7 (11.0)	(12.7)
smile → smile	6.4 (12.8)		4.0 (2.0)		11.0 (16.1)	

Averages of the corresponding variables over the 8 independent observations

distinguishing whether in mixed pairs the smiler was the first mover or the responder. In addition, to facilitate comparisons across treatments, Table 3 also shows the pooled statistics of the two mixed signal configurations in the extra columns inserted for the SeqCost treatment.

5.1. *Frequency of Signal Constellations*

In the SimFree treatment, the overall frequency of 'ready-ready' pairs is almost equal to the frequency of mixed signal pairs and significantly greater than the frequency of the 'smiling-smiling' pairs (Wilcoxon signed ranks test, $\alpha < 1\%$, one-tailed). In the other two treatments (SimCost and SeqCost), the general observation is that the frequency of 'ready-ready' pairs is significantly greater than the frequency of mixed signal pairs, which in turn is significantly greater than the frequency of the 'smiling-smiling' pairs (Wilcoxon signed ranks test, $\alpha < 2\%$, one-tailed).

Comparing the column 'number of cases' across the three Tables reveals that non-costly smiles are much more frequently used than costly ones. In the non-costly signal treatment SimFree players smile on average 35% of the time, while this is 11% in the costly SimCost treatment (and 13% in the SeqCost treatment). The difference is significant at a level of $\alpha < 1\%$, one-tailed (Mann-Whitney U-test). Thus, signal cost clearly has the effect predicted by our Hypothesis 3.

Although signal order does not seem to have an effect on the frequency with which subjects choose to report the 'smiling' state, it does have a significant effect on the avoidance of signal conflicts as predicted by Hypothesis 5. There are significantly less mixed signal pairs and significantly more 'smile-smile' pairs in the sequential signal treatment SeqCost than in the simultaneous signal treatment SimCost (Mann-Whitney U-test, $\alpha < 5\%$, one-tailed). In fact, in the simultaneous SimCost treatment, 89.8% of the smiles occur in mixed pairs, while this is 50.5% in the sequential SeqCost treatment.

Figure 2, which depicts the development of signal constellation frequencies in ten-round blocks for each treatment, shows that although there are no clear trends in the development of the distribution of signal constellations over time, there are some interesting developments. For example, the frequency of mixed signal pairs rises over time in the SimCost treatment, while it falls in the SeqCost treatment.[21]

5.2. *Choice of Effort Levels*

One of the important questions of our analysis is whether effort level choices are correlated to the signal choices. Figure 3 reports for each treatment the distribution of all effort levels across all rounds for each independent observation, i.e., group of eight players, distinguishing again the various signal constellations. The black squares identify the median effort level for each group, the boxes represent the 25th and 75th percentile, and the lines the 5th and 95th percentile.

We make the following observations. First, in all treatments the median effort in 'ready-ready' pairs is always '*1*' with the one exception of the sixth group in the SimCost treatment. Second, in the costly treatments (SimCost and SeqCost), the median effort level in smiling pairs is always above the minimum effort of '*1*'. Third, the median effort level of these smiling pairs in the costly treatments is always higher than in the 'ready-ready' pairs (with a single exception, which is the same as the one above). Fourth, for each of the three treatments there is a group for which the median effort level chosen by smiling pairs equalled the maximum possible effort ('*7*').

The average effort level chosen by subjects in each of the possible signal constellations of each treatment was shown in Tables 1, 2, and 3 above. In all three treatments, the average effort level increases with the number of smiles. It is lowest in the non-smiling pairs and highest in the smiling pairs, with the mixed signal pairs taking the middle position. This supports Hypothesis 1, which predicted higher effort levels in signalling pairs. Statistical tests provide further evidence for Hypothesis 1. In the simultaneous non-costly signal treatment SimFree, the subjects in 'smiling-smiling' pairs choose significantly higher effort levels than the subjects in the mixed signal pairs

[21] The increase of the frequency of mixed pairs in SimCost is significant at $\alpha < 10\%$ (Wilcoxon signed ranks test; one-tailed), whereas the decrease in SeqCost is significant at $\alpha < 5\%$ for the same Wilcoxon test.

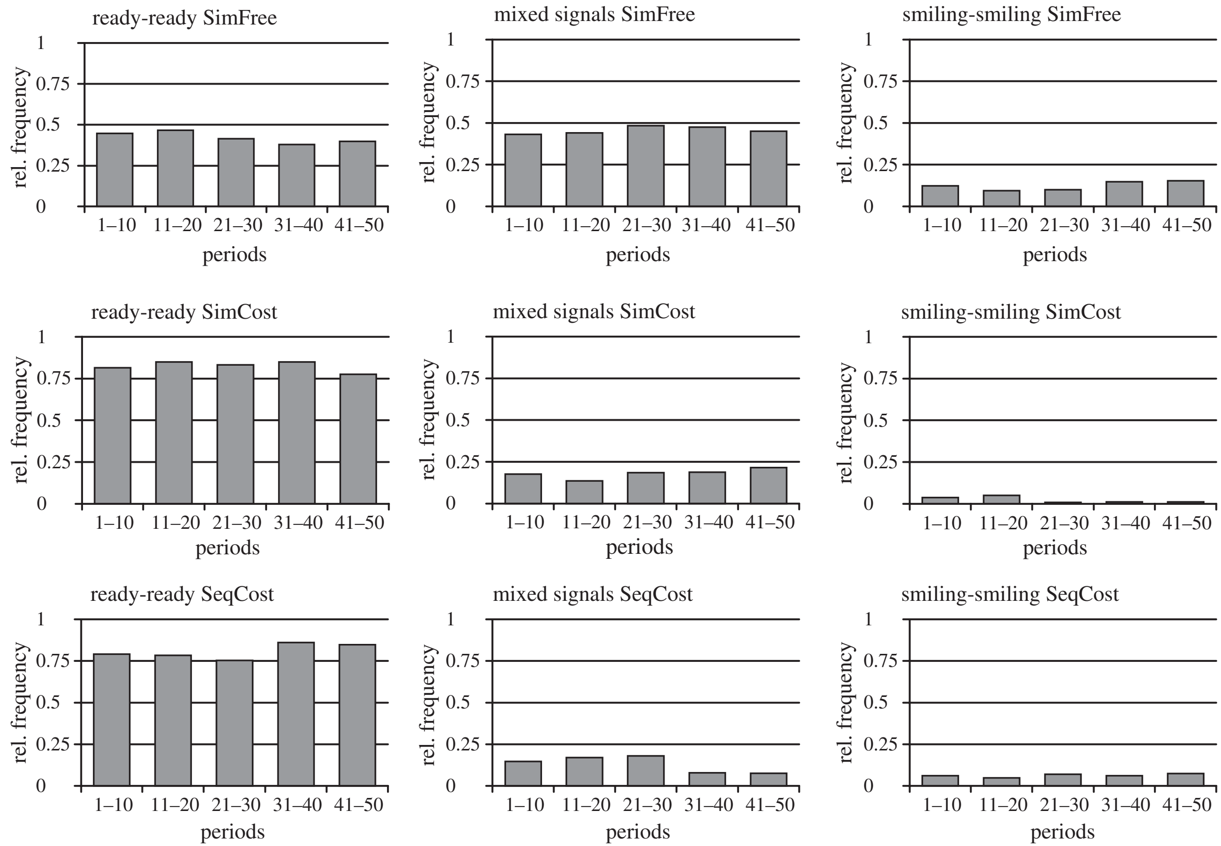

Fig. 2. *Development of Signal Constellations*

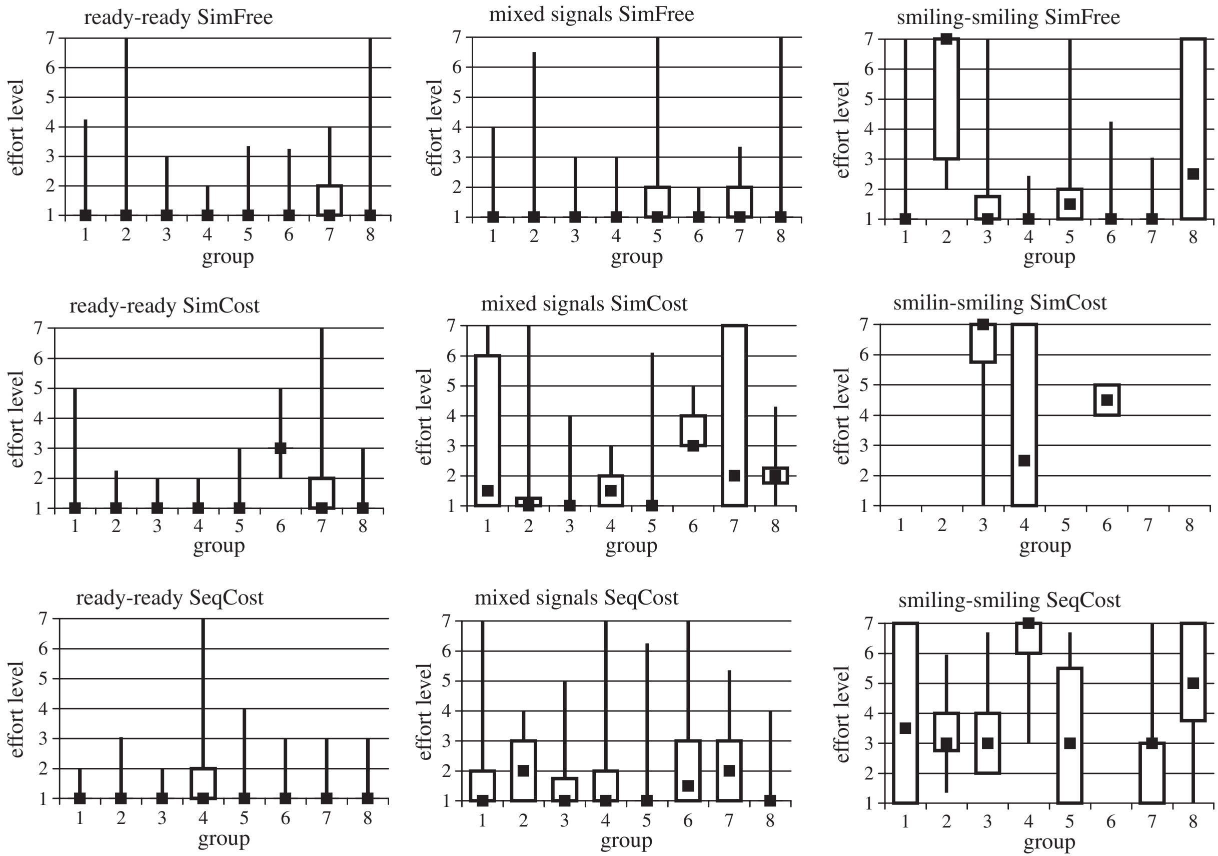

Fig. 3. *Median Effort Levels*

and the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 5\%$, one-tailed). The difference between the mixed and the 'ready-ready' pairs is not significant. In the simultaneous costly signal treatment SimCost, the subjects in the mixed signal pairs choose significantly higher effort levels than the subjects in the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 1\%$, one-tailed). Since 'smiling-smiling' pairs appear only in three of the eight independent groups in this treatment, the tests cannot pick up significant differences between this and the other two constellations, even though the average effort level in these pairs is more than twice as high as in the other pairs. In the sequential costly signal treatment SeqCost, both tests are significant. Subjects in the 'smiling-smiling' pairs choose significantly higher effort levels than subjects in the mixed signal pairs, who in turn choose significantly higher effort levels than the subjects in the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 1\%$, one-tailed). Hence, smiling is used as a cue foreshadowing the choice of higher effort levels, especially if both players smile at each other.

Next, what about the effort levels of the individual players in the mixed signal pairs? In none of the treatments is there a significant difference between the effort levels chosen by the smiling players and that of the players that sent a ready signal. In the SeqCost treatment this is true no matter whether the smile had been chosen by the player making the first move or by the responding player. In other words, once a mixed signal constellation has been established, both players seem to have a similar perception of the situation they are in, and there does not appear to be a fundamental difference in trusting behaviour between the smiling and non-smiling players in this respect.

This does not exclude the possibility that in the SeqCost treatment the order in which the mixed signals have been sent matters. In fact, the effort level is significantly higher in 'ready-smiling' pairs than in 'smiling-ready' pairs (Wilcoxon signed ranks test, $\alpha < 5\%$, one-tailed). That is, if an inviting smile has not even been returned, then this induces less trust to go for a higher effort level than when the responding player having received a ready signal still decides nevertheless to send a strong signal himself by incurring the cost of a smile.

Although all three treatments show the same type of correlation between state signal choice and effort level choices, there is a clear treatment effect. Comparing the average effort levels across treatments, we notice that there are no treatment differences concerning the effort level choices of 'ready-ready' pairs. In both the mixed signal and the 'smiling-smiling' pairs, however, the signal cost variable has a significant effect on effort level choices. This supports Hypothesis 4, since subjects in these constellations choose significantly higher effort levels when the signal is costly than when the signal is non-costly. This result is clearly related to the significant drop in the frequency of observed smiles when a signal cost is introduced. The signal cost induces a self-selection, separating those who use the signal strategically from those who would use the signal for other reasons (or without any reason) if it were for free.

Finally, an important regularity concerning the development of the average effort levels over time should be noted. Figure 4 depicts the development of the average effort level choices for each signal constellation in ten-round blocks for each treatment. It is not surprising that in the 'ready-ready' pairs the average effort level choices decrease over time with a tendency to converge to the lowest possible level, namely '*1*'. The same type of decline holds for the mixed signal pairs and for the 'smiling-smiling' pairs in the non-costly signal case.[22] This hints at stability requirements of the signalled coordination. Apparently, the one-sided smiling in the mixed pairs cannot stabilise on high effort level choices. An interesting aspect of the data is that such a decline does not occur in the costly signal treatments (SimCost and SeqCost).[23] That is, although even 'smiling-smiling' pairs seem to have problems stabilising high effort choice behaviour, small signal costs may help as they sort out those subjects who would otherwise smile without choosing high effort levels.

5.3. *Payoffs*

Comparing the results of the last two sub-sections, one question comes to mind. Why does the frequency of 'smiling-smiling' pairs not rise, even when subjects are genuinely signalling high effort choices? The key to answer this question is the measure of 'success': although subjects in 'smiling-smiling' pairs are genuinely signalling trustworthiness, they are not successful in achieving high payoffs.

Tables 1, 2, and 3 showed that while in every treatment the average effort level choice rises with the number of smiles in a pair, the average payoff drops. In the simultaneous non-costly signal treatment SimFree, the subjects in 'smiling-smiling' pairs receive significantly lower payoffs than the subjects in the mixed signal pairs and the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 2\%$, one-tailed), while the difference between the mixed and the 'ready-ready' pairs is not significant. In the simultaneous costly signal treatment SimCost, the subjects in the mixed signal pairs receive significantly lower payoffs than the subjects in the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 2\%$, one-tailed). Just as in the case of the effort levels, the statistical tests cannot pick up significant differences between 'smiling-smiling' pairs and the other two constellations, because of the low frequency of 'smiling-smiling' pairs in the data. In the sequential costly signal treatment SeqCost, the subjects in the 'smiling-smiling' and the mixed signal pairs receive significantly lower payoffs than the subjects in the 'ready-ready' pairs (Wilcoxon signed ranks test, $\alpha < 5\%$, one-tailed). The difference between the 'smiling-smiling' and the mixed signal pairs, however, is not significant, even though the overall averages are relatively far apart.

Figure 5 depicts the development of the average payoffs for each signal constellation in ten-round blocks for each treatment. In the 'ready-ready' pairs of all treatments, there is a clear tendency for convergence to the safe equilibrium payoff of 21 points. The same type of development, but starting at a lower level, can be seen in the mixed signal pairs. This is due to the fact that the average effort level choice in these pairs over time tends towards the lowest level (see Figure 4). Matters are different in the 'smiling-smiling' pairs. The average payoff of the subjects in these pairs also increases over time, but only in the non-costly signal treatment (SimFree) is this due to a convergence towards the safe equilibrium. In the other two treatments (SimCost and SeqCost), the

[22] All these declines in effort levels are significant at $\alpha < 5\%$ (Wilcoxon signed ranks test; one-tailed).

[23] The clear increase in average effort in SimCost is not significant due to the small number of observations.

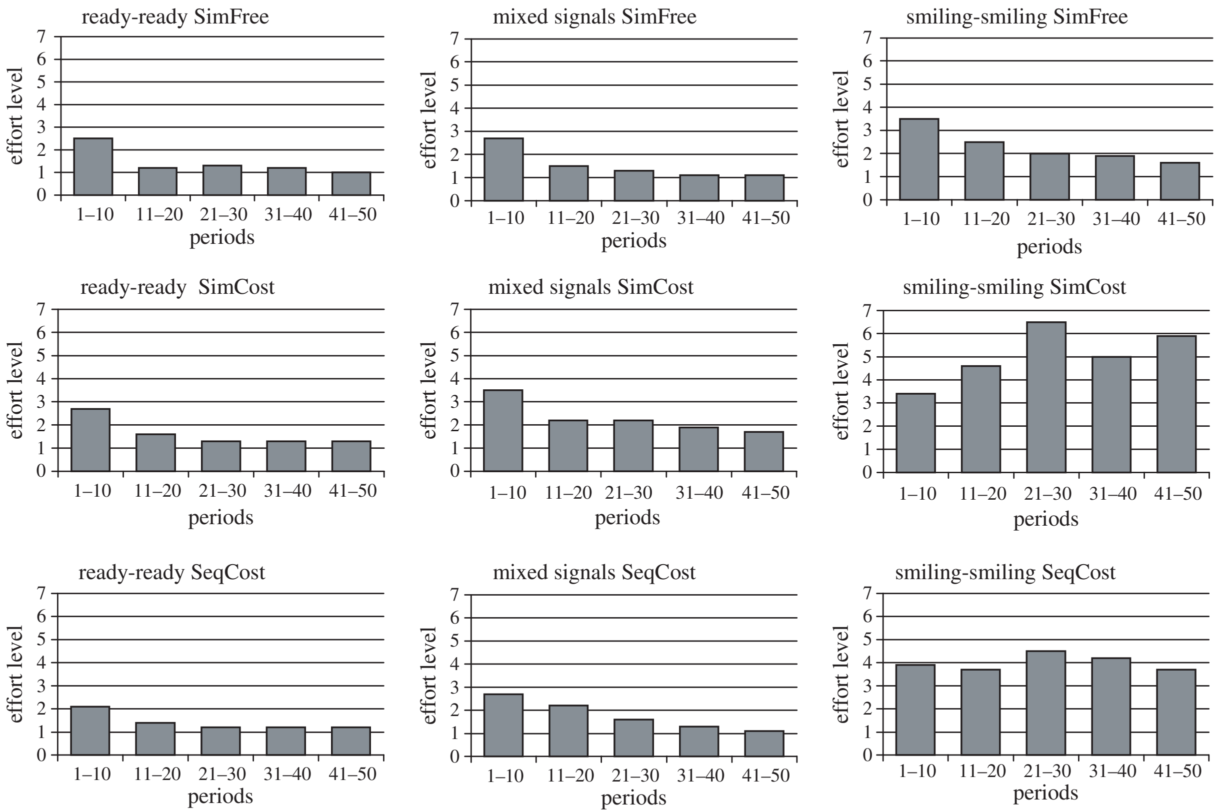

Fig. 4. *Development of Average Effort Levels*

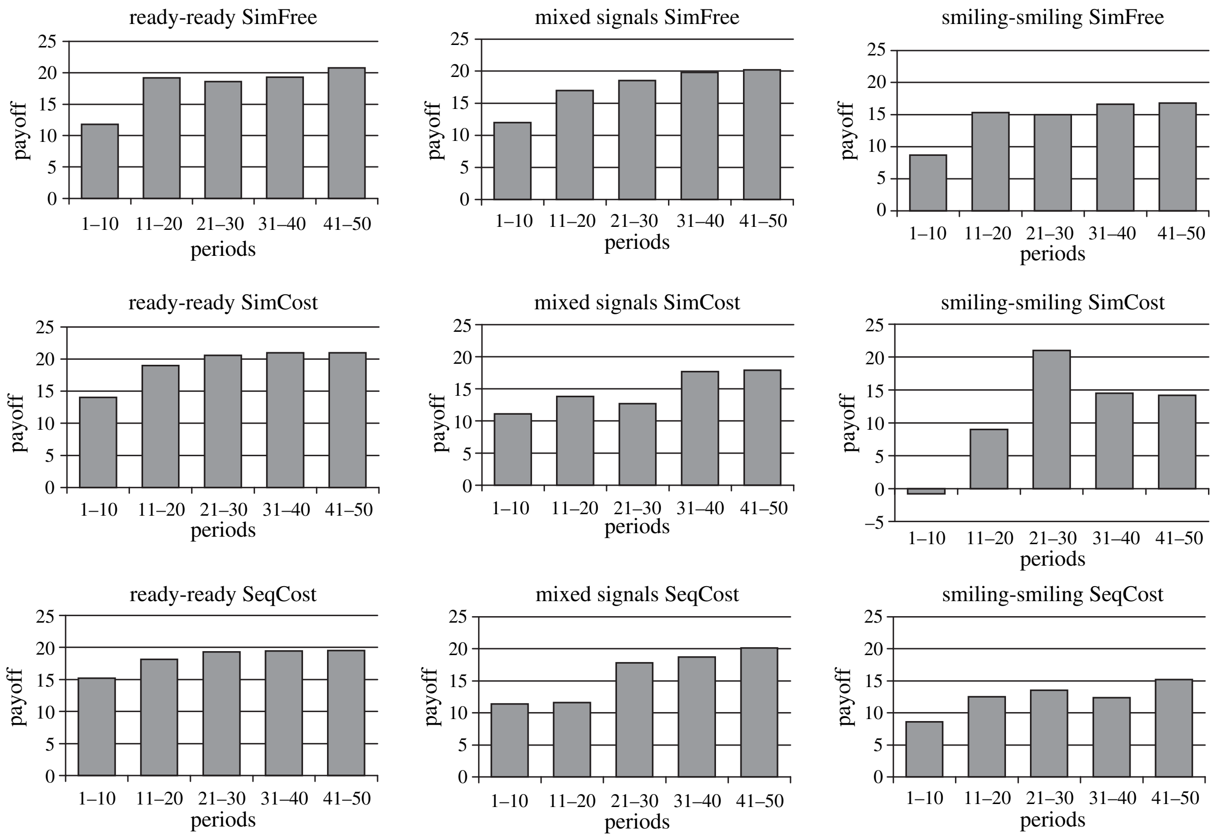

Fig. 5. *Development of Average Payoffs*

reason for the positive development in the payoffs of 'smiling-smiling' pairs is the increase in coordinated effort choices, although these coordination successes are not enough to drive payoffs all the way up to the level of payoffs in the safe equilibrium.[24]

Hence, it seems that the subjects who are trying to use the smile as a coordination device are chasing a dream. They set out to improve their own and their partner's situation by signalling trustworthiness and choosing high effort levels but end up earning substantially less than the payoff of 21 points that they could have for sure by choosing the lowest effort level. On average, the subjects who try to coordinate using the smile signal do not even manage to make up for the losses over time. Hence, Hypothesis 2 must be rejected.

As explained in Section 1, to achieve efficient coordination all the players need is a shared understanding of a cue signalling trustworthiness. As it turns out in our experiment, the path to reach such an unambiguous understanding seems too difficult. While the smiling emerges as a convention signalling trustworthiness, it seems the players have not reached sufficient agreement as to what degree of trust is implied by a smile, i.e., how much risk they can afford to take in the minimum effort game. In the experiment, players in smiling pairs most frequently chose the effort levels '*3*', '*4*' and '*7*'. Hence, while some subject smiles and plans to choose the effort level '*3*', it may happen that his partner smiles intending to go for '*7*'. If two smiling players who have different plans meet, then inevitably one of them will be hurt. It appears that this lack of coordination, following from some players being more cautious with trust than others, prevents a spreading of the signalling convention.

6. Conclusions

The main conclusion is that the analysis of the experimental data presents significant and substantial evidence confirming that simple cues such as smiles, winks and handshakes can play a role as coordination devices by establishing trust. First, subjects recognise the necessity of a coordination instrument. They discover and exploit the state button as an information channel to make use of it as a meaningful communication device, genuinely signalling high effort levels through smiles. Second, small costs are enough to separate the serious from 'noisy' signallers, as these costs implied less signalling but higher effort choices for smiling pairs. Moreover, in the costly treatments both the frequencies and effort levels of smiling pairs did not diminish over time. Third, subjects aim at coordinating signals when possible, as there were more smiling (and fewer mixed) pairs in the sequential state report treatment.

Notwithstanding the fact that our experimental findings support the casual empirical evidence cited in the introduction that simple cues can be used as meaningful coordination devices, signalling trustworthiness, we do not observe a tendency to widespread smiling behaviour. Clearly, further analysis of the dynamics of the development of trust is needed. If the simple binary 'smiling' signals are not sufficient to

[24] The increases in the payoffs for mixed signalling pairs in the SeqCost treatment, and for 'smiling-smiling' pairs in both the SimCost and SeqCost treatments are not significant (partly due to the small number of observations). All other increases in payoffs mentioned are significant at $\alpha < 5\%$ (Wilcoxon signed ranks test; one-tailed).

establish trust and solve coordination problem more efficiently, then the question is what additional aspects might be essential in everyday face-to-face interactions that allow simple cues to achieve this.

As to such further research, we propose three conjectures. First, it might be that the intrinsic risk of the game we analysed is too high to establish trust even in a setup with face-to-face interactions as found typically outside the laboratory. Second, a richer social context than is typically found in the laboratory may be needed to establish a signalling norm. A third conjecture is that the signals themselves may need to be richer than the binary 'smiling' signals used in our experiment, and that even the simplest cues used in everyday life may convey much more information than our binary 'smiling' signals. For example, Chaplin *et al.* (2000) argue that one handshake is not the same as another, and that a single handshake contains a wealth of information about the person's personality. A handshake is not a binary variable, but a multi-dimensional sign, possibly a continuous one in many dimensions (including strength, vigour, duration, completeness of grip, temperature, dryness, texture and eye contact). Perhaps a similar complexity applies to apparently simple cues such as smiles and winks; it might be that the richness of information this conveys matters to establish trust.

Although such extensions to this study may help to clarify some details, our findings make a fundamental contribution to understanding the role of simple, possibly ambiguous non-verbal cues in economic interaction. While such signals may be employed to communicate coordination intention, they may actually be inefficient if misinterpretation is costly. The managerial implication of this finding reverberates something that is almost a folk-theorem amongst international management scholars: sending the right cues is great for business but if one does not know the culture and does not get it exactly right, it might be better to avoid cueing.

Appendix A.1. Instructions

This is an experiment in the economics of market decision making. The instructions are simple. If you follow them closely and make appropriate decisions, you may make a substantial amount of money. These earnings will be paid to you in cash at the end of the experiment. From now on until the end of the experiment you are not allowed to communicate with each other. If you have a question, please raise your hand.

In this experiment there will be 50 market rounds. In each round, you will be in a market with one of the other participants, where in each of the 50 rounds this will be a person that is randomly assigned to you. In each round both you and the other person in your market will pick a value of X. The value you pick and the smallest value picked for X in your market (including your own choice of X) will determine the payoff you receive.

The values of X you may choose are 1, 2, 3, 4, 5, 6, and 7. You are provided with a table on your handout and on the screen showing your payoff for every possible combination of your own X choice and the minimum X choice in your market. Please look at the table now. You will find your payoff for a round as follows: First, look for the row that is marked on the left side with the X-Value that you chose. Then look for the column that is marked with the smallest value chosen by any participant in your market at the top. For example, if you choose a 4 and the smallest value chosen is 3, you earn 14 points that round.

To be sure that everyone has understood the instructions so far, we would like to ask you to please complete the following practice table please with the help of the payoff table:

Payoff Table							
Your choice of X-Value	smallest chosen X-Value						
	1	2	3	4	5	6	7
1	21						
2	12	22					
3	3	13	23				
4	-6	4	14	24			
5	−15	−5	5	15	25		
6	−24	−14	−4	6	16	26	
7	−33	−23	−13	−3	7	17	27

Practice Table		
Your choice of X-Value	smallest chosen X-Value	Your Payoff Please fill in this column!
4	2	
2	2	
5	5	
6	4	

Each round starts only after all participants have pressed one of their state buttons. The states of all participants in your market are displayed to you. [In each market, one of the participants first reports his/her state. This state is shown to the other participant. Then the second participant reports his/her state and this state is shown to the first participant. Which one of the participants is first to report his/her state, is determined randomly in every round.]* [Only reporting the 'ready' state is free of cost. Reporting any other state costs 0.5 points.]** In each round you make your decision by pressing your choice of X at the left hand side of the payoff table. Once all participants have made their decision, the round ends and you will be informed of the results of your market. The smallest value of X in your market and the corresponding payoff for you will be indicated in the payoff table, and also in a separate feedback window. Moreover, your total payoffs up to the current round will be indicated in a separate status window.

At the end of the experiment you will be paid according to the total payoffs you realised. For every 100 points gained you will receive DM 3.50. Additionally, you will receive a lump sum of DM 3.50 for participating in the experiment. The cash is paid to you in a separate room. No participant can see what the other participants have earned.

If you have any questions, please ask them now.

*The sentences in these brackets were included in the treatment SeqCost, but not in SimFree and SimCost. **The sentences in these brackets were included in the treatments SimCost and SeqCost, but not in SimFree.

Appendix A.2. Data at the Level of Independent Observations

Tables A1 to A3 present the data at the level of the independent observations, i.e., as values for each of the groups of 8 players.

Table A1

Treatment SimFree – Simultaneous and Non-Costly Signals

		Ready-ready pairs					Mixed signal pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
Group 1																
all	200	88	1.4	1.2	18.6	9.0	92	1.3	1.2	19.2	7.7	20	1.5	1.6	16.7	14.2
1–10	40	17	2.6	2.3	11.1	18.1	20	2.5	2.1	13.5	14.9	3	3.2	2.7	1.5	24.6
11–20	40	23	1.1	0.3	20.4	2.9	15	1.1	0.4	20.4	3.2	2	1.0	0.0	21.0	0.0
21–30	40	16	1.1	0.3	19.9	3.0	21	1.0	0.2	20.8	1.4	3	2.0	2.2	12.0	20.1
31–40	40	13	1.1	0.3	20.3	2.4	21	1.0	0.2	20.8	1.4	6	1.0	0.0	21.0	0.0
41–50	40	19	1.0	0.0	21.0	0.0	15	1.0	0.0	21.0	0.0	6	1.0	0.0	21.0	0.0
Group 2																
all	200	75	1.5	1.5	17.4	11.9	103	1.5	1.4	18.6	9.5	22	4.9	2.3	11.7	19.2
1–10	40	23	2.5	2.3	9.9	19.4	13	3.7	2.6	10.3	19.6	4	5.0	2.6	5.0	25.0
11–20	40	20	1.1	0.3	20.3	2.4	18	1.3	1.1	18.0	9.5	2	7.0	0.0	27.0	0.0
21–30	40	6	1.0	0.0	21.0	0.0	28	1.1	0.2	20.5	2.0	6	5.0	2.1	10.0	18.9
31–40	40	9	1.0	0.0	21.0	0.0	24	1.0	0.0	21.0	0.0	7	4.9	2.2	12.8	17.0
41–50	40	17	1.0	0.0	21.0	0.0	20	1.2	1.0	19.2	8.6	3	3.2	1.8	11.5	15.9
Group 3																
all	200	66	1.4	1.2	18.7	8.2	97	1.4	1.1	17.7	10.0	37	1.8	1.9	14.2	16.0
1–10	40	18	1.9	1.6	16.3	9.6	17	2.2	2.1	10.1	18.5	5	3.1	2.6	6.1	22.0
11–20	40	14	1.0	0.2	20.7	1.7	22	1.3	0.8	18.1	7.6	4	2.8	2.5	5.3	22.4
21–30	40	17	1.3	1.1	18.6	9.6	19	1.2	0.5	19.4	4.1	4	1.3	0.4	18.8	3.9
31–40	40	10	1.3	1.1	18.8	9.8	17	1.2	0.9	18.9	7.9	13	1.4	1.2	17.2	10.6
41–50	40	7	1.0	0.0	21.0	0.0	22	1.0	0.2	20.6	1.9	11	1.5	1.7	16.1	15.5
Group 4																
all	200	96	1.2	0.8	20.1	4.9	88	1.4	1.3	18.1	10.5	16	1.2	0.5	19.6	4.6
1–10	40	13	2.2	2.0	15.7	11.8	23	2.2	2.0	11.8	17.3	4	1.5	0.9	16.5	7.8
11–20	40	25	1.0	0.1	20.8	1.3	14	1.0	0.2	20.7	1.7	1	1.0	0.0	21.0	0.0
21–30	40	22	1.0	0.1	20.8	1.3	16	1.0	0.2	20.7	1.6	2	1.3	0.4	18.8	3.9
31–40	40	19	1.0	0.0	21.0	0.0	19	1.1	0.2	20.5	2.0	2	1.0	0.0	21.0	0.0
41–50	40	17	1.1	0.3	20.5	3.0	16	1.2	1.0	19.3	9.4	7	1.0	0.0	21.0	0.0
Group 5																
all	200	117	1.3	1.3	19.0	9.2	71	2.0	1.8	15.5	12.9	12	2.3	2.0	9.4	17.9
1–10	40	19	3.0	2.6	9.8	20.2	17	3.8	2.3	9.6	17.7	4	3.8	2.8	−3.8	25.4
11–20	40	22	1.1	0.3	20.4	3.0	16	1.8	1.6	13.7	14.1	2	1.8	0.8	14.2	7.5
21–30	40	24	1.0	0.0	21.0	0.0	13	1.5	1.4	16.5	12.3	3	1.5	0.5	16.5	4.5
31–40	40	28	1.0	0.1	20.8	1.2	11	1.1	0.3	20.2	2.6	1	1.5	0.5	16.5	4.5
41–50	40	24	1.0	0.0	21.0	0.0	14	1.1	0.4	20.0	3.7	2	1.5	0.5	16.5	4.5
Group 6																
all	200	38	1.3	1.3	18.0	12.1	104	1.1	0.7	19.7	6.1	58	1.5	1.4	17.4	10.9
1–10	40	8	2.1	2.3	10.9	21.1	19	1.4	1.1	17.2	10.2	13	2.8	2.4	9.3	19.9
11–20	40	7	1.1	0.3	20.4	2.3	20	1.3	1.0	18.5	8.8	13	1.2	0.6	18.9	5.8
21–30	40	10	1.3	1.3	18.3	11.8	22	1.0	0.0	21.0	0.0	8	1.0	0.0	21.0	0.0
31–40	40	7	1.0	0.0	21.0	0.0	22	1.0	0.2	20.6	1.9	11	1.1	0.3	19.8	3.1
41–50	40	6	1.0	0.0	21.0	0.0	21	1.0	0.2	20.8	1.4	13	1.2	0.4	19.6	3.2
Group 7																
all	200	103	1.6	1.3	17.1	9.4	77	1.6	1.0	17.5	7.6	20	1.4	1.1	17.2	10.0
1–10	40	23	2.7	1.7	13.8	12.0	13	2.3	1.4	14.6	9.7	4	2.1	2.0	10.9	17.7
11–20	40	23	1.5	1.1	16.7	9.9	14	1.8	0.9	17.1	7.5	3	1.3	0.5	18.0	4.2
21–30	40	22	1.5	1.3	17.2	11.0	15	1.6	1.2	16.0	10.0	3	1.5	1.1	16.5	10.1
31–40	40	17	1.2	0.4	19.4	3.4	18	1.2	0.5	19.2	4.1	5	1.3	0.6	18.3	5.8
41–50	40	18	1.1	0.4	19.8	3.8	17	1.1	0.5	19.7	4.4	5	1.0	0.0	21.0	0.0

Table A1

Continued

		Ready-ready pairs					Mixed signal pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
Group 8																
all	200	90	2.0	2.1	13.0	18.5	98	2.0	2.0	13.9	17.0	12	3.7	2.7	7.0	22.3
1–10	40	22	2.8	2.6	7.1	22.2	16	3.3	2.4	8.6	19.8	2	6.8	0.4	24.2	4.2
11–20	40	15	1.8	1.8	14.1	16.4	22	2.4	2.4	9.2	20.9	3	3.7	2.7	−3.0	24.7
21–30	40	16	2.2	2.3	11.6	20.1	21	1.9	2.1	13.3	18.9	3	2.7	2.4	6.0	21.8
31–40	40	18	2.0	2.2	12.0	20.1	20	1.4	1.3	17.4	12.0	2	3.3	2.3	5.8	18.2
41–50	40	19	1.0	0.0	21.0	0.0	19	1.0	0.2	20.8	1.4	2	2.5	2.6	7.5	23.4
Average of all groups																
all	200	84.1	1.5	1.3	17.7	10.4	91.3	1.5	1.3	17.5	10.2	24.6	2.3	1.7	14.2	14.4
1–10	40	17.9	2.5	2.2	11.8	16.8	17.3	2.7	2.0	12.0	16.0	4.9	3.5	2.1	8.7	18.3
11–20	40	18.6	1.2	0.6	19.2	5.0	17.6	1.5	1.1	17.0	9.2	3.8	2.5	0.9	15.3	8.1
21–30	40	16.6	1.3	0.8	18.6	7.1	19.4	1.3	0.7	18.5	6.3	4.0	2.0	1.1	15.0	10.4
31–40	40	15.1	1.2	0.5	19.3	4.6	19.0	1.1	0.5	19.8	4.0	5.9	1.9	0.9	16.6	7.4
41–50	40	15.9	1.0	0.1	20.8	0.9	18.0	1.1	0.4	20.2	3.9	6.1	1.6	0.9	16.8	7.8

Table A2

Treatment SimCost – Simultaneous and Costly Signals

		Ready-ready pairs					Mixed signal pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
Group 1																
all	200	188	1.5	1.4	18.8	8.1	12	3.3	2.6	6.8	21.0	0				
1–10	40	37	3.0	2.3	13.6	14.6	3	5.2	2.3	6.6	22.2	0				
11–20	40	38	1.3	0.8	18.4	7.3	2	4.0	2.5	−1.3	23.4	0				
21–30	40	36	1.1	0.2	20.5	2.1	4	3.3	2.4	0.5	21.6	0				
31–40	40	39	1.1	0.5	20.3	4.5	1	1.0	0.0	20.8	0.3	0				
41–50	40	38	1.0	0.0	21.0	0.0	2	1.0	0.0	20.8	0.3	0				
Group 2																
all	200	188	1.2	1.0	19.3	8.3	12	2.1	2.2	10.6	20.0	0				
1–10	40	36	1.9	1.7	14.6	14.6	4	2.1	2.0	10.6	17.6	0				
11–20	40	38	1.2	1.0	19.3	8.7	2	1.0	0.0	20.8	0.3	0				
21–30	40	39	1.1	0.7	20.2	6.1	1	4.0	3.0	−6.3	26.7	0				
31–40	40	38	1.0	0.1	20.9	1.0	2	2.5	2.6	7.3	23.2	0				
41–50	40	37	1.0	0.0	21.0	0.0	3	2.0	2.2	11.7	20.2	0				
Group 3																
all	200	101	1.2	0.9	19.7	7.0	91	1.4	1.3	18.6	9.1	8	5.8	2.2	12.7	21.3
1–10	40	20	2.0	1.9	14.4	14.5	19	2.7	2.4	11.7	17.6	1	4.0	3.0	−6.5	27.0
11–20	40	24	1.0	0.0	21.0	0.0	14	1.1	0.3	20.1	2.3	2	4.3	2.8	−3.8	25.0
21–30	40	20	1.0	0.2	20.8	1.4	18	1.1	0.5	20.0	4.4	2	6.5	0.9	21.0	8.4
31–40	40	21	1.0	0.0	21.0	0.0	18	1.0	0.0	20.8	0.3	1	7.0	0.0	26.5	0.0
41–50	40	16	1.0	0.0	21.0	0.0	22	1.0	0.0	20.8	0.3	2	6.8	0.4	23.8	4.2
Group 4																
all	200	141	1.2	0.5	19.5	4.2	55	1.7	1.0	17.2	8.3	4	3.6	2.7	1.9	23.2
1–10	40	28	1.4	0.6	18.5	5.3	10	1.2	0.4	20.0	2.8	2	2.8	2.5	4.8	22.4
11–20	40	31	1.3	0.6	18.9	4.8	9	1.9	0.9	17.2	7.8	0				
21–30	40	32	1.2	0.5	19.5	4.1	8	1.6	0.9	16.9	7.1	0				

Table A2

Continued

		Ready-ready pairs					Mixed signal pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
31–40	40	30	1.1	0.2	20.4	2.2	9	1.8	0.8	16.6	6.2	1	4.0	3.0	−6.5	27.0
41–50	40	20	1.1	0.4	20.1	3.4	19	2.0	1.2	16.2	11.1	1	5.0	2.0	4.5	18.0
Group 5																
all	200	188	1.3	1.2	18.5	9.7	12	1.5	1.7	16.3	14.9	0				
1–10	40	39	2.6	2.3	9.4	18.5	1	4.0	3.0	−6.3	26.7	0				
11–20	40	37	1.0	0.2	20.6	1.8	3	2.0	2.2	11.7	20.0	0				
21–30	40	37	1.0	0.0	21.0	0.0	3	1.0	0.0	20.8	0.3	0				
31–40	40	37	1.0	0.0	21.0	0.0	3	1.0	0.0	20.8	0.3	0				
41–50	40	38	1.0	0.0	21.0	0.0	2	1.0	0.0	20.8	0.3	0				
Group 6																
all	200	143	3.2	0.8	20.0	6.5	54	3.5	1.0	18.2	8.2	3	4.5	0.5	22.3	3.5
1–10	40	34	3.6	1.3	16.4	9.6	6	4.2	1.7	13.9	13.6	0				
11–20	40	31	3.2	1.0	19.5	6.1	7	3.5	0.6	18.3	5.7	2	4.8	0.4	21.7	4.2
21–30	40	24	3.1	0.5	21.2	4.5	16	3.3	1.0	16.5	9.1	0				
31–40	40	27	3.0	0.3	22.3	2.4	12	3.8	0.8	19.8	5.8	1	4.0	0.0	23.5	0.0
41–50	40	27	3.0	0.4	21.7	3.7	13	3.3	0.5	20.8	4.6	0				
Group 7																
all	200	175	1.9	1.8	17.8	10.3	25	3.7	2.8	16.4	16.2	0				
1–10	40	29	4.6	2.3	11.2	17.9	11	5.9	2.2	19.8	15.8	0				
11–20	40	35	2.3	1.9	13.8	13.6	5	2.9	2.5	7.6	20.6	0				
21–30	40	38	1.1	0.2	20.5	2.0	2	1.0	0.0	20.5	0.6	0				
31–40	40	40	1.0	0.0	21.0	0.0	0					0				
41–50	40	33	1.0	0.0	21.0	0.0	7	1.5	1.6	16.0	14.3	0				
Group 8																
all	200	196	1.3	1.0	19.5	6.7	4	2.3	1.3	14.4	9.6	0				
1–10	40	38	2.5	1.8	13.6	13.7	2	3.0	1.4	12.8	13.2	0				
11–20	40	39	1.0	0.2	20.7	1.7	1	1.5	0.7	16.0	7.1	0				
21–30	40	40	1.0	0.0	21.0	0.0	0					0				
31–40	40	40	1.0	0.0	21.0	0.0	0					0				
41–50	40	39	1.0	0.0	21.0	0.0	1	1.5	0.7	16.0	7.1	0				
Average of all groups																
all	200	165.0	1.6	1.1	19.1	7.6	33.1	2.4	1.7	14.8	13.4	1.9	4.6	1.8	12.3	16.0
1–10	40	32.6	2.7	1.8	14.0	13.6	7.0	3.5	1.9	11.1	16.2	1.5	3.4	2.8	−0.8	24.7
11–20	40	34.0	1.6	0.7	19.0	5.5	5.4	2.2	1.2	13.8	10.9	2.0	4.6	1.6	9.0	14.6
21–30	40	33.3	1.3	0.3	20.6	2.5	7.4	2.2	1.1	12.7	10.0	0.3	6.5	0.9	21.0	8.4
31–40	40	34.0	1.3	0.1	21.0	1.3	7.5	1.9	0.7	17.7	6.0	0.4	5.0	1.0	14.5	9.0
41–50	40	31.0	1.3	0.1	21.0	0.9	8.6	1.7	0.8	17.9	7.3	0.4	5.9	1.2	14.2	11.1

Table A3

Treatment SeqCost – Sequential and Costly Signals

		Ready-ready pairs					Ready-smiling pairs					Smiling-ready pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
Group 1																					
all	200	169	1.2	0.6	19.8	4.4	12	2.2	1.8	12.7	14.7	12	2.5	2.4	8.1	20.9	7	4.0	2.8	13.5	18.2
1–10	40	28	1.7	0.8	18.3	5.7	3	1.5	0.5	16.3	4.3	3	3.5	2.6	1.6	22.4	6	4.2	2.9	15.3	17.6
11–20	40	28	1.3	0.9	18.8	7.9	6	2.4	1.9	13.0	14.6	5	3.0	2.6	2.8	24.0	1	3.0	2.0	2.5	18.0
21–30	40	35	1.1	0.3	19.7	3.1	1	1.0	0.0	20.8	0.3	4	1.1	0.3	19.6	3.1	0				
31–40	40	38	1.0	0.2	20.8	1.4	2	3.0	2.4	2.8	21.8	0					0				
41–50	40	40	1.0	0.2	20.8	1.4	0					0					0				
Group 2																					
all	200	180	1.4	0.8	18.6	6.2	7	1.9	1.0	18.1	5.6	9	2.2	1.5	15.3	10.8	4	3.4	1.7	11.6	12.2
1–10	40	30	2.1	1.1	15.6	8.7	3	2.7	0.7	19.1	4.2	3	2.0	0.8	18.4	4.8	4	3.4	1.7	11.6	12.2
11–20	40	37	1.7	1.0	17.1	7.9	1	1.0	0.0	20.8	0.3	2	3.3	2.3	5.5	18.1	0				
21–30	40	35	1.3	0.7	18.3	6.2	3	1.5	0.8	16.3	7.0	2	2.5	1.1	17.3	4.6	0				
31–40	40	38	1.1	0.3	20.4	2.7	0					2	1.3	0.4	18.5	4.0	0				
41–50	40	40	1.0	0.1	20.9	1.0	0					0					0				
Group 3																					
all	200	125	1.2	1.0	19.6	7.5	14	2.1	1.8	14.8	13.4	19	1.3	1.1	17.9	9.4	42	3.3	1.3	14.8	11.3
1–10	40	31	1.9	1.8	15.7	14.2	4	4.0	2.4	3.8	20.6	3	1.5	0.8	16.3	6.8	2	2.8	1.5	9.8	11.6
11–20	40	28	1.0	0.2	20.7	1.7	2	1.3	0.4	18.5	4.0	6	1.8	1.7	14.0	15.1	4	2.9	1.8	11.1	15.9
21–30	40	22	1.0	0.0	21.0	0.0	6	1.6	0.6	18.8	3.9	3	1.0	0.0	20.8	0.3	9	3.7	1.2	16.5	8.5
31–40	40	26	1.0	0.1	20.8	1.2	1	1.0	0.0	20.8	0.3	2	1.0	0.0	20.8	0.3	11	3.6	1.3	14.5	12.1
41–50	40	18	1.0	0.0	21.0	0.0	1	1.0	0.0	20.8	0.3	5	1.0	0.0	20.8	0.3	16	2.9	1.2	15.6	10.3
Group 4																					
all	200	139	2.2	2.2	11.9	19.2	11	2.8	1.8	12.1	12.8	33	1.6	1.6	16.3	13.5	17	6.0	1.6	18.2	14.6
1–10	40	32	2.7	2.1	11.8	16.9	5	3.1	1.8	9.9	16.3	1	2.0	1.0	11.7	8.8	2	4.3	2.2	6.3	23.2
11–20	40	30	1.9	2.1	12.6	19.3	1	2.0	1.0	11.7	8.8	5	2.4	2.4	12.2	18.2	4	6.0	1.3	18.0	10.6
21–30	40	26	1.8	2.0	13.4	17.9	3	3.0	2.1	12.7	10.0	10	1.6	1.8	14.9	16.1	1	7.0	0.0	26.5	0.0
31–40	40	25	2.1	2.3	11.3	20.7	1	2.5	0.5	17.3	4.8	9	1.4	1.4	17.3	12.4	5	6.4	1.2	21.9	9.3
41–50	40	26	2.2	2.4	10.3	21.2	1	1.5	0.5	16.3	4.8	8	1.1	0.2	20.2	2.3	5	6.2	1.6	17.7	15.7
Group 5																					
all	200	175	1.3	1.0	19.1	7.1	15	1.8	1.8	13.3	16.6	8	1.4	0.9	16.8	7.9	2	3.5	2.6	−2.0	23.4
1–10	40	37	2.2	1.6	14.8	12.6	3	3.2	2.7	1.3	24.8	0					0				
11–20	40	34	1.4	0.9	18.6	7.0	5	2.1	1.9	10.9	17.1	1	2.5	1.5	7.3	13.8	0				
21–30	40	27	1.1	0.2	20.5	2.1	6	1.1	0.3	20.0	2.6	5	1.4	0.7	17.2	6.1	2	3.5	2.6	−2.0	23.4
31–40	40	39	1.0	0.0	21.0	0.0	1	1.0	0.0	20.8	0.3	0					0				
41–50	40	38	1.0	0.1	20.9	1.0	0					2	1.0	0.0	20.8	0.3	0				
Group 6																					
all	200	195	1.3	1.0	19.1	7.5	5	2.7	2.3	7.4	19.2	0					0				
1–10	40	37	2.3	1.8	12.9	14.7	3	2.8	2.0	7.6	15.9	0					0				
11–20	40	38	1.2	0.6	19.3	5.0	2	2.5	2.6	7.3	23.2	0					0				
21–30	40	40	1.0	0.0	21.0	0.0	0					0					0				
31–40	40	40	1.0	0.0	21.0	0.0	0					0					0				
41–50	40	40	1.0	0.1	20.9	1.0	0					0					0				
Group 7																					
all	200	155	1.3	1.0	19.1	7.0	11	2.6	1.8	11.9	14.1	16	2.0	1.4	17.1	7.3	18	2.7	1.8	9.4	16.2
1–10	40	27	2.2	1.9	14.8	12.5	4	3.3	2.2	10.5	18.8	5	2.9	1.8	15.6	8.7	4	3.1	2.5	1.4	22.2
11–20	40	27	1.2	0.8	19.2	7.0	3	2.8	1.7	10.9	13.2	5	2.0	1.0	15.8	8.5	5	2.8	1.7	10.3	17.3
21–30	40	27	1.1	0.3	20.5	2.7	3	1.7	0.7	14.8	6.9	4	1.5	0.7	18.8	3.9	6	2.6	1.6	11.3	11.2
31–40	40	38	1.2	0.6	19.3	5.4	0					0					2	2.3	0.8	14.2	7.6
41–50	40	36	1.0	0.1	20.9	1.1	1	2.0	1.0	11.7	9.3	2	1.0	0.0	20.8	0.3	1	1.5	0.5	16.0	4.5
Group 8																					
all	200	152	1.2	0.7	19.5	5.2	9	2.2	1.5	15.8	12.0	27	1.3	0.8	18.3	6.9	12	4.8	2.0	11.4	16.9
1–10	40	31	1.6	1.0	17.6	7.5	4	3.1	1.6	14.1	15.4	3	1.7	1.1	14.8	10.1	2	5.3	1.8	7.3	16.1
11–20	40	28	1.3	0.8	18.7	6.0	2	2.0	1.2	11.7	10.9	8	1.4	1.0	16.8	9.1	2	3.8	0.4	20.8	4.2
21–30	40	29	1.1	0.5	19.8	4.2	0					7	1.3	0.6	18.2	5.3	4	5.5	1.9	15.0	13.0
31–40	40	31	1.0	0.1	20.9	1.1	1	1.0	0.0	20.8	0.3	6	1.0	0.0	20.8	0.3	2	4.5	2.6	−1.0	23.6
41–50	40	33	1.1	0.5	20.5	4.4	2	1.0	0.0	20.8	0.3	3	1.0	0.0	20.8	0.3	2	4.3	1.9	11.3	15.8

Table A3
(Continued)

		Ready-ready pairs					Ready-smiling pairs					Smiling-ready pairs					Smiling-smiling pairs				
			Effort		Payoff			Effort		Payoff			Effort		Payoff			Effort		Payoff	
Round	No of pairs	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.	No	Mean	S.D.	Mean	S.D.
Average of all groups																					
all	200	161.3	1.4	1.0	18.3	8.0	10.5	2.3	1.7	13.3	13.6	15.5	1.8	1.4	15.7	11.0	12.8	4.0	2.0	11.0	16.1
1–10	40	31.6	2.1	1.5	15.2	11.6	3.6	3.0	1.7	10.3	15.0	2.3	2.3	1.4	13.1	10.3	2.5	3.9	2.1	8.6	17.2
11–20	40	31.3	1.4	0.9	18.1	7.7	2.8	2.0	1.3	13.1	11.5	4.0	2.3	1.8	10.6	15.3	2.0	3.7	1.4	12.5	13.2
21–30	40	30.1	1.2	0.5	19.3	4.5	2.8	1.7	0.8	17.2	5.1	4.4	1.5	0.7	18.1	5.6	2.8	4.5	1.5	13.5	11.2
31–40	40	34.4	1.2	0.5	19.4	4.1	0.8	1.7	0.6	16.5	5.5	2.4	1.2	0.5	19.4	4.3	2.5	4.2	1.5	12.4	13.2
41–50	40	33.9	1.2	0.4	19.5	3.9	0.6	1.4	0.4	17.4	3.7	2.5	1.0	0.0	20.7	0.7	3.0	3.7	1.3	15.2	11.6

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