FAST ACQUISITION OF COOPERATION AND TRUST: A TWO-STAGE VIEW OF TRUSTING BEHAVIOR

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Trustful behavior was defined in terms of the consecutive numbers of matching-to-sample problems worth money that each subject worked during sessions that ended in an equitable distribution. Two stages of acquisition are inherent in this definition; the first stage requires acquisition of an equitable method of distributing reinforcers (cooperation) to show that the within-session deviations (trust) from equity that develop during the second stage are temporary and are not part of an inequitable method of distributing reinforcers. Previous research has indicated that a contingency to trust is necessary to override the aversiveness of the inequity inherent in trusting and to produce consistent and maximal trust (half of the problems worked consecutively by each subject). The present experiment examined such a contingency. The trust contingency was an increased requirement for changing the direction of problem allocation. Only the subject who had been allocated a problem could change that allocation, by pulling a lever 45 or more times. On the other hand, no separate responses were required to allow the person who worked the last problem to also work the next one (passive trust). Hence, giving a problem was the only way to increase the distribution of problems to the other person and hence prevent oneself from receiving all of the reinforcers. All eight pairs of subjects cooperated from the outset. Trusting behavior developed for all four pairs exposed to the contingency to trust and expanded to maximal levels by the second session for three of the four pairs.

Key words: trust, cooperation, matching to sample, humans

This research addressed the role of potential inequity at the outset of a two-person exchange upon the subject's production of equity and the development and expansion of trusting behavior in which trust is a combination of two effects: equity at end of session and expansion of within-session inequity.

Trusting is the allowing of temporary deviations from equity during an overall equitable relationship (Hake & Schmid, 1981). For example, at least minimal trust occurs in cooperation (Deutsch, 1958) or sharing when two persons alternate giving or taking reinforcers: Joe gives Sue a ride to work on Monday, Wednesday, and Friday, and Sue reciprocates by driv-

ing on Tuesday, Thursday, and Saturday. With greater trust the deviation from equity is larger. Nearly maximal trust could be said to occur when a professor loans a valuable manuscript to a scholar returning to Russia, when an author agrees to write the first chapters in a jointly authored book, or when Subject A allows Subject B to take the first 20 reinforcers in a 40-trial session. The professor, the author, and Subject A have shown a high level of trust by putting themselves in a temporarily inequitable situation that could be permanently inequitable should the scholar fail to return the manuscript, the coauthor fail to complete his chapters prior to publication time, or Subject B continue to take reinforcers in the second half of the session. As the level of trusting increases, the amount of short-term, and thus of potential long-term, inequity also increases. Our definition, however, is not restricted to instances in which an individual who is behind allows the partner to obtain a reinforcer (cf. Matthews & Shimoff, 1979). To be sure, a higher degree of trust may be indicated when Subject A is behind and allows Subject B to get further ahead than when Sub-

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ject A is ahead and allows Subject B to catch up, but both will be designated as trusting behavior so long as equity is eventually reached through noncompetitive methods. The minimal definition of trust, a temporary increase in inequity within the context of eventual equity, requires that each of the above two degrees of trusting behavior occur, one level by each subject (Hake & Schmid, 1981).

Once trusting has been acquired through an explicit contingency, the contingency is not necessary to maintain it; trusting endures even when the contingencies that produced it are eliminated (Hake & Schmid, 1981; Matthews, 1977; Matthews & Shimoff, 1979). But in its initial acquisition, trust appears to be distinct from other social-exchange effects. Contingencies merely implicit in social-exchange procedures have been sufficient to produce a change from competition to sharing (e.g., Hake, Vukelich, & Olvera, 1975; Olvera & Hake, 1976) but not to trust (Hake & Schmid, 1981). Such implicit contingencies might include the aversiveness of inequity (Marwell & Schmitt, 1975; Shimoff & Matthews, 1975) as evidenced by emotional side effects, aggression, or by one person quitting. In contrast, trust appears to depend upon special, explicit contingencies, as when Matthews (1977) found that trust remained at minimal levels until he introduced a punishment contingency for non-trusting behavior (i.e., points were subtracted each time the two subjects alternated which of them received the reinforcer).

Hake and Schmid (1981) also found that an explicit contingency was necessary to produce trust, but acquisition was slower than in Matthews' procedure. Subjects worked matching-to-sample problems for money and could either take or give the problem in a pattern of mixed allocation (cooperate), not respond and let the other person take the problem on some occasions (share), try to take the problem on some occasions (share), try to take the problem exclusively (compete), or not respond and thereby let the person who worked the last problem also work the next one (passive trust). In procedures allowing for passive trust, the person who received the last reinforcer continues to receive reinforcers on subsequent trials so long as neither participant emits a separate response that changes the distribution of reinforcers. Under active trust, a response is required to distribute each problem (e.g., Matthews, 1977).

To avoid the possible instructional effects of punishing the behavior of not trusting (i.e., alternating), Hake and Schmid's contingency to trust involved a response requirement for all distributions of the matching-to-sample problems. When only four lever pulls were required to give or take a problem (no explicit contingencies for either equity or trust), pairs learned to cooperate or share, but in 18 sessions only minimal trust was observed (strict alternation of single problems). When 30 or 60 lever pulls were required to distribute a problem (i.e., a higher response requirement for giving or taking than for passive trust and therefore a contingency favoring trust), trusting developed to the extent of sequences with 10 or 15 consecutive problems. When 30 lever-pulls were required, the development of trust took a few sessions; with 60 pulls required, it developed within initial sessions of exposure.

Some research has indicated that once equity is reached, subjects avoid unequal payoffs even when the differential payment would result in more reinforcers for either one or both persons (Marwell & Schmitt, 1975; Shimoff & Matthews, 1975). This further supports the view that the short-term inequities inherent in trusting may have aversive properties (e.g., risk of nonreciprocation, aggression) that tend to oppose its occurrence. The same aversiveness may produce cooperation rather than nonequitable distributions. However, in previous studies, the transition to trusting behavior may have introduced larger risks (potential inequities) than those resolved during the acquisition of cooperation, particularly for subjects who cooperated at the outset and thus were not exposed to the magnitudes of the inequity involved in alternatives such as independent work (e.g., Matthews & Shimoff, 1979) or competition (Hake & Schmid, 1981). The present procedure is one in which this aversiveness of inequity may favor trusting behavior rather than oppose it.

In the procedure described below, subjects could change the distribution of the reinforcers only by giving a reinforcer, not by taking as well as giving. The potential for inequity in such a procedure is considerable, because one subject could receive all of the reinforcers by never giving, or receive none if the other subject never gave. Maximal inequity could be avoided only by cooperating. In a procedure

in which subjects could only give reinforcers, would cooperation be acquired almost immediately because of the aversiveness of the alternative and the absence of other alternatives? With a history of resolving this maximal inequity, would the smaller inequities involved in trusting then be less aversive? If so, would a contingency still be necessary to produce trust? With a contingency to trust, would trust be acquired at the outset and expand quickly to maximal levels?

In addition to the questions above, this study also examined other indicators of the aversiveness of the inequities involved in trust, including changes in trusting behavior itself (gradual versus abrupt expansion of trust, maintenance of trusting behavior after the contingency has been removed, alternation by subjects of being behind, and changes in correlated behavior (i.e., rate of checking scores—auditing).

METHOD

The apparatus and procedure, including the general sequence of events within each session, were similar to those of Hake and Schmid (1981) with the exception that in Hake and Schmid's experiment, subjects could change the direction of problem distribution by giving or taking. In the present procedure, giving was the only way to change the problem distribution. Subjects determined who would work matching-to-sample problems on each trial by pulling a distribution lever and thereby give the problem to the other person or by waiting for the machine to automatically give the

problem to the person who received the last one. After the problem was distributed, it was worked by pressing letter-coded buttons on the matching-response panel to match the letters presented in the sample-stimulus panel.

Subjects

Sixteen volunteers from lower division psychology courses at West Virginia University served. There were three pairs of males and one pair of females in each of the two groups. Each subject was paid five cents for each matching-to-sample problem that he or she worked correctly. In addition, each subject received a bonus of 75 cents per day for attending five consecutive days. If only one subject showed up for a session, that subject was still eligible for the bonus and was paid an additional \$1.25 for that day. Each pair member was paid on a different day to reduce the possibility of subjects splitting their earnings after they were paid rather than during the experimental session. Most subjects also received class credit for participating.

Apparatus

The apparatus was similar to that used in earlier experiments (e.g., see Hake, Vukelich, & Kaplan, 1973, for exact dimensions). Each pair member had a sample panel for producing sample stimuli (left side of Figure 1) and a matching-response panel (right side of Figure 1). The matching panels were mounted, back to back, on the same table approximately .75 m apart. Each subject's sample panel was within easy reach.

Fig. 1. Diagram of the sample panel (left) and the matching-response panel (right) of one subject.

The 5-cent magnitude-of-reinforcement stimulus was presented through an opening in the top center of the matching panel. Directly below was a feedback light that flashed when the subject pulled the bottom distribution lever labeled "other person" with a force of at least 6 pounds (26.7 N). The upper distribution lever was inoperative. Two rows of three matching-response buttons, labeled P, K, V and T, H, R, were below the feedback light. Two more feedback lights were at the top left-hand side of the matching panel. When a subject pulled the distribution lever, the center feedback light flashed, as did the coactor-feedback light on the left-hand side of the other person's panel. Two distribution lights, one green and one brown, color coded to match the color of each subject's matching panel and located beneath the feedback lights, indicated which subject would receive the next problem. When both lights were on, the subject who had worked the last problem could determine who would work the next problem by pulling the bottom distribution lever. A self-audit counter covered with one-way glass and labeled "me" was located in the upper right-hand corner of the matching panel. Five presses on the button adjacent to the audit illuminated the area behind the one-way glass for 5 sec so that a subject could view the score on that counter. A coactor-audit counter in the bottom right-hand corner labeled "other person" allowed the subject to check the other subject's score in a similar manner. Pressing the button labeled "conference" activated a cumulative time clock in the next room to indicate the amount of time during a session that subjects were engaged in conversation. Subjects were told that they were free to talk with each other but that they should press and hold down the conference button when they were talking. There was no experimental contingency for pressing, or failing to press, the conference button.

The sample panel was mounted at eye level of the seated subject. Illumination of the "sample-operative stimulus" atop the panel indicated when the sample panel could be activated by pressing the button marked "sample-producing-button." Pushing the sample-producing button produced one of two letters in each of the three openings in the panel face. Letter combinations were randomized on a 33-pole stepper.

The experimental room was approximately

3 m by 3 m. A timer, visible to both subjects, showed the time remaining in the session. A closed-circuit television camera and microphone, in full view of the subjects, permitted continuous visual and auditory monitoring. Electromechanical programming equipment and the video and audio monitors were in an adjacent room.

Procedure

Basic Procedures. Each pair of subjects participated in two or three sessions per day for a minimum of 9 and a maximum of 21 sessions. Session length was varied randomly within blocks of three sessions, with one session each of 16, 18, and 20 min, which consisted of 32, 36, and 40 matching-to-sample trials, respectively. The number of sessions per day and session length varied so that if subjects divided the problems, they would be more likely to do so within each session rather than splitting the total number of problems over several sessions or even several days (cf. Hake & Schmid, 1981).

Each trial began with the illumination of the magnitude-of-reinforcement stimulus that presented the 5-cent value for the forthcoming problem and stayed on the next 25 sec. One second later, one of the color-coded distribution lights was illuminated to indicate which subject had worked the last problem and would be able to work the next one unless that subject responded on the distribution lever. Two seconds later, both distribution lights came on for 15 sec to indicate that the person who worked the last problem could give this problem to the other person during that time by responding on the distribution lever. Each problem had to be distributed within the 15-sec period or the problem was automatically distributed to the subject who worked the last one. Initial seating of subjects was determined randomly, but each subject was required to remain at the same panel throughout the experiment. The initial problem on each experimental day was assigned randomly. For subsequent sessions that day, the distribution of problems remained with the subject who had received the last problem on the previous session. A fixed ratio (FR) of 4 was required to distribute problems for one group (FR-4 group) and FR 45 was required for the other group (FR-45 group). The response requirement for Subjects 1 and 2 in the FR-45 group

was increased to FR 60 prior to the 11th session, because both subjects could complete the response requirement within 8 sec and subjects were alternating frequently.

When a subject had been given a problem to work or had waited for the apparatus to deliver the problem automatically (passive distribution), that subject's sample panel was illuminated. Working the problem consisted of first pressing the sample-producing button to produce the sample stimuli for 1 sec and then pressing the corresponding buttons on the matching panel. If correct, five points were added to the subject's self-audit counter and five points were counted on the other person's coactor-audit counter. An incorrect matching response or one made over 22 sec after the onset of the problem-distribution lights was not followed by points. Subjects had ample time to do the problem: 7 sec when the problem was distributed passively or 7 sec plus the remaining time in the distribution interval when the problem was given. At the end of the trial (i.e., after 25 sec), all panel lights went out for 4 sec. The onset of the magnitude-of-reinforcement stimulus signaled the start of the next trial.

For Subjects 1 and 2, the response requirement was reduced from FR 60 to FR 4 after Session 15 and from FR 45 to FR 4 after Session 9 for the other three pairs in the FR-45 group. Six sessions were conducted with the FR-4 response requirement. Pairs in the FR-4 group were tested for a minimum of 9 and a maximum of 11 sessions. Figure 2 summarizes the changes.

Instructions and Training. Before the experiment started, one subject at a time was seated in front of a matching panel and told that the panel could be used to work problems worth five cents each. Subjects were read instructions that indicated the function of each part of the matching and sample panels and the sequence of events on each trial. Subjects were then told that the person whose distribution light came on at the beginning of the session would receive problems to work unless the distribution lever was pulled enough times to give a problem to the other person, who would then continue to receive problems unless that subject gave a problem. Subjects were asked to work a problem, then to passively distribute a problem by not responding, and then to actively distribute a problem by pulling the

"give" lever. During this initial training period and prior to the first session, subjects were seated in different rooms. This was done so that any conversation about the division of reinforcers would occur during the experiment where it could be monitored. Before each session, subjects were reminded that they could actively distribute problems or let the machine distribute problems and that they could do it any way they chose. The full set of instructions was always fastened to an extension at the top of the subject's matching panels (not shown in Figure 1), which, in addition to the back-to-back arrangement of the matching panels, prevented subjects from directly observing each other's responses. The full set of instructions is provided in Appendix A.

RESULTS

Acquisition of Trusting

Figure 2 shows the maximum (unconnected triangles) and mean (connected circles) number of correctly solved problems worked consecutively during each session by each subject. Only correctly solved problems are plotted, because only correct responses were reinforced and accuracy was high. Accuracy of working problems ranged from 95 to 100% for both groups. Minimal trust is indicated by a strict alternation of problems or a mean of 1. Expanded trust was defined as both subjects working an average of at least 1.5 consecutive problems within a session. Maximal trust would be indicated by one subject working the first half of the problems in a session and the other subject working the second half. Because the total number of problems in a session varied from 32 to 40, the maximal level of trust ranged from 16 to 20 problems per subject. This variation in total problems per session also accounts for some of the apparent variation in maximal trust seen in Figure 2.

Data for the FR-4 group are in the left half of Figure 2. All pairs in the FR-4 group developed an equitable method of distributing problems during the first session and equity endured over the remaining sessions. Equity was defined as at least 80% correspondence of scores within a session (i.e., the subject with the fewest points had at least 80% as many as his partner); hence, equity for the four pairs ranged from 87 to 100% for the first session and averaged 96 to 99% for all sessions.

Fig. 2. Consecutive reinforcers for each session for all subjects. Unconnected triangles indicate the maximum number of consecutive problems worked correctly in a session, and connected circles indicate the average number of consecutive problems worked correctly. Pairs of subjects are represented, starting at the bottom, from the lowest to the highest overall average number of consecutive problems. The pair members of the FR-4 group only are plotted in pairs on the left side of the figure. For subjects in the FR-45 group, the dotted line shows when the response requirement was changed. For Subjects 1 and 2 the response requirement was increased to FR 60 at the tenth session and then decreased to FR 4 at the 16th session. The response requirement was reduced from FR 45 to FR 4 at the tenth session for the other three pairs in the FR-45 group.

Subjects 11 and 12 showed the least trusting behavior, averaging 1.1 consecutive problems for all sessions and a maximum of 3 and 2, respectively. Subjects 5 and 6 worked an average

of 2 consecutive problems in most sessions; there was no expansion in the level of trust across sessions. Subjects 7 and 8 showed a stable pattern through the eighth session with a mean of 2.9 consecutive problems, computed across sessions. Because they averaged 5.3 consecutive problems during the ninth session, two additional sessions were conducted to determine if the increase was a stable pattern. Trust did not continue to increase, so no further sessions were conducted. Subjects 15 and 16 averaged 5 problems in a row, but this average was comprised mainly of sessions at 1 or 2 consecutive problems and only two sessions at high levels of trust (17 to 20 consecutive problems), Sessions 4 and 10.

Pairs in the FR-45 group also developed equitable methods of distributing problems during the first session; equity ranged from 86 to 100% for the first session and averaged 84 to 100% over all sessions. Subjects 1 and 2 showed the least trust in the FR-45 group, averaging 1.8 consecutive problems for the first 10 sessions. When the response requirement was increased to FR 60, the average number of consecutive problems increased to 3.6 during the eleventh session and to 8.8 by the thirteenth session for both subjects. The overall average for five sessions at FR 60 was 6.3 consecutive problems. There was, however, a decrease in equity to 86%, because Subject 1 gave her partner more problems than she worked herself. Subjects 9 and 10 showed a more typical pattern under the FR-45 response requirement. This pair worked an average of 15.3 problems consecutively for the nine sessions under FR 45. They averaged slightly more than three consecutive problems during the first session and this increased to 13.5 by the second session. Subjects 3 and 4 also showed a large increase in the amount of trust after the first session. An average of 4.5 problems were worked consecutively during the first session, but by the second session the average increased to 18. This maximal trust continued for the remaining sessions for both pairs. Subjects 13 and 14 showed maximal trust from the outset and this pattern endured throughout the experiment. The mean number of problems worked consecutively for nine sessions was 17.5 and the effect occurred from the first session during which Subject 14 worked 18 problems consecutively and Subject 13 worked 16 consecutively.

Maintenance of Trust. A durable trust effect was observed when the fixed ratio decreased from FR 45 to FR 4; the level of trusting behavior remained high, higher than the level of trusting behavior found with any of the subjects in the group who began with the FR-4 response requirement. The trust effect for Subjects 1 and 2 decreased from the levels observed at FR 60 but remained above that obtained at FR 45 and higher than that typically found in the FR-4 group. Equity decreased for two pairs. Subject 1 continued to give her partner more problems than she worked so that equity fell from an average of 86% in the FR-60 condition to 61% during the FR-4 condition and as low as 52% during one session. Subject 3 also began giving more problems to his partner than he worked himself so that equity for that pair fell from 93% to an average of 85%. Equity for the other two pairs was 98% for Subjects 9 and 10 and 100% for Subjects 13 and 14 for the six sessions at FR 4. Subjects 1 and 2 worked a mean of 4 problems in a row at FR 4, which was lower than their average of 6.3 when the response requirement was FR 60. Subjects 9 and 10 continued to show a high level of trust, working an average of 16.3 consecutive problems for the six sessions at FR 4. The drop at Session 11 is a result of "evening up" at the end of the session: both subjects worked 17 consecutive problems (triangle) and then split the remaining two problems, resulting in a mean of 9 consecutive problems for each subject for that session. Subjects 3 and 4 worked an average of 16.3 problems in a row and Subjects 13 and 14 worked an average of 17.8 in a row. With the exception of Subjects 1 and 2, all subjects continued their stable pattern of trusting behavior when the high response requirement was reduced to FR 4. The other six subjects in this condition showed a higher level of trust at FR 4 than any of the subjects in the FR-4 group.

Amount behind during and at end of session. The primary measure of trust to this point has been the number of consecutive reinforcers obtained by pair members. Another measure is based upon who is behind during most of the session, because giving a problem when behind may constitute a higher degree of trust than giving when ahead. Results from the five pairs of subjects who consistently showed expanded trust (four pairs from the FR-45 group and one pair from the FR-4 group) are plotted

TOP GRAPH

S MAXIMUM BEHIND — ○, △

OTHER S MAXIMUM BEHIND — □

BOTTOM GRAPH

S BEHIND AT END OF SESSION — ●, ▲
(NO SYMBOL IF EVEN)

Fig. 3. Maximum number of reinforcers each pair member was behind during each session (top of each pair of ordinates) and the pair member that was behind at the end of the session (bottom graph) for the five pairs of subjects that showed consistent patterns of expanded trust. The pair member that was the furthest behind during the session is indicated in the top graph by the line with the unfilled circle or triangle. The line with the unfilled square shows the maximum number of reinforcers the other pair member was behind. Sessions in which both subjects were equally behind are indicated by a circle and a triangle. The bottom graph shows the pair member that was behind at the end of the session (filled circle or triangle). Absence of a symbol indicates the pair members were even at the end of the session. The broken lines indicate a change in the response requirement for distributing problems.

in Figure 3. The top graph for each pair shows which pair member was furthest behind during each session (unfilled circle or triangle), by how much, and the maximum the other subject was behind (square). The bottom graph for each pair shows which, if either, pair member (filled circle or triangle) was behind at the end of the session and by how much. The typical pattern was for only one subject to be behind during the session. For those who eventually showed maximal trust (i.e., Subjects 3 and 4, 9 and 10, 13 and 14), one subject was behind by about half of the possible problems. The bottom graph shows that by the end of the session, however, the distribution was equitable (i.e., the pair members were even or only a problem or two different). For the pairs that showed expanded but less than maximal trust (e.g., Subjects 1 and 2, and Subjects 7 and 8 from the FR-4 group), subjects were never behind more than 5 or 10 problems during a session, but, as with the other pairs, during each session one subject was typically further behind than the other.

All pairs varied as to which subject was furthest behind but they did not alternate during

the sessions. The usual pattern was for one subject to be behind for one or two sessions and then for the other subject to be behind for one or two sessions (e.g., Subjects 9 and 10). Only Subjects 13 and 14 alternated on a strict session-by-session basis.

In agreement with the definition of trust, the maximum inequity within a session was greater than the inequity at the end of a session. Also, no pair member was consistently behind at the end of a session and only rarely was a subject behind by more than five reinforcers (25 cents). Subjects 1 and 2 were the closest to an exception when the response requirement was reduced to FR 4.

Audits. Audits decreased over sessions for the subjects in the FR-45 group, who showed maximal levels of trust, but there was no consistent pattern for those in the FR-4 group, who showed lower levels of trusting behavior. Subjects 1 and 2 of the FR-45 group made virtually no audits except during the training session and in a debriefing at the end of the experiment. Table 1 shows the mean number of self, coactor, and interpersonal (self and coactor audit within 5 secs of each other) audits

Table 1

Self, coactor, and interpersonal audits for Sessions 1 to 3 and 7 to 9 for both groups and the last three sessions for the FR-45 group. Subjects 1 and 2 who made virtually no audits have been omitted from the FR-45 group.

Sessions	Self Audits			Coactor Audits			Interpersonal Audits		
	1 to 3	7 to 9	last	1 to 3	7 to 9	last	1 to 3	7 to 9	last
FR-45 group									
Pairs									
3	4.7	3.7	.7	5.7	2.0	.7	3.0	1.3	.7
4	7.7	8.3	4.3	6.3	5.3	2.7	4.7	3.3	.7
9	16.3	1.3	1.3	13.0	2.0	1.3	7.3	.3	.3
10	9.7	1.0	.3	12.0	.3	.7	5.7	.7	.0
13	2.7	2.0	3.0	1.0	1.0	1.0	.3	.3	.3
14	4.7	6.0	3.3	4.7	6.0	3.7	1.3	2.0	1.0
Mean	7.6	3.7	2.2	7.1	2.8	1.7	3.7	1.3	.5
FR-4 group									
Pairs									
5	7.7	3.5	—	10.0	12.0	—	5.0	10.3	—
6	6.7	11.3	—	6.0	13.6	—	5.0	11.0	—
7	6.0	5.7	—	6.7	6.7	—	5.0	3.0	—
8	7.3	7.3	—	5.3	11.3	—	6.3	6.7	—
11	7.0	3.7	—	6.0	2.3	—	4.0	1.7	—
12	11.0	6.3	—	10.0	6.0	—	10.0	5.0	—
15	10.6	12.0	—	10.7	11.0	—	3.0	9.3	—
16	9.3	7.7	—	9.7	7.3	—	8.3	4.6	—
Mean	8.2	7.2	—	8.1	8.8	—	5.8	6.5	—

per session for subjects who audited. The mean for subjects in the FR-45 group decreased from 7.6 self, 7.1 coactor, and 3.7 interpersonal audits on the first three sessions to 3.7, 2.8, and 1.3 on sessions seven through nine, and on the last three sessions decreased further to 2.2, 1.7, and .5, respectively. Subjects in the FR-4 group showed no consistent trend across sessions, averaging 8.2 self, 8.1 coactor, and 5.8 interpersonal audits on the first three sessions and 7.2, 8.8, and 6.5 on sessions seven through nine. There was no consistent trend in auditing within sessions for any pair of subjects.

Audio and Visual Observations. All subjects were monitored via audio and video equipment. These observations were not comprehensive and are intended only to give a suggestion of the atmosphere and to reveal some of the verbal responses that preceded a change in responding. Some examples of conversations that did include a strategy for distributing the problems were: "Go ahead and take two at a time" (Subject 15, Session 2), and "Why don't you work for the first ten minutes?" (Subject 15, Session 4). Changes in strategies were often, but not always, preceded by a suggestion such as, "Let's go back to the other way of doing them" (Subject 15, Session 4). Some comments also focused on the purpose of the experiment, such as, "What the heck are they trying to find out?" and "They must be looking for something besides what we are doing" (Subjects 9 and 10, Session 2).

All subjects were allowed to bring books and other materials into the experimental room but they were not told to do so. Many subjects in both groups brought books, and those in the FR-45 group, who often had several minutes between problems, read school books and newspapers. Although some of the FR-4 subjects also brought books and papers with them, their strategy of distributing problems in blocks of only one or two problems did not allow time to read. A complete list of audio and visual observations that were recorded is included in Appendix B.

DISCUSSION

Trusting was defined in terms of the numbers of consecutive matching-to-sample problems that each subject worked during sessions that ended in an equitable distribution. Two stages of acquisition are inherent in this defini-

tion. The first stage requires acquisition of an equitable method of distributing reinforcers (cooperation) to show that the within-session deviations (trust) from equity that develop during the second stage are temporary and are not part of an inequitable method of distributing reinforcers. Considering trust as a sequence and combination of two effects also has implications concerning the role of the acquisition of cooperation upon (1) the speed of acquisition of the overall effect, including acquisition of cooperation as well as of trust, and (2) the effects of the acquisition of cooperation upon the subsequent acquisition of trust. In the present procedure, the aversiveness of the inequity involved in trusting could have been reduced because the temporary within-session inequity of trusting was smaller than the initial potential inequity previously resolved in the acquisition of cooperation. Hence the present procedure, which involved a change from our earlier procedure such that subjects could only give reinforcers and not take reinforcers for themselves as well, was expected to lead to the following changes in the acquisition of trust: (1) immediate acquisition of cooperation, (2) some acquisition of trust even when there was little or no explicit contingency favoring trust, (3) fast acquisition of trust and a fast increase to maximal trust when there was a contingency to trust, and (4) decreases in the aversiveness of inequity after the acquisition of a large and consistent trust effect. These predictions were substantially confirmed.

All subjects responded cooperatively early in the first session, although it appeared that alternatives were considered, as illustrated by the comment of Subject 5 during training, "Why should I ever give to the other person?" Such rapid and uniform acquisition of a stable equitable solution has not been found in previous studies. For example, in the most directly comparable study, Hake and Schmid (1981) found that 4 of 13 pairs initially competed, and even though Matthews (1977) arranged for cooperation to pay more than the individual-work alternative, 2 of 7 pairs required two sessions to achieve stable cooperation and 2 pairs did not cooperate in the two sessions provided. Working individually or in competition were not options in the present study, but subjects did not have to cooperate, as indicated by the above comment of Subject 5 or the question of another subject, "What happens if one guy

keeps all the problems?" The number of alternatives to an equitable solution was restricted in all of these studies; hence, the faster acquisition of cooperation in the present study appears to have been due to the aversiveness of the one alternative that was provided.

A contingency to trust, the greater response requirement for the FR-45 group than for the FR-4 group, was still necessary to produce consistent and maximal expansion of trust, as revealed by the differences in performance between the FR-4 and FR-45 groups. One of the FR-4 pairs consistently showed trusting behavior by distributing three to five consecutive reinforcers for each pair member, but this was far short of the 15 to 20 consecutive reinforcers distributed by three pairs of the FR-45 group and the 5 to 10 by the remaining pair. Two other pairs of the FR-4 group showed either a very small effect or a small effect on all but two occasions where they showed nearly maximal trust. However, the FR-4 group in this study still showed more trusting behavior than the FR-4 group of our earlier study (Hake & Schmid, 1981), in which the mean number of consecutive reinforcers rarely changed from 1 and never averaged as high as 1.5 per session. The fast acquisition of cooperation was probably not a factor, because either cooperation or sharing was also acquired at the outset in the earlier study by three of the five pairs and none of them showed any expansion of trust. It should be noted that Matthews (1977) and Matthews and Shimoff (1979) have found considerably more consistent expansion of trust without an explicit contingency favoring trust. Matthews (1977) speculated that the contingency might have been related to "coordination costs" (e.g., vigilance, timing, and sequencing of responses) that are reduced when there are longer sequences of the same type of response. This explanation seems especially plausible for their procedure in which subjects could not communicate with each other. It should also be considered that in the present study, eliminating the option to take reinforcers also eliminated the possibility of sharing (i.e., the equitable distribution of reinforcers through taking) that is typically preferred over cooperation (Hake et al., 1975). One possible basis for that preference is the greater "coordination costs" in cooperation when one person gives the problem and the other person works it as compared to sharing when the same

person takes the problem and works it. The increased cost plus the prior experience of resolving a larger potential inequity during acquisition of cooperation may have been responsible for the development of some trust by the FR-4 group.

When there was a contingency to trust (i.e., in the FR-45 group), three of the four pairs trusted in the first session and consistent maximal trusting began in either the first (one pair) or second (two pairs) session. The fourth pair differed in that trusting did not develop until the fourth session and never expanded to maximal levels. This pair expressed boredom with the experiment both verbally and in their behavior in the experiment (e.g., they did not check their scores; near the end of the experiment they did not keep an accurate count of the number of problems worked by each), and they terminated their participation one session before the end of the experiment). The present results may be contrasted with our previous study in which subjects could change the distribution of problems by taking as well as by giving. In that study consistent maximal trusting developed in 3 of 5 pairs at FR 30 and in 2 of 3 pairs at FR 60 but it developed much more slowly. For example, in the FR-30 group, 4 of 5 subjects eventually trusted but not until the second, fourth, or eleventh (2 pairs) session. When sessions with competition were eliminated trusting began either the first, second, fourth, or tenth session after the development of an equitable solution. Three of the four pairs showed maximal expansion of trust that had developed by the first, second, or fourth session after trusting behavior began to occur. For the FR-60 group, trusting was acquired the first session but it did not expand beyond five problems until the sixth session for any of the three pairs. Maximal trusting developed in 2 of 3 pairs after six and nine sessions of trusting. The generally faster and greater development of trusting behavior in the present procedure appears to have had several effects in the acquisition process, including (1) faster acquisition of cooperation, (2) faster development of trust after acquisition of cooperation, and (3) more rapid and complete expansion of trusting after trusting had begun to occur.

There were several indications in the present results that the aversiveness of inequity decreased as trust developed. First, subjects did not alternate being behind within sessions such

that both were behind about the same amount each session. Similarly, they did not systematically alternate being behind over sessions. This indifference to being behind suggests that within-session inequity was not a major variable after trusting developed (cf. Hake & Schmid, 1981). Second, score-checking behavior (audits) decreased across sessions for those subjects who showed maximal trusting (cf. Hake & Schmid, 1981). Third, trusting endured after the trust contingency was removed, indicating the contingency was no longer necessary to override the aversiveness of within-session inequity (cf. Hake & Schmid, 1981; Matthews, 1977; Matthews & Shimoff, 1979).

Trust is an unusual topic for the experimental analysis of behavior: It is typically considered a personality characteristic or trait, the province of personality theory. However, as defined here and by Matthews and Shimoff (1979) in terms of publicly observable events, it fits within the conventional natural science requirements for acceptability. It also fits the next-step strategy of natural science and the experimental analysis of behavior (Skinner, 1966): In the area of social exchange, trusting behavior is simply the next step beyond sharing and cooperation. The level of explanation in the behavior-analytic studies of trust is also consistent with the next-step strategy, because the principles discovered with individual subjects are taken as the starting point for explaining complex social behavior (see Bem, 1972; Hake & Olvera, 1978). The explanation of complex social behavior may ultimately require more than the principles of learning for individual subjects, but the starting point in behavior analysis is what is currently known. What else is required cannot be known until we begin.

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APPENDIX A

Instructions

1. The panels in front of you can be used to obtain and to work problems for points that you can exchange for money. All problems will be worth 5¢.
2. When a session is over, you may have earned more money, less money or the same amount of money as the other person depending upon how many problems you each work correctly.
3. Look at the large panel (matching panel). At the beginning of each problem, the large light (magnitude of reinforcement-stimulus) in the center of the panel will come on and the number five will appear there. This means that the problem is worth 5¢. Shortly after this light goes on, one of the colored lights on the left side of the matching panel will come on. The color of this light will indicate who will get the next problem to work if it is not distributed by that person. Shortly after this light comes on, both of the colored lights will come on.
4. After these lights come on, if you are at the same color matching panel as the first light that came on, you can distribute the problem to your partner. If you pull the bottom plunger enough times you can "give" the problem to the other person.
5. If the problem is not distributed by pulling the bottom plunger when both of the colored lights are on, the machine will automatically give the problem to the person who had the last one. When the light on top of the sample panel comes on you can work the problem for points.
6. Be sure that you pull the plunger all the way out when you are responding on the distribution lever. The small light in the center of your matching panel will flash each time you pull the distribution lever. When the other person responds to give you a problem the light at the top-left of your matching panel will flash.
7. If he gives you the problem, or you get it by letting the machine deliver it, the light on top of the sample panel will come on. When this happens, you can push the button in the center of the sample panel and a series of letters will appear in the hole above this button. Your task is to match these letters by pressing the same letters on your matching panel.
8. Each trial will last for 30 seconds; you must match the letter presented on the sample stimulus before the 30 seconds are up or you will not receive credit for the problem. Also, if you press the wrong button on the matching panel you will not get points for that problem.
9. On the right side of the matching panel are two small mirrors. By pressing the small button next to the top mirror five times you will be able to see how many points you have earned. Pushing the bottom button five times will tell you how many points the other person has.
10. We would like for you to press the "conference" button when you are talking with the other person. Other than these restrictions, you can work the problems any way you want.
11. You should not move any of the equipment. We will tell you when the session is over.

APPENDIX B

Notes of Experimenters on Visual and Auditory Observations of Subjects' Behavior

<i>FR-4 Group</i>			<i>FR-45-46 Group</i>		
<i>Subject</i>	<i>Session</i>	<i>Comment, Behavior, or Event</i>	<i>Subject</i>	<i>Session</i>	<i>Comment, Behavior, or Event</i>
5	training	"Why would I ever give any problems to the other person?" The experimenter replied that the instructions were on the apparatus and that the way the subject decided to respond was up to him.	1 & 2	1	Very little talking.
7 & 8	1	Very little conversation between subjects.		6	Still very little talking.
	2	Conversation increasing, almost continuous. Subjects evened score in the last few minutes.		11	Response requirement raised to FR 60.
11	1	Subject 11 missed the first 2 problems, and did not seem to understand how to work them. Session restarted.		12	Some talking between subjects, prior to session.
11 & 12	3	Talking throughout session.		13	Working problems in blocks of 6 or 7 but they appear to be dividing by time rather than by score.
	4	Both subjects trying to "beat" the machine by giving to person who already has the problem. They wanted to see if they could get the problems sooner or get more problems in a session. They quit when they discovered that there was a fixed number of problems in a session.		16	Response requirement reduced to FR 4. Conversation about school, dates, and how glad they will be when the experiment is finished.
15	1	"The reason I haven't gotten any [problems] is that you haven't given me any."		18	Talking throughout the session.
15 & 16	1	Subject 16 tried giving to Subject 15, who already had the problem, to see if it allowed more time to work the problem or if they could get extra problems to work. He discovered that this procedure made no difference in the total number of problems available.	4	19	Talking throughout the session.
	2	"Go ahead and take two [problems] at a time."	4	1	Subject 4 slow in pulling lever so that he did not distribute the problem to his partner in time and he came out ahead, 105-90.
	4	"Why don't you work for the first ten minutes?" (Subject 15 had been drinking green beer for St. Patrick's Day.)	4	2	Subject 4 began reading paper at 4.7 minutes into the session.
	5	"Let's go back to the other way of doing them." (distributing problems by ones and twos)	3 & 4	3	Subject 4: "Why don't you work the first ten minutes?"
	8	Both subjects reading; Subject 15 missed 2 problems because he was reading rather than paying attention.	3 & 4	3	Subject 3 pulled wrong lever when he tried to give to subject 4 and therefore came out ahead, 85-95.
			3 & 4	5	Both subjects reading magazines.
			3 & 4	7	Both responded on same trial, trying to "beat" the machine. They discovered that this approach did not work.
			3 & 4	8	Very little conversation; both reading.
			3	11	Subject 3 working on poster.
			4	12	Subject sharing newspaper with Subject 3.
			3 & 4	14	Subject 4's audit counter did not work so Subject 3 told him his score.
			9	1	Missed the first two problems because he pushed the wrong buttons.
			9 & 10	2	"What the heck are they trying to find out?" Subject 9: "Must be looking for something other than what we are doing."
			9 & 10	3	Lots of conversation between subjects about school, dates, etc.
			9	14	Subject 9 discussed the money he lost by missing a session (bonus money).