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Can occupational norms foster cooperative behavior?
An experimental study comparing cooperation by military officers and civilians

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Abstract

In this experimental study, we examine the behavior of Bundeswehr officers and officer candidates regarding their willingness to cooperate. Due to the military training, which focuses on comradeship and reliable teamwork even under extreme conditions, we expect a strong bond between soldiers and therefore more cooperation among them. Furthermore, there are additional norms for soldiers that explicitly call for social responsibility and an appropriate behavior relative to civilians. For that reason, we also expect more altruism and trust of soldiers compared to pure civilian groups. To explore these issues in an experimental setting, the subjects had to play the dictator game, the ultimatum game, and the trust game. These three established experiments allow us to measure and distinguish between different aspects of social and cooperative motivation. We find that soldiers are on average more altruistic, more cooperative, and more trusting as well as more trustworthy. These results do not only hold for the interaction among soldiers but in most cases also with regard to the behavior of soldiers towards civilians.

Zusammenfassung

In dieser experimentellen Studie untersuchen wir das kooperative Verhalten von Offizieren (bzw. Offiziersanwärtern) der Bundeswehr. Dabei betrachten wir ihre Interaktionen sowohl untereinander als auch gegenüber zivilen Probanden. Unsere Kernhypothesen sind, dass sich die angehenden Offiziere aufgrund ihrer stark auf Gemeinschaftssinn ausgerichteten Ausbildung (Kameradschaft) und einem auf gesellschaftliche Verantwortung hin orientierten Selbstverständnis (Sozialkapital) sowohl untereinander als auch gegenüber den zivilen Probanden kooperativer verhalten als eine rein zivile Vergleichsgruppe. Wir ziehen hierfür mit dem Diktatorspiel, dem Ultimatumspiel sowie dem Investitionsspiel (trust game) drei etablierte Standardexperimente heran, mit denen sich jeweils bestimmte Facetten (pro)sozialer bzw. kooperativer Motivation messen und voneinander unterscheiden lassen. Im Experiment verhalten sich Soldaten im Durchschnitt signifikant altruistischer, kooperativer, vertrauensvoller und vertrauenswürdiger. Dies gilt in den meisten Fällen nicht nur für das Verhalten unter Soldaten sondern auch von Soldaten gegenüber Zivilisten.

Keywords: Experiment, Dictator Game, Ultimatum Game, Trust Game, Cooperative Behavior, Professional Norms, Military

JEL-classification: C72, C78, C91, D01, D63, D64

1. Introduction

If people have to work together in teams or other cooperative endeavors like joint ventures or strategic alliances, it is of great help if they do not behave purely selfish. In particular, some sense of altruism, fairness, and trust improves the situation for all aspects that cannot be explicitly contracted upon. This paper deals with the question whether appropriate occupational norms might actually foster such cooperative behavior.

Cooperation is quite important among soldiers to assure reliable teamwork even under extreme conditions. It is a central hypothesis of this paper that the institution of "comradeship" (a bond between soldiers) might assure more cooperative behavior among soldiers. Beyond that there are additional occupational norms for soldiers that also explicitly call for appropriate behavior relative to civilians (being "an officer and a gentleman"). To some extent, these norms also have a formal underpinning by law. For example, the German military law ("Soldatengesetz") requires soldiers to respect and assist their comrades and this law even prescribes an exemplary conduct of all soldiers outside the military sphere.

To explore this issue in an experimental setting, students at the Bundeswehr University ("soldiers") and students from other universities in Munich ("civilians") had to play the dictator game, the ultimatum game, and the trust game. As we also wanted to know whether soldiers treat other soldiers differently than civilians and whether civilians behave differently if their opponent is a soldier, we grouped soldiers and civilians appropriately and the subjects where informed about their opponents status.

There exist many experimental studies that consider the impact of differences in age, culture or gender in the dictator game, the ultimatum game, and the trust game – see the meta studies by *Engel (2011)* for the dictator game, *Oosterbeek et al. (2004)* for the ultimatum game, and *Johnson/Mislin (2010)* for the trust game. However, to our knowledge the impact of occupational norms on the behavior in such experiments and in particular differences between soldiers and civilians have not yet been analyzed. With respect to soldiers there are some general discussions of the importance of trust (see e.g. *Allen/Berg, 2013*). *Goette et al. (2006)* analyze the behavior of Swiss army officers in a prisoner's dilemma setting. However, they did not compare the behavior of soldiers with civilians and they restrict attention to minimal group effects (officers that worked together during a four week training are shown to cooperate more among themselves than when grouped with other officers). Considering the possible impact of occupational norms on cooperative behavior, a paper by *Fehr/List (2004)* may be most closely related to our work. They show in a trust game setting that CEOs are on average more trusting and trustworthy than students.

The paper proceeds as follows: In section 2 we describe our data and the experimental setting. In the next three sections we present the hypotheses and the results of the statistical analysis for the dictator game (section 3), the ultimatum game (section 4), and the trust game (section 5), respectively. Section 6 concludes by summarizing the central results.

2. Description of the experiment

The experiment has been conducted in December 2013 and May 2014 in the MELESSA experimental lab at LMU Munich (Ludwig-Maximilians Universität München) and in the computer lab at the Bundeswehr University Munich). The experiment has been coded and performed with the software z-tree (see *Fischbacher, 2007*). There have been a total of 152 subjects – 56 students from Bundeswehr University ("soldiers") and 96 students from other universities in Munich ("civilians"). The students from Bundeswehr University are officer candidates or officers that all had a military education of about 15 months prior to their academic studies.

Before starting the experiment, we also collected some personal data about the subjects. As can be seen in *table 1*, the two groups are in general quite similar. The most obvious difference is the substantially lower share of female "soldiers".

	Soldiers		Civilians	
total	56		96	
playing against soldiers	32	57.1%	26	27.1%
playing against civilians	24	42.9%	70	72.9%
male	43	76.8%	56	58.3%
female	13	23.2%	40	41.7%
parents have been soldiers	21	37.5%	---	---
age (average)	23.2		21.8	
siblings (at least 1)	47	83.9%	87	90.6%
active volunteer work	22	39.2%	34	35.4%
unmarried	55	98.2%	94	97.9%

Table 1: Sociodemographic data

The subjects played each of the three games (dictator game, ultimatum game, and trust game) over six rounds. In each round the players have been assigned by random matching in a way that assures that no subject plays twice against the same opponent and that each subject is the first player in three rounds and the second player in the other three rounds. Subjects were only informed whether the opponent is a civilian or a soldier but did not get any other information about the other player. There also has been no possibility for communication during the experiment. To avoid potential bias of some civilian subjects, the soldiers have been asked not to wear uniform.

This results in a total of 456 observations for both the dictator game and the ultimatum game. For the trust game the amount passed back has been determined by the so called "strategy method" (see *Selten, 1967*). In this setting the subjects indicate in a chart for every possible first round transfer which amount they would give back. The actual second-mover payments are then given by the values that result from the chart. The advantage of this approach is that information is not only received from actual strategies but also from (incentivized) hypothetical strategies.

The actual payment to the subjects at the end of the experiment depended on the number of points that they have received in the games. Points have been converted at an exchange rate of 10 points = 1 Euro in real money that was paid in cash to the participants. The average payment over all subjects was 11.50 Euro; soldiers received a marginally lower payment of 11.39 Euro while civilians received 11.56 Euro on average.

Beyond the personal data and the behavior in the game, subjects have also been asked some survey questions about the trustworthiness of soldiers and other occupational groups like firemen or lawyers and about personal characteristics attributed to the occupational group of soldiers. The results of these surveys will not be used in the present analysis and therefore are not reported here. However, it is planned to use them to distinguish different subgroups of civilians and soldiers – e.g. civilians that

highly trust soldiers – and to analyze empirically whether these subgroups behave differently in the experiment. First results can be found in a research report about the empirical study in German language (*Wiens et al., 2015*).

3. Dictator game

In the dictator game only the first player has an endowment (10 points in our setting). She can decide whether she gives anything of her endowment to the second player. The game is named "dictator game" because it is only the dictator (the first player) that can affect the distribution between the two players. If the first player is strictly selfish, she would not give anything to the other player. However, as shown in many experiments even under perfect anonymity many first players give a positive amount to the second player. This behavior can only be explained by "unconditional altruism" as the transfer is given without any direct reward and there is also no possibility of a punishment if nothing has been transferred. In most experiments the majority of "dictators" transfer at least a part of their endowment to the other player. In a meta study *Engel (2011)* obtains the result that on average over all analyzed studies nearly 17% of the subjects transfer 50% of their endowment, 34% give more than nothing but less than 50%, and only 36% show a purely selfish behavior and keep the whole endowment.

Officers and officer candidates have been exposed to the occupational norm of comradeship and are also supposed to serve as a positive role model in their behavior off duty and outside the military facilities. In the dictator game this should imply that soldiers are especially more generous than civilians when interacting with other soldiers ("in-group cooperation") but also relative to civilians ("outgroup cooperation"). If this is actually true, transfers from soldiers to other soldiers but also to civilians should be higher on average than the transfers given by civilians.

From this a first general hypothesis can be deducted and empirically tested:

- ***H-D1*** *(Soldiers show generally more unconditional altruism)*: x(Sol - All) > x(Civ - All)
  Officers and officer candidates give higher transfers than civilians to both their own comrades and civilians.

To find out whether actually both in-group and outgroup cooperation is higher for soldiers, two additional hypotheses must be tested:

- ***H-D2*** *(Comradeship calls for supporting comrades – in-group cooperation)*:
  x(Sol - Sol) > x(Sol - Civ)
  If there is an intrinsic motivation that is based on the norm of comradeship, soldiers should give more to their comrades than they give to civilians.
- ***H-D3*** *(Soldiers serve as positive role model – outgroup cooperation)*: x(Sol - Civ) > x(Civ - Civ)
  If the internalization of the occupational norm of comradeship and the norms that describe the expected behavior off duty make soldiers generally more caring, they should also give more to civilians than civilians give to each other.

Based on the data from the experiment, it will now be shown whether these three hypotheses can be empirically supported. In a first step some descriptive statistics will be presented. In a second step the results of the statistical tests are reported.

Descriptive statistics

Figure 1 shows the frequency distribution curve for the dictator game. The distribution for aggregated data of all subjects is similar to the results obtained for students in the literature (see e.g. *Engel, 2011, p. 598)*. However, the number of zero transfers is relatively high, indicating that a large number of participants behave as the theoretical model predicts.

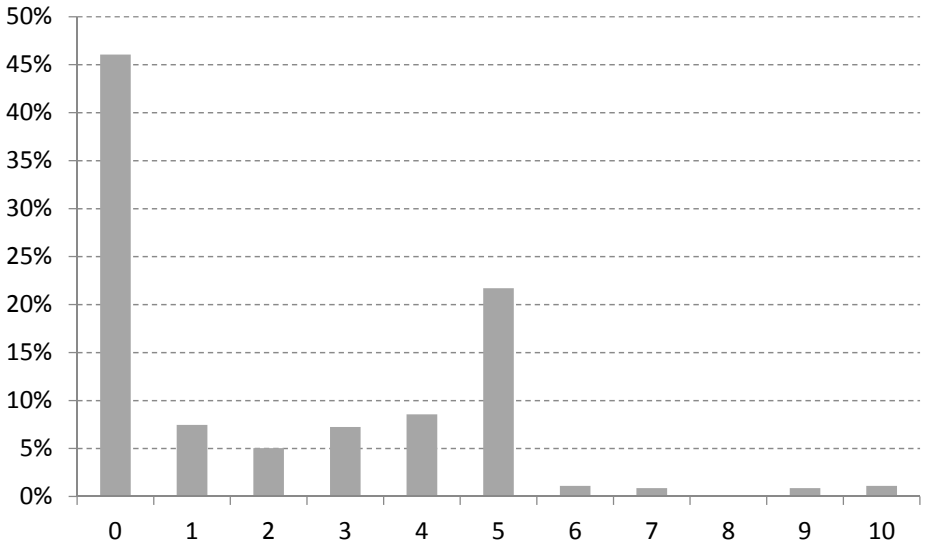

Figure 1: Transfers in the dictator game (all participants)

If the data for soldiers and civilians are compared (*Figure 2*), it becomes obvious that there are much more civilians who give nothing. While the frequency distribution is bimodal for both groups, in contrast to the civilians, the number of soldiers that give half of their endowment is almost as large as the number that gives nothing (black bars in the figure).

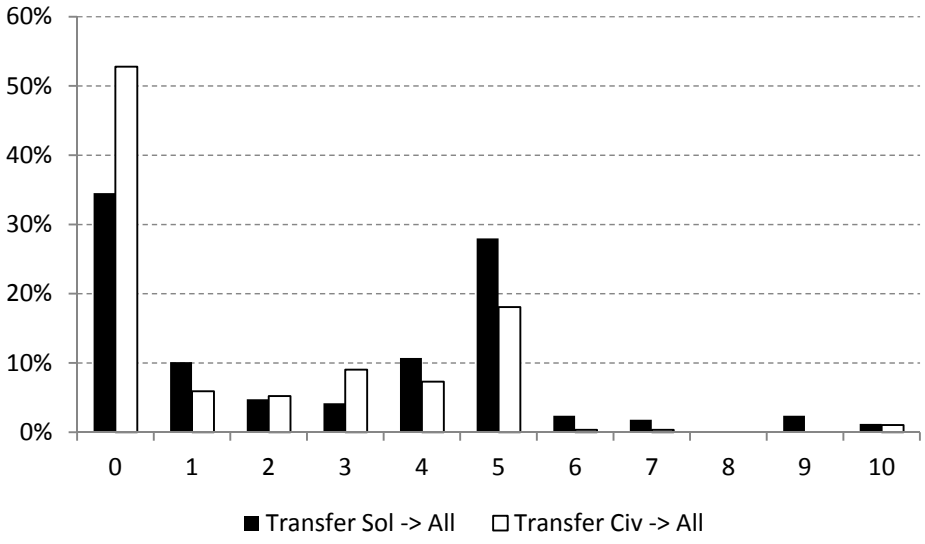

Figure 2: Transfers in the dictator game (comparison between soldiers and civilians)

Table 2 displays the descriptive statistics of the dictator game for aggregated data and all feasible combinations of groups. We report the number of observations (N), the mean and the standard deviation (SD).

The differences between soldiers and civilians that showed up in *figure 2* result in a substantially higher mean transfer of soldiers. Looking at the different combinations of the two groups, a very high mean transfer among soldiers can be noticed. Transfers from soldiers to civilians are on average also higher than these from civilians to soldiers which in turn exceed those between civilians. However, these differences are not equally pronounced as those from the interaction between soldiers and all other cases.

	Donor	Receiver	N	Mean	SD
(1)	All	All	152	2.14	1.99
(2)	Soldier	All	56	2.75	2.21
(3)	Civilian	All	96	1.78	1.76
(4)	Soldier	Soldier	32	3.21	2.29
(5)	Soldier	Civilian	24	2.14	2.00
(6)	Civilian	Soldier	26	1.97	1.58
(7)	Civilian	Civilian	70	1.70	1.83

Table 2: Descriptive statistics for the dictator game

One problem for obtaining statistically significant results for the more detailed hypotheses is the relatively small number of observations for interactions between soldiers and civilians. Here it should also be noted that the number for the soldier-civilian interaction is smaller than the respective number for the civilian-soldier interaction. This is due to the fact that we observed during the experiment that two civilian subjects from Bundeswehr University (there are a few civilian students at the Bundeswehr University) erroneously registered as soldiers. So we had to skip the observations where these subjects played the active part, while we could still use the data from the civilians as they assumed to play against soldiers.

Statistical tests

To test the hypotheses, the average transfer of each subject is calculated over the three rounds where this subject is the dictator. The resulting values are than used as the transfer of the respective person. The one-sided version of the Mann-Whitney-U-test is then applied to determine whether the transfers of subjects in one group are statistically significant higher than the transfers in another group.

- The first, most general **hypothesis *H-D1*** states that soldiers should be more generous than civilians. This is tested by comparing transfers Sol-All to Civ-All. As can be seen in row (1) of *table* 3, the hypothesis can be confirmed at the 1% level.
- The second **hypothesis *H-D2*** assumes that soldiers give more to soldiers than to civilians as they are motivated in particular by the social norm of comradeship. This is tested by comparing transfers between soldiers (Sol-Sol) with transfers from soldiers to civilians (Sol-Civ) as indicated in row (3) of *table 3*. While the means differ quite substantially, the hypothesis is only statistically significant at the 10% level. As already mentioned above, this is possibly due to the fact that the number of observations is much smaller than in the test for the general hypothesis.
- The third **hypothesis *H-D3*** states that soldiers behave generally more cooperative and not only with respect to other soldiers. If this is true, transfers Sol-Civ should be higher than transfer Civ-Civ – see row (4) in *table 3*. Even though means differ by more than 20%, we cannot statistically confirm this hypothesis (the error probability is about 13% and therefore even exceeds the 10% threshold).

Beyond the implications for the tested hypotheses, *table 3* provides some additional interesting information. The mean transfer of civilians to soldiers exceeds the transfer among civilians. While this difference in transfers is not statistically significant, it might indicate the possibility that at least part of the civilians give more to soldiers because they have a positive appreciation for the profession. In *Wiens et al. (2016)* we tested this hypothesis by using the information from the questionnaire about the reputation of different professions. We found that transfers were significantly higher for those civilians who stated a high degree of trust in the soldiers' profession. As this paper concentrates on the behavior of soldiers, this is not explored right here. However, there is also another aspect to consider: if not only soldiers but also civilians give more to soldiers, hypothesis *H-D2* can only be validated if

soldiers give also more to soldiers than civilians do. As can be seen in row (6) of *table 3*, this difference is statistically significant at the 5%-level.

	Group[a] A	Mean A	Group[a] B	Mean B	Test[b]
(1)	Sol-All	2.75	Civ-All	1.78	1988 (0.003***)
(2)	Sol-Sol	3.21	Civ-Civ	1.70	697 (0.001***)
(3)	Sol-Sol	3.21	Sol-Civ	2.14	292 (0.061*)
(4)	Sol-Civ	2.14	Civ-Civ	1.70	715 (0.132)
(5)	Civ-Sol	1.97	Civ-Civ	1.70	794 (0.163)
(6)	Sol-Sol	3.21	Civ-Sol	1.97	276 (0.014**)
(7)	Sol-Civ	2.14	Civ-Sol	1.97	300 (0.407)

a Group names: Soldiers (Sol), Civilians (Civ) or both together (All);
the first name represents the donor of the transfer, the second name the receiver

b Test statistic for differences in transfers averaged for each subject (Mann-Whitney-U-Test);
values for asymptotic one-side significance in parentheses
* 10% level of significance, ** 5% level of significance, *** 1% level of significance

Table 3: Statistical results for the dictator game (group differences)

4. Ultimatum game

In the ultimatum game the second player has the option to reject the amount offered by the first mover. If he rejects, both players get nothing. In the subgame perfect equilibrium of this game the first mover would give nothing and the second player nevertheless accepts this offer as he could not do better by rejecting it. However, in experiments small offers (up to 50% of the total amount) are often rejected and most first movers take this possibility into account and offer significantly positive amounts. *Osterbeek et al. (2004*) report in a meta study that proposers offer on average about 40% of their endowment and that about 16% of all positive offers are rejected.

For the present analysis it is of interest whether and how the relative generosity of soldiers vs. civilians is affected by the possibility that an offer may be rejected. On the one hand offers from soldiers and civilians may differ less if it is not mainly the intrinsic motivation that determines the amount transferred but the fear that low offers are rejected. On the other hand soldiers may expect higher transfers from their comrades and will therefore reject offers that would be accepted from civilians. If soldiers are aware of this, they might be inclined to offer more to their comrades. If soldiers serve as positive role models, this might affect the transfer expected by civilians in a similar manner.

To explore these aspects, the following hypotheses will be empirically tested:

- ***H-U1*** *(Higher general extrinsic motivation for generosity):* x(Sol - All) > x(Civ - All)
  Soldiers are likely to offer higher transfers as they assume that receivers expect more generosity from them. In contrast to the analysis of the dictator game this is an extrinsic motivation: Soldiers do not give more because they think it is appropriate to do so but because they fear that a lower offer from them would be rejected. For transfers between soldiers this can be attributed to comradeship, for transfers to civilians from the function of being a positive role model.
- ***H-U2*** *(Soldiers expect that in particular their comrades reject low offers)*: x(Sol - Sol) > x(Sol - Civ)
  As comradeship is an important social norm for soldiers, a soldier will expect that a comrade will be more reluctant to accept a low offer than a civilian who does not have this special relation. To avoid rejection of his offer he will accordingly offer a higher transfer.
- ***H-U3*** *(Soldiers expect that civilians reject low offers from soldiers)*: x(Sol - Civ) > x(Civ - Civ)
  If soldiers serve as positive role models, a soldier will expect that civilians will reject low offers from soldiers and therefore offers more than a civilian would have done.
- ***H-U4*** *(Civilians expect that soldiers are more likely to reject low offers)*: x(Civ - Sol) > x(Civ - Civ)

If soldiers are assumed to be generally more generous (positive role model), civilians may expect that soldiers are also more likely to punish selfish behavior. Therefore, they might offer higher transfers to soldiers in order to avoid rejection.

While these hypotheses consider the transfers offered and discuss the role of expected rejection only indirectly, it is interesting to also test for the actual differences in rejections. The problem is that we only observe differences in rejections if a certain transfer is actually proposed. As can be seen in the descriptive statistics below, there are only substantial differences in rejection rates for an offered transfer of 3 points (lower offers are almost always rejected, higher offers are almost always accepted). Therefore, the statistical test will concentrate on observations with this amount of transfer.

- ***H-U5*** *(Low offers of soldiers are more likely to be rejected):* RP(xSol=3) > RP(xCiv=3)
  Both comradeship and behavior as role model call for more generous behavior of soldiers. If the receiver considers a violation of either norm, he might like to punish the proposer. If the same transfer is proposed by a civilian, there is less desire for punishment and the offer is therefore more likely to be accepted. Therefore the rejection probability RP for a transfer xSol=3 by a soldier is supposed to be higher than the rejection probability for a civilian that offers the same amount RP(xCiv=3).
- ***H-U6*** *(Soldiers are more likely to reject low offers):* RP_Sol(x=3) > RP_Civ(x=3)
  Unlike civilians, soldiers that have internalized the norm of comradeship are more likely to consider low transfer proposals as socially inadequate. They are therefore more likely to punish such low offers. Therefore the probability RP_Sol that a soldier rejects an offer of x=3 is supposed to be higher than the rejection probability RP_Civ of a civilian receiver for the same offer.

Descriptive statistics

Figure 3 displays the results in the ultimatum game for all participants together (without distinguishing between the different groups). The upward facing bars indicate the frequency distribution of offers similar to *figure 1*. The downward facing bars show the share of rejected offers at each transfer amount. To give an example, in about 8% of the cases 2 points have been offered and more than 60% of such transfers have been rejected.

Similar to the results in the literature the most frequent transfers are 4 and 5 points. The majority of first movers offer either half or almost half of their initial endowment. All offers at a level of 5 or more points are accepted and also most of the 4 point offers. On average, proposing to transfer 4 points yields the highest expected payoff for the proposer (about 5.4). If only 3 points are offered, about 30% of the transfers are rejected and the expected payoff is lower than 5 points. Smaller transfers are rejected by the majority of receivers.

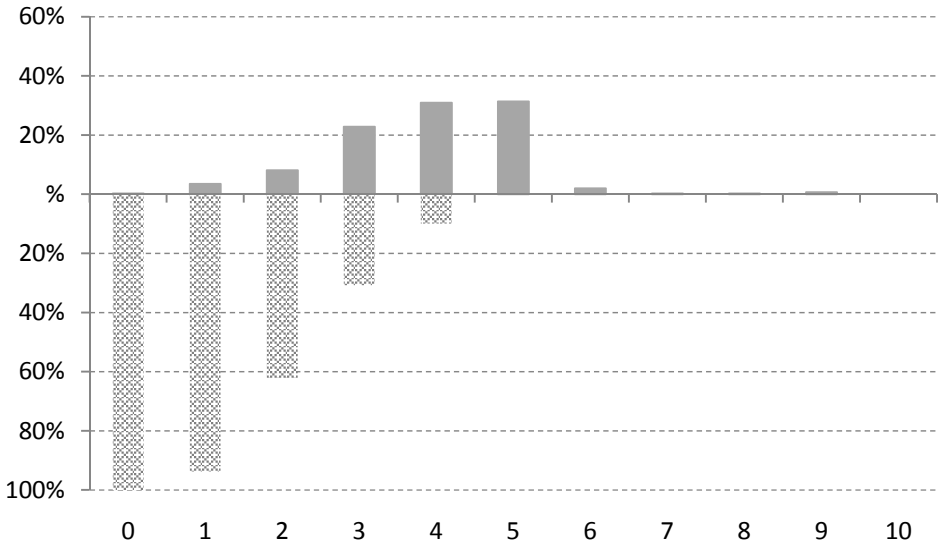

Figure 3: Frequency of offers and rejection rates in the ultimatum game (all subjects)

Figure 4 shows how the offers from soldiers (black bar) and civilians (white bar) differ. The basic structure of the frequency distribution of offers is similar for both groups. However, there are also some obvious differences. The modal offer of civilians is 4 points and 3 as well as 5 points are almost equally likely. In contrast, 5 points (fair split) has clearly the highest frequency for soldiers and an offer of 3 points is less likely in the case of soldiers. Note that the reported rejection rates state how second movers (both soldiers and civilians) react to offers by soldiers and civilians, respectively. Here it is interesting that offers by soldiers below the fair split are substantially more likely to be rejected which is particularly obvious for transfers of 3 points. It seems as if a higher transfer is expected from soldiers and that soldiers actually anticipate that an offer of 3 points is not enough or maybe react to non-acceptance by offering a higher transfer in the next round.

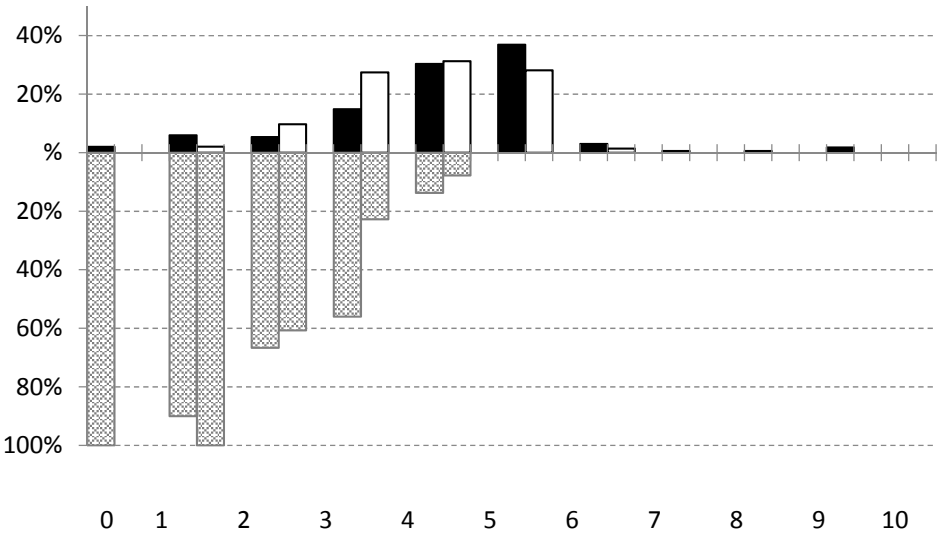

Figure 4: Frequency of offers and rejection rates in the ultimatum game (soldiers vs. civilians)

Looking at the descriptive statistics for the ultimatum game in *table 4* and comparing it with the statistics from the dictator game (*table 2*) it is quite obvious that the means of the different groups are

much closer but also that the variance within each group is much lower. A striking result is that the mean transfer given from civilians to soldiers is higher than that from soldiers to civilians.

	Proposer	Receiver	N	Mean	SD
(1)	All	All	152	3.90	1.08
(2)	Soldier	All	56	4.10	1.31
(3)	Civilian	All	96	3.78	0.91
(4)	Soldier	Soldier	32	4.26	1.36
(5)	Soldier	Civilian	24	3.89	1.23
(6)	Civilian	Soldier	26	4.05	0.82
(7)	Civilian	Civilian	70	3.68	0.92

Table 4: Descriptive statistics for the ultimatum game

Statistical tests

Concerning the first four hypotheses, which compare differences in the transfers of the proposer, the following results are obtained:

- ***Hypothesis H-U1*** states that soldiers are on average more generous than civilians. As indicated by row (1) in *table 5* this difference is statistically significant. But the means are much closer together as in the dictator game (a difference of about 0.3 points instead of 1 point) and the hypothesis is only confirmed on the 5%-level.
- While the mean transfer among soldiers is almost 0.4 points higher than the transfer from soldiers to civilians, the difference in transfers is not statistically significant (see row (3) in *table 5*) and therefore ***hypothesis H-U2*** cannot be confirmed. However, it might be noted that this is mainly due to the fact that the number of observations is quite small for the two groups compared.
- ***Hypothesis H-U3*** can be confirmed at the 10%-level even though mean differences of transfers are only 0.2. So it is just the other way around as in the dictator game where soldiers transferred significantly more to soldiers than to civilians but the difference between the transfers from soldiers to civilians and transfers among civilians was not statistically significant.
- ***Hypothesis H-U4*** is confirmed at the 5%-level (see row (5) in *table 5*). Civilians offer on average almost 0.4 points more to soldiers than to civilians and the difference is statistically significant.

	Group[a] A	Mean A	Group[a] B	Mean B	Test[b]
(1)	Sol-All	4.10	Civ-All	3.78	2.164 (0.022**)
(2)	Sol-Sol	4.26	Civ-Civ	3.68	799 (0.010**)
(3)	Sol-Sol	4.26	Sol-Civ	3.89	355 (0.314)
(4)	Sol-Civ	3.89	Civ-Civ	3.68	678 (0.078*)
(5)	Civ-Sol	4.05	Civ-Civ	3.68	702 (0.042**)
(6)	Sol-Sol	4.26	Civ-Sol	4.05	377 (0.269)
(7)	Sol-Civ	3.89	Civ-Sol	4.05	311 (0.488)

a Group names: Soldiers (Sol), Civilians (Civ) or both together (All);
the first name represents the donor of the transfer, the second name the receiver

b Test statistic for differences in transfers averaged for each subject (Mann-Whitney-U-Test);
values for asymptotic one-side significance in parentheses
* 10% level of significance, ** 5% level of significance, *** 1% level of significance

Table 5: Statistical results for the ultimatum game (group differences)

Table 6 supplements *figures 3* and *4* by displaying the frequency distributions of offers and the share of rejections for a given offer separately for the four different groups (Sol-Sol, Sol-Civ, Civ-Sol and Civ-

Civ). Beyond that it also shows the average payoff for a given offer which is calculated by multiplying the remaining endowment after transfer (1-x) with the probability of acceptance (1-RP).

The bold-faced numbers indicate the most frequent offers and the highest average payoffs. With the exception of offers from soldiers to civilians, the most frequent offer yields the highest expected payoff; in the former case, it would have been better to offer only 4 instead of 5 points. In some cases, two or three values for offers are almost equally frequent and the average payoff in these cases is quite close. Overall the expectation of most subjects about rejection probabilities seems to be sufficiently adequate to assure that only a relatively small number of offers is rejected and the chosen offers result for most cases in average payoffs that are at least close to optimal.

However, there is one interesting result where expectations are not matched. Both civilians and soldiers seem to assume that soldiers are less likely to accept low transfers (in the range between 1 and 3 points) and therefore avoid such transfers: Soldiers offer such low transfers to their comrades in only 22% of all cases and so do civilians, too. To civilians transfers in this range are offered in 32% and 46% of the cases, respectively. However, there is no indication that soldiers behave according to that expectation as the behavior of second movers (rejection rate) is essentially the same for civilians and soldiers both for interaction with soldiers and the interaction with civilians.

	Offers [points]	**1**	**2**	**3**	**4**	**5**	**>5**
Sol - Sol	Frequency [%]	4.2	3.1	14.6	***35.4***	***32.3***	9.3
	Share of rejections [%]	100	66.7	57.1	14.7	0.0	0.0
	Average payoff	0.00	2.66	3.00	***5.12***	***5.00***	≤4.00
Sol - Civ	Frequency [%]	8.3	8.3	15.3	23.6	***43.1***	1.4
	Share of rejections [%]	83.3	66.7	54.5	11.8	0.0	0.0
	Average payoff	1.50	2.66	3.19	***5.29***	***5.00***	≤4.00
Civ - Sol	Frequency [%]	2.6	6.4	12.8	***43.6***	30.8	3.8
	Share of rejections [%]	100	60.0	20.0	2.9	0.0	0.0
	Average payoff	0.00	3.20	***5.60***	***5.83***	5.00	≤4.00
Civ - Civ	Frequency [%]	1.9	11.0	***32.9***	***26.7***	***27.1***	0.5
	Share of rejections [%]	100	60.9	23.2	10.7	0.0	0.0
	Average payoff	0.00	3.13	***5.38***	***5.36***	5.00	≤4.00

Table 6: Frequency distribution of offers, share of rejections and average payoff for a given offer

Another interesting point is the striking fact that both civilians and soldiers are less likely to accept a medium low offer of 3 points from soldiers – such an offer by civilians is only rejected by about 20 to 25% of the receivers while about 55% of the offers from soldiers are rejected. This supports ***hypothesis H-U5,*** which states that low offers from soldiers are more likely to be rejected as comrades seem to punish a violation of the comradeship norm and civilians seem to assume that soldiers should serve as positive role models and punish them if they do not fulfill this expectation. The difference is statistically significant at the 1% level as indicated by the two-sided p-value of Fisher's exact test at p = 0.0027 based on a 2x2 contingency table with soldiers vs. civilians and acceptance vs. rejection. ***Hypothesis H-***

U6 is obviously not supported as the rejection probabilities for civilians and soldiers at an initial transfer of 3 points are quite similar if one controls for the fact whether the offer is made by a soldier or a civilian, respectively.

5. Trust game

The trust game (see *Berg et al., 1995*) is the most complicated setting. Like in the other two games, the first mover has an endowment of 10 points and can give a share to the other player. This amount is then multiplied by three, i.e. a transfer of 3 points by the first mover yields 9 points received by the other player. This second mover can then decide whether and how much he gives back to the first mover. As already mentioned above, the decision about the return transfer is via the strategy method. This implies that each player has to fill out a list where he displays how much he wants to transfer back for each possible transfer received. In the subsequent play only the first movers decide how much to transfer while the decision of the second mover is determined by the strategy described in the list. As has been shown in a meta study by *Johnson and Mislin (2011)*, using the strategy method instead of direct play does not significantly change the outcome in the trust game.

This setting allows us to analyze differences in trust and trustworthiness of the subjects. As soldiers have to work closely together and must trust each other, it would be expected that they are more trusting and as well more trustworthy than civilians.

Concerning trusting behavior, quite similar to the ultimatum game, the following hypotheses will be tested empirically.

- ***H-T1*** *(Soldiers are generally more trusting):* x(Sol - All) > x(Civ - All)
  Soldiers are used to trust other people because they have to do so in the military context. As they have internalized this trusting behavior, they will show more trust than civilians irrespective of whether they interact with soldiers or civilians.
- ***H-T2*** *(Soldiers especially trust their comrades)*: x(Sol - Sol) > x(Sol - Civ)
  Soldiers depend on each other and therefore they have to trust their comrades. This might make them more trusting if they decide about a transfer to another soldier than about a transfer to a civilian.
- ***H-T3*** *(When interacting with civilians soldiers are more trusting than civilians)*:
  x(Sol - Civ) > x(Civ - Civ)
  Soldiers learn in their professional environment that trusting is important. Therefore, they also show more trust than civilians do when they interact with other civilians.
- ***H-U4*** *(Civilians consider soldiers to be more trustworthy)*: x(Civ - Sol) > x(Civ - Civ)
  Given that soldiers serve as role models, civilians consider soldiers less likely to disappoint them. Therefore, they are more trusting when interacting with soldiers.

While the second mover could only reject an offer in the ultimatum game, the strategy set is now much richer. As the strategy method has been applied, the relevant data to test the following hypotheses about trustworthiness is available. To distinguish it from the first round transfer, the second round transfer will be labelled by y.

- ***H-TW1*** *(Soldiers are generally more trustworthy):* y(Sol - All) > y(Civ - All)
  Soldiers are used to reciprocate trust of their comrades. If they have really internalized this norm, they will give back more than civilians irrespective of the fact whether they deal with soldiers or civilians.
- ***H-TW2*** *(Soldiers reciprocate trust of their comrades)*: y(Sol - Sol) > y(Sol - Civ)

Soldiers expect that their comrades are trusting and will in return reciprocate this trust by higher return transfers. For low first mover transfers this might no longer be true as they might want to punish the non-trusting behavior of their comrades.

- ***H-TW3*** *(Soldiers are more trustworthy in interaction with civilians)*: x(Sol - Civ) > x(Civ - Civ)
  Soldiers want to behave according to the expectations for a positive role model. Therefore, they are likely to return higher shares of the transfers received from civilians than civilians in an interaction among themselves.

First mover transfer – descriptive statistics

On average, the first movers transfer about half of their endowment. However, transfers range from 0 to 10 points, with modal points at 0 and 10 points (each a little bit more than 20%), a third spike at 5 points with about 12%, and the other possible transfers almost equally distributed (see *figure* 5). Note that this structure is typical for first mover transfers in the trust game (see e.g. *Cox, 2004, p. 272*).

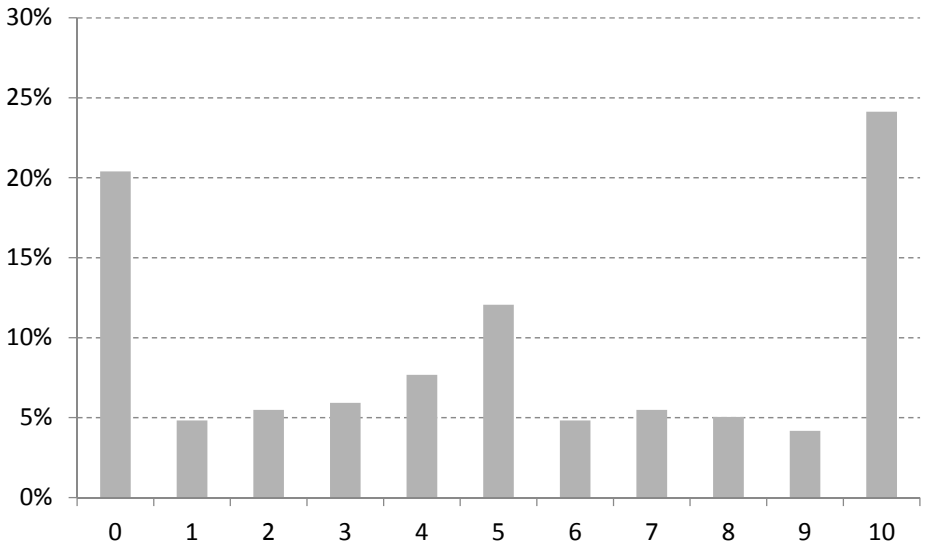

Figure 5: First mover transfers in the trust game (all subjects)

The basic structure with a large heterogeneity among subjects (large standard deviation SD in *table 7*) is the same for both soldiers and civilians. However, soldiers invest on average about 1.3 points more than civilians do. This is mainly due to a much larger portion of subjects that transfer 10 points and a smaller share of soldiers that transfer nothing as can be seen in *figure 6*.

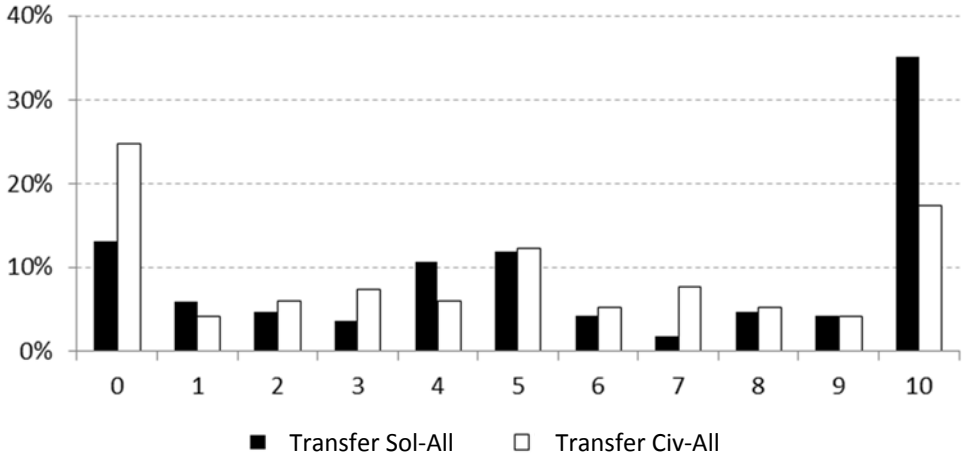

Figure 6: First mover transfers in the trust game (soldiers vs. civilians)

As indicated by *table 7* it has little influence whether the second mover is a soldier or a civilian (difference of about 0.2 points). However, it should be noted that the average transfer of soldiers to civilians is higher than the transfer among soldiers.

	Donor	Receiver	N	Mean	SD
(1)	All	All	152	5.10	3.47
(2)	Soldier	All	56	5.93	3.53
(3)	Civilian	All	96	4.62	3.37
(4)	Soldier	Soldier	32	5.85	3.48
(5)	Soldier	Civilian	24	6.03	3.67
(6)	Civilian	Soldier	26	4.77	3.63
(7)	Civilian	Civilian	70	4.56	3.29

Table 7: Descriptive statistics for the trust game (first mover transfers)

First mover transfers – statistical tests

Concerning the first four hypotheses that compare differences in the first mover transfers, the following results are obtained:

- ***Hypothesis H-T1*** states that soldiers are generally more trusting. As indicated by row (1) in *table 8* this difference is statistically significant. However, even though means differ by about 1.3 points, the hypothesis is only confirmed on the 5%-level. This is most likely due to the high in-group heterogeneity, which makes statistical interference less precise.
- As already mentioned above, whether the first mover transfer is made to a civilian or a soldier has almost no impact. Beyond that, soldiers give on average even more to civilians than to soldiers. Subsequently, ***hypothesis H-T2*** cannot be confirmed as can be seen in row (3) in *table 8*. However, it should be noted that soldiers give significantly more to their comrades as civilians give among each other (see row (2) in *table 8*)
- Furthermore, soldiers transfer on average significantly more to civilians than civilians among themselves. As can be seen in row (4) of table 8 the means differ by almost 1.5 points and ***hypothesis H-T3*** can be confirmed at the 5%-level.
- Finally, while civilians transfer somewhat more to soldiers than to other civilians, this difference is not statistically significant and therefore ***hypothesis H-T4*** cannot be confirmed.

	Group[a] A	Mean A	Group[a] B	Mean B	Test[b]
(1)	Sol-All	5.93	Civ-All	4.62	2.108 (0.013**)
(2)	Sol-Sol	5.85	Civ-Civ	4.56	884 (0.044**)
(3)	Sol-Sol	5.85	Sol-Civ	6.03	372 (0.417)
(4)	Sol-Civ	6.03	Civ-Civ	4.56	633 (0.036**)
(5)	Civ-Sol	4.77	Civ-Civ	4.56	884 (0.414)
(6)	Sol-Sol	5.85	Civ-Sol	4.77	340 (0.115)
(7)	Sol-Civ	6.03	Civ-Sol	4.77	251 (0.116)

a Group names: Soldiers (Sol), Civilians (Civ) or both together (All);
the first name represents the donor of the transfer, the second name the receiver

b Test statistic for differences in transfers averaged for each subject (Mann-Whitney-U-Test);
values for asymptotic one-side significance in parentheses
* 10% level of significance, ** 5% level of significance, *** 1% level of significance

Table 8: Statistical results for the trust game (first mover transfer - group differences)

Return transfer – descriptive statistics

Figure 7 displays for soldiers and civilians the share of the obtained payment (first mover transfer multiplied by three) that is returned by the second mover. Note that these returns are displayed as continuous curves for visual aspects – even though the transfers are discrete. In addition to the curves for the two groups the full compensation boundary (one third of the obtained payment) and the share that yields a fair split of the total endowment available after the initial transfer is displayed. An example may be helpful to understand what is meant by the latter concept: Consider a first mover transfer of 4 points which yields 12 points (3 x 4 points) for the second mover and 6 points remaining for the first mover. If the second mover now returns 3 points (a share of 0.25), in the end both subjects obtain 9 points. Note that this would imply that nothing is returned for first mover transfers of 2 points or less as in these cases the first mover already has a higher remaining endowment without any return transfer.

Looking at the actual data the average payments are not in line with this idea of a fair split: For both soldiers and civilians transfer shares for low first mover transfers are positive while transfer shares for high first mover transfers are well below the fair split. Generally average transfer shares rise with higher first mover transfers. However, only soldiers pay back enough to assure on average full compensation for high first mover transfer. If one looks closer at the distribution of return payments it becomes clear that this "unfair" behavior is mainly due to a relatively large number of subjects that return nothing or almost nothing.

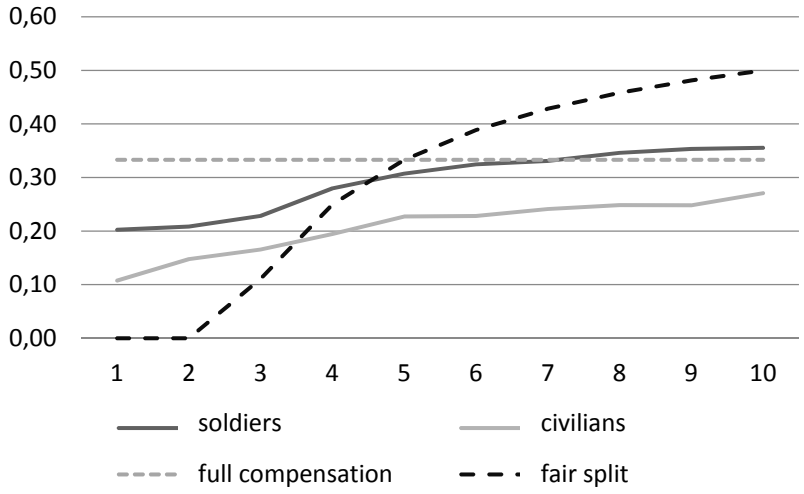

Figure 7: Shares returned in trust game (soldiers vs. civilians)

If all four different group constellations are considered (see *figure 8*), it is striking that soldiers behave on average more trustworthy than soldiers among themselves. This somehow resembles the higher first mover transfers from soldiers to civilians observed above. For higher initial transfers the average share of returns is also substantially higher from civilians to soldiers than among civilians. In how far these differences are also statistically significant is analyzed in the next step.

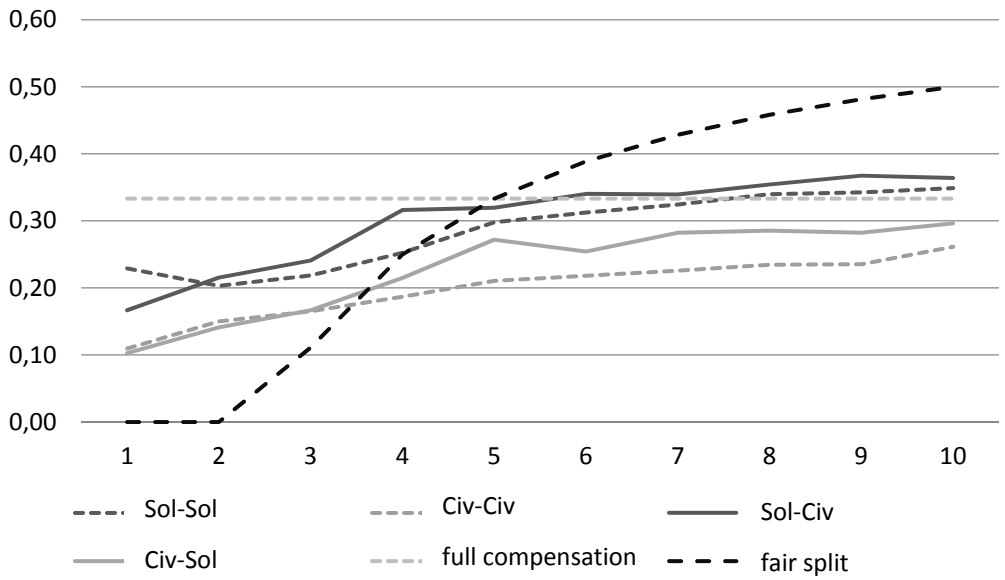

Figure 8: Shares returned in trust game (group comparison)

Return transfer – statistical tests

The statistical tests have been performed for all combinations of subgroups and each possible first-mover transfer. As the number of combinations are quite large, the numerical results are presented on an extra page in two separate tables: *table 9* that presents the mean transfers between the different groups, and *table 10* that reports the error probabilities of the one-sided versions of the Mann-Whitney-U-test; cases where the mean transfer of the second group combination is higher have been underlined to avoid misunderstandings.

What are the results obtained with respect to the three hypotheses about trustworthiness?

- ***Hypothesis H-TW1*** states that soldiers are generally more trustworthy. As indicated by row (1) in *table 10* the difference is statistically significant for all possible first mover transfers. Note that for first mover transfers of 2 and 3 points the significance is only given at the 10% level. However, as the values for return transfers are for both groups higher than necessary for a fair split, these results are of less importance. Therefore, it could be stated that the hypothesis is clearly confirmed.
- There is no support for ***hypothesis H-TW2***. Soldiers return on average even higher shares to civilians than they return to their comrades (see rows (4) and (5) in *table 9*). Note, however, that according to row (3) in *table 10* transfers from soldiers to civilians only significantly differ for a first mover transfer of 4 points. Therefore, it seems justified to conclude that it just does not really matter for the return shares whether soldiers interact with civilians or with their comrades.
- On the other hand, soldiers return on average about 50% more to civilians than civilians among themselves. Accordingly row (4) of *table 10* indicates that ***hypothesis H-TW3*** can be clearly confirmed.

Table 9: Mean return transfer shares in the trust game (trustworthiness)

	Donor	Receiver	N	1	2	3	4	5	6	7	8	9	10
(1)	All	All	152	0.14	0.17	0.19	0.23	0.26	0.26	0.27	0.28	0.29	0.30
(2)	Soldier	All	54	0.20	0.21	0.23	0.28	0.31	0.32	0.33	0.35	0.35	0.36
(3)	Civilian	Alle	96	0.11	0.15	0.17	0.19	0.23	0.23	0.24	0.25	0.25	0.27
(4)	Soldat	Soldier	32	0.23	0.20	0.22	0.25	0.30	0.31	0.32	0.34	0.34	0.35
(5)	Soldier	Civilian	24	0.17	0.22	0.24	0.32	0.32	0.34	0.34	0.35	0.37	0.36
(6)	Civilian	Soldier	26	0.10	0.14	0.17	0.21	0.27	0.25	0.28	0.29	0.28	0.30
(7)	Civilian	Civilian	70	0.11	0.15	0.17	0.19	0.21	0.22	0.23	0.23	0.24	0.26

Table 10: Significance of differences in return transfer shares (trustworthiness)

	Group A	Group B	1	2	3	4	5	6	7	8	9	10
(1)	Sol-All	Civ-All	0.008***	0.079*	0.058*	0.009***	0.018**	0.003***	0.005***	0.003***	0.001***	0.008***
(2)	Sol-Sol	Civ-Civ	0.015**	0.195	0.207	0.122	0.07*	0.029**	0.022**	0.018**	0.013**	0.04**
(3)	Sol-Sol	Sol-Civ	0.254	0.34	0.187	0.045**	0.192	0.176	0.245	0.217	0.233	0.284
(4)	Sol-Civ	Civ-Civ	0.094*	0.1*	0.038**	0.002***	0.007***	0.002***	0.004***	0.003***	0.001***	0.01***
(5)	Civ-Sol	Civ-Civ	0.459	0.486	0.388	0.237	0.092*	0.159	0.068*	0.084*	0.105	0.179
(6)	Sol-Sol	Civ-Sol	0.037**	0.234	0.32	0.385	0.453	0.232	0.347	0.24	0.183	0.225
(7)	Sol-Civ	Civ-Sol	0.121	0.134	0.099*	0.023**	0.152	0.042**	0.132	0.048**	0.033**	0.084*

6. Conclusion and discussion

Overall we obtain the result that soldiers are on average more altruistic, more cooperative and more trusting as well as more trustworthy than civilians. The difference between soldiers and civilians is not only statistically significant but also substantial. In the dictator game soldiers give on average over 50% more than civilians and show therefore much more unconditional altruism. The difference in the ultimatum game is smaller (about 10%). However, this is mainly due to the fact that civilians are now forced by the threat of rejection to offer higher amounts which yields a much lower variance in the amount of transfers (more than 75% are in the range between 3 and 5 points). In the trust game the first mover transfer of soldiers is on average almost 30% higher than the transfer of civilians. A look at the distribution graph shows that this is due to a much lower percentage of zero transfers ("no trust") and a much higher share of transfers of the total endowment ("fully trusting"). Finally, soldiers are also much more trustworthy as they return on average an about 40% higher share of the received transfer.

The more altruistic, cooperative and trusting behavior is in general not restricted to the interaction with other soldiers (in-group cooperation) but extends to the behavior of soldiers relative to civilians. When considering mean transfers in the dictator and the ultimatum game, soldiers give more to their comrades than they give to civilians, and the average transfer of soldiers to civilians exceeds the average transfer among civilians. This would indicate a strong impact of comradeship for in-group cooperation and a limited spillover to the interaction with civilians. These findings are insofar remarkable as the experimental tasks were quite distinct from the soldiers' habituated military context: Their participation was off-duty, the experimental tasks didn't involve any "military" framing and the soldier subjects didn't wear their uniforms during the experiment. However, due to the relatively small number of observations for the interaction between soldiers and civilians not all differences are statistically significant, which implies that one should be somewhat cautious to draw such conclusions. For the ultimatum game we obtain an additional interesting result: while rejection rates do not differ significantly between civilians and soldiers, relatively low transfers from soldiers (transfers of 3 points) are much more likely to be rejected by both soldiers and civilians. In the trust game it is even the case that first mover transfers as well as return transfers (shares) of soldiers are on average higher than these among soldiers. However, as these differences are not statistically significant this observation basically implies that soldiers are generally more trusting and trustworthy and do not restrict this behavior to their comrades.

What is the reason that soldiers behave differently than civilians? As the group of soldiers studied has already been exposed to 15 months of intensive military training, we think that the differences in behavior relative to the civilian students can be mainly attributed to this training. However, as we cannot fully rule out (self) selection effects (more cooperative people want to become soldiers or the recruiting commission chooses the more cooperative applicants), an additional study with candidates at the moment of recruiting might be of interest.

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