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Luck or Cheating?
A Field Experiment on Honesty with Children

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Luck or Cheating?

A Field Experiment on Honesty with Children*

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Abstract

We ran an experiment with children to study the development of honesty with age. We asked each child to toss a fair coin in private and to record the outcome (white or black) in a paper sheet. We rewarded only who reported white. We found a fraction of reported whites significantly larger than 50%, uniformly across age groups. This suggests that some children cheat when cheating is profitable and they are not observed. In a second treatment we told children not to cheat. This reminder reduced the probability of reporting white by 18% on average, and significantly more in girls.

Keywords: honesty; children; field experiment.

JEL codes: C93; J13.

In everyday life we observe dishonesty. People ride the bus without buying a ticket, do not pay their taxes and illegally download music from the Internet. Unfortunately, these examples are only a subset of the possible cases of dishonest behavior. As argued in Mazar and Ariely (2006), dishonest actions are socially costly as they "contribute to the U.S. economy losing hundreds of millions of dollars in tax revenues, wages, and investment dollars, as well as hundreds of thousands of jobs each year." On the other hand, there are many economic activities that operate on an honor system. For instance, at an airport, all luggage is placed on a common conveyor belt and it is assumed that passengers will only claim their own; or some hotels allow guests to serve and record their own drinks**.** This heterogeneity of behavior is surprising.

An extensive experimental literature studies dishonesty in economics (Fischbacher and Heusi, 2008; Pruckner and Sausgruber, 2008; Mazar, Amir and Ariely, 2007) and psychology (Polak and Harris, 1999; Wilson, Smith and Ross, 2003). Concurrently, the behavior of children in different situations is increasingly being studied, with a growing body of literature in experimental economics having emerged over the last few years (see for instance Fehr, Bernhard and Rockenback, 2008; Harbaugh, Krause and Berry, 2001; Harbaugh, Krause and Vesterlund, 2002 and 2007). However, to the best of our knowledge the development of honest and dishonest behavior with age has not yet been studied. This paper takes a step towards addressing this issue, by reporting data from a field experiment with children.

We ran a field experiment in an Italian summer camp, which allowed us to observe a large number of children who differed in age and other demographic characteristics. Our sample includes nearly 200 observations, encompassing children between the ages of 5 and 15. In a first experiment we asked children to toss a fair coin, which was white on one side and black on the other, and to report the result. Children only received a prize if they reported the white outcome. If everyone were to report honestly, we should observe a roughly equal distribution between white and black outcomes. However, the toss was not observed, so each child could easily cheat.[1] If cheating had no internal cost, it would therefore be convenient

for all children to report the white outcome. In our sample 85% of the children reported the white outcome. This fraction is statistically larger than 50% and smaller than 100%. This suggests that: *i*) some children cheat when the environment allows them to do so; *ii*) other children are honest even if this behavior is costly. The tendency to cheat is statistically significant in all sub-groups based on age, gender, school performance, number of siblings, and body mass index (hereafter BMI), but is more pronounced in older children and those with siblings. In a second experiment we repeated the same game with other children, but we explicitly reminded them not to cheat. On average this reminder reduces the probability of reporting the white outcome by 18%. The effect of this reminder was significantly larger in girls.

The paper is organized as follows: in Section I we sketch the experiment. In Section II we present our results and in Section III we draw our conclusions. The appendix provides details on the experiment.

I. The Experiment

We conducted an experiment with young children at the CUS Summer Camp of Padua (Italy), over two days in July 2008.[2] The experiment took place outdoors, and the participants perceived the task as being one of the typical camp activities. We explained the game rules individually to each child, ensuring they fully understood before playing. In the game we asked each child to step behind a wall, toss a fair coin, which was white on one side and black on the other, and to report the result. Only children who reported white received a prize. Children in our sample were of different ages, and we needed an experimental currency that would be desirable for everybody. We did not use monetary rewards as a number of works find money inhibits cheating (see Mazar, Amir and Ariely, 2007). We therefore gave a prize of 5 tokens to those who reported the white outcome. At the end of the day, children exchanged their tokens at the summer camp's clubhouse, choosing from a menu of snacks, beverages and ice cream. We privately agreed with the summer camp on an exchange rate

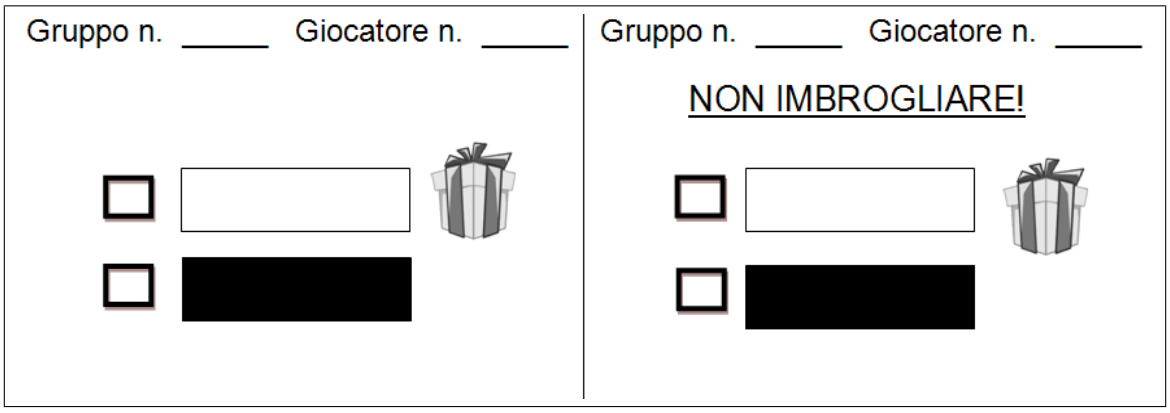
of 50 eurocents for the prize.

Importantly, children were not observed during their toss. Hence, they could easily cheat and report the white outcome even if the result of their toss was black. Although we are not able to tell whether each child was honest, we can estimate the honesty of the children as a whole group, by comparing the observed fraction of reported white outcomes with the expected 50 percent.

During the two days we ran two treatments of the game with different children. In the Control Treatment (CT), we carefully avoided mentioning the possibility of cheating, but at the same time, we did not explicitly tell the children not to cheat. In the Reminder Treatment (RT), we explicitly told them not to cheat. We did so both orally during the game explanation, and in writing, by adding the sentence "DO NOT CHEAT!" ("NON IMBROGLIARE!" in Italian) to the reporting sheet. Children in the RT thus filled in the reporting sheet b) rather than a) in Figure 1.

Figure 1.

a) Reporting sheet in CT. b) Reporting sheet in RT.



We received permission to run the experiment from the manager and the instructors of the summer camp. A few days before the experiment, we also asked parents for their consent along with some basic information about each child (age, gender, school performance, number of siblings, height, weight).[3] Based on a consent rate of 83.88 percent, our final dataset

comprises 182 children aged 5 to 15 years.[4] Table 1 reports the average characteristics of the children in the CT and RT groups; the two samples are approximately equal in size with similar demographic characteristics.[5]

Table 1. Average sample statistics

	Whole sample	CT	RT
% Reported white outcomes	76.92	85.39	68.82
Age	8.79	9.16	8.33
% Girls	28.02	27.55	28.72
% Excellent at school	41.76	47.96	37.23
Number of siblings	0.93	0.97	0.86
Body Mass Index (BMI)	16.78	17.33	16.05
Observations	182	89	93

II. Results

Our findings can be summarized by three main results, the first of which is as follows:

Result 1. *Many (but not all) children cheat. The tendency to cheat is observed uniformly in any sub-group based on age, gender, school performance, number of siblings, or BMI, but is less frequent in younger children and in children without siblings.*

Overall, 76.92% of the children reported a white outcome with a 95% binomial confidence interval of (70.11%, 82.83%). Table 2 shows the percentage of reported white outcomes by sub-groups, with binomial confidence intervals in round brackets.

Since the coin is fair, one would expect the confidence interval to include 50%. The percentage in our sample is instead statistically above 50%, both for the whole sample as well as for smaller sub-groups defined according to age, gender, school performance, number

of siblings, and BMI. This result indicates that some children do not hesitate to cheat if they have a chance to do so. On the other hand, it would be convenient to always report white since nobody controls the result of the toss. The percentage we observe is however statistically below 100% in every group. This suggests that a non-negligible number of children receive internal rewards from being honest. Comparing the sub-groups with a two-sample parametric test (last column of Table 2), we find moderate evidence – significant at 10% – that the proportion of those reporting white is lower in younger children and in those without siblings.

Table 2. Percentage of reported white outcomes in the experiments

	% White (1)	Obs.	% White (2)	Obs.	H_0: (2) = (1)
Age:	8 or younger		older than 8		
	72.83	92	81.11	90	1.3263*
	(62.55, 81.58)		(71.49, 88.59)		[0.0924]
Gender:	Girls		Boys		
	70.59	51	79.39	131	1.2656
	(56.17, 82.51)		(71.45, 85.96)		[0.1028]
School performance:	Good or fair		Excellent		
	76.42	106	77.63	76	0.1921
	(67.18, 84.12)		(66.62, 86.40)		[0.4238]
Siblings:	No siblings		One or more		
	70.46	44	80.17	116	1.3144*
	54.80, 83.24)		(71.75, 87.00)		[0.0944]
BMI:	Bottom 50%		Top 50%		
	76.71	73	77.47	71	0.1074
	(65.35, 85.81)		(66.00, 86.54)		[0.4572]

Note: 95% binomial confidence interval in round brackets; p-value in square brackets. The last column reports a two-sample parametric test of equality of the proportions (2) and (1). Alternative hypothesis: (2) < (1). * = significant at 10%. For age we use 8 as a cutoff to have two sub-groups roughly equal in size.

We then focus on the effect of the RT (Table 3).

Result 2. *Telling children not to cheat significantly reduces the proportion of white outcomes. The effect is observed uniformly in any sub-group based on age, gender, school performance, number of siblings, and BMI.*

Table 3. Reminder treatment effect

	CT sample		RT sample		H_0: (1) = (2)
	% White (1)	Obs.	% White (2)	Obs.	
Whole sample	85.39	89	68.82	93	2.6532***
	(76.32, 91.99)		(58.37, 78.02)		[0.0040]
Children aged 8 or below	82.86	35	66.67	57	1.6948**
	(66.35, 93.44)		(52.94, 78.60)		[0.0451]
Children aged more than 8	87.04	54	72.22	36	1.7591**
	(75.10, 94.63)		(54.81, 85.80)		[0.0393]
Girls	83.33	24	59.26	27	1.8833**
	(62.62, 95.26)		(38.80, 77.61)		[0.0298]
Boys	86.15	65	72.73	66	1.8895**
	(75.34, 93.47)		(60.36, 82.97)		[0.0288]
Good or fair at school	85.11	47	69.49	59	1.8813**
	(71.69, 93.80)		(56.13, 82.61)		[0.0300]
Excellent at school	85.71	42	67.65	34	1.8794**
	(71.46, 94.57)		(49.47, 82.61)		[0.0301]
Without siblings	80.95	21	60.87	23	1.4584*
	(58.09, 94.55)		(38.54, 80.29)		[0.0724]
With siblings	88.33	60	71.43	56	2.2819**
	(77.43, 95.18)		(57.79, 82.70)		[0.0112]
Bottom 50% BMI	84.85	33	70.00	40	1.4939*
	(68.10, 94.89)		(53.47, 83.44)		[0.0676]
Top 50% BMI	84.78	46	64.00	25	2.0019**
	(71.13, 93.66)		(42.52, 82.03)		[0.0226]

Note: 95% binomial confidence interval in round brackets; p-value in square brackets. The last column reports a two-sample parametric test of equality of the proportions (1) and (2). Alternative hypothesis: (1) < (2). * = significant at 10%; ** = significant at 5%; *** = significant at 1%.

While the percentage of reported whites is always statistically above 50% in the CT group, in some sub-groups of the RT sample the confidence interval includes this proportion. Indeed, it is only in the RT that we do not find significant evidence of cheating behavior in some sub-groups. Specifically, this is the case for girls, children with higher school perfor-

mance, children without siblings, and children with a high BMI. In the last column of Table 3 we report a two-sample parametric test to compare the proportions (2) and (1) of white outcomes reported in the CT and RT samples. We find a generalized negative effect of RT on the proportion; the effect is significant at conventional significance levels, uniformly in any sub-group.

Finally, we provide a quantitative assessment of the RT effect. In doing so, we control for all the child's characteristics jointly.

Result 3. *The reminder treatment reduces the proportion of white outcomes on average by 18%. The effect is significantly larger in girls.*

Table 4 shows the marginal effects resulting from two probit regressions where the dependent variable is a binary variable taking a value 1 if the child reports the white outcome, and 0 otherwise. In specification (1) this variable is regressed over binary variables on age groups, gender, school performance, siblings, BMI, and RT effect. If children behaved uniformly honestly or dishonestly, we should not observe a significant effect of any variable in the regression. We indeed see that the child's variables do not explain the reported coin toss at conventional significance levels. In particular, we notice that the probability of reporting white is statistically equal between younger and older children. Only the RT dummy variable is significant at 5%. Column (1) shows that simply telling the children not to cheat reduces the probability of reporting white by 17.96%. In specification (2) we add the interactions between the RT and the child's characteristics. We find no evidence of a different treatment effect with respect to age, school performance, number of siblings, or BMI, but the effect seems to be smaller in boys (significant at 10%). If the probability of reporting white with the RT is reduced by 35.31% for girls, it is reduced only by $35.31 - 24.25 = 11.06\%$ for boys.

Table 4. Probability of reporting the white outcome (marginal effects)

Variable	(1)	(2)
Age over 8	0.0360	0.0319
	(0.0750)	(0.1064)
Boy	0.0307	-0.1199
	(0.0811)	(0.1057)
Better at school	-0.0761	-0.0642
	(0.0738)	(0.1069)
One or more siblings	0.1036	0.1087
	(0.0858)	(0.1250)
High BMI	-0.0527	-0.0410
	(0.0749)	(0.1081)
RT	-0.1796**	-0.3531*
	(0.0733)	(0.2015)
RT*Age over 8		-0.0087
		(0.1552)
RT*Boy		0.2425*
		(0.1181)
RT*Better at school		-0.0185
		(0.1519)
RT*One or more siblings		-0.0028
		(0.1569)
RT*High BMI		-0.0384
		(0.1615)
N. observations	141	141
Pseudo-R^2	0.0657	0.0874
Log-pseudolikelihood	-70.5498	-68.9114

Note: Method: probit regression. Dependent variable: binary variable equal to 1 if the child reports the white outcome, and 0 otherwise. Standard errors in parentheses. The number of observations in the regression, 141, is lower than the number of children who tossed the coin, 182, as in several cases parents did not give information about one or more of their child's characteristics. * = significant at 10%; ** = significant at 5%.

III. Discussion

Our results show that, even from an early age, some children have an inclination to cheat when given the opportunity to do so. The result that dishonesty develops early in childhood is crucial for a society interested in reducing it. The fact that some children in our experiment reported the (losing) black outcome also shows that there may be an internal reward from being honest, as suggested by Frank (1987) and Levitt (2006). It seems however that most children do not receive such internal rewards. This result is consistent with the findings in Pruckner and Sausgruber (2008). Finally our analysis suggests that a powerful method to encourage honesty is simply to remind people to behave correctly. While this action does not entirely remove the problem, it significantly reduces the probability of cheating at virtually no cost. A similar result is found with older subjects in recent works from Mazar, Amir and Ariely (2007). We find that a reminder treatment is more effective in females than in males.

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Notes

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[1]In our experiment, children either tell the truth or lie. For sake of clarity we do not permit a mixed behavior as in Mazar, Amir and Ariely (2007), where individuals are allowed to lie "a little".

[2]Refer to the appendix for a description of the CUS activities and for pictures.

[3]We use gender, age, weight and height to calculate the BMI.

[4]Among the 242 parents we contacted, 203 gave their consent, but 9 of the children were absent in the two days of the experiment. 12 of the remaining 194 children attended both sessions; in the second day we took them apart and asked to comment on their and others' previous outcome. None of the children claimed to have cheated in the first game, but some said that others might have done so.

[5]We are skeptical only on the accuracy of reported performance at school. Our impression is that parents over-rated the performance of their children: around 42% of the sample reported an "excellent" performance, a similar fraction a "good" performance, and the remaining a "fair" performance. Nobody instead reported a "poor" performance. This is however not a problem for us, as we are interested only in creating a ranking of the school performance.

Appendix

Luck or Cheating?
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Alessandro Bucciol and Marco Piovesan

Appendix Contents

A.1 Timeline

Our procedure comprises three phases: the authorization, the experiment, and the reward. The first phase is conducted one week before the experiment, and consists of asking the parents of the children to read, fill in, and sign an authorization form. The form includes basic information on the child participating in the experiment: age, gender, school performance, number of siblings, height, and weight.

The second phase is the experiment itself, which was conducted on two Thursdays, the 3rd and 24th of July, in 2008, with multiple sessions for different groups of children between 9:00am and 5:30pm.

The reward phase occurs after the experiment has concluded. At the end of each session, the management of the summer camp is informed on the rewards, and permits its clubhouse to distribute the prizes to the children. Since the children were not allowed to collect their prizes without an adult, most of the distribution occurred the day after the experiment.

A.2 Instructions (script, translated from Italian)

Stage 1: Greeting and introductory instructions for the group (5-10 minutes).

Hello everybody!

First of all, thanks a lot for letting us come to your summer camp today. It's really nice to be here. Do you like the summer camp? It is your first time? (We asked other questions, just to familiarize ourselves with children).

Today you have the opportunity to play a game. This game is easy and we hope also fun. It gives you the chance to win some tokens, which you can exchange at the end of the day for candies, ice cream, or sodas at the clubhouse of CUS. Everybody can win something, but the more carefully you will listen to our instructions, the more tokens you will win. So, please do not talk, and try to listen what we will tell you over the next few minutes. If you have any questions, please raise your hand, and we will be happy to answer you.

The object of the game is to toss this coin and to report us the outcome. According to the outcome you can receive 0 or 5 tokens. As I said before, you can exchange your tokens with what you want at the clubhouse of CUS.

Questions? Does anyone need to go to the toilet?

Let's start the game then.

Stage 2: Identification (5-10 minutes)

Since this is our first time here, and we do not know your name, we need to give you a tag with a number on it, which is on a string that you can wear around your neck. The number on the tag has no meaning. However, please keep it always with you, because we will record your result using this number, and we will only give tokens to the children that return the number tag when the game is over.

Here we have a plastic bag with some cards. Each card has a number. My helper is going to come by, and you can pick a card. Once you have a number, you have to go to that table, say your name and then get your tag with the same number. During the game, we will use these numbers to identify you, since we do not know your names.

The assistants assign a tag to each child whose name is in the list of approved participants, corresponding to the number drawn. Once everybody has a tag, we continue with individual instructions.

Stage 3: Game explanation (individually)

Please listen to me carefully. This coin has two sides: one black and one white. Now, you have to go behind the wall over there and toss once this coin. Then, you have to report the

outcome using this report sheet. Nobody will see the outcome of your toss. You will receive 5 tokens if you report white. Is it clear?

Children in RT were also said the following:

Remember do not cheat!

We ask some questions, to check the children's comprehension of the task, and the payoff implications. We answer their questions, or requests to repeat part of the instructions.

Stage 4: Game playing (individually)

Children go individually behind the wall, toss the coin and fill in the report sheet. Then they return us the report sheet. Only then we repeat this procedure with another child.

Stage 5: Farewells (10 minutes)

Thank you very much guys. You really did a great job. Now, to thank you we have a surprise. There are some sodas, juices and water for you. Come on, follow us and enjoy!

When saying farewell to the children, they are provided with some beverages. This was expressly requested by the management of the summer camp, to ensure a "prize" of some sort for all the children, even those who reported the black outcome.

In the mean time assistants prepare the bonuses with their corresponding tokens.

Ok, the game is now over; please return us the tag. After 5:30 this evening you can get a certificate showing the number of tokens you won. You can get your rewards at the clubhouse whenever you want, provided that you come with an adult.

A.3 Material

The material used in the experiment is summarized by the pictures below.

A.3.1 Authorization form

The authorization form consists of four pages, as shown below. After the title page, the first page contains information about us, and the second is where the parents fill in authorization information (age, gender, school performance, number of siblings, height, and weight). The last page explains the game.


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Da alcuni anni la teoria economica sta mostrando sempre più attenzione verso bambini e ragazzi. Studiarne il comportamento consente in particolare di trarre informazioni utili a capire i processi decisionali degli adulti. Conoscere adeguatamente cosa determina le azioni di bambini, ragazzi e adulti è essenziale per la costruzione di adeguati modelli teorici e, in ultima analisi, per indirizzare le scelte di politica economica verso percorsi che aumentino il benessere di tutti.

Per questo motivo avremmo in mente di coinvolgere suo figlio in un nostro progetto svolto in collaborazione con i centri estivi CUS e l'Università di Padova. L'analisi sarà condotta utilizzando semplici giochi rappresentativi di situazioni economiche stilizzate. Suo figlio percepirà la cosa come una normale ora di attività ricreative, per cui riceverà in cambio dei piccoli premi da ritirare (solo in sua compagnia) presso lo solo Club della struttura sportiva.


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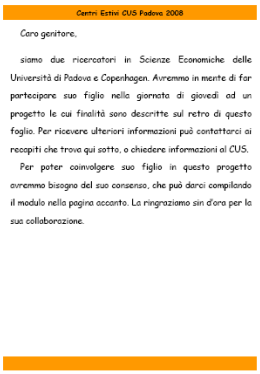
Attività Ricreative

Università degli Studi di Padova


Centri Estivi CUS Padova 2008

Caro genitore,

siamo due ricercatori in Scienze Economiche delle Università di Padova e Copenhagen. Avremmo in mente di far partecipare suo figlio nella giornata di giovedì ad un progetto le cui finalità sono descritte sul retro di questo foglio. Per ricevere ulteriori informazioni può contattarci ai recapiti che trova qui sotto, o chiedere informazioni al CUS.

Per poter coinvolgere suo figlio in questo progetto avremmo bisogno del suo consenso, che può darci compilando il modulo nella pagina accanto. La ringraziamo sin d'ora per la sua collaborazione.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AUTORIZZO Si No

COGNOME _____

NOME _____

SESSO maschio femmina

ANNO DI NASCITA _____

COMUNE DI RESIDENZA _____

a prendere parte all'attività descritta in questo documento.

FIRMA _____

INFORMAZIONI FACOLTATIVE

(saranno usate in forma anonima per rilevazioni statistiche)

(EVENTUALE) NUMERO FRATELLI _____

ALTEZZA (cm.) _____

PESO (kg.) _____

RENDIMENTO SCOLASTICO

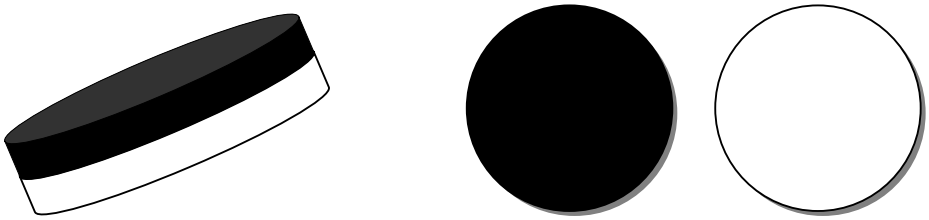
insufficiente sufficiente buono ottimo

Le informazioni raccolte saranno usate esclusivamente per le finalità suddette in conformità al D. lgs. n. 196/2003.

DA RESTITUIRE ENTRO GIOVEDÌ AI CENTRI ESTIVI CUS

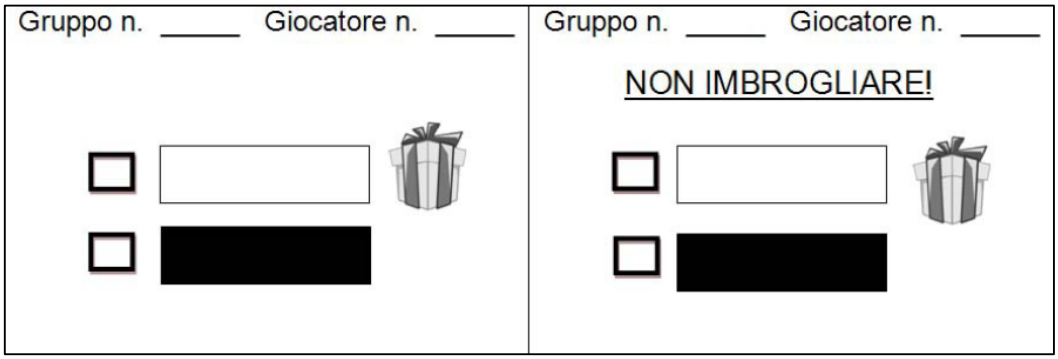
A.3.2 Coin

In our experiment, we used a coin like this:



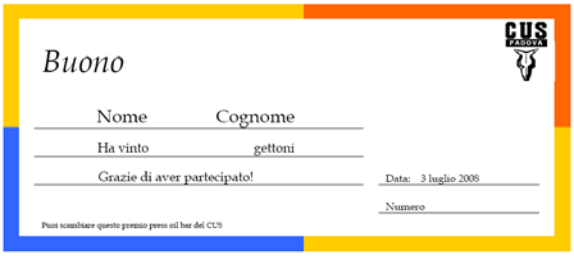
A.3.3 Reporting sheets

a) Control Treatment; b) Reminder Treatment



A.3.4 Certificate

At the end of the day we give each child a certificate (see below) showing the number of tokens he or she won. If he or she comes to the clubhouse with an adult, this certificate can be used to get rewards.



A.4 Rewards

The reward phase occurs after the experiment has concluded. At the end of each session, the management of the summer camp is informed on the rewards, and permits its clubhouse to distribute the prizes to the children. Since the children were not allowed to collect their prizes without an adult, most of the distribution occurred the day after the experiment.
The clubhouse is very well supplied. Examples of what it is possible to buy inside it are: assorted ice cream, assorted candies, sodas (water, iced tea, Cola and other soft drinks), juices (pear, peach, pineapple, apricot, etc.) milk and coffee, assorted chips, cookies, croissants and muffins.

We agreed with the management of the summer camp to exchange 1 token with 10 eurocents.

A.5 Supplementary information on the CUS activities

The "Centro Universitario Sportivo" (CUS) is a non-professional sport center created in the 40s to promote sport activities free of charge among the students of the Italian universities. In the past CUS athletes have often succeeded in national and international competitions, have won medals at the Olympic Games, and have set new Italian records. Every major Italian university manages its own center. Among others, the University of Padua currently counts around 60,000 students regularly enrolled in the various courses of its 13 faculties. The university owns two sport grounds located near the city walls. The main sport ground, where we ran the experiment, covers 70,000 square meters and includes facilities for playing athletics, field hockey, Greco-Roman wrestling, rugby, soccer, jogging, body building and tennis.

Besides its main purpose, the CUS has recently given more attention to children and young adults. The CUS of Padua has administered a summer camp since 1993. The summer camp covers 12 weeks from June to September, with a break in the middle of August. Enrollment is open to all children aged 15 or less, and costs between 95 and 110 Euros per week (depending on the week chosen). The fee allows taking part in all the activities organized by the summer camp, from Monday to Friday, 9.00 AM to 5.30 PM, with some breaks for snacks and lunch (offered by the CUS). The number of children enrolled in an average week of July is 120, with age mostly concentrated between 6 and 12. At the beginning of the week, children are divided in six groups of around 20 units each, roughly homogeneous in age; occasionally a special group is created for children in pre-scholar age. A highly-qualified instructor assists each group in the activities. Typical activities are athletics, judo, mini-volleyball, mini-basketball, rugby, soccer, but there is also room for chess, drawing, theater etc.