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1. ARTICLE: A Fine is a Price, 29 J. Legal Stud. 1

ARTICLE: A Fine is a Price

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Author: Uri Gneezy and Aldo Rustichini *

Highlight

ABSTRACT

The deterrence hypothesis predicts that the introduction of a penalty that leaves everything else unchanged will reduce the occurrence of the behavior subject to the ***fine***. We present the result of a field study in a group of day-care centers that contradicts this prediction. Parents used to arrive late to collect their children, forcing a teacher to stay after closing time. We introduced a monetary ***fine*** for late-coming parents. As a result, the number of late-coming parents increased significantly. After the ***fine*** was removed no reduction occurred. We argue that penalties are usually introduced into an incomplete contract, social or private. They may change the information that agents have, and therefore the effect on behavior may be opposite of that expected. If this is true, the deterrence hypothesis loses its predictive strength, since the clause "everything else is left unchanged" might be hard to satisfy.

Text

 [*1] I. INTRODUCTION

SUPPOSE you are the manager of a day-care center for young children. The center is scheduled to operate every day until four in the afternoon, when the parents are supposed to come and collect their children. Quite frequently, however, parents arrive late, and force you to stay after working hours. You have considered a few alternatives in order to reduce the frequency of this behavior. A natural option is to introduce a ***fine***: every time a parent comes late, she will have to pay a ***fine***. Will that reduce the number of parents who come late?

The prediction that it will seems extremely plausible. It is in fact also commonly made in two distinct fields of research: legal and criminal studies, on the one hand, and psychological studies, on the other.

The literature in psychology on this topic is very large, and it is textbook material. [1] After early formulations of the theory, [2] a host of studies followed, but the conclusion is still controversial.

 [*2] This large body of literature agrees, however, on a few general findings. When negative consequences are imposed on a behavior, they will produce a reduction of that particular response. When those negative consequences are removed, the behavior that has been discontinued will typically tend to reappear. The changes induced by the punishment may or may not be enduring changes, depending on several factors, such as the severity of the punishment or whether it is associated with a stimulus or only with the actual behavior. A punishment is most effective in reducing a behavior when it is certain and immediately follows that behavior. Finally, adaptation tends to develop to the punishment itself; thus, if the severity and other parameters of the punishment are left unchanged, its effectiveness tends to decrease over time. [3]

In the field of legal studies the deterrence theory justifies punishment as deterring future crimes on the assumption that a higher expected punishment produces lower levels of criminal behavior. The deterrence theory can be phrased as an empirical hypothesis. One can test whether punishments that are more severe, swift, and certain produce a decrease in the level of crime. [4] It is important to recall that economic analysis of the effect of a punishment on behavior is not direct and requires, instead, a complete specification of market forces. The equilibrium level of crime is set by the intersection of supply and demand curves, and the effects of punishment are determined in the general equilibrium. A change in one of the parameters, such as the level of punishment, changes the decision problem of the single agent (and this fact would tend to reduce her preferred level of crime). This change, however, also changes the problem of the other agents, and their reactions, and therefore affects again the problem of the single decision maker. The overall result might not be the reduction that one may have anticipated [*3] by considering the problem of the agent in isolation. For example, this reduction might be smaller because some agents have withdrawn from criminal activity, thus increasing the returns of crime.

Once these caveats are kept in mind, it is fair to say that the deterrence hypothesis is based on the assumption that the introduction of a penalty will produce a reduction of the behavior.

In the field study we present in this paper, the prediction was violated: the observed relationship was found to be significant and positive. Specifically, we studied the effect of _**fines**_ on the frequency with which parents arrive late to collect their child from day-care centers. Our data include observations of 10 day-care centers over a period of 20

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[1] For a clear exposition on this topic, see A. Bandura, Principles of Behavior Modification (1969); and B. Schwartz, Psychology of Learning and Behavior (1984).

[2] A first test of the effect of punishment was given by W. K. Estes, An Experimental Study of Punishment, 3 Psychol. Monographs 263 (1944).

[3] A direct comparison of the results of this evidence with our particular experiment would be misleading. The literature presenting this evidence deals with behavior modification as a long-lasting effect. In addition, the effect is rarely considered as mediated by foresight (an exception is the work of Bandura, _supra_ note 1, and in general the social learning theorists).

[4] The literature presenting the deterrence argument goes back at least to C. Beccaria, An Essay on Crimes and Punishment (H. Paolucci trans. 1774); J. Bentham, An Introduction to the Principles of Morals and Legislation (1789); and W. Blackstone, Commentaries on the Laws of England, A Facsimile Edition of the First Edition of 1765-1769 (1765-69); see, in particular, Vol. 4, commentary 11-12). This hypothesis has received new strength from law and economics, some fundamental papers being G. B. Becker, Crime and Punishment: An Economic Approach, 76 J. Pol. Econ. 169 (1968); G. J. Stigler, The Optimum Enforcement of Laws, 78 J. Pol. Econ. 526 (1970); J. R. Harris, On the Economics of Law and Order, 78 J. Pol. Econ. 165 (1970); and several works by Isaac Ehrlich: see I. Ehrlich, Participation in Illegitimate Activities: A Theoretical and Empirical Investigation, 81 J. Pol. Econ. 521 (1973); and I. Ehrlich, The Deterrent Effect of Capital Punishment: A Question of Life and Death, 65 Am. Econ. Rev. 397 (1975); I. Ehrlich & R. Mark, Fear of Deterrence: A Critical Evaluation of the "Report of the Panel on Research on Deterrent and Incapacitation Effects," 6 J. Legal Stud. 293 (1977). The literature elaborating on these initial contributions is very large; see a recent review by I. Ehrlich, Crime, Punishment, and the Market for Offences, 10 J. Econ. Persp. 43 (1996).

weeks. In the first 4 weeks we simply observed the number of parents who arrived late. At the beginning of the fifth week we introduced a **_fine_** in six of the 10 day-care centers. The **_fine_** was imposed on parents who arrived more than 10 minutes late. No **_fine_** was introduced in the four other day-care centers, which served as a control group.

After the introduction of the **_fine_** we observed a steady increase in the number of parents coming late. At the end of an adjustment period that lasted 2-3 weeks, the number of late-coming parents remained stable, at a rate higher than in the no-**_fine_** period.

The **_fine_** was removed at the beginning of the seventeenth week. In the following 4 weeks the number of parents coming late remained at the same high level of the previous period, higher than in the initial 4 weeks.

We do not claim that the effect is similar every time a **_fine_** is introduced. It is easy to speculate that no parent would come late if a very large **_fine_** were involved. What this field study teaches us, we believe, is that the introduction of the **_fine_** changes the perception of people regarding the environment in which they operate. In particular, we argue that the environment in our study, as in many real-life situations, is defined by an incomplete contract. In the specific situation under examination, the exact consequence of coming late was not specified in the contract between the parents and the day-care center. For instance, there was no precise set of clauses specifying the consequence of one, two, or several occurrences of a delayed pickup of a child. Parents could form any belief on the matter, as they probably did, and act accordingly. The introduction of the **_fine_** into this incomplete contract, however, reshapes the parents' perception of this environment.

II. THE STUDY

A. Background

There are two types of day-care centers in Israel: private and public. This study was conducted in 10 private day-care centers in the city of Haifa from **[*4]** January to June 1998. All of these centers are located in the same part of town, and there is no important difference among them. In the day-care centers the owner is also the principal. Two years of studies are required to be a certified principal. In all of the day-care centers that we studied, the manager remained in the facility until one in the afternoon. After that time the assistants were in charge. During the day children are organized into groups according to age, from 1 to 4 years old. Each day-care center is allowed to hold a maximum of 35 children. In some exceptional cases a few additional children are allowed. The fee for each child is NIS 1,400 per month. (The NIS is the New Israeli Shekel.) At the time of the study, a U.S. dollar was worth approximately NIS 3.68, so the fee was about $ 380 at that time.

The contract signed at the beginning of the year states that the day-care center operates between 0730 and 1600. There is no mention of what happens if parents come late to pick up their children. In particular, before the beginning of the study, there was no **_fine_** for coming late. When parents did not come on time, one of the teachers had to wait with the children concerned. Teachers would rotate in this task, which is considered part of the job of a teacher, a fact that is clearly explained when a teacher is hired. Parents rarely came after 1630.

B. The Study

At the beginning of the study, research assistants went to the day-care centers to ask the principals to participate in an academic study about the influence of **_fines_**. Each manager was promised that at the end of the study she [5] would receive coupons with a value of NIS 500 for buying books. The principals were given a telephone number at the university that they could call to verify the details. None of the principals actually did so.

The overall period of the study was 20 weeks. [6] In the first 4 weeks we simply recorded the number of parents who arrived late each week. At the beginning of the fifth week, we introduced a **_fine_** in six of the 10 day-care

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[5] All the managers in the study (and, as far as we know, in Israel) are women.

[6] Actually it was 21 weeks, with a break of 1 week because of a holiday after week 14. Moreover, week 11 included only 4 days of study (Sunday-Wednesday), so the number of late-coming parents that week was calculated as 5/4 times the actual number.

centers, [7] which had been selected randomly. The announcement of the **_fine_** was made with a note posted on the bulletin board of the day-care center. Parents tend to look at this board every day, since important announcements are posted there. The announcement specified that the **_fine_** would be NIS **[*5]** 10 for a delay of 10 minutes or more. (A translation of the announcement from Hebrew is presented in Appendix A.) The **_fine_** was per child; thus, if parents had two children in the center and they came late, they had to pay NIS 20. Payment was made to the principal of the day-care center at the end of the month. Since monthly payments are made to the owner during the year, the **_fines_** were added to those amounts. The money was paid to the owner, rather then to the teacher who was staying late (and did not get any additional money). The teachers were informed of the **_fine_** but not of the study. Registering the names of parents who came late was a common practice in any case.

At the beginning of the seventeenth week, the **_fine_** was removed with no explanation. Notice of the cancellation was posted on the board. If parents asked why the **_fines_** were removed, the principals were instructed to reply that the **_fine_** had been a trial for a limited time and that the results of this trial were now being evaluated.

C. A Few Comparisons

A comparison with other **_fines_** in Israel may give an idea of the size of the penalty that was introduced. A **_fine_** of NIS 10 is relatively small but not insignificant. In comparison, the **_fine_** for illegal parking is NIS 75; the **_fine_** for driving through a red light is NIS 1,000 plus penalties; the **_fine_** for not collecting the droppings of a dog is NIS 360. For many of these violations, however, detection and enforcement are low or, as in the case of dog dirt, nonexistent in practice. [8] A baby-sitter earns between NIS 15 and NIS 20 per hour. The average gross salary per month in Israel at the time of the study was NIS 5,595.

III. RESULTS

The raw data are presented in Table 1. The first column reports the number of the day-care centers in our study (the first six are the test group, where a **_fine_** was introduced, and the last four are the control group). The second column reports the total number of children in the center. The other columns report the number of times per week that parents came late (each occurrence of a delay is a separate item). For example, in week 4 day-care center number 3 had nine cases of late-arriving parents.

TABLE 1

NUMBER OF LATE-COMING PARENTS PER WEEK ACCORDING TO DAY-CARE CENTERS

CENTER	NO. OF CHILDREN	WEEK									
		1	2	3	4	5	6	7	8	9	10
Test group:											
1	37	8	8	7	6	8	9	9	12	13	13
2	35	6	7	3	5	2	11	14	9	16	12
3	35	8	9	8	9	3	5	15	18	16	14
4	34	10	3	14	9	6	24	8	22	22	19
5	33	13	12	9	13	15	10	27	28	35	10

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[7] In the beginning, there were 12 day-care centers, but the recordings from two day-care centers were incomplete, and we decided not to report their results.

[8] On the specific topic of **_fines_** for failing to collect dog droppings, see P. Webley *et al.*, Why Do Some Owners Allow Their Dogs to Foul the Pavement? The Social Psychology of a Minor Infraction (unpublished manuscript, Univ. Exeter, Dep't Psychology 1998).

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		WEEK									
CENTER	NO. OF CHILDREN	1	2	3	4	5	6	7	8	9	10
6	28	5	8	7	5	5	9	12	14	19	17
Control group:											
7	35	7	10	12	6	4	13	7	8	5	12
8	34	12	9	14	18	10	11	6	15	14	13
9	34	3	4	9	3	3	5	9	5	2	7
10	32	15	13	13	12	10	9	15	15	15	10

		WEEK									
CENTER	NO. OF CHILDREN	11	12	13	14	15	16	17	18	19	20
Test group:											
1	37	15	13	14	16	14	15	16	13	15	17
2	35	10	14	14	16	12	17	14	10	14	15
3	35	20	18	25	22	27	19	20	23	23	22
4	34	25	18	23	22	24	17	15	23	25	18
5	33	24	32	29	29	26	31	26	35	29	28
6	28	14	13	10	15	14	16	6	12	17	13
Control group:											
7	35	3	5	6	13	7	4	7	10	4	6
8	34	7	12	9	9	17	8	5	11	8	13
9	34	6	6	9	4	9	2	3	8	3	5
10	32	17	12	13	11	14	17	12	9	15	13

NOTE.--The columns under "week" report the number of parents who came late.

As a first indicator of the effect of the *fine*, the average number of parents [*7] from the first six day-care centers (those with the *fine*) who came late per week was compared with the corresponding average from the four centers of the control group. Figure 1 indicates the rather dramatic impact of the *fine*.

To strengthen this observation, the medians of the two groups as well as the extreme values (minimum and maximum) of delay were compared (see Figure 2).

In the test group the number of occurrences of delay increased steadily in the first 3-4 weeks after the introduction of the *fine*. The rate finally settled, at a level that was higher, and almost twice as large as the initial one. [*8] The number of late arrivals seemed to remain stable after the *fine* was removed. In the control group no noticeable change took place after the fourth week, or in any other week.

The average results are typical in each case: the data for each individual day-care center are reported in Table 2. The data report the average number of late-coming parents in the different day-care centers for each of the four stages of the study (the period with the *fine*, weeks 4-17, is divided into two stages). The same data are presented in Figure 3.

TABLE 2

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AVERAGE NUMBER OF LATE-COMING PARENTS, ACCORDING TO FOUR PERIODS OF THE STUDY

Center	No. of Children	Weeks 1-4	Weeks 5-8	Weeks 5-16	Weeks 17-20
1	37	7.25	9.5	12.5	15.25
2	35	5.25	9	12.2	13.25
3	35	8.5	10.25	16.8	22
4	34	9	15	19.1	20.25
5	33	11.75	20	24.6	29.5
6	28	6.25	10	13.1	12
7	35	8.75	8	7.2	6.75
8	34	13.25	10.5	10.9	9.25
9	34	4.75	5.5	5.5	4.75
10	32	13.25	12.25	13.1	12.25

NOTE.--The four periods of the study are as follows: before the *fine* (weeks 1-4), the first 4 weeks with the *fine* (weeks 5-8), the entire period with the *fine* (weeks 5-16), and the postfine period (weeks 17-2).

The data were subject to formal statistical tests. The details are presented in Appendix B. The statistical tests show the following main facts.

Fact 1.--The effect of introducing the *fine* was a significant increase in the number of late-coming parents.

Fact 2.--Removing the *fine* did not affect the number of late-coming parents relative to the time of the *fine*. In particular, this number remained higher in the treatment group than in the control group.

Fact 3.--There is no significant difference in the behavior of the test group and the control group in the initial 4 weeks, and there is no significant trend in the test group.

IV. INTERPRETATION OF THE RESULTS

Any model, or explanation, of these results has to provide two specific predictions: first, the fact that the rate of delay increases after the introduction of a *fine*; second, the fact that this rate remains stable after the *fine* is removed.

 [*10] The literature we reviewed in the introduction does not seem to provide a satisfactory explanation for both of these results. The controversial issue in that literature was whether punishment induces a reduction in the relevant behavior. The possibility of an increase in the behavior being punished was not even considered from either the theoretical or empirical point of view.

One also has to consider that the models investigated in that literature have at least two features that differ from the environment of our study. First, the "crime" in our study is very mild and so are the punishments. Second, no uncertainty of punishment exists, since parents are sure they will be detected.

The model we suggest is different from all of these models in one central assumption: we assume that the *fine* changes the agents' perception of the social situation in which they are involved. We present below several possible explanations of the data, mainly based on this assumption. Later we will discuss their relative merits.

A. A Model of Differential Information and Incomplete Contracts

In the initial period, parents who are not facing a *fine* can refer only to a partially specified contract to anticipate any consequences of their delay. As the initial weeks go by, parents acquire some additional information. For instance, they learn that the penalty is not severe for the mild level of late arrivals that is actually taking place. This is, of

course, not enough to know whether the same would hold for worse behavior on their part. The implicit contract that the day-care center presents to parents might, for example, be perceived as follows: "We are going to take care of your children after closing time if you come late. We are not going to put a **_price_** schedule for this extra service, which will therefore be performed free of charge. Of course, any delay on your part is supposed to be an exceptional case, and you should come late only when strictly necessary. If you come late too often, we might do something about it." In order to avoid this unspecified and uncertain but possibly more serious consequence, parents abstain from "too many" delays.

The introduction of a **_fine_** makes the sure consequence of a delay a little worse, because parents now have to pay for each delay, but it also provides information. None of the explicit terms of the contract have been modified, nor have any of the relevant laws or even the widely accepted social norms: but parents have now reason to believe that a **_fine_** is the worst that can happen. [9]

[*11] The behavior displayed in our study in the first 3-4 weeks after the **_fine_** has been introduced is consistent with this explanation. Parents slowly test the reaction of the day-care centers to higher levels of delays. As they see no other reaction over and above the **_fine_**, they continue to increase their delay. In the final period, after the **_fine_** is removed, they still have no reason to anticipate anything worse than a **_fine_**, and they do not reduce the rate of late arrivals. If anything, since even the **_fine_** is gone, they slightly increase it.

B. A Simple Formal Model

We now outline, in an informal way, an explicit game in order to capture the importance of the new information. The players in the game are the owner of a day-care center (a woman) and a finite group of parents (all men). There are two types of owners, who differ only in the type of action they can take. The first type, labeled S, can use a severe action labeled K. An example of a severe action is the exclusion ("Kicking out") of the child from the day-care center. The other type, mild and labeled M, can only raise a **_fine_** f. Both types can also simply do nothing. The type of the owner is unknown to the parents, and each type occurs with equal probability.

For the sake of simplicity, we assume that the game goes on for an infinite number of periods, and players discount their utility of every period. In every period, players play sequentially. First the owner chooses the action for that period. If she chooses K or f she has to pay a fixed implementation cost for the first period. If she does nothing then she pays nothing. Then all of the parents simultaneously choose an amount of delay from an interval. The payoff for the owner is the fee, if there is one, for that period, minus the cost of the delay to her, all multiplied by the total delay. The payoff for each parent is the value, v, of the delay (arriving late to the day-care center has a value because, say, it gives the parent some flexibility) minus the fee, all multiplied by the amount of the delay. The value v is larger than the **_fine_** f. If the owner is of type S and she chooses K, then the game is over; the payoff to the owner is zero and the payoff to the parents is a large and negative number.

Here is an equilibrium [10] of this game. Parents choose an amount of delay, [*12] d^*, that is just enough to make both types of owner indifferent between either paying the cost of introducing f or K, depending on which type of owner they are, and doing nothing. Parents keep doing this until the game goes on, unless some parent has chosen a higher delay than in the past, or the owner has charged a **_fine_**. In both cases they choose the maximum delay in every future period, even if the **_fine_** is later withdrawn.

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[9] For this explanation it is essential that the contract be incomplete. The alternative is that the contract was complete both before and after the introduction of the **_fine_** and that it simply changed from one situation to the other as a result of a unilateral decision by the owners of the day-care center. This argument, however, does not provide any way to explain why parents increase the number of delays when the **_price_** for doing so rises.

[10] To be precise, a "sequential equilibrium," as defined in D. Kreps & R. Wilson, Sequential Equilibrium, 50 Econometrica 863 (1982). This equilibrium concept requires each player to take an optimal action, given the strategy of the others and his belief on the current position in the game tree. This belief is restricted by Bayesian updating whenever possible, and by a limiting process in the case of zero-probability events.

The owner does nothing in each period, as long as all parents choose the delay *d** or less in the previous periods and the owner herself has chosen inaction. If any of the players, including her, has deviated in the previous periods, she chooses *f* if she is of type *M* and *K* if she is of type *S*. Note that this choice completely reveals her type. Parents revise their belief on the type of the owner using the available information. If the owner chooses inaction after a delay larger than *d**, they believe she is surely a mild type *M*. [11]

To see that this is an equilibrium, let us begin again with the parents. None of them finds it convenient to choose a delay larger than *d**, deterred by the expected loss in the bad outcome *K*. Sticking to the equilibrium is better than any one-period gain. After any player's deviation, including his own, the maximum delay, provided, of course, that the game is not over, is the best choice. In fact, the parents believe that the owner is mild, and the worst thing she can do is impose the ***fine*** she is already charging: but *v > f*.

For the owner of both types, as long as the delay is less than or equal to *d**, inaction is a good choice, since there is an implementation cost for *f* or *K*. Now, suppose that the owners observe a delay larger than *d**. The mild type of owner *M* knows that the other type will choose the hard line *K;* she cannot take that action, and parents will recognize that she is mild. So they will afterward choose a large delay, and she might as well introduce the ***fine*** as partial compensation of the cost. The severe type, *S*, knows that if she chooses inaction parents will believe she is mild, and will increase their delay, so her best choice is to cut the losses and do *K*.

This equilibrium yields three predictions:

1. In the initial period there is a low level of late arrivals.

2. If off the equilibrium path the owner charges a ***fine***, then parents believe she is mild and increase the number of delays.

3. If later the ***fine*** is removed, parents still believe the owner is mild and they do not change their behavior.

 [*13] These predictions perfectly match our data. In our study, however, the introduction of the ***fine*** off the equilibrium path was not decided by the owner, but by us.

C. Multiple Equilibria

The model we presented ignores an aspect that might be important. The cost that a parent is inflicting on the owner by coming late on a specific day depends very much on how many parents are coming late on the same day. The increase in the cost is almost zero if the parent is not the only one. So there may be multiple equilibria in the game. In one of the equilibria many parents are coming late, and so every single parent might as well come late too. In the other equilibrium, no one or very few of the parents are coming late, and since the cost a parent is inflicting on the owner is higher, he might decide to be on time. The introduction of the fee may have shifted the game from the second to the first equilibrium, which also explains the behavior in the last period.

D. Social Norms

The explanation we just gave is based on the assumption of perfectly rational and perfectly selfish individuals (both parents and owners). A completely different interpretation based on the concept of social norm is possible. [12]

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[11] This is a crucial point. The sequential equilibrium concept requires this belief to be, in a limited sense, a rational belief: even if the probability of the event *d > d** is zero at this equilibrium. And it is going to be, if the probability that the mild type chooses inaction after a large delay is infinitely larger than the same probability for the type *S*.

[12] The concept of social norm is at the core of sociological theory. The literature on the theme is large and growing. We are using here the formulation given in J. Coleman, Foundations of Social Theory (1990), in particular, chs. 10 and 11. In Coleman's view, "a norm concerning a specific action exists when the socially defined right to control the action is held not by the actor but by the others." The authority of the others "is not voluntarily vested in them, either unilaterally or as a part of an exchange, but is created by the social consensus" (id. at 293). Finally, a social norm is enforced by an external sanctioning system or, if the norm

Unfortunately, the theory of social norms is less developed than game theory, so our reasoning will have to be more informal.

The introduction of the **_fine_** may have changed the perception of the two relevant acts: the parents coming late and the teachers taking care of the children after closing time. Parents may have interpreted the action of the teachers in the first period as a generous, nonmarket activity. They may have thought: "The contract with the day-care center only covers the period **[*14]** until four in the afternoon. After that time, the teacher is just a nice and generous person. I should not take advantage of her patience."

The introduction of the **_fine_** changes the perception into the following: "The teacher is taking care of the child in much the same way as she did earlier in the day. In fact this activity has a **_price_** (which is called a '**_fine_**'). Therefore, I can buy this service as much as needed."

Parents feel justified in their behavior by a social norm that states, approximately: "When help is offered for no compensation in a moment of need, accept it with restraint. When a service is offered for a **_price_**, buy as much as you find convenient." This social norm by itself is not sufficient to explain the observed behavior. After all, the payment of NIS 10 was labeled a "**_fine_**," and the service was being offered at a very unusual, nonlinear **_price_** (flat zero fee for less than 10 minutes, and flat NIS 10 fee for more). So an additional norm seems to be needed: "A **_fine_** is a **_price_**." The two labels of the payment as **_price_** or **_fine_** are equivalent.

With the two social norms stated so far, the behavior in the first and second period is explained. No guilt or shame (depending on the degree of internalization of the social norm) can be attached to the act of buying a commodity at will.

The behavior in the third period, however, is still difficult to explain. Now the first social norm would predict a low level of delay. We may think that a period of 4 weeks is not sufficient to bring the behavior back to the appropriate level. But considering that 2 or 3 weeks had been enough to double the level of delays after the introduction of the **_fine_**, we should estimate that the learning rate of the parents is too fast to justify so much inertia.

Perhaps a third social norm is needed: "Once a commodity, always a commodity." This norm and second clause of the first norm explain the behavior in the final period: a commodity at zero **_price_** is bought in large quantities. Overall, three norms seem necessary to explain three facts. This may not look optimal from a methodological point of view, but the real test of this explanation is in an independent verification of the fact that these norms are indeed active. The results of a related experiment that we present next may give some support to it.

E. No Reward and Zero Reward

In a different experiment [13] we study the effect of rewards on performance. Subjects in four different groups were paid a flat fee of NIS 60 for **[*15]** participation. We then asked the subjects to solve a set of 50 questions from an IQ test. To subjects in the first group we promised in addition NIS 0.10 for each question answered correctly; to a second group, NIS 1; and to a third group, NIS 3. Finally, to a fourth group we did not mention money. The first group had the worst performance, even worse than the last group, to which no compensation was offered. The conclusion seems to be that the absence of a **_price_** is not just the limit of very low **_prices_**. Mentioning a payment is enough to change the perception of the contract: from a service, which is due from them as subjects in the experiment, to a market exchange. In a similar manner, in the day-care study a **_fine_** is enough to change the perception of the obligation to arrive on time.

V. CONCLUSIONS: INCOMPLETE CONTRACTS AND INCENTIVES

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is internalized, by an internal sanctioning system (*id.*). One should also mention E. Ullmann-Margalit, The Emergence of Norms (1977). For an application to law, see C. R. Sunstein, Social Norm and Social Roles (Coase Lecture Series, Univ. Chicago Law Sch. 1995); and Social Norms, Social Meaning, and the Economic Analysis of Law, 27 J. Legal Stud. (1998); see, in particular, Laurence Lessig, The New Chicago School, *27 J. Legal Stud. 661 (1998).*

[13] The design and results of this experiment are reported in detail in U. Gneezy & A. Rustichini, Pay Enough, or Don't Pay at All (CentER Discussion Paper, Tilburg Univ. 1998).

The evidence presented indicates that in our group of day-care centers the introduction of a ***fine*** increased the behavior that was ***fined*** and that the new higher level was not reduced when the ***fine*** was removed. These are the facts, and we have to explain them. We have presented two possible interpretations, and we have to conclude for the moment that on the basis of the data and the theory available we cannot refute either of the two. A satisfactory answer will be interesting, however, because these facts are probably more than a curious finding.

It is true that a "large enough" fee would eventually reduce the behavior. For instance, many day-care centers in the United States clearly announce a fee for coming late at the start of the year, and this fee is large and proportional to the length of the delay. The resulting penalty is more severe for the average delay than the nonlinear ***fine*** we introduced in our study, even after adjusting for difference in ***prices*** and incomes in the two countries. Casual observation shows that there are few delays, but we have not examined if the average delay is different from the one in our sample. Comparing the two systems would be an interesting research project.

The study we presented shows, we think, something different, which we may summarize as follows. ***Fines***, as well as rewards, are decided in a larger context, which for convenience we may define as a game. Many of the games we face in real life are not completely or precisely defined. This is the case even when their description is reasonably accurate, as is, after all, a contract for child care in a private day-care center. People facing this game do not come to it simply with their preferences and beliefs; they also bring to it a perception of the strategic situation they are facing. The contract that is presented to them and any modification that is made later may change this perception. The evidence presented here suggests that introducing a ***fine*** may indeed change the perception of the game and of the equilibrium. **[*16]** This change may be a simple acquisition of information (as it was in the simple model we have proposed above), or it may derive from a more dramatic shift of perception, as it is in the norm we postulated: "Once a commodity, always a commodity." In both cases, the effect of a change in a clause of the contract may produce effects different from what might be expected from the assumption that "everything else is left unchanged."

We believe this is important, because there is no reason to believe that this effect is limited to minor faults, such as a delay in the time of picking up one's child. For instance, the announcement of a government that tax evasions are going to be more severely pursued may be interpreted in different ways, and have a different effect, than the anticipated increased compliance.

APPENDIX A

TEXT OF THE ANNOUNCEMENT INTRODUCING THE ***FINE***

*Announcement: **Fine** for Coming Late*

As you all know, the official closing time of the day-care center is 1600 every day. Since some parents have been coming late, we (with the approval of the "Authority for Private Day-Care Centers in Israel") have decided to impose a ***fine*** on parents who come late to pick up their children.

As of next Sunday a ***fine*** of NIS 10 will be charged every time a child is collected after 1610. This ***fine*** will be calculated monthly, and it is to be paid together with the regular monthly payment.

Sincerely,

The manager of the day-care center

APPENDIX B

STATISTICAL ANALYSIS OF THE DATA

The first statistical test was a baseline comparison of the two groups: that with the ***fine*** ("treatment") and that without the ***fine*** ("control") in the first 4 weeks. An ANOVA model was used, with the arcsine of square-root transformation of the daily percentage of parents coming late to each day-care center. Day care nested within a

group is considered a random effect. The interaction between week number and group was also tested. The results of this test are as follows:

1. No significant baseline difference exists between the treatment group and the control group: $F(1, 8) = .65$, $p = .44$. That is, the number of late-coming parents in each group before the introduction of the **_fine_** (weeks 1-4) is not statistically different.

2. There is a significant effect for day care within a group: $F(8, 24) = 5.95$, $p = .0003$. That is, the individual day-care centers within a group are statistically different from one another.

3. There is no significant effect for week: $F(3, 24) = .68$, $p = .57$; and for the **[*17]** interaction between week and group: $F(3, 24) = .78$, $p = .52$. That is, no trend or systematic difference was found between weeks.

Next, the time effect within the control group only was considered. The hypothesis tested was this: the increase in the number of parents coming late is simply a time trend, independent of the fact of the introduction of a **_fine_**. A time trend may exist in the control group if, for instance, parents acquire over time more familiarity with the teachers of the center and so feel more justified in stretching the rules a little. The results of this test follow:

1. There is a significant effect for day care: $F(3, 57) = 33.82$, $p = .0001$. That is, the individual day-care centers are again found to behave differently.

2. There is no significant effect for week: $F(19, 57) = 1.04$, $p = .44$. In other words, there is no statistically significant difference between weeks, and hence no trend in the data.

The effect of the **_fine_** on the number of late-coming parents was tested using an ANOVA model with the arcsine of square-root transformation of the daily percentage of parents arriving late at each day-care center. Day care is considered a random effect, and week is nested within five blocks of 4 weeks each (block 1, 2, . . ., 5 corresponds to weeks 1-4, 5-8, . . ., 17-20, respectively). The penalty effect was tested by using 10 contrasts according to blocks. The interaction between day care and blocks was also tested. The test results showed the following:

1. A significant effect exists for blocks: $F(4, 75) = 41.83$, $p = .0001$. Of the 10 pairwise comparisons of blocks, seven are highly significant:

   Block 1 versus block 2: $F(1, 75) = 15.52$, $p = .0002$.

   Block 1 versus block 3: $F(1, 75) = 83.44$, $p = .0001$.

   Block 1 versus block 4: $F(1, 75) = 112.30$, $p = .0001$.

   Block 1 versus block 5: $F(1, 75) = 97.35$, $p = .0001$.

   Block 2 versus block 3: $F(1, 75) = 26.99$, $p = .0001$.

   Block 2 versus block 4: $F(1, 75) = 44.33$, $p = .0001$.

   Block 2 versus block 5: $F(1, 75) = 35.14$, $p = .0001$.

   Block 3 versus block 4: $F(1, 75) = 2.14$, $p = .1478$.

   Block 3 versus block 5: $F(1, 75) = 0.54$, $p = .4665$.

   Block 4 versus block 5: $F(1, 75) = 0.53$, $p = .4673$.

2. As before, there is a significant effect for day care: $F(5, 75) = 25.23$, $p = .0001$.

3. There is a significant effect for week within blocks: $F(15, 75) = 2.90$, $p = .0012$.

4. There is no significant interaction between day care and blocks: $F(20, 75) = 0.88$, $p = .6117$.

Finally, in addition to the contrasts we ran a simultaneous test to compare the five blocks in order to control the significance level (keep [alpha] = 5 percent). To do this, Duncan's multiple range test was employed. The results of this test showed a significant difference between weeks 1-4, 5-8, and 9-20. There was no significant difference between weeks 9-12, 13-16, and 17-20.

Graphic

FIGURE 1, Average number of late-coming parents, per week; FIGURE 2, Median value of delay for the test (dark line) and the control (light line) groups. The diamonds and the crosses indicate the extreme values for the test and the control groups, respectively.; FIGURE 3, Average number of late-coming parents for the 10 different day-care centers

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