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A. Michael Spence

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## TIME AND COMMUNICATION IN ECONOMIC AND SOCIAL INTERACTION \*

A. MICHAEL SPENCE

In discussing the declining pleasures of the bed, Professor Linder cites an example with which, at the time of reading, I was particularly struck:

It would be inconceivable, for reasons of time, that a modern young lady should require her presumptive lover — as she did in a Noh play I once had the pleasure of seeing — to appear for one hundred evenings and wait outside her door, to be admitted on the hundred-and-first. The smooth character parodied in the well-known film *The Knack* is described as requiring only “two minutes from start to finish.” (p. 85.)

The passage appears in a chapter on the acceleration of consumption, an effect resulting from equilibrium adjustments to the increasing availability of goods. It struck me in a slightly different way. It rather seems an excellent example of the expenditure of time for purposes of communication, or looked at slightly differently, for the purposes of screening. The point is not simply that communication, like any other productive or consumptive activity takes time, and therefore as the shadow price of time rises, the time devoted to the activity is reduced. It is the expenditure of time that is the signal, or slightly more generally, it is the fact that the activity takes time (in the case of the Noh play, a long time) that imparts signaling power to it. It is, of course, important that this time spent not be overwhelmingly enjoyable for everyone.

The theme, then, which I should like to pursue here, is the idea that the expenditure of time in economic and social interaction can function as a signal and that willingness to spend time can be and is used as a screening device.

Consider the Noh play. The presumptive lover is required to spend uncomfortable hours on the doorstep in order to gain access to the young woman's company. This, I suspect, is intended to screen out the less serious suitors. Sitting on a doorstep, in itself, certainly seems largely unrelated to the process of falling in love or to the inherent affection the young man may have for the lady inside. Moreover, it is likely to be unpleasant for both parties to the transaction. The suitor is asked to incur a cost that is substantially irrelevant to his interest in the woman, as a demonstration of that

\* I am grateful to Jack Appleman, Mark Moore, Thomas C. Schelling, and the referees, for stimulating help in developing these ideas.

interest. Incidentally, the custom need not have a pure screening function. It may also directly test the endurance, stamina, and discipline of those suitors with the requisite interest in the young woman.

One can ask how effective the screening device is, and perhaps why it might be effective at all. Several possibilities suggest themselves. First, if the benefit to youths of having conveyed serious intent is positively correlated with the extent of their interest, then one might expect that sitting on the doorstep would screen out the less serious suitors. If the shadow price of time rises (for reasons like those suggested by Becker and Linder), then either the social custom will adjust to reduce the time cost of the signal, or young ladies may have no suitors. If the former occurs, the increase in the shadow price of time might be deemed desirable because it reduces unproductive time spent signaling affection. If those who are actually interested in the girl enjoy the time on the doorstep, the time spent may not be terribly unproductive. Those for whom it would be unproductive do not do it.

Variance in the shadow price of time in the population of eligible suitors may reduce the screening effectiveness of the device, that is, increase the probability of getting a dud. For example, if the unemployed find it easier to sleep all day and stay up nights sitting on doorsteps, then one may get a moderately interested unemployed youth or a very interested worker. From the point of view of effectively screening out the less dedicated, the worst that can happen is that the shadow price of time be positively correlated with interest. For then the net benefits to signaling for the serious suitor and others may be approximately the same, and the screening device breaks down altogether.

Abstracted from the information carried by the time signal, time spent is likely to be unproductive, and the time system inefficient. One might try to avoid incurring the inefficiency cost by replacing the system with one based on price. The highest bidder gets the girl. Unfortunately, the variance in the marginal rate of substitution of money for feminine companionship may vary considerably over individuals, and perhaps more than the shadow price of time. Therefore, the price system may do a far less adequate job of screening than the time system, in spite of its apparent advantage in terms of efficiency. One can imagine suitors hiring or trying to hire substitute sitters to gain access to the prize. One can also imagine the girl's parents or the society forbidding stand-ins (or perhaps sit-ins) to maintain the integrity of the screening system.

If substitute sitters were allowed, then sitters might initiate the process and then sell entrance tickets on an open market. And if this were the World Series, we would call them scalpers. To circumvent the problem of the time-rich unemployed suitor, girls' parents might opt for a mixed time-price system; fifty nights and a thousand yen. Over time, as experience was gained in the effectiveness of different price-time pairs, the society might settle on an optimal pair. From the point of view of the parents, the attributes to be taken into account are (1) the prior probability distribution over the degree of interest given that a youth both sits there and pays a money price, and (2) the revenue generated by the fee. Young men care about the girl, and both prices. To the extent that money price is used, there is a redistribution of income, and to the extent that time is used, there is a dead-weight loss, which can also be interpreted as redistribution (but not of income) from youths in general who have to spend the time, to parents who on average attract higher quality sons-in-law for their daughters.

Time is a common signal in interpersonal interactions. Students screen teachers on the basis of their willingness to spend time with them. The time spent can be a signal of interest. Given that time spent is taken as a signal of interest, it is not difficult to see why teachers will spend time with students. It is slightly less obvious why, over time, interest turns out to be correlated with time spent. Indeed the correlation is far from perfect. The integrity of the signal is presumably maintained by virtue of the fact that the marginal cost of the time to the teacher is negatively correlated with his or her interest in the particular student. Total costs (rather than marginal ones) will matter if students infer interest directly from time spent and not from past correlation between teacher interest and willingness to spend time.

Individuals may be treated differently in the interpretation placed upon the time signals that they emit. The Senator may receive more credit for attending the funeral of an old friend than an unemployed relative would. The shadow price on their respective times is presumed to be different, and the signal interpreted accordingly. This suggests that projecting the image of being busy and placing a high marginal value on time may be an important way of economizing on signaling costs. I think I have met business executives who have learned this lesson, though they would undoubtedly not state it in these terms.

In the funeral case, it may be important that attendance at the funeral, unlike gifts to the widow, confers no benefit to the widow

other than its informational content as a signal. Gifts might look like a transaction between the widow and the friend and be misinterpreted either by the widow or by third parties to whom the signal may be directed. To the extent this point generalizes, it suggests that time has a certain natural advantage. It involves a sacrifice by one person that does not usually result in a corresponding gain to another.

Going back briefly to the student-teacher relationship, one can distinguish at least three different ways in which time spent with students might be productive. First, it may be directly productive for the student in terms of learning. In addition, it may yield satisfaction to the teacher insofar as he has successfully conveyed his interest. And third, the information conveyed by the signal may be productive if it increases the motivation of the student. Suppose now that there were an alternative and less costly way of conveying interest. Then the well-motivated teacher should invest in time spent with students up to the point at which the marginal net return is zero. The fact that there are additional benefits to time spent because of its signaling function suggests that, as compared with the world of perfect information, there is overinvestment in time spent signaling. If the time cost for the teacher is negatively correlated with students' work and interests and if the time spent is productive for the teacher, then efficient investment may distinguish teachers automatically; the signaling effect is acquired gratis, i.e., overinvestment is not necessarily the result. The signaling effect may also compensate for motivational failure among teachers that might, in the presence of costless perfect information, lead to underinvestment in teaching time. It should be added that the hypothetical world of complete information, however, is not necessarily an interesting standard of comparison.<sup>1</sup>

Law firms in New York used to be notorious for the implicit

1. I witnessed a striking case of the effective use of time as a signal some years ago in an academic setting. The work load in a course was particularly heavy, and virtually all of the students in the course rightly objected. There was a meeting with the instructor, a busy person, to hammer out differences. For some time, little progress was made — I think because it was not obvious to the students that there was the requisite community of interest between themselves and the teaching staff. At a critical point, a member of the class suggested that perhaps the instructor had used up as much time as he could afford on this little problem. The latter put his feet on the table and said he did not know about anyone else, but he was here for the duration. The dispute was then settled in about ten minutes, perhaps because from that point on, it was clear that there was substantial community of interest. I doubt if the somewhat painful first forty-five minutes could have been dispensed with. There really was not any good substitute for the time signal, least of all verbal declarations.

requirement that the junior employees work fifteen and sixteen hours a day. There are two questions one can raise with respect to this practice. One is whether it successfully screened out the people they wanted to screen out. Intuitively, the individual who most badly wants to make partner in the firm and is therefore willing to work such hours is not necessarily the most talented potential partner. At best it operated as an imperfect partial screen. The second is whether the practice was a thinly disguised means of exploitation, or whether it was the result of a tendency for there to be equilibrium overinvestment in a signal in the manner described above. It is possible that such long hours actually reduced individual productivity. In that case, the exigencies of screening would diminish productivity.

The signaling impact of time spent in certain ways is not always inferred from a past correlation between the signal and the state of affairs that it suggests. The message may be inferred directly from the perception of the shadow price on time. The individual who spends the night in a sleeping bag in front of the box office at Boston Garden in order to have a good ticket to the Stanley Cup games is presumed to be a hockey fanatic, not because others who have done the same thing in the past turned out upon investigation to be hockey buffs, but rather because anyone willing to do that must value the sport highly. Of course this kind of inference can be mistaken. If someone spends a lot of time talking to you in a public place, and you know he is busy, you may take this as a signal that he really enjoys talking to you, whereas he may be deriving most of the benefit from being seen in a public place and would look silly just standing there alone.

The difficulty experienced by two people in breaking off a chance and unwanted meeting is surely familiar. The problem is that the person who makes the decision to terminate the encounter emits a signal that conveys something about the value he attaches to the meeting. The other remains uncommitted, though he may have wanted just as desperately to move on. Both may wait a suboptimally long time hoping to be the noncommittal party. This problem would not arise if time were not a pervasive signal of interest in (or concern for) others in interpersonal interactions. Increases in the shadow price of time might be expected to cut short such encounters to everyone's mutual benefit, without fully solving the problem.<sup>2</sup>

2. The amounts by which such encounters are shortened depend on the supply elasticities of time.

Time, it is often argued, is a particularly important signal of parental affection to children. Parents who have more than one offspring come to learn that the standard may be relative. If the absolute amount of time spent with one's children may be taken as a signal of relative amounts of affection, it becomes rational to be careful to devote approximately equal time to all. It may be important to do this even if children's demands for parental affection differ, because differences in time spent may be hard signals for children to interpret. Time in this and other contexts is rarely the only signal. But it is often an important one. Other modes of behavior that also signal affection may lend themselves to deception because they are easily simulated. The value of time as a signal is its unavoidable cost. It is difficult to counterfeit.

The amount of time a jury is out deliberating is commonly taken as an index of the difficulty it is having in coming to a decision. Yet the jury might be out there waiting a respectable time so as not to seem to have failed to weigh their decisions carefully. Presumably, unless there is strong social or other pressure against quick decisions, the time costs of extended idleness with eleven strangers are sufficient to cause deliberation times to be correlated with the difficulty of the decision. Social pressures may have the effect of altering the structure of benefits and costs so as to change the pattern of investment in time and to relieve the signal of its informational content.

There are many other examples of time signaling. Politicians use it on the stump to indicate concern for the people they want to represent. Incumbents are treated differently from their opposition. It is assumed that the shadow price on their time is higher. The incumbent has a natural signaling advantage. President Nixon appears to have lost very little by remaining indoors throughout the recent campaign as far as the electorate is concerned. His party, however, would have preferred a more vigorous campaign on behalf of governors, senators, and House representatives. Chancellor Brandt, on the other hand, received much credit for a vigorous and time-consuming campaign.

It is not uncommon to find time used in markets as a substitute for, or a supplement to price, in the allocation of goods and services. The public sector is particularly prone to the strategy of setting a money price for public services below the equilibrium price and allowing a nonzero time price to take up the equilibrium slack. Medical care in clinics is provided free, or at a marginal money cost of zero, but one frequently has to wait. Sometimes the consumer is

asked to choose among several price-time pairs. Computer time is sold on this basis. The user states his priority class. The higher it is, the more he pays, and the faster the service.

The criminal justice system provides interesting examples of pure time, pure price, and mixed price-time systems. Offenders pay for crimes (admittedly probabilistically) in fines, time in prison, or both. Rarely, as far as I know, is there a choice, much less a continuum of choices. There are several reasons for operating with prison sentences as well as fines. Exclusive use of fines with limited individual budgets may fail to meet the demands of both deterrence and retributive justice. If the shadow price on time varies less than that on wealth over the population, time in prison is a more egalitarian form of penalization. If Linder is correct, perhaps prison terms should be lowered on the theory that with fixed sentences the real penalty is rising. Third, as is often the case, the time signal is more public. This increases the extent of the penalty. Indeed, if it permanently restricts the offenders' future employment opportunities, it may be too harsh. The mixed prison-fine system may be used for the same reasons that the parents in the Noh play used both money and time to screen out less serious suitors. Both prison sentences and fines are simultaneously signals of the seriousness with which society views crimes, threats for purposes of deterrence, and prices or costs to be paid by the offender.<sup>3</sup>

Failure to use the price system as a screening device in the allocation of resources may not be entirely irrational. Sometimes (and I suspect more often than is usually acknowledged) one cares about individual attributes other than marginal rates of substitution of income for whatever it is that is being offered. To return to the Noh play, the girl's family is not interested in the suitor's marginal willingness to pay in yen as such, unless they are profit maximizers. Willingness to pay in any medium is a signal and not a measure of what the person is interested in. It may therefore be quite rational to resort to the time system, or to any one of a variety of other possibilities.

The same principle may apply to the World Series, or places in a national park campsite, or service at a clinic. At least part of our objective may be to allocate the resource to high-value users, where high value is not *measured* by willingness to pay in anything. It may be possible to object to this assertion, on grounds that interpersonal comparisons of utility simply do not make sense.<sup>4</sup> But I

3. See Becker (1968) for a discussion of optimal penalties for offenses.

4. If utility is taken in its technical sense, as an ordinal representation of



find myself in disagreement with this view. Given three tickets to the Winter Olympics to give to friends, I would try to give them to those who I thought would derive the most pleasure from them. The recipients would be different if the tickets were to the National Ballet. Such decisions may be difficult, and it can be argued *ex post* that one has made mistakes. But it sounds odd to suggest that the very idea of making such decisions is nonsense: at least it sounds odd to me. To be sure, thought experiments of exchange among individuals are legitimate *evidence* in making interpersonal comparisons. I only wish to argue that they may not be decisive.

If we accept the notion of interpersonal comparisons of individual welfare in the broadest sense, there remains the edifice of neoclassical welfare economics whose shadow casts doubt on the desirability of failing to use the price system. For abstracted from certain kinds of transactions costs, it is hard to avoid the conclusion that the use of time in an allocative mechanism is inefficient.<sup>5</sup> Moreover, under a set of conditions that we can accept for the moment, welfare theory tells us that there is a one-to-one correspondence between price equilibria and Pareto-optimal allocations in the economy. To move from one efficient allocation to another, only income has to be redistributed.

This suggests that the only reason we might fail to use the price system in a particular case is that we do not like the income distribution, cannot do anything about it directly, and therefore are prepared to put up with a certain amount of inefficiency in order to improve the distribution of a particular resource.<sup>6</sup> The existence of secondary markets in the commodity would, of course, defeat the purpose. Presumably, it is not just the existence of externalities that makes it desirable to disallow the sale of places in the freshman class at Harvard by those who were admitted. Or perhaps with an optimal income distribution, it would have been rational to switch to the price system in the Noh play.

So the question is, if we had the power to redistribute income,

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individual preferences, then interpersonal comparisons of utility do not make sense. We need another word, perhaps individual welfare, that refers to what we can and do compare. Pareto (1971, p. 112) uses the term *ophelimity*. I. M. D. Little (1970, pp. 52ff.) presents the case in a compelling manner.

5. From one preceding discussion it is clear that nonprice screening devices including time can be and are used to screen people on the basis of productive capability, interest in things and people, need, usefulness, or any characteristic of interest, and not just on one basis of his own individual welfare. But here I want to concentrate on an informational gap in welfare economics.

6. Other informational gaps may cause the use of a diluted price system. For example, education and other signals are used in job markets.

would we ever resort to nonprice allocation procedures in cases other than those in which the sheer administrative costs of the price system are excessive? I think the answer is yes. It is true that given any social welfare function there is an income distribution that in conjunction with a price system leads to the welfare optimum. But we do not know what that distribution is. Moreover, and more importantly, to find out what it should be, we need precisely the sort of information about people's interests and talents that is provided by the variety of screening and allocational mechanisms we observe, including those that use time. The alternative or supplementary screening devices are partial substitutes for redistributing income.

Let me put the matter another way. The argument is that nonprice signaling and screening in economic and social contexts deserve more attention, in spite of the fact that they are frequently inefficient. That is to say, they may require people to incur extraneous and unrecoverable costs (like time costs) in order to signal the character of their preferences and abilities. To implement the prescriptions of welfare economics, one requires information that one does not now have. Moreover, the acquisition of this information probably cannot entirely be separated from the mechanisms by which we choose to allocate resources initially. Therefore, the argument that the same effect could have been achieved with a redistribution of income (if only we had known enough about people's preferences to deduce it) is of little practical importance.

There is an informational gap in the middle of welfare economics that is not best thought of as purely a problem of income distribution. In a world of perfect information and general agreement about the social welfare function, tickets to the Olympics should go to the highest bidders, as should places in institutions of higher education. Without it the price system is used selectively. It is supplemented by other screening devices. And it may not be used at all in certain contexts, which tend to escape our notice because they are not normally part of the subject matter of economics.<sup>7</sup>

As a matter of history and cross-cultural comparison, the scope of social interaction mediated by the price system varies from society to society. In some, marriage is an almost purely monetary transaction between parents. In others, certain kinds of jobs are

7. The problem of revelation of preferences is normally associated with decisions about the level of provision of public goods. It is also a problem in deciding on an income distribution. People cannot be expected to come forward to explain that the things they really want to have or do, are cheap, so that their income need not be very large.

bought and sold. In our markets for labor services, price is only part of an elaborate set of screening mechanisms, designed or having evolved to fill informational gaps. Jobs are sometimes allocated to those who wait, often in an apprenticeship capacity and often for periods longer than those required to learn the skills that are supposed to accompany graduation to journeyman status. In our society time spent at the funeral of a friend may be a signal of esteem to the widow. In other cultures substantial contributions to the financial resources of the widow may serve the same function and provide a form of informal life insurance as well. Perhaps the modern analogue of the time signal in the Noh play is expenditures by young men on the entertainment of their dates.

In the political process time signals are sometimes important. The intensity of concern of individual groups for certain issues is expressed by demonstrations, picketing, and time spent lobbying and keeping track of the issues. Time is a signal in what Albert Hirschman calls the voice option. It may be precisely the availability of such time-related signals that allows intensity of interest back into the collective choice process. Sometimes political activities go further and are designed to impose time costs on decision makers, an effective strategy when the shadow prices on time of the activists (disgruntled welfare recipients, for example) and the authorities differ.<sup>8</sup>

Time is likely to play a central role in future work on screening and nonprice allocative mechanisms and institutions for a variety of reasons. First, it is scarce for almost everyone and therefore costly. Second, though we may differ considerably as individuals in the way we allocate time, we all face roughly the same underlying constraint. It may be this element of commonality that partially accounts for its pervasive use as a signal. And third, almost any signaling activity is likely to take time so that part (and if Becker (1965) and Linder are right, perhaps an increasingly large part) of signaling costs will be the time costs.

STANFORD UNIVERSITY

8. I am indebted to Mark Moore and a referee for drawing my attention to time signals in political processes.