

WHY WERE WORKERS WHIPPED? PAIN IN A PRINCIPAL-AGENT MODEL*

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Violence, which seems inherently irrational, and economics, which calls itself the study of rational behaviour, seem altogether unrelated. But violence is often used in incentives – one reason a person threatens to hurt another is to get that person to do something. This paper uses a model to show that threatening pain can be rational and that pain is inflicted upon people who are poor in the sense of having bad alternatives. The model corrects a confusion in previous models of slavery and helps explain why child and not adult labourers were beaten during the British industrial revolution.

I. THE MODEL

Consider Patrick Waldrum, an eight-year-old living in Wolverhampton in 1841, who

goes a begging every day; it's hard work ... [S]ometimes only gets a halfpenny all day; that's a very bad day's work, for working at it all day, and if it rains too. Has no father, has got a mother ... when she has no work she begs too ... [She] beats him sometimes when he only earns a halfpenny a day; always beats him when he don't get nothing (United Kingdom, Parliament, 1843, p. q21. Quoted in Nardinelli 1982, p. 288).

If he works hard his chances of earning money improve, but there is always the possibility that he will get little or nothing, meaning that either he did not work hard or that he just had bad luck. His mother cannot tell how hard he works. She only sees the earnings he brings home, and if they are low, she beats him.

In a principal-agent model, the agent chooses an effort level which determines a probability distribution over several possible outcomes which give different payoffs to the principal. The principal can observe only the realised outcome and not the effort level, and hence gives the agent an incentive consisting of actions conditional on the outcomes. Knowing that the agent will choose a utility-maximising effort level, the principal picks an incentive which maximises her own expected utility, given the constraint that the agent's expected utility must be at least his 'reservation utility,' the utility he could get in some alternative.

In other models, the incentive is a set of conditional money transfers. Here the principal cannot give the agent fines (negative money) since the agent has

* I must thank many people, including Tai-Yeong Chung, Steve Matthews, and Stan Reiter for conversations, Stefano Fenoaltea, Jane Mansbridge, Akira Motomura, and two anonymous referees for detailed comments, and Joel Mokyr for repeated readings and guidance.

no wealth, but instead can give the agent threats.¹ What is 'given' in a threat I call 'pain.'² The result of the model is that the principal gives pain to (beats, whips) agents with low reservation utilities.

In my model, there are two outcomes: 'good,' which yields a payoff of one to the principal, and 'bad,' which yields zero. The agent, who has reservation utility \bar{U} , chooses the effort level a , which is the probability that the good outcome occurs: the harder the agent works, the more likely the good outcome. The incentive can be expressed as (m^g, p^g) , (m^b, p^b) , the amounts of money and pain given if the outcome is good or bad, respectively. The cost to the principal of giving an amount of money m and an amount of pain p is given by $C(m, p)$. The agent's utility from receiving money m , pain p , and exerting effort a is given by $U(m, p) - V(a)$.

I assume that U increases in money and decreases in pain. The agent is risk averse with respect to lotteries over money alone (a standard assumption) and risk loving with respect to lotteries over pain alone (not standard, but one which has some support – see Tversky and Kahneman 1981, n. 6, p. 458). The agent can be given arbitrarily large utility with money and arbitrarily large disutility with pain, and I normalise $U(0, 0) = 0$. The disutility of effort V is increasing and unbounded, and the marginal disutility of effort starts at zero and increases as effort increases from zero. The principal is risk neutral, and C increases in money and in pain, with constant or increasing marginal costs to providing money alone and pain alone. Finally, U , V , and C are assumed to be sufficiently smooth.

These are the assumptions, except for two which are introduced later. Given the incentive (m^g, p^g) and (m^b, p^b) , what level of effort will the agent choose? His expected utility is $aU(m^g, p^g) + (1-a)U(m^b, p^b) - V(a)$ and so his choice of a is determined by $U(m^g, p^g) - U(m^b, p^b) - V'(a) = 0$. The principal takes this into account and maximises her expected profits given this constraint ('incentive compatibility') and the constraint that the agent's expected utility must be at least \bar{U} ('voluntary participation').³ Her problem is

M. Find (m^g, p^g) , (m^b, p^b) , and a which maximise

$$a[1 - C(m^g, p^g)] + (1-a)[-C(m^b, p^b)]$$

such that

$$aU(m^g, p^g) + (1-a)U(m^b, p^b) - V(a) \geq \bar{U}$$

and

$$U(m^g, p^g) - U(m^b, p^b) - V'(a) = 0.$$

If $m^g > 0$ and $p^g > 0$, necessary conditions imply that $[\partial C(m^g, p^g)/\partial m]/[\partial C(m^g, p^g)/\partial p] = [\partial U(m^g, p^g)/\partial m]/[\partial U(m^g, p^g)/\partial p]$. But by the assumptions, the left hand side of the equation is positive and the right hand side is negative. This

¹ Here a 'threat' is an incentive which when carried out makes both the principal and agent worse off. It differs from a fine, which when carried out makes the principal better off (he receives money) and the agent worse off. Schelling (1980, p. 123, n. 5) makes this distinction, which is perhaps not so obvious: Osband (1987, p. 593) confuses them.

² Scarry (1985, p. 16) reminds us that 'the very word "pain" has its etymological home in "*poena*" or "punishment."'

³ 'Voluntary participation' is just the commonly used name, which of course does not literally describe, for example, a slave's decision.

is also the case for $m^b > 0$ and $p^b > 0$. Thus if (m^g, p^g) , (m^b, p^b) , and a is a solution of problem M, then either $m^g = 0$ or $p^g = 0$, and either $m^b = 0$ or $p^b = 0$. The principal would never use both money and pain after a given outcome, because he could use less of both and thereby give the agent the same utility at a lower cost. So we can represent the incentive (m^g, p^g) , (m^b, p^b) with two numbers: the agent's utility if the good outcome occurs u^g , and her utility if the bad outcome occurs u^b . If one of these numbers is negative (positive), the corresponding bundle contains only pain (money). Thus we can define the expenditure function $e(u)$, the principal's cost of giving utility u to the agent: $e(u) = C[0, g^{-1}(u)]$ if $u < 0$, $e(u) = 0$ if $u = 0$, and $e(u) = C[f^1(u), 0]$ if $u > 0$, where $g(p) = U(0, p)$ and $f(m) = U(m, 0)$. It is strictly convex and looks like the letter U, with minimum zero at zero. For technical ease we assume that it is sufficiently smooth at zero. We get a simplified problem

S. Find u^g, u^b , and a which maximise $a[1 - e(u^g)] + (1 - a)[-e(u^b)]$

such that

$$au^g + (1 - a)u^b - V(a) \geq \bar{U}$$

and

$$u^g - u^b - V'(a) = 0.$$

Call ES the problem in which the voluntary participation constraint holds with equality, and instead of \bar{U} , use the dummy variable u . Solving the constraints we get $u^g = u + V(a) + (1 - a)V'(a)$ and $u^b = u + V(a) - aV'(a)$, and if we let $\pi(a, u) = a[1 - e(u^g)] + (1 - a)[-e(u^b)]$, ES is an unconstrained maximisation problem in one variable: find a which maximises $\pi(a, u)$. It turns out that $\partial\pi/\partial a = 1 - e(u^g) + e(u^b) - a(1 - a)V''(a)[e'(u^g) - e'(u^b)]$, and thus when $a = 0$, $u^g = u^b$ and so $\partial\pi/\partial a = 1$. Since π is increasing at zero, if u^g, u^b , and a solve ES, then $a > 0$. Since $V'(a) > 0$ for non-zero a and $u^g - u^b = V'(a)$, we know that $u^g > u^b$. A solution to S must also solve ES for some $u \geq \bar{U}$, and so if u^g, u^b , and a solve S, then $a > 0$ and $u^g > u^b$.

From necessary conditions for S ($0 = -ae'(u^g) + \lambda a + \mu$ and $0 = -(1 - a)e'(u^b) + \lambda(1 - a) - \mu$), we find that $\lambda = ae'(u^g) + (1 - a)e'(u^b)$ and $\mu = a(1 - a)[e'(u^g) - e'(u^b)]$, where λ is non-negative and μ is positive, negative, or zero. Since $a > 0$, $u^g > u^b$, and e' strictly increases, μ is positive. Since λ is non-negative and a is positive, $\lambda a + \mu$ is positive. From the first condition above, $ae'(u^g) = \lambda a + \mu$ and so $e'(u^g) > 0$. But $e'(u) > 0$ only when $u > 0$, and so we know that if u^g, u^b , and a solve S, then $u^g > 0$. Hence $p^g = 0$ always. Pain will not be given if the outcome is good.

The last assumption is that $(1 - a)V'''(a) \geq 2V''(a)$ for $a \in (0, 1)$, which seems arbitrary but is easily justified. The agent chooses the effort level according to $u^g - u^b = V'(a)$. The utility difference 'produces' effort: the bigger the utility difference, the higher the agent's effort. Now measure the level of effort not as a but as proportional to $-\log(1 - a)$. That is, a 0.9 probability of the good outcome corresponds to an effort level of 1, a 0.99 probability corresponds to an effort level of 2, and so on. This scale makes sense, as each unit of effort reduces the probability of the bad outcome by a multiplicative factor (for example, each unit of effort goes into laying down another layer of shingles, each with the same independent probability of leaking, and the bad outcome

is a leaky roof). A sufficient condition for this assumption is that the 'production' of effort (measured in this 'log-failure rate' scale) has constant or decreasing marginal returns with respect to utility difference.⁴

With this assumption we can show that $\partial^2 \pi / \partial a^2 < 0$, and so a solution to $\partial \pi / \partial a = 0$ gives the unique solution of problem ES.⁵ A solution exists – we can show that $\partial \pi / \partial a$ goes from positive to negative as a goes from 0 to 1. So given u , a unique $a(u)$ maximises $\pi(a, u)$. We can define $u^g(u)$, $u^b(u)$, and $\pi(u)$ accordingly, and it turns out that $\partial u^g / \partial u > 0$ and $\partial u^b / \partial u > 0$. Also, we can show that there exists a unique u^* such that $u^b(u^*) = 0$.

From the envelope theorem, $\partial \pi / \partial u = -\lambda = -ae'(u^g) - (1-a)e'(u^b)$, which is negative if $u^b \geq 0$. So π decreases over $[u^*, \infty)$. Thus when $\bar{U} < u^*$, maximising π over $[\bar{U}, \infty)$ (i.e. problem S) is equivalent to maximising π over the compact set $[\bar{U}, u^*]$, and hence at least one optimum exists. If $\bar{U} \geq u^*$, problem S has the unique solution $u^g(\bar{U})$, $u^b(\bar{U})$, and $a(\bar{U})$.

Remember that $m^g > 0$ and $p^g = 0$ always. When $\bar{U} \geq u^*$, in the unique solution $m^b \geq 0$ and $p^b = 0$ (no pain is given). If $\bar{U} < u^*$, in a solution $m^b = 0$ and $p^b > 0$ (pain is given). All other things remaining the same, as the agent's reservation utility increases, the principal's optimal choice of incentive moves from one in which pain is given to one in which it is not.

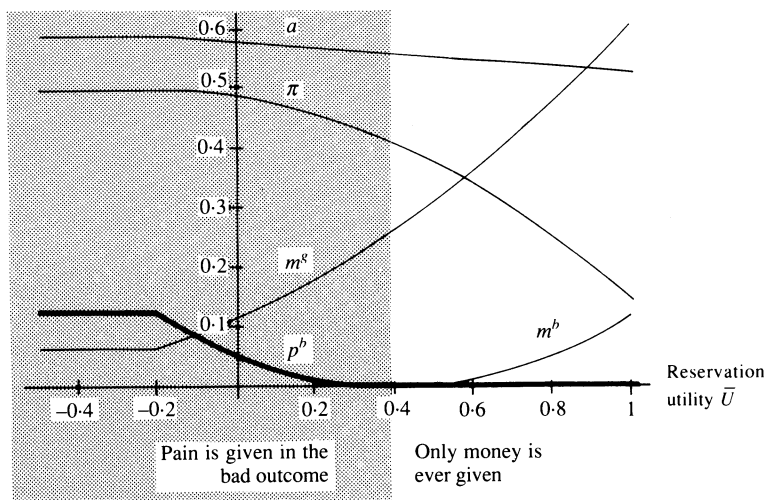


Fig. 1.

Fig. 1 shows m^g , m^b , p^b , a and π for \bar{U} between -0.5 and 1 , where $C(m, p) = m + p$, $U(m, p) = 2(\sqrt{m} - \sqrt{p})$, and $V(a) = [1/(1-a) - a - 1]/4$. The curves are flat for \bar{U} below -0.2 , where the voluntary participation constraint does not hold with equality.⁶ In this region, the agent receives an expected utility exceeding his reservation utility because the principal would not gain by

⁴ In other words, $Y'''(r) \geq 0$ for $r \in (0, \infty)$, where $Y[r(a)] = V(a)$ and $r(a) = -\log(1-a)$.

⁵ For more mathematical details, see Chwe (1990).

⁶ When threats are not available and there are two outcomes, under weak assumptions the voluntary participation constraint always binds. See Grossman and Hart (1983), p. 30.

lowering it. As \bar{U} increases, m^a increases and p^b decreases. Once $\bar{U} \geq 0.4$, $p^b = 0$ and m^b increases.

The model is distinctive since a 'limitation of the present models is the restricted reward or penalty system used. It is virtually always stated in terms of monetary payments' (Arrow, 1985, p. 50). In other models there is no 'wealth constraint': the agent is assumed to have enough wealth so that threats need not be given.⁷ Also, in more complicated models, 'complex incentive schemes ... stand in the way of serious extensions and applications. One can say little about comparative statics properties of the model and it is also hard to introduce additional variables into the analysis' (Hart and Holmström, 1987, p. 91). In this simple model, comparative statics results are obtainable.

II. SLAVERY

None of the few formal economic models of slavery (including Bergstrom, 1971 and Findlay, 1975) explicitly models the monitoring or 'policing' problem. My model might fill a need, especially if 'the whole institution of slavery seems to have hinged on the question of policing costs' (Barzel, 1977, p. 109).

Aside from the overwhelming objection that slaveowners just are not rational in the economic sense, maybe the most immediate objection to my model's application to slavery concerns the notion of reservation utility. Usually it is interpreted as the utility or wage that the agent could get in another job or by simply not working. But slaves do not have these alternatives. There are, however, three ways to interpret a slave's reservation utility. The first is that there is a very large but not infinite disutility of death or suicide. Consider 'Margaret Garner, fugitive slave, who, when trapped near Cincinnati, killed her own daughter and tried to kill herself. She rejoiced that the girl was dead – "now she would never know what a woman suffers as a slave" – and pleaded to be tried for murder. "I will go singing to the gallows rather than be returned to slavery"' (Aptheker, 1949, p. 12, quoted in Davis, 1981, p. 21). The second interpretation is that some slaves had a very small chance of escaping successfully. 'During the 1850s about a thousand slaves a year ran away to the North, Canada, and Mexico' (Genovese, 1974, p. 648). The expected utility of an escape attempt (different for each person – most runaways were young men) could thus be considered as a slave's reservation utility. Thirdly, there were several 'economic' reasons why slaveowners did not treat their slaves arbitrarily badly, such as the fact that health was necessary for hard work, and that they were literally 'human capital' to be maintained for future productivity and resale value. Not uncommonly, a slaveowner's neighbours would intervene if he treated his slaves unusually badly (Genovese, 1974, p. 41).

What are the results of the model? Slaveowners incur costs in lowering slaves' reservation utilities; the model shows how they also get benefits. It also

⁷ In Mirrlees's (1974) example, the degenerate solution, in which the principal gives arbitrarily large fines, is unrealistic because giving someone arbitrarily low utility must after a certain point become costly.

gives a reason for 'paternalism' (why slaveowners did not make their slaves' expected utilities arbitrarily low) based on the cost of carrying out incentives: in cases such as the example in Fig. 1, the slave would receive a minimum expected utility, regardless of how low her reservation utility is.

The model also sharpens our intuitions. I show this by way of a critique of Robert Fogel and Stanley Engerman's model of a slaveowner's choice of how much 'force' versus 'wages' to use as incentives for his slaves. Slaveowners 'generally used force for exactly the same purpose as they used positive incentives – to achieve the largest product at the lowest cost. Like everything else, they strove to use force not cruelly, but optimally' (Fogel and Engerman 1974, vol. 1, p. 232). Their model is the 'usual production-isoquant mapping,' in which the two axes are labelled 'Force' and 'Wages': 'The unit isoquant for the "production" of labor ... shows all of the various combinations of force and "wages" (positive inducements) that will yield one unit of labor ... The isocost curve ... describes all of the different combinations of force and "wages" which can be "purchased" for a given total expenditure,' and is concave because 'the more force that is used, the greater the cost of an additional unit of force of a given "quality"' (Fogel and Engerman 1974, vol. 2, pp. 155–6). The optimal choice of force versus wages corresponds to the point at which the two curves are tangent.

They assume that the labour isoquants are convex, without offering an argument that force and wages 'produce' labour in the way that factor inputs produce output (as in the standard theory of the firm). But a bigger problem is the meaning of a 'combination' of force and wages. Force and wages would not both be used *ex post*, after the slave has done something. The master would never efficiently use wages and a little force to reward the slave, or force and a little wages to punish the slave.⁸ So a combination of force and wages means that they are used *ex ante*: force is used if one thing happens (like unsatisfactory work), and wages are used if another happens (like satisfactory work). The cost of a force-wages combination must depend on how often, or with what probability, force and wages are used.⁹ If wages are given with complete certainty, the amount of force could be made arbitrarily large at no cost (since it is never used). This does not make much sense, because a slaveowner limits his threats at least partly because he might have to carry them out. Force would not be used with complete certainty, because this would mean that the threat never works.

So we are left with the case in which both force and wages are used with some likelihood. What determines when force versus wages are given? The slave's performance must be at least partly involved, for otherwise there would be no incentive. But then, how can the cost of the force-wages combination be determined independently of the labour 'production' process, if the cost of

⁸ Since a slave requires 'positive' incentives like food to be a strong labourer, a slaveowner might whip the slave and give her food at the same time. But my argument still works; the point is that pain is given conditionally, and must be so modelled.

⁹ 'Quality' of force is puzzling. Are twenty lashes ten times as much force as two lashes, or force of a different quality? The proper distinction is between the severity of pain and how often or with what probability it is inflicted.

implementing the combination depends on the slave's performance? Roughly speaking, the isocost curve cannot be determined independently of the labour isoquant, invalidating the idea of optimal choice at a tangency.

Their confusion is widely shared. We forget that incentives are fundamentally *conditional*.¹⁰ When incentives are narrowly conceived as offers it is easy to forget their conditional nature, for if they work they are always carried out. Labour is often 'exchanged' for a wage, which makes a wage seem more like an object than an incentive, in which money is given *if* an action is performed. But of course one does not 'exchange' labour for whipping or pain. Because we almost always think of them as offers, we fetishise incentives.¹¹

For if they do not correctly model the slaveowner's force-wages choice, what do they model? Relabel their 'Force' axis as 'Clothing' or some other good. Now the point of tangency of the isocost and indifference curves represents the clothing-wages combination which gives the slave a certain level of utility at lowest cost, and thus legitimately represents a slaveowner's optimal choice. Fogel and Engerman model a choice between an offer and a threat as a choice between two offers. This confusion is more literally displayed by Giorgio Canarella and John Tomaske (1975, p. 626): 'For slaves, force is a discommodity.' Force, or violence, is different from a pet skunk inherited from one's great-uncle: it is not an object.

III. CHILD LABOUR

It is easy to forget that the threat of pain has been and is given to 'free' as well as 'not free' labourers.¹² One thing the model makes clearer is why people would receive pain in a labour relationship without being forced to. 'Being forced to' can be defined in terms of the model: one forces another person to be her labourer if one does so by (even indirectly) changing her reservation utility. 'Voluntary' slavery can exist if the alternatives are bad enough and are not the result of the master.¹³ But we can still call voluntary slavery 'forced labour', since once a person becomes a slave his reservation utility is largely in the control of his master. He would not be forced to enter the relationship but would be forced to continue in it. Apprentices in seventeenth and eighteenth

¹⁰ Gutman and Sutch (1976, n. 3 on p. 58 and p. 73) grasp this ('Fogel and Engerman might be forgiven for their confusion of the frequency and incidence of punishment with its effectiveness') only to let go of it in a different context: "'It was the *universal custom* in Georgia," explained Ralph Flanders [Flanders 1933, p. 146, emphasis by Gutman and Sutch] ... "to allow slaves the privilege of raising small crops of their own for which the master paid cash, or which could be exchanged at the storeroom for anything they chose to buy." There is a great difference between a "universal custom" and a selective labor incentive. A custom is a habitual practice, an established way of doing things. If it happened this way, the garden patch hardly served as a positive labor incentive.' Giving a teenager the keys to the car is an (almost universal) U.S. custom, but is often used in an incentive.

¹¹ The fetishism thesis can in fact be stated as follows: relations of interactions between men appear as relations of comparison between objects.' (Elster, 1985, p. 96).

¹² For example, whipping Asian labourers was standard practice on Hawaiian sugar plantations well into this century (see Choy, 1979, p. 95-6 and Takaki, 1983).

¹³ Patterson (1982, p. 130) explains: 'Poverty was, of course, one of the main reasons for self-sale ... in several advanced societies such as China and Japan it was at times a major source of slaves. In Russia between the seventeenth and nineteenth centuries self-sale as a result of poverty was the most important reason for enslavement among the mass of domestic slaves.'

century Britain were forced labourers whose masters had almost complete control over their working and non-working lives.

Children who worked for wages in nineteenth century British factories who were 'free' labourers had reservation utilities which were not under the control of their employers. Parents sent their children off to work to supplement the family income, and sometimes received their children's wages directly. So the difference between an adult's reservation utility and a child's was not the difference between their market wages. A child labourer's low reservation utility was due to his basic dependence on his parents, as told by sixteen-year-old Frederick Hough:

I left Mr. Okes's mill because of getting beat. I complained to my father, and told him that if ever the slubber beat me again I would come away ... That day he beat us all round, soon after he came in; and I said that I would not stand it any longer; and next time I dropped an end, and he came out with the strap, and began to beat me again; as soon as he went into the billy-gate again I started, and came home, and never worked there again ... the next morning I got another place, and so my father said nothing about it. I do not think my father would have been angry with me for starting, if I had not got another place, because the man always beat me so (United Kingdom, Parliament, 1833, C. 1, pp. 12-3).

Since things got bad enough, Frederick Hough decided to leave. But, behind this, even for a sixteen-year-old, was the worry about how he would be treated by his father.

The model explains why an apprentice was more likely to be beaten than a 'free' child labourer,¹⁴ why young child labourers were more likely to be beaten than older ones (since they could less easily live independently),¹⁵ and why free adults were rarely beaten.¹⁶ Undoubtedly there were complementary reasons, such as macroeconomic ones concerning the demand and supply of labour. This historical context, including the institution of parish apprenticeship, also cannot be ignored (Nardinelli, 1982; Fenoaltea, 1984; Pinchbeck and Hewitt, 1969, pp. 223-59; and Dunlop, 1912).

IV. DANGERS

Much is ignored in the model here, including the possibility of victims fighting back. Violence must be understood in many different ways, and I hope that I have shown that rational choice modelling is one of them. But it has certain pitfalls, or dangers.

The first is that characterising violence as the result of a rational choice has mixed effects. The confusion of 'rational' in the instrumental sense and

¹⁴ Nardinelli (1982, p. 287) finds that 'in the metal trades, for example, the investigators found that 79% of the apprentices were beaten. Only 48% of the free child workers experienced corporal punishment.'

¹⁵ 'We beat only the lesser, up to thirteen or fourteen. The boy of fifteen was considered too big to beat,' stated Samuel Miller in United Kingdom, Parliament, 1833, C. 1, p. 45, quoted in Pollard (1963), p. 260.

¹⁶ Nardinelli (1982, p. 294) says that 'in spite of the apparent effectiveness of corporal punishment in disciplining child workers, by the middle of the 19th century it was seldom used for older workers.'

'rational' in the normative sense is the basis of Fogel and Engerman's intimation that 'cruel' and 'optimal' are opposed. In the debate over their book, this confusion was never completely exorcised.¹⁷

Calling violence a rational choice can be a justification bordering on an excuse, as in 'rationalisation.' It is important to understand how some people hurt others because of their self-interests, and not because they are 'evil.' But a person who hurts others might be more likely to stop if he could think of himself only as purely evil. Calling his act a rational choice allows him to say to himself, 'I may be cruel, but at least I'm rational', or 'It may be cruel, but at least it's effective.' In their periodicals southern slaveowners emphasised 'efficient' slave management.¹⁸ Another example is given by Elaine Scarry (1985, p. 28):

Although the information sought in an interrogation is almost never credited with being a *just* motive for torture, it is repeatedly credited with being the motive for torture. But for every instance in which someone with critical information is interrogated, there are hundreds interrogated who could know nothing of remote importance to the stability or self-image of the regime. Just as within a precarious regime the motive for arrest is often a fiction (the eggseller's eggs were too small – Greece), and just as the motive for punishing those imprisoned is often a fiction (the men, although locked in their cells, watched and applauded the television report that a military plane had crashed – Chile), so what masquerades as the motive for torture is a fiction.

One can see how a rational choice model of torture would reproduce this fiction. To the extent that my model does not describe reality, it provides a fictional motive and hence a justification for hurting people. Bruno Bettelheim (1960, pp. 240–1) provides an illustration from Dachau and Buchenwald:

Almost daily one guard or another, tinkering with his gun, would tell a prisoner that he would shoot him down except that a bullet cost three pfennig, and that was too much of Germany's money to spend on him

They repeated their statement so often because they had been told it so often in their indoctrination ... but prisoners by and large only found it silly. It was quite difficult for the average SS man to degrade human life to a thing of no value. He was impressed that his superiors could set the value of a human being below the trifling cost of a bullet. In his

¹⁷ Fenoaltea (1981, p. 307) declares: 'Here, then, is the central *curiosum* of the slavery debate. The best evidence that slavery was harsh and terror-driven is the superior "efficiency" of slavery; the best evidence that slavery was mild and benevolent would be that slaves worked no harder than free men. *Time on the Cross* argues that slavery was benign, and advances the productivity argument that undermines that view; *Reckoning with Slavery* argues that slavery was harsh, and attacks the productivity argument that supports that view.'

¹⁸ In the words of 'a committee of Georgia planters appointed to select the Southern Central Agricultural Society's prize essay for 1853 ... "the authors ... generally concur ... in the opinion that the pecuniary interests of the master are best consulted by a humane and liberal treatment of the slave."' Breeden (1980, pp. xx–xxi) offers 'three possible explanations: first, cruel masters may have remained silent; second, the emphasis on slave welfare may have been feigned; and finally, these writers may have been genuinely influenced by concerns of humanity and duty.' But another reason is that masters would not feel any better about themselves if they recommended that slaves be treated brutally.

astonishment and disbelief he had to try it out again and again to convince himself.

This device works by allowing the guard to think of himself as making a rational choice (indeed, a cost-benefit choice). It is not simply a devaluation of human life: the guard does not say 'you are worth three pfennig' but 'shooting you would cost too much.' Killing is made palatable by making it out to be something a rational person would choose to do.

Another effect is that once a person's act is described as rational, we can attach blame to her. This lies behind the child's excuse (after hitting a friend too hard and making her cry) of 'I didn't *mean* it' as well as the insanity defence. This paper, by 'establishing a motive,' blames certain people for hurting other people. But the logic of rationality can twist into 'blaming the victim.' A woman's remaining in a violent relationship is often taken to mean that she consents or even desires to be beaten.¹⁹ Another example of how blame can be subtly shifted is that 'there is not only among torturers but even among people appalled by acts of torture and sympathetic to those hurt, a covert disdain for confession' (Scarry, 1985, p. 29). But Yoram Barzel (1977, pp. 102-3) is fairly explicit:

Certain plantation activities involved the simultaneous work of large numbers of slaves, and frequently such work was assigned under a 'task system' of uniform daily quotas ... Had it been apparent that the quota would be set to the perceived ability of any particular slave, that individual would have had incentive to understate his capability. But where the quota was set at some 'customary' level, no such incentive was present. ... The less able slave might be driven to exhaustion in a vain attempt to meet the quota, and the signal to abler workers would be clear.

An implication of the model, then, is that occasionally slaves of wealth-maximizing owners would die of exhaustion ... 'It was the usual fate of such laggards [in slave caravans] to be killed by their disappointed masters, anxious to discourage any thought of feigning incapacity as a means of escape, just as in the Congo area it was usual to kill slaves who fell ill while carrying ivory.' ...

... As the notion of 'shirking' does not apply to machines, we would not expect a machine to be driven to destruction. The maximizing behaviour of slaves, in the above instance, is the source of their plight [the quotation is from Fisher and Fisher, 1970, p. 78, and the phrase in brackets is Barzel's].

The source of their plight is their masters; less immediately, the source is the people who enslaved them. Barzel shifts blame away from where it belongs, where something can be done (end slavery and meanwhile get the masters to stop killing), to where nothing can be done (people cannot become machines).

¹⁹ The *Handbook for Domestic Violence Victims* (Illinois Coalition 1986, p. 4) includes: '*MYTH*: A woman who stays with her husband or boyfriend after being beaten must like to be beaten. *REALITY*: Being beaten hurts and no one likes it. There are many reasons why women remain with abusive men, including their fear of further violence, the financial hardships of leaving, their emotional attachment to their partners and their belief that families should stay together.'

Not only can slaves be blamed because they are rational – their very rationality is to blame.

There is also the danger of sliding between description and prescription. Here I have described a principal's optimal choice to understand violence better, but could be hired by an actual, not hypothetical, principal. The title of this paper would be 'How to Whip Workers Efficiently' and would contain exactly the same model.²⁰ According to John Pratt and Richard Zeckhauser (1985, p. 35), 'the real world has provided substantial nourishment for the theory of agency. Now it is time to reciprocate. We hope our decision-maker readers, now acting as agents, will apply the concepts of agency theory and the lessons of this volume to the improvement of business practice and hence ultimately to the benefit of society.' I might similarly declare my intentions: 'The real world has provided nourishment for the theory of inflicting violence for profit and for punishing children. Now it is time to reciprocate.'

Finally, in modelling a social situation, one necessarily depersonalises the people involved. This is more problematic in discussing violence than in discussing economics' more traditional subjects. There is the danger of diverting one's self from the necessity of concern and responsibility. But there is also the possibility of a more trenchant compassion.

V. CONCLUSION

The model here has an almost common-sensical result: Victims of violence in labour or similar relationships tend to be people who are poor in the sense of having bad alternatives. The model shows how this is a result of the inflictor's profit-maximisation decision.

It may have further applications. In Boston before World War II, 'conflicts about children's work obligations ... were the most frequent origin of child abuse' (Gordon, 1988, p. 181), suggesting that child abuse has an economic history. Today, many women in relationships with abusive men remain and are repeatedly beaten. When battered women were 'asked directly, "Why did you stay?"' they usually stated that they felt they had few or undesirable or no alternatives' (Pagelow, 1981, p. 72). I hope that further work will make more clear to what extent economic, along with sociological and psychological, perspectives can help us understand kinds of violence we have yet to abolish.

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Date of receipt of final typescript: June 1990

²⁰ This is not a new subject for economics. Finley (1985, pp. 17–8) tells us that 'Xenophon's *Oikonomikos* is a guide for the gentleman landowner. It begins with a long introduction on the good life and the proper use of wealth, followed by a section on the virtues and leadership qualities necessary for the householder and on the training and management of his slaves, an even longer section on wifely virtues and the training of a wife, and the longest section of all, on agronomy.'

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