CHAPTER 8

SIGNALING*

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INTRODUCTION

SIGNALING theory (ST) tackles a fundamental problem of communication: How can an agent, the receiver, establish whether another agent, the signaler, is telling or otherwise conveying the truth about a state of affairs or event which the signaler might have an interest to misrepresent? And, conversely, how can the signaler persuade the receiver that he is telling the truth, whether he is telling it or not? This two-pronged question potentially arises every time the interests between signalers and receivers diverge or collide *and* there is asymmetric information; namely, the signaler is in a better position to know the truth than the receiver is.

The state of affairs or event about which communication can occur could be anything. As it happens, in the literature it often has to do with the signaler's unobservable qualities, or, as it is sometimes said, her 'type'; for example, in a famous early study by Michael Spence (1974) the quality refers to a worker's productivity, which can be either of two types, high and low, and which the employer cannot directly observe. An 'honest' signaler would like to persuade the receiver that he is the good type, but the problem is that a 'dishonest' signaler too would like to do the same. How can the receiver decide and what should the signaler do?

Signaling theory, which is only a little more than thirty years old, has now become a branch of game theory. In economics it was introduced by Michael Spence in

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much money they spend and on what items, whether their hands are smooth or callous, and whether they blush easily or look us in the eye. We can see what they do or gather evidence on what they have done in our absence. We can memorize their individual traits, such as face or email address, and we reidentify them on seeing those traits again. We can of course hear what they say and the accent with which they say it.

Sometimes what we perceive conveys no information on properties that interests us; sometimes we mistake an innocent gesture for a sign or a signal of some property. Still, our best chance to find out something about people's unobservable properties is by establishing a connection between their perceivable features and their unobservable properties. Whenever interests are potentially at odds, this connection is the object of signaling theory.

Signs and signals

People's perceivable features come in two forms: signs and signals. The difference and links between the two are complex, but in the limited space I have I will only mention the main distinctions, drawing on Bacharach and Gambetta (2001).

Signals are the stuff of *purposive* communication. Signals are any observable features of an agent which are intentionally displayed for the purpose of raising the probability the receiver assigns to a certain state of affairs. 'Features' of an agent that make up a signal could be anything: they include parts or aspects of his body, pieces of behavior by him, and his appurtenances.

Signs are a different concept from signals. Signs can be just anything in the environment that is perceptible and by being perceived happens to modify our beliefs about something or someone. But signs are dormant potential signals. They are the raw material of signals. The basic form of the sign–signal transformation is that a signaler takes steps to display the sign. We cannot take for granted that signs are noticed. A duelling scar may be not on the face but the thigh or chest. The crowded tables of a restaurant may be invisible from the street unless we devise some system for outsiders to see them. One way of signaling is to take steps to make apparent a sign that would not otherwise be observed: to bare the chest to display a tattoo, to glaze the restaurant façade to reveal the crowds inside. One trigger of this transformation is the bearer's realization of the meaning of certain actions in the eyes of an observer. I may be unaware that my accent is informing others of some quality of mine, until some observer acts in a way that makes me aware and at which point I may choose to display it intentionally. We often produce the raw material of signals innocently by going about our lives, without planning for them to become signals. Most of our actions and observable traits will never become signals, but some will. Even checking one's email on one's home computer at a certain time

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8.1 The Theory's Basic Principles

When we believe that our interests and those of others are identical, establishing a connection between signals and states of affairs can be relatively easy. In many of our exchanges we simply believe what others want us to believe by what they do or say. This is the case when we deal with an individual with whom we have reasons to believe that we share our interests either generally or in a given situation.

A child who is told by his father to jump from a wall—'Jump, I'll catch you'—has no reason to disbelieve his father. The father's words mean what he says; they describe his true intentions because of who he is. The underlying problem here is one of coordination: both need to understand given utterances or gestures in the same way. They need to know the conventions, whether linguistic or related to other gestures. The main threat to communication here is *misunderstanding*.

Yet, as a Sicilian anecdote indicates, even in this case one cannot be entirely sure. A Mafioso once said to his son 'Jump, I'll catch you!' and when the son did he let him fall to the ground. 'Now,' he said, 'you'll learn that you cannot trust anyone.' This grim lesson reminds us of the threat of misrepresentation, by which others wilfully lead us to make the wrong connection: they emit false signals. The son understood the meaning of the message correctly and acted accordingly, but the message was false. Whether people truly share their interests with us is also not directly observable, itself a property that may be misrepresented.

When our interests are not necessarily identical, as in courtship or in business, or worse they openly clash, as in conflicts, the risk of strategic misrepresentation is potentially rife. Can we believe the pitiful story of a beggar asking us for money in the street, a suitor promising marriage, or that Iraq has weapons of mass destruction? From the minor daily encounters to the grand interactions between nations, the question of what to believe is ubiquitous. We cannot trust what people say or do to persuade us that they are trustworthy by default; or when they try to persuade us that it is not to our advantage to fight them because they are stronger than us. And yet not all signalers are lying. The honest among them—by 'honest' here I simply mean that they mean what they say or signal to us—are eager for us to know that they are honest. Is there a way in which truth can be transmitted even when interests are not aligned and knowledge is asymmetrical?

Typical situations that signaling theory covers have two key features:

(i) There is some action the receiver can do which benefits a signaler, whether or not he has the quality k, for instance marry him, but
(ii) this action benefits the receiver if and only if the signaler truly has k, and otherwise hurts her—for instance, marry an unfaithful man.

This applies to conflict situations too: if we know that our opponent is going to win a fight, we may choose to yield without fighting at a lesser cost for both. Thus

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crash. But, as we know only too well, suicide terrorists may be prepared to do just that and can afford to mimic a normal passenger simply by boarding. Some can drink from a poisoned chalice.

When the contamination of the signal is partial it remains credible enough for the majority of honest signalers to keep using it and for a minority of mimics to gain from using it too. In it, at least some truth can be transmitted. In many instances weak signals induce receivers to probe and seek more credible signals, or k signalers to spend resources protecting their signals from the threat posed by dishonest non-k signalers. When the contamination is complete the signal stops being informative, and rational receivers should ignore it.

8.1.1 A classic example

To understand how signaling theory works I will now discuss a classic case of a perfectly discriminating signal reported by Livy, the Roman historian. The Etruscans were besieging Rome, and a brave man known as Caius Mucius infiltrated the enemy's camp aiming to kill Porsena, the King of the Etruscans.

> Afraid to ask which of the two was the king, lest his ignorance should betray him, Mucius struck as fortune directed the blow and killed the secretary instead of the king. . . . He was seized and dragged back by the king's bodyguard to the royal tribunal. Here, alone and helpless, and in the utmost peril, he was still able to inspire more fear than he felt.

Rather than being cowed, Mucius threatens Porsena, hinting at the fact that many more like him are queueng up to try and kill him.

> The king, furious with anger, and at the same time terrified at the unknown danger, threatened that if [Mucius] did not promptly explain the nature of the plot which he was darkly hinting at he should be roasted alive. 'Look,' Mucius cried, 'and learn how lightly regard their bodies those who have some great glory in view.' Then he plunged his right hand into a fire burning on the altar. Whilst he kept it roasting there as if he were devoid of all sensation, the king, astounded at his preternatural conduct, sprang from his seat and ordered the youth to be removed from the altar. 'Go,' he said, 'you have been a worse enemy to yourself than to me . . . I send you away exempt from all rights of war, unhurt, and safe.' (Livy 1912: 2. 12)[4]

The case of Mucius, who later gained the nickname Scaevola (left hand), shows us the basic principle at work, and makes very clear all the fundamental elements that need to be identified to describe a genuine signaling episode.

The main characters: Mucius is the signaler and Porsena the receiver.
The property: Porsena cannot observe Mucius' resistance to pain for the sake of loyalty to his Romans compatriots.

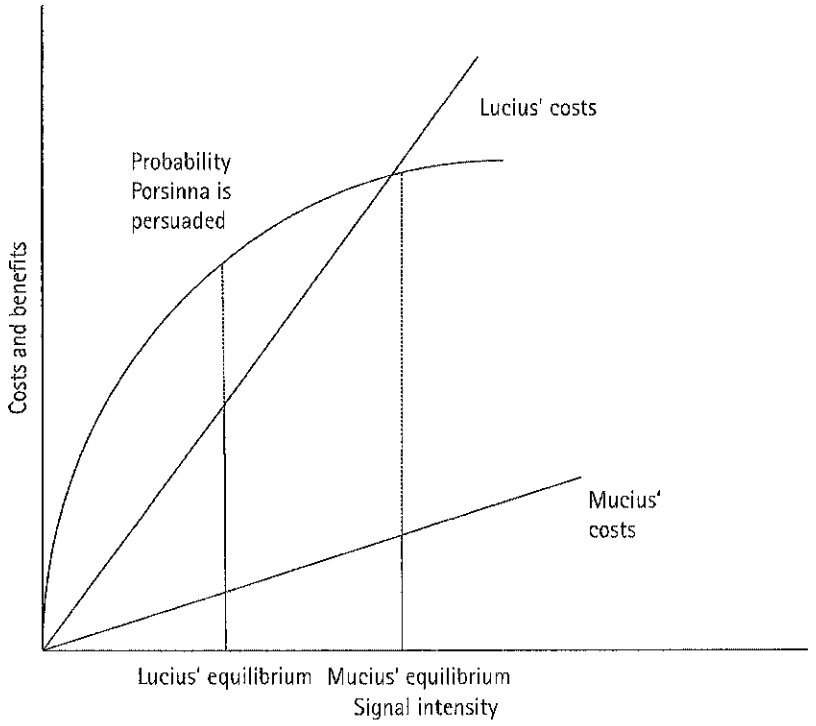

Fig. 8.1 A signaling model in which two signalers face different costs to emit the same signal intensity (after Johnstone 1997)

him, for he may obtain information on the Romans' plans, while it does not pay to torture Mucius. Both types would like Porsena to believe that they are resilient to torture.

Suppose there is a continuous signal whose cost for the signaler is positively correlated with the property the signaler wants to signal: the longer you can keep your hand in a burning fire the higher the cost and the more intense the signal becomes. The Mucius type is more resilient, and this implies that for him the same length of time with his hand in the fire is less costly than it is for the weaker type. Lucius can burn the tip of his fingers, Mucius a whole hand. Lucius and Mucius are on two different cost lines, as represented in Figure 8.1. For the same intensity they have different costs, Mucius can thus emit a more intense signal, a signal that Lucius cannot afford.

In Figure 8.1 I represent the signaler's benefits as a continuous variable for ease of exposition and generality. One can think of it as the probability that Porsena assigns to facing a type who is resilient to torture rather than someone who just pretends to be, a probability that grows as the signal intensity grows. The higher

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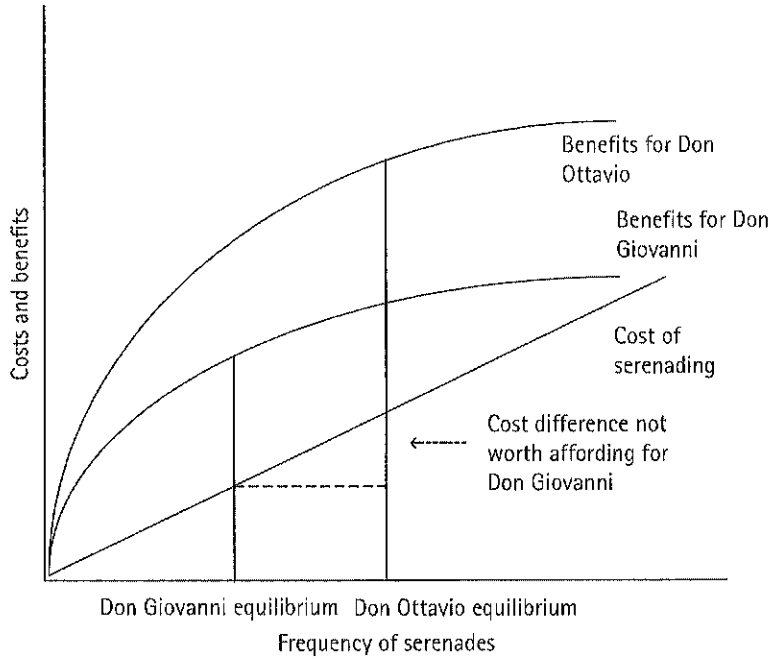

Fig. 8.2 A signaling model in which two signalers obtain different benefits from the same receiver's response (after Johnstone 1997)

the form of 'spending a lot of time with the woman, seeing her more often than other women, dating her for an extended period of time, calling her frequently on the phone, and writing her numerous letters' (Buss 2003: 102).[5]

8.2 Sources of Signal Cost

In order to identify a signaling episode it is essential to know the link between the property being signaled and the cost of the signal. There are several types of links, the main ones of which I will now describe.

8.2.1 Receiver's independent cost: 'wasting' key resources

In animal behavior 'the concept of signal costs requires that signaller fitness go down as the signalling goes up' (Searcy and Nowicki 2005: 14); in other words, the

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scared. By increasing the risk of predator detection and attack, the caller would signal that it has confidence in its ability to escape or fight back, thereby reducing the risk of an attack.

To understand the difference between receiver-dependent and receiver-independent costs, consider two types of signals aimed at dissuading opponents from fighting. One consists in threatening the opponent by moving very close to him or in showing one's back to him, either way signaling that one is not afraid of the opponent's attack, so much so that one makes it easier for the opponent to strike. Here there is no loss of resources, the cost is merely potential and due to the increased risk the individual incurs of suffering should the receiver attack. In the other case one can try to dissuade the opponent by tying one's hand behind one's back and thus depriving oneself of a resource which would be essential for one to fight. In both cases one shows confidence in one's ability to overcome the opponent, in the former by facilitating the opponent's attack, in the latter by handicapping oneself.[7] (The name used in zoology to refer to signaling theory, *the handicap principle*, is derived from this type of case and thus to receiver-independent costs.)

8.2.3 Third party-dependent cost

I do not know if it occurs among other animals, but among humans we also have signals the cost of which is dependent on a third party's response, which the communicating agents can exploit. Divine Brown, a Los Angeles prostitute who achieved her fifteen minutes of fame for administering oral sex to British actor Hugh Grant in 1995, revealed her particular kind of test to make sure that the prospective customer was not an undercover policeman. Before agreeing to trade, she asked Grant to expose himself in the street. The reason, she said, is that an undercover policeman would not do that. Divine believed that exposing oneself is an action with information value because only a real customer can afford to do it while an undercover policeman would not break the law for he would risk losing his job. In this case the signal cost for the 'dishonest' signaler is imposed by a third party, the law and the police authorities.

The same reasoning inspires a tougher test applied by drug dealers in New York. Since the mid-nineties

> as police have intensified their assault, the dealers have also adopted more perilous tactics. Five or six times each month, undercover investigators are now forced to use cocaine or heroin at gunpoint, to prove to dealers that they can be trusted. At least twice a month, an officer [who refuses] is shot or otherwise wounded during a staged purchase, say police commanders, who spoke on condition of anonymity.
>
> (*New York Times*, 21 January 1998; Gambetta 2009: ch. 1)

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be more costly for someone else to imitate my voice and accent accurately. And if the medium of communication allows it I can just do what no one else can: show my face, which will be still costless for me and impossible to do for mimics. If being a woman works as a signal of nonaggression, for example, then the cost of being one and displaying it are high only for men who would like to mimic 'woman-ness,' while costless for genuine women. Drinking from a nonpoisoned chalice has no cost for the nonpoisoner. In short, not all honest signals imply a cost for the honest signaler.

8.2.6 Knowing costs, benefits, and incidence of deception

Signaling theory is a powerful tool that can deliver specific answers to the questions when and how much false signaling will occur. However, crucial for the existence of the solutions which it offers are strong assumptions about the players' background knowledge: they must know the sizes of the benefits and of the cost of emitting s, for both k signaler and non-k signalers; and a receiver must also know the base-rate probabilities that a signaler is k and non-k.

> When she peers through the Judas hole and sees a stranger in a UPS uniform, as she wonders whether to confer the benefit of opening the door she needs to have in mind the ease or difficulty of acquiring a UPS disguise, and the value to a criminal of what he would get from securing entry, and have some idea of the general incidence of criminality. (Bacharach and Gambetta 2001: 161)

These measures are of course not necessarily easy to obtain, and imperfect knowledge often explains the occurrence of successful deception.

What thus counts as a signal as well as what makes it more or less costly for different types of signalers is particular to the context in which it is used, and this is one of the reasons why the theory, while powerful in abstract terms, is often hard to apply without a fine-grained appreciation of the domain in which signals are emitted and received. To identify German spies British interrogators asked the results of famous cricket matches, the knowledge of which was costless to acquire for a genuine British man by simply living in the country, but hard to know and costly to memorize for even a well-trained German spy.

8.2.7 When signaling fails

Even without deception and even if the right cost conditions are present, there are still ways in which signaling can fail. In general, this is because signaling and asking for certain signals may reveal more than we would wish and thus prove confusing or backfire. I shall mention only two members of a larger family. To reflect on them is important, for it reveals some of the theory's limitations.

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feeding, cooperation, and intra- and interspecific conflict. Here I have no space to dwell on this, while encouraging the reader to look up the excellent overview by Searcy and Nowicki (2005).

Signaling theory is now a fundamental part of microeconomics[8] and game theory. Various theoretical refinements have been published over the last twenty years (e.g. Cho and Kreps 1987; Kreps and Sobel 1994). Although to a lesser extent than in animal studies, several empirical tests have also been carried out: on Spence's early model of education as a signal of productivity (see Logren, Persson, and Weibull 2002 for a review and Kübler, Müller, and Normann 2005 for an experimental test), and on a variety of practices, such as product guarantees, financial markets, advertising,[9] charity donations (Glazer and Konrad 1996), and scientific publications funded by private firms (Belenzon and Patacconi 2008).

Recent theoretical developments in economics include[10] a model by Feltovich, Harbaugh, and To (2002), backed by some experimental evidence, which tries to explain a puzzle that is at once of interest to sociologists and may seem a challenge to signaling theory: so-called 'countersignaling':

> Why do the nouveaux riches flaunt their wealth, while the old rich scorn such gauche displays? Why do mediocre students often outperform talented students? Why are moderate quality goods advertised heavily, while high-quality goods rely on their reputation? Why do minor officials prove their status through petty displays of authority, while the truly powerful prove their strength by avoiding such displays?[11]

With respect to the standard model, two realistic modifications are introduced: first, in addition to low- and high-quality signalers there are medium-quality ones; next, receivers have additional incomplete information about the signaler's quality that is independent of the signal. For instance, the signaler's wealth is

> inferred not just from conspicuous consumption, but also from information about occupation and family background. This extra information is likely to be only partially informative, meaning that types of medium quality may still feel compelled to signal so as to separate themselves from low types. But even noisy information will often be sufficient to adequately separate high types from low types, leaving high types more concerned with separating themselves from medium types. Since medium types are signaling to differentiate themselves from low types, high types may choose to not signal, or countersignal, to differentiate themselves from medium types. While it might seem that the sender is just saving signaling costs by not signaling, we show that countersignaling can be interpreted as a signal of confidence that the extra information about the sender is favorable.[12]

In political science, apart from Jervis's early study (1970) written before signaling theory was first formalized, there have been both theoretical developments (e.g. Austen Smith and Banks 1998) and many applications.[13] The topics tackled using the theory range widely, and cannot possibly all be mentioned here. They include

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8.4 Origins

Although as a formally defined and well-developed tool signaling theory is relatively young, in a loose sense the core idea has ancestors, the most notable of which is Thorstein Veblen's *The Theory of the Leisure Class* (see Fig 8.3), published in 1899.[14] The idea came as a solution to a grand empirical puzzle: How can we explain the widespread occurrence of wasteful activities, self-harming practices, gifts, and nonanonymous altruism? How can we make sense of practices that do not produce material goods for the direct enhancement of well-being, but seem to waste useful goods, or waste the time that could be helpfully spent in productive activities? Why, was Veblen's question, should our fundamental instinct for workmanship, frugality, efficiency, and the pursuit of self-interest be violated on such a large scale by seemingly irrational and costly practices? (The question of waste is also at the centre of the theory in biology: 'The Handicap Principle is a very simple idea: waste can make sense, because by wasting one proves conclusively that one has enough assets to waste and more. The investment—the waste itself—is just what makes the advertisement reliable,' Zahavi and Zahavi 1998: 229.)

The analytical reach of the modern version of the theory has become broader, in that it includes, as we have seen, costs that are not produced only by wasteful use of resources, and its foundations have become deeper and more precise, capable of producing testable propositions. However, it is worth giving a brief account of the ancestors, not only because it is interesting as intellectual history, but because it reveals some of the pitfalls of using the theory which even some contemporaries still incur.

8.4.1 Veblen and his progeny

Veblen was at pains to make clear that he was using the term 'waste' as a 'technical term,' and 'for want of a better term': 'It is here called "waste" because this expenditure does not serve human life or human well-being on the whole, not because it is waste or misdirection of effort or expenditure as viewed from the standpoint of the individual consumer who chooses it' ([1899] 1994: 60).

His answer to the question of what waste is for relies on three assumptions: (i) we want more prestige rather than less; (ii) other people want to know how much of it we deserve; and (iii) prestige is, in contemporary societies, also a function of how much wealth we have. But since wealth is not an easily observable property of individuals and families, people display their real wealth by wasting time, goods, and money in a visible way, conspicuously that is:

> The growth of conspicuous leisure and consumption, it appears that the utility of both alike for the purposes of reputability lies in the element of waste that is common to

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still a brilliant read and an inspiration for new work (e.g. Bagwell and Bernheim 1996; Becker, Murphy, and Glaeser 2000), he has little to say on what his model cannot explain.[15]

Whether by influence or coincidence, Veblen's idea has progeny, which include Marcel Mauss and Pierre Bourdieu, and whose latest descendant is Eric Posner. In the *Essais sur le don* Marcel Mauss never cites Veblen, but his core observations bear a striking similarity to Veblen's theory:

> In some potlatch systems [in northwest America] one must spend everything one possesses and keep nothing. The highest prestige will be gained by the richest man who is also capable of squandering his wealth recklessly... Everything is conceived as if it was a 'war of wealth'... Sometimes it is not a question of giving and of receiving in return, but of destroying in order not even to appear desirous of receiving something back. Whole cases of candlefish or whale oil, houses, and blankets by the thousands are burnt; the most valuable coppers are broken and thrown into the sea in order to crush, 'flatten' a rival. In this way, not only does one improve one's position on the social ladder, but also that of one's family. (Mauss [1924] 1954: 35)[16]

Bourdieu never mentions Veblen or Mauss, but in *Esquisse d'une theorie de la practique* ([1972] 1977), as well as later in *La Distinction*, he moves onto the same turf. Just like Veblen, and declaring himself to be reacting to reductive 'economism,' he wants to 'extend economic calculation to *all* the goods, material and symbolic, without distinction' (p. 178). 'Symbolic capital, in the form of the prestige and renown attached to a family and a name is readily convertible back into economic capital' (p. 179). The acquisition of prestige, he writes in reference to his fieldwork in Algeria, implies

> substantial material and symbolic investments, in the form of political aid against attack, theft, offence, and insult, or economic aid, which can be very costly, especially in times of scarcity. As well as material wealth, *time* must be invested... *giving or squandering time* being one of the most precious of gifts... [S]ymbolic capital can only be accumulated at the expense of the accumulation of economic capital.
>
> (Bourdieu [1972] 1977: 180)

Grand theory relying on the core idea has reemerged recently with Eric Posner's *Law and Social Norms* (2000). Posner attempts something very ambitious; namely, to explain social norms as signaling equilibria. He believes that the key property humans want to signal is their ability to postpone gratification. In the language of economics, this is referred to as the 'discount rate'; that is, how much a good is valuable tomorrow relative to its value today. Those who signal a low discount rate are perceived as better partners in repeated cooperative endeavours, for they feel relatively less tempted to cheat. Posner interprets an extravaganza of practices as signals of a low discount rate: manners, fashion, gift-giving, conspicuous consumption, marriage and family, obedience to law, shaming of criminals, deferred sex, unprotected sex, voting, patriotic displays, self-censorship, race

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To test empirically whether people really spend their money on lavish objects to signal their wealth, whether they succeed and how, and who their audience really is and what it gains from responding in one way or another to the signal, for a start we could search for variations in Veblen's assumptions. For instance, we could test whether for domains in which wealth is not valued very much, and in which other properties confer prestige, as for example among academics or priests, we observe lower proportions of conspicuous expenditure. We could further measure whether domains in which wealth is more or less easily observable yield corresponding differences in conspicuous consumption. For instance, in Norway people can now see each other's income-tax returns online, while, say, in Southern Italy many are too engaged in the black economy (or, worse, in the 'black and blue' economy) for anyone to be able to easily know their real wealth, and people should thus spend proportionally a lot more than in Norway displaying it. Research along these lines is only just beginning (e.g. Kerwin, Hurst, and Roussanov 2007), and the extensive range of options that comes to mind with regard to wealth displays epitomizes the potential that this genuinely cross-disciplinary theory has in many other domains of human behavior.

Notes

1. An ESS is a strategy which, if adopted by a population of players, cannot be invaded by any alternative strategy. It is a Nash equilibrium which is 'evolutionarily' stable, meaning that once it is fixed in a population, natural selection alone is sufficient to prevent alternative (mutant) strategies from successfully invading.
2. This hypothesis is controversial; see, for instance, Buller (2005), who challenges the evidence for the cross-cultural applicability of the waist–hip-ratio preference.
3. Interview with Lt. Col. Tim Spicer, *Cambridge Review of International Affairs*, 13 (1) (1999), 165–71.
4. I am not the first to use this as an example of an extreme signal: see Austen Smith and Banks (2000).
5. 'One strong signal of commitment is a man's persistence in courtship. It can take the form of spending a lot of time with the woman [etc.]...These tactics are extremely effective in courting women as permanent mates, with average effectiveness ratings of 5.48 on a 7-point scale, but only a moderately effective 4.54 at courting casual sex partners. Furthermore, persistence in courtship proves to be more effective for a man than for a woman because it signals that he is interested in more than casual sex' (Buss 2003: 102).
6. The translated text of *Fasti* can be found online at A. S. Kline's free archive of poetry website, at <http://www.tonykline.co.uk/PITBR/Latin/OvidFastiBkSix.htm#BkVIJune9>, accessed 2008.
7. A related category of signals draws its cost from defying not the risk of the receiver's attack, but the risk posed by impersonal forces. Some games of daring come into

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Goffman picks up one strand of ST by pointing out that people will not attend to easy-to-fake signals, such as words, but then points to their attempts to catch whether the others are truthful by observing giveaways, which would include emotional expressions (1969: 127).

15. For some penetrating criticisms of Veblen's theory see Veyne (1976: 94 ff.) and Elster (1983: 66 ff.).
16. Although I use the translation in the 1954 English edition as a basis, I have modified this quotation to make it more faithful to the original and correct some misinterpretations. For a modern study of gifts as economic signals see Camerer (1988).

References

Austen Smith, D., and Banks, J. F. (2000), 'Cheap Talk and Burnt Money', *Journal of Economic Theory*, 91: 1–16.

——and Fryer, R. (2005), 'An Economic Analysis of "Acting White"', *Quarterly Journal of Economics*, 120 (2) 551–83.

Bacharach, M. O. L., and Gambetta, D. (2001), 'Trust in Signs', in Karen Cook (ed.), *Trust in Society* (New York: Russell Sage).

Bagwell, L. S., and Bernheim, B. D. (1996), 'Veblen Effects in a Theory of Conspicuous Consumption', *American Economic Review*, 86 (3): 349–73.

Banks, J. S. (1991), *Signaling Games in Political Science* (New York: Harwood).

Becker, G. S., Murphy, K. M., and Glaeser, E. (2000), 'Social Markets and the Escalation of Quality: The World of Veblen Revisited', in G. S. Becker and K. M. Murphy (eds.), *Social Economics: Market Behavior in a Social Environment* (Cambridge, Mass.: Harvard University Press), 84–104.

Belenzon, S., and Patacconi, A. (2008), 'Open Science as a Signaling Device: Evidence from Firm Publications', unpublished paper, March.

Besley, T. (2005), 'Political Selection', *Journal of Economic Perspectives*, 19: 3–60.

Bliege Bird, R., and Smith, E. A. (2005), 'Signaling Theory, Strategic Interaction, and Symbolic Capital', *Current Anthropology*, 46 (2): 221–48.

Bolton, P., and Dewatripont, M. (2005), *Contract Theory* (Cambridge, Mass.: MIT Press).

Bourdieu P. [1972] (1977), *Outline of a Theory of Practice* (Cambridge: Cambridge University Press).

Breen, R., and Cooke, L. P. (2005), 'The Persistence of the Gendered Division of Domestic Labour', *European Sociological Review*, 21 (1): 43–57.

Buller, D. (2005), *Adapting Minds: Evolutionary Psychology and the Persistent Quest for Human Nature* (Cambridge, Mass.: MIT Press).

Buss, D. M. (2003), *The Evolution of Desire: Strategies of Human Mating* (New York: Basic).

Camerer, C. (1988), 'Gifts as Economic Signals and Social Symbols', *American Journal of Sociology Organizations and Institutions: Sociological and Economic Approaches to the Analysis of Social Structure*, 94 (supplement): S180–S214.

Cho, I. K., and Kreps, D. (1987), 'Signaling Games and Stable Equilibria', *Quarterly Journal of Economics*, 102: 179–221.

KYDD, A. (2003), 'Which Side Are You On? Bias, Credibility and Mediation', *American Journal of Political Science*, 47 (4): 597–611.

LIVY (1912), *History of Rome*, trans. W. L. Roberts (New York: Dutton); at <http://www.perseus.tufts.edu/cgi-bin/ptext?lookup=Liv.++2.+12>, accessed 2008.

LOGREN, K. G., PERSSON, T., and WEIBULL, J. W. (2002), 'Markets with Asymmetric Information: The Contributions of George Akerlof, Michael Spence and Joseph Stiglitz', *Scandinavian Journal of Economics*, 104 (2): 195–211.

LOHMANN, S. (1993), 'A Signaling Model of Informative and Manipulative Political Action', *American Political Science Review*, 87 (2): 319–33.

MCADAMS, R. H. (2001), 'Signaling Discount Rates: Law, Norms, and Economic Methodology', *Yale Law Journal*, 110: 625–89.

MAUSS, M. [1924] (1954), *The Gift: Forms and Functions of Exchange in Archaic Societies* (London: Cohen and West).

MILLER, G. F. (1998), 'Review of "The Handicap Principle" by Amotz and Avishag Zahavi', *Evolution and Human Behavior*, 19 (5): 343–47.

OVERGAARD, P. B. (1994), 'The Scale of Terrorist Attacks as a Signal of Resources', *Journal of Conflict Resolution*, 38 (3): 452–78.

PODOLNY, J. M. (2005), *Status Signals* (Princeton, N.J.: Princeton University Press).

POSNER, E. (2000), *Law and Social Norms* (Cambridge, Mass.: Harvard University Press).

RAUB, W. (2004), 'Hostage Posting as a Mechanism of Trust: Binding, Compensation, and Signaling', *Rationality and Society*, 16 (3): 319–65.

SCHELLING, T. (1960), *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press).

SEARCY A. W., and NOWICKI, S. (2005), *The Evolution of Animal Communication. Reliability and Deception in Signalling Systems* (Princeton, N.J.: Princeton University Press).

SINGH, D., and YOUNG, R. K. (2001), 'Body Weight, Waist-to-Hip Ratio, Breasts, and Hips: Role in Judgments of Female Attractiveness and Desirability for Relationships', *Ethology and Sociobiology*, 16: 483–507.

SOSIS, R., and BRESSLER, E. R. (2003), 'Cooperation and Commune Longevity: A Test of the Costly Signaling Theory of Religion', *Cross-cultural Research*, 37 (2): 211–39.

SPENCE, M. (1973), 'Job Market Signaling', *Quarterly Journal of Economics*, 87: 355–74.

——(1974), *Market Signaling* (Cambridge, Mass.: Harvard University Press).

VEBLEN, T. [1899] (1994), *The Theory of the Leisure Class* (New York: Dover).

VEYNE, P. (1976), *Le pain et le cirque* (Paris: Seuil).

ZAHAVI, A. (1975), 'Mate Selection: A Selection for a Handicap', *Journal of Theoretical Biology*, 53: 205–14.

——and ZAHAVI, A. (1998), *The Handicap Principle* (Oxford: Oxford University Press).