M

Manipulation and Dishonest Signals

Carl Brusse
Department of Philosophy and Charles Perkins Centre, The University of Sydney, Sydney, NSW, Australia

Synonyms

Deception; Influence

Definition

Dishonest signals are displays, calls, or performances that would ordinarily convey certain information about some state of the world, but where the signal being sent does not correspond to the true state. Manipulation is the sending of signals in a way that takes advantage of default receiver responses to such signals, to influence their behavior in ways favorable to the sender. Manipulative signals are often dishonest, and dishonest signals are often manipulative, though this not need be the case. Some theorists have defined signaling in such a way that evolutionarily reinforced signals are essentially manipulative.

Introduction

Signals in the natural world are evolved phenomena, where two actors, the sender and the receiver, use an observable trait or behavior of the sender to direct the behavior of the receiver. The fitness benefits of this relationship for both actors, on average over evolutionary time, help explain why the relevant behaviors evolved. In standard cases, the sender signals conditional on some state of the world which they (alone) have access to, and the receiver responds conditionally to the signal. The conditional strategies of signaling and responding coevolve depending on the fitness impacts of the receiver's actions (given what the state of the world was), the costs of available signals and responses, and combined effects of the different strategies (Maynard Smith and Harper 2003; Skyrms 2010) (see ▶ "Animal Signaling").

However, evolved response strategies to signals (and other stimuli) are also vulnerable to exploitation via manipulation. If the interests of senders and receivers are not exactly the same, then there will be situations where it is in the interests of the sender to have the receiver behave in a way that is not in the receiver's interests (given the true state of the world). This incentivizes signaling strategies which are dishonest and/or manipulative, and this incentivizes signaling forms and strategies which make dishonest signals more difficult or strategically unwise (see ▶ "Costly Signaling").

T. K. Shackelford, V. A. Weekes-Shackelford (eds.), *Encyclopedia of Evolutionary Psychological Science*,
https://doi.org/10.1007/978-3-319-16999-6_3616-1

Dishonest Signals in Nature

Evolved dishonest signals are well known among insects and other invertebrates, where fitness effects of signaling and manipulation are amenable to study. For example, male fiddler crabs have one large claw used for fighting other males and signaling their capacity to do so (by waving it as a visual signal of relative size and strength). Claws lost in fights can be regrown, but some species cut their losses and prioritize the rapid enlargement of much weaker "dummy" claws, which are ineffective in fighting but can still serve the signaling function dishonestly. Sexual signals such as pheromones are another clear case of manipulable fitness-critical signaling. These signals regulate mating behaviors between partners so that mating occurs when both optimally resourced for the production of viable offspring, with pheromones and other signals triggered by sexual maturity and fertility, and mating behaviors triggered by those signals. One famous manipulator of such systems is the *Ophrys speculum* orchid, which attracts male *Campsoscolia ciliata wasps* by producing flowers which mimic the approximate shape of a female wasp and accurately reproduce their pheromones. This is so successful that male wasps preferentially copulate with the flower rather than with actual females (Ayasse et al. 2003). The payoff for the orchid is pollination, as repeated pseudocopulation carries pollen widely between plants, but the wasp incurs a net fitness cost due to the wasted effort and loss of reproductive opportunity. Developmentally entrenched dishonest signaling between species often involves mimicry, with more common examples being the coloring of some harmless species of arthropods, amphibians, and reptiles to resemble toxic or venomous species, as a deterrent to predators.

Vertebrates, especially those with complex social organization, often exhibit complex, flexible, and voluntary signaling strategies, with a variety of dishonest signals used for conditional advantage against conspecifics. Primate studies show that the use of dishonest signals correlates with cortex size and social complexity (McNally and Jackson 2013). Chimpanzees learn to conceal or suppress signals depending on context, for example, to avoid attention of alpha males, and can be straightforwardly deceptive (De Waal 2007). However, such signaling is often less straightforward and more controversial with respect to measuring fitness impacts and drawing evolutionary conclusions.

This difficulty carries across to the application of signaling theory to communication and deception in humans. Human sociality is mediated by languages and other signals, which in principle can be treated as vast systems of signal and response strategies. However, voluntary human signaling is often based on learned responses rather than developmentally acquired traits; costs and benefits associated with deception or honesty are generally hard to identify with direct fitness payoffs. As with much of ethology, the degree to which animal signaling and manipulation theory is continuous with human social psychology is open to debate.

Contested Definitions

Depending on how signals, dishonesty, and manipulation are defined, dishonest signals and manipulation need not be the same thing. Behavior-altering parasites, for example, clearly manipulate their hosts without exploiting signal responses. Deceptive manipulation is also possible that exploits environmental responses rather than established signal-response behaviors. For example, the luminescent esca organs of anglerfish are often used to imitate the food sources of prey fish, or otherwise confuse or lure them in for predation. Anglerfish are clearly manipulating their prey via a form of deception, but the responses they take advantage of are not typically responses to *signals* and did not evolve as such, meaning that the traditional "communicative" or co-evolutionary paradigm of signaling does not fit the case well.

In contrast to the more co-evolutionary "information-based" formulation of signaling, some theorists also argue that even honest signals are best seen as cases of manipulation (Dawkins and Krebs 1978; Krebs and Dawkins 1984). Because the fitness benefits of sending a signal are only realized if it influences the behavior of a receiver, it is argued that the primary selected function of signals is to manipulate rather than to communicate or inform. On this way of thinking, all signals are manipulative, but sometimes being manipulated is worthwhile (i.e., when signals are mostly "honest"), and it might sometimes make little difference to the receiver either way. This view therefore retains natural selection as a key component, but only for senders, and its modern proponents argue that it is misleading to link the idea of signaling to the transfer of information/ meaning encoded in the signal, or even treat honesty or dishonesty as a primary consideration (Rendall and Owren 2013).

Stability and Dynamics

Regardless of what counts as a signal or as manipulation, the ability of receivers to glean the facts that a sender has access to from their signaling behavior remains evolutionarily significant (sometimes called "mind reading"). Dishonest signals, if treated as veridical, can be directly costly to the receiver. However, in the context of an established, mutually beneficial signaling system, these can also indirectly costly to both senders and receivers more generally due the value of honest, veridical signals being undermined. This provides incentives for receivers to evolve detection mechanisms and for honest senders to evolve complementary "guarantee" mechanisms.

Among the posited systems of guarantee-detection for mammals (especially humans and closely related primates) are involuntary emotional displays and the ability to rapidly interpret them. Darwin argued that reflexive facial expressions (and other reflexes such as blushing) in humans and other great apes are evolved veridical signals of emotional states (Darwin 1872). Robert Frank goes further, using game theoretic analysis to argue that emotional states themselves evolved as solutions to the threat of dishonest signals. Anger (for example) is seen as an easily identified loss of control which predictably restricts the sender to a dominant course of action, akin to making a show of throwing away the steering wheel of your car in a game of chicken (Frank 1988). Again, the deep human dependence on cultural learning (and potential cross-cultural variation) complicates detailed evolutionary analyses of any particular forms of emotional display or manipulative behavior, though plausible general principles can be posited. In theory, producing and recognizing involuntary, hard-to-fake physiological displays that are directly generated by mental states could be strategically advantageous in competitive social contexts. However, evolving more sophisticated capacities to mimic them would also be advantageous for would-be manipulators, so we should expect to see an evolutionary arms race between intense displays, "acting ability," and ability to discern genuine anger, fear, and love from manipulative fakery.

The evolutionary dynamics of manipulation therefore follow the general pattern of parasitic relationships. Manipulated receivers often pay a significant fitness cost, so a simple approach to evolutionary theory sees such signals as unstable: the receivers are under evolutionary pressure to alter their strategies to avoid being duped. For example, it might be possible for *Campsoscolia ciliata* wasps to evolve coordination strategies based around alternative pheromone signals that the orchid finds harder to mimic. But this would depend on generation time and other factors in the comparative evolvability of both species. The persistence of *Ophrys speculum's* manipulations might therefore be the result of it rapidly adapting to produce any pheromone the wasp uses. Alternatively, there might be an ongoing chemical arms race: with the wasp occasionally switching pheromone signals and the orchid racing to catch up. Another possibility is that the fitness costs to the wasp of being manipulated never rise to the level that a difficult. It is also worth noting that the orchid's breeding strategy makes it an obligate manipulator of the wasp, and therefore it too will suffer if its fitness impact on them is too great. It is therefore possible that the manipulative signaling relationships might be self-regulating, such that selection pressure on receivers stays at levels too low to make adaptive escape worthwhile.

Conclusions

Signaling theory provides a broad framework to approach the evolutionary psychology of communication, deception, and manipulation. Furthermore, evidence from primate studies suggest that deception and the capacity to deceive is linked to need to navigate and exploit social structures and relationships. Deception almost certainly evolved alongside communication, cooperation, and social complexity in our recent evolutionary past, and in principle, it can be understood in simple game theoretic terms that are applicable to evolutionary explanation. In practice though, due to the relative complexity and cultural dependence of humans with respect to their psychology, societies, and signaling systems, the productive application of these principles in psychological research remains a challenge.

Cross-References

▶ Evolution of Emotion in Social Context

References

Ayasse, M., Schiestl, F. P., Paulus, H. F., Ibarra, F., & Francke, W. (2003). Pollinator attraction in a sexually deceptive orchid by means of unconventional chemicals. *Proceedings of the Royal Society of London B: Biological Sciences, 270*(1514), 517–522. https://doi.org/10.1098/rspb.2002.2271.

Darwin, C. (1872). *The expression of the emotions in man and animals*. John Murray, London.

Dawkins, R., & Krebs, J. R. (1978). Animal signals: Information or manipulation? In J. R. Krebs & N. B. Davies (Eds.), *Behavioural ecology: An evolutionary approach* (pp. 282–309). Oxford: Blackwell Scientific.

DeWaal, F. B. M. (2007). *Chimpanzee politics power and sex among apes*. Baltimore: Johns Hopkins University Press.

Frank, R. H. (1988). *Passions within reason: The strategic role of emotions*. New York: W W Norton & Co.

Krebs, J. R., & Dawkins, R. (1984). Animal signals: Mind-reading and manipulation. In J. R. Krebs & N. B. Davies (Eds.), *Behavioural ecology: An evolutionary approach* (2nd ed., pp. 380–402). Oxford: Blackwell Scientific.

Maynard Smith, J., & Harper, D. (2003). *Animal signals*. New York: Oxford University Press.

McNally, L., & Jackson, A. L. (2013). Cooperation creates selection for tactical deception. *Proceedings of the Royal Society B: Biological Sciences, 280*(1762), 20130699. https://doi.org/10.1098/rspb.2013.0699.

Rendall, D., & Owren, M. J. (2013). Communication without meaning or information: Abandoning language-based and informational constructs in animal communication theory. In U. E. Stegmann (Ed.), *Animal communication theory: Information and influence* (pp. 151–188). Cambridge, MA: Cambridge University Press. https://doi.org/10.1017/CBO9781139003551.010.

Skyrms, B. (2010). *Signals: Evolution, learning, & information*. New York: Oxford University Press.