Applying Adaptationism to Human Anger: The Recalibrational Theory

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In the late 1960s and early 1970s, evolutionary biology underwent a scientific revolution in which poorly defined models of evolutionary change were replaced with a theoretically rigorous program of research that integrated the major findings of evolutionary biology, animal behavior, and genetics. This integration included a method, known as the adaptationist program, for identifying and describing design in organisms, a method that matches the engineering requirements inherent in adaptive problems to features in the organism that are designed to solve those problems. In this chapter, I apply the methods of the adaptationist program to human anger and argue that anger is the output of a cognitive mechanism designed by natural selection to negotiate conflicts of interest. The causes of anger, the behavior it produces, the factors that mitigate it, and its effects on physiology, perception, and cognition can be explained by reference to this adaptive function.

In brief, the Recalibrational Theory states that anger is a system designed by natural selection to recalibrate the weight another individual places on the angry person's interests. Anger deploys two main strategies to convince the target to treat the angry individual better. One, toward those with whom the angry individual has a cooperative relationship, individuals may withhold benefits (e.g. the silent treatment). Two, toward those who have little incentive to value the cooperation of the angry individual, anger can mobilize aggressive acts. This later option is responsible for a great deal of human aggression and is very close in design and functional to conspecific aggression in other animals.

The Evolutionary Biology of Resource Conflict

Natural selection is the only process shown capable of creating complex functional design in organisms (Williams, 1966). Evolutionary psychology is an approach to psychology that uses analyses of selection pressures to discover and understand the cognitive machinery designed by those selection pressures. The closer the fit between the logic of the selection pressures and the known features of the mechanism under study, the more confident one can be about the proposed function of the mechanism, the accuracy of the posited selection pressures, and any future predictions derived from the model of the machinery under study. Therefore, a thorough examination of both the selection pressures and the proposed cognitive mechanism are necessary for a theoretically sound, computational model of any organic mechanism designed by natural selection. An analysis of the selection pressures inherent in resource conflict and the major features of human anger show a very tight fit, making a strong case that human anger was designed by natural selection to regulate resource conflict.

Selection Pressures Inherent in Resource Conflict

By virtue of their common design, organisms of the same species tend to exploit the same resources in their environment. For example, they tend to mate with members of the same species, eat the same foods, and seek to occupy the same territories. Selection pressures to gain increased access to finite resources will naturally design organisms to compete for those resources. Excluding kin, and assuming there are no reciprocal consequences, natural selection will design one organism to attempt to gain resources with no regard for the impact of their activities on competitors. Considering this, the animal kingdom presents a surprisingly high number of species that demonstrate apparent restraint in response to conflicts of interests. Rattlesnakes, for example, use wrestling to resolve conflicts rather than their deadly fangs (Maier, 1998). Red deer will parallel walk, roar, and finally antler wrestle but not stab each other from behind or the side with antlers (Clutton-Brock & Albon, 1979). Cichlid fish engage in parallel swimming, mouth wrestling, and tail beating before engaging in highly damaging combat (Enquist & Leimar, 1983).

These examples were so contrary to the perceived logic of natural selection that, for a while, group selection was deemed the only plausible explanation (Lorenz, 1966). That is, it was thought that these contests were not selected for at the individual level, but rather that genes for engaging in sublethal contests were selected because groups that contained such individuals would survive longer than groups that contained lethal fighters.

In the same year of Lorenz's publication, George Williams published *Adaptation and Natural Selection* (1966), the most comprehensive refutation of then extant versions of group selection theory. A number of theories of animal conflict arose to fill the vacuum after the dissolution of group selection accounts; most of these new theories stemmed from the introduction of game theory to evolutionary biology by Maynard Smith (1982), which allowed evolutionary biologists to posit mathematically precise models of selection pressures. The Asymmetric War of Attrition (AWA) was one of those explanations. It is an economic model for analyzing the selection pressures operating in situations of conflict between two animals of different strength competing over an adaptive resource that holds differential value to the two organisms (Hammerstein & Parker, 1982; Maynard Smith & Parker, 1976). The model expresses the conditions under which X will fight if Y does not relinquish the resource. For any two organisms, X and Y, X should fight for the resource when the following inequality is satisfied:

$$v(X) > v(Y) * k(X)/k(Y)$$

In this equation, v(X) is the adaptive value of the contested resource to organism X, v(Y) is the adaptive value of the resource for organism Y, and k(X) / k(Y) is relative RHP (i.e., Resource Holding Power) which is the rate at which organism X will incur injuries if both organisms attempt to gain the resource divided by the rate at which Y will incur injuries. As can be seen in the equation, if the organisms are equally matched (i.e. k(X)/k(Y) = 1) then X will be selected to fight and Y will be selected to relinquish the resource when X values the resource more than Y; in other words, whoever needs it more will get it. On the other hand, if X and Y value the resource equally (i.e. v(X) = v(Y)) then whichever organisms is the better fighter will be selected to take the resource. In general, an organism becomes more likely to fight for a resource when it values it more than its opponent and when it is a better fighter than its opponent.

Design of Animal Conflict and Selection Pressures in the Asymmetric War of Attrition

Five converging lines of evidence suggest that animals have been designed to respond adaptively to the selection pressures modeled in the Asymmetric War of Attrition.

1. Animals are designed such that relative Resource Holding Power partially determines the resolution of resource conflicts.

The advantage in a resource conflict of being the more formidable competitor has been noted in species as distantly related as the sea anemone (Brace & Pavey, 1978), beetles (Eberhard, 1979), African buffalo (Sinclair, 1977), and crayfish (Hazlett, Rubenstein & Ritschoff, 1975). A particularly dramatic example was found by Petrie (1984) who studied territory size in the moorhen (*Gallinula chloropus*) and found that relative male weight was a perfect predictor

(Spearman correlation coefficient of 1.0) of territory size. (For many more examples see Archer, 1988, Chapter 9).

2. Animals are designed such that the relative valuation of the resource partially determines the resolution of resource conflicts.

Animals that have been deprived of food for longer time periods tend to win contests over food. This effect has been replicated with chimpanzees (Nowlis 1941), house cats (Cole & Shaffer 1966), crayfish (Hazlett et. al. 1975), bald eagles (Hansen 1986), and dark-eyed juncos (Cristol, 1992), among other species. The effect is not limited to differential valuation of food, but has been found for differential value of mating opportunities, nesting sites, feeding sites, and webs as well (for a review see Enquist & Leimar, 1987; for a particularly clear example see Austad, 1983).

3. Animals are designed to assess relative RHP and relative resource value.

Because the costs of aggression can be avoided if animals know in advance who will win, animals will be selected to assess cues that predict who is likely to win, and respond appropriately. In a variety of studied species it has been found that animals have been designed not only to calculate their competitor's RHP, but also to broadcast their own RHP. Several species of birds and lizards have evolved physical signals of fighting ability (i.e., "badges") that appear to track, quite accurately, the organisms' fighting ability (Rohwer & Rohwer, 1978). These badges would be worthless if the signals were not used by competitors to compute the animals' RHP. Furthermore, the existence of dominance hierarchies in many species indicates the capacity of animals to measure their relative RHP (for a review of the non-primate animal literature see Huntingford and Turner, 1987; for primate examples see Smuts et al., 1987).

4. Animals are designed to demonstrate RHP to lower the costs of conflict.

Both organisms can minimize the cost of conflict if the eventual loser can recognize that it will lose. If animal aggression over resources is designed to demonstrate relative RHP, the conflicts should follow a general pattern of escalation in which low cost demonstrations (which are probably less accurate) are exchanged before higher cost demonstrations or eventual non-ritualistic, “no holds barred” combat. Large discrepancies in RHP should be evident even by comparatively inaccurate demonstrations of RHP. For example, tail beating in the cichlid fish (shaking one’s tail at an opponent so that waves hit him) is an indicator of body size and strength that is presumed to be less predictive than mouth-locked wrestling (during which fish lock mouths and vigorously shake each other), but mouth-locked wrestling is more costly in terms of energy and probability of injury. This pattern of escalation, a model of which is called the sequential assessment game (Enquist & Leimar 1983), has been observed in numerous and distally related species including cichlid fish (Enquist et al., 1990), bowl and doily spiders (Austad, 1983), African buffalo (Sinclair 1977), beetles (Eberhard 1979), common toads (Davies & Halliday 1978), red deer (Clutton-Brock & Albon 1979), and pigs (Jensen, P. & Yngvesson, 1998).

5. Species in which animals typically engage in repeated interactions will maintain an internal representation of relative RHP that governs conflicts of interest without needing to re-establish RHP through competitive interactions.

The internal storage of relative RHP is indicated by what are called dominance hierarchies, which have been noted in many social species such as dark-eyed juncos (Cristol, 1992), chickens (Guhl, 1956), dark chub fish (Katano, 1990), hyenas (Owens & Owens, 1996), and every social monkey and ape (Smuts et al. 1987). While dominance hierarchies are talked about as if they were features of a community, it is important to remember that the information about one's position compared with other group members is stored within the individuals' brains.

Humans: Constructing a Cognitive Model of Human Anger

Human resource competition often looks different from non-human animal resource competition, largely because of our ability to mentally represent conflicts of interests. A dung fly can fight with a competitor over a piece of food, but a human can fight over whether someone should have gotten a piece of food, or even over whether someone should have agreed with someone else who wanted to give a piece of food to a third party, and so on. Although humans face conflicts of interest over morsels of food, the majority of resource conflicts between humans do not involve tangible, material resources, but instead involve conflicts over courses of action (retrospective and prospective), exchanges of information, social alliances, and other abstract cost-benefit tradeoffs between individuals. Such tradeoffs fit the mathematical definition of resource competition, and thus would have been subject to the same selection pressures as the hypothetical morsel of food in the traditional AWA equation. An analysis of the selection pressures inherent in resource conflict argues for the existence of an internal variable, similar to that which underlies dominance hierarchies in non-human animals, which regulates decisions about cost-benefit interactions in humans. This has been called a Welfare Tradeoff Ratio (Sell, 2006; Tooby et al., 2008).

Welfare Tradeoff Ratios (WTRs)

It is posited that humans internally represent a threshold for acceptable cost-benefit transactions, a Welfare Tradeoff Ratio (WTR) for every individual they interact with. For an agent X, the WTR he has toward agent Y defines the cost-benefit ratio below which X will give Y the resource and above which X will attempt to take the resource. This is represented mathematically as: $v(X) > v(Y) * WTR_{xy}$. In other words, the WTR X has toward Y (WTR_{xy}) indicates how much weight X puts on Y's interests when making decisions that impact them both. For example, if X's WTR toward Y is .5, then X will cede a resource worth 5 to himself if Y values it at more than 10. Welfare Tradeoff Ratios are theorized to be the computational elements underlying folk notions such as love, respect and deference.

An individual will have different WTRs for different individuals. For example, a person might be willing to ruin a stranger's sweater to dress a pet's wound, but unwilling to ruin a work supervisor's sweater for that same purpose, i.e. the WTR he has toward his supervisor is higher than toward a stranger.

Given mutual human dependence, the costs of contests, and the nature of kin and friendship, natural selection is predicted to have designed humans such that Welfare Tradeoff Ratios will be set higher based on numerous factors related to another's ability to enforce his or her own welfare. One set of factors is related to the ability to enforce WTRs by threatening to inflict harm; these include, for example, greater physical strength and more coalitional support. Welfare Tradeoff Ratios set primarily by the threat of force will be consulted, presumably, only when there is some possibility that the individual will be present to defend his or her interests. This is entirely analogous to the relative formidability (RHP) that is known to affect resource division in non-human animals. Another set of factors that set WTRs is related to the ability to defend one's welfare by threatening to withdraw the benefits of cooperation. These include, for example, the person's status as a frequent and dependable reciprocation partner, his or her status as a friend who has a stake in one's welfare (Tooby & Cosmides, 1996), or his or her possession of special abilities that can be deployed to benefit others.

There are at least two kinds of Welfare Tradeoff Ratios that govern cost-benefit transactions in different contexts: 1) monitored WTRs – which define the threshold of cost-benefit transactions when both parties are present or otherwise capable of defending their interests, and 2) intrinsic WTRs – which define the threshold of cost-benefit transactions when the other individual is not present or is unable to defend his or her interests. Presumably, intrinsic WTRs allowed individuals to adaptively partition cost-benefit transactions in a world where the welfare of other individuals was of adaptive significance for oneself.[1]

The Recalibrational Theory of Anger: Human Anger is an Adaptation to Raise Another's Welfare Tradeoff Ratio with Respect to Oneself

I propose that a large and well bounded subset of phenomena that people refer to when they use the word "anger" can be understood as the output of a highly sophisticated, complex, reliably-developing computational system, instantiated in neural tissue and designed by natural selection, that is deployed as a negotiation tool to resolve present and future conflicts of interest in the angered individual's favor. The anger system does this by initiating behaviors that (1) recalibrate the target's estimates of the costs and benefits of actions to the target and to the angered individual, and (2) raise the target's Welfare Tradeoff Ratio toward the angered individual, so the target takes that individual's welfare more into account in the present, the future, or both. The two main negotiation strategies deployed to recalibrate the target's WTR are (1) threatening to inflict costs (or actually doing so) and (2) threatening to withdraw cooperation (or actually doing so).

Causes of Human Anger

Anger should be triggered when one individual interprets the actions of the target as indicating that the target's WTR toward the individual is lower than the accepted level. Welfare

Tradeoff Ratios are theorized to be used when making cost-benefit decisions – indeed that is their hypothesized function – but they may also be used by other cognitive programs such as memory storage for individuals (e.g., we may remember our niece's birthday but not our mailman's birthday), frequency of consideration (e.g., one thinks daily about a spouse but may forget about old friends for weeks at a time), inherent pleasure in being around an individual, the weight placed on the veracity of another's beliefs, one's willingness to seek advice or share secrets, and vicarious WTR toward friends of friends. Because WTRs are used by so many cognitive systems, there is predicted to be a plethora of computationally distinct ways of triggering anger, each with its own blend of behavioral responses dependant on how the WTR was indicated (see below for examples).

Theoretically, the clearest indication of a low WTR is the target's willingness to take actions that impose a large cost on the angry individual in order for the target to receive a small benefit. Holding other variables constant, anger is more likely to be activated over a cost-benefit transaction as (a) the cost imposed on the individual increases, (b) the benefit reaped as a result of that cost decreases, and (c) characteristics of the instigator, the angry individual, and the two individuals' relationship indicate that it is possible for the angry individual to force the other to use a higher WTR than was indicated by the cost-benefit transaction imposed.

Computational Processes Executed by Anger

Just as animals are designed to minimize the cost of violent confrontations that can be avoided by communication regarding relative resource value and relative RHP, so should human anger be designed to minimize the costs of anger that are triggered by misperceived costs and benefits on behalf of both the angry individual and the target of anger.

When evidence clearly exists that the instigator perceived the cost to be large and the benefit to be small and enacted the transactions with such knowledge (i.e., intentionally), then anger should trigger behavior that is designed to increase the WTR in the target such that the target will be less likely to impose cost-benefit transactions of that ratio (or worse) again.

On the other hand, when evidence exists that the target perceived a cost or benefit differently than the angry individual, the anger system should be designed to modify the target's perception of that variable in ways that prevent this particular transaction (and a subset of other transactions involving the same misconstrued variable) from being enacted.

Behavioral Responses Generated by Anger

The primary functions of anger are to raise the magnitude of the WTR of an individual who has demonstrated a lower WTR than is acceptable to the angry individual, and/or to recalibrate that individual's estimates of the magnitude of the costs imposed and benefits received. Welfare Tradeoff Ratios in the target should be open to modification when this will allow the target to avoid being harmed or having cooperation withdrawn—more precisely, in circumstances that predicted, ancestrally, that these two negative outcomes were likely.

Thus, when the anger system is triggered by evidence that the target's WTR toward the angry individual is too low, it should motivate him or her to make credible threats, or demonstrate qualities that would make such threats credible, if issued. WTRs are hypothesized to be set, partly, by relative formidability, as is the case with many other animals. Thus if an individual is showing evidence of a low WTR, it could be the result of an underestimation of one's willingness or ability to use force and could be recalibrated by a cost-effective demonstration of said force. As with non-human animals, formidability should be demonstrated starting with low-cost, presumably less accurate, demonstrations of physical strength and escalate as needed to more accurate and dangerous demonstrations of strength. Evidence reviewed below reveals that this is how anger actually works.

The theory also predicts that anger should be designed to manipulate the target's estimates of the magnitude of costs and benefits inherent in the transaction. To the extent that you can increase another's perception of a cost he or she imposed on you, you can decrease the probability that the individual will impose such a cost on you again. The same is true of reducing another's perception of the benefit they received.

Known Features of Anger

Given the breadth of data collected on human anger, the first step when proposing a new theory must be to determine its consistency with empirical findings that have been shown to be both large in effect and robust across studies. It should be noted that while I did my best to choose the datasets below based on their effect sizes, reliability, and cross-cultural documentation, I am not providing a complete review of the anger literature.

Feature #1: Anger Frequently Results from the Imposition of Costs

Individuals tend to get angry when costs are imposed on them. Most importantly, the magnitude of the anger response is positively correlated with the magnitude of the cost. Empirical studies that varied the magnitude of the cost have confirmed this relationship across a host of different cost types, such as the voltage of electric shocks (O'Leary & Dengerink, 1973) severity of insults (Taylor, 1967), seriousness of a crime (Blumstein & Cohen, 1980), and monetary payoffs in economic games (Fehr & Gaechter, 2000).

Feature #2: Intentionality Increases the Likelihood of Anger

When a cost is imposed, but without prior knowledge on behalf of the imposer, there is much less anger and retaliation than if the cost was knowingly imposed (see Epstein & Taylor, 1967). Theories that posit intentionality have used different definitions. For example, Heider (1958) defined intention as a plan that guides action, Kaufmann (1970) defined an aggressive action as one that is known by the actor to have a non-zero chance of inflicting harm on the target, and Tedeschi and Felson (1994) defined an intentional action as one “performed with the expectation that it will produce a proximate outcome of value to the actor” (p. 164). Intentionality, being directly unobservable, is a category the human mind uses to classify types of actions, and thus must be discovered and explored rather than defined as a given, objective feature of the world. A theory of intentionality will have to answer, at a minimum, what information must be known for something to qualify as intentional. For example, if someone plans to hit you with a toy ball and expects that you will enjoy this as part of a game, but you become angry when hit because you didn’t want to play, should the person’s act be viewed as intentional? Heider’s definition cannot answer this question. Kaufmann’s definition would result in the act being judged as not intentional. Tedeschi and Felson’s definition would classify the act as intentional.

Feature #3: Apologies Mitigate Anger

The most reliable way to reduce anger, according to the empirical literature, is to apologize (Frantz & Benningson 2005; Riordan, Marlin & Kellogg 1983). The content of apologies varies, and a great deal of empirical work remains to be done on distinguishing “real” from “false” apologies and discovering why angry individuals are so sensitive to the difference (see Holtgraves, 1989).

Feature #4: Anger and Aggression Are Often Used by Males to Restore “Face”

Violent and homicidal aggressive acts are most common among young men, across cultures and time periods (Daly & Wilson 1988). These acts are largely the result of insults and attempts to save "face" or attain status by fighting. This account of violent aggression among males has been noted, to some extent independently, by criminologists (Luckenbill 1977), sociologists (Williams 1980), social psychologists (Berg & Fox, 1947; Cohen, Chapter 7, this volume; Felson 1982) and evolutionary psychologists (Daly & Wilson 1988). Most impressively, a host of cultural anthropologists have documented the positive association between fighting ability and status in non-police societies, including the Yanamamo of Venezuela (Chagnon 1983), the Dani of Highland New Guinea (Sargent 1974), the Montenegrins of Eastern Europe (Boehm 1984), Inuit/Eskimos (Balikci 1970), the Jivaro Indians of the western Amazon (Karsten 1935), and American gangs (Toch 1969). In each of those societies, threats to one's "face" or "status" are often the trigger for violent episodes between young men.

Feature #5: Personal Insults Are One of the Most Reliable Causes of Anger

Though not usually the object of study, personal insults have been used in aggression research for 40 years and have (in most cases) been shown to be sufficient causes of anger (Geen, 1968; Worchel, Arnold, & Harrison, 1978). In non-laboratory cases of aggression, it has been been found that personal "insults" almost always precede homicides (Berg & Fox, 1947; Toch, 1969; Luckenbill, 1977) and assaults (Felson, 1982).

Feature #6: Anger Results in an Exchange of Arguments

The most common response to an anger-inducing event in naturally occurring situations is to engage in an argument. Averill established this fact in the early 1980s with an influential study of a large sample of adults (1982).

Feature #7: Anger Has Cross-Culturally Universal Features and Neuro-Physiological Locality

The anger expression is universal across individuals and cultures, including cultures with no historical contact with the West (Brown, 1991; Ekman, 1973). It has been demonstrated in 6-

month-old infants (Stenberg & Campos, 1990) and in congenitally blind children (Galati et al., 2003).

Physiological changes accompanying anger have been found to be similar across cultures (Rime & Giovannini 1986): Subjects from a broad European sample reported that anger felt unpleasant and warm and was frequently associated with muscular tension. These response patterns were different from those of other emotions in all cultures.

Behavioral responses that result from anger are also similar across European countries. Specifically, anger often leads to vocal changes involving increased volume and sometimes trembling, changes in movement quality, clenched fists, and increased hand movement (Shaver et al., 1987; Wallbot, Ricci-Bitti, & Baenninger-Huber 1986). Furthermore, Scherer and colleagues have categorized vocal expressions of emotion and showed that when a person is angry, fundamental frequency (roughly, pitch) often increases in mean and variability (Banse & Scherer ,1996). This pattern is also distinct from those of other emotions.

The antecedents of anger have also been shown to be cross-culturally similar. Recall the cross-cultural data on aggression being driven by insults to one's "face" reviewed in feature #4. Wallbott and Scherer (1986) noted similar antecedents of anger in a broad range of European countries.

Finally, there have been numerous studies of parts of the brain that are differentially activated by anger, showing that its neural underpinnings are similar across individuals and species and that they are distinct from those of other emotions (see also Denson, Chapter 6, this volume). Panksepp (2000) theorized, based on brain imaging and lesion studies, that anger relies mostly on the medial amygdale, bed nucleus of strai terminalis, and the medial and perifornical hypothalamus. The anger/rage system is moderated primarily by acetylcholine and glutamate in ways that connect the amygdale and periaqueductal gray with the hypothalamus (Siegel & Schubert, 1995). Finally, a recent meta-analysis confirmed that testosterone tracks individual differences in tendencies toward anger and aggression with a correlation of approximately .20 (Archer, 2005; see also Slotter & Finkel, Chapter 2, this volume).

How Does the Recalibrational Theory Account for Features of Anger?

Feature #1: Cost Imposition

The Recalibrational Theory predicts that the cause of anger is not negative affect per se but the indication that another holds a low Welfare Tradeoff Ratio with respect to you. A common indication of such a WTR is the imposition of a cost that is too large given the benefit the offender received. Holding the magnitude of the benefit constant, the larger the cost one is willing to impose, the more likely anger is to be triggered. Likewise, holding the cost constant, the more the other person benefits by imposing that cost, the less angry one will be (Sell, 2006).

Feature #2: Intentionality

Intentionality judgments, in the context of anger, can be thought of as the outputs of a cognitive mechanism that determines whether a WTR was engaged when a cost was imposed. This predicts that anger-relevant intentionality requires knowledge of the magnitude of the imposed cost, the magnitude of the benefit received, and the identity of the individual on whom the cost was imposed. Each of these three components has been shown to affect anger in the predicted direction (Sell, 2006).

Feature #3: Apologies

The Recalibrational Theory suggests that apologies are explicit acknowledgements of either: (1) a past discrepant WTR that has been corrected or (2) misperceptions of costs and benefits. The content of WTR-recalibrated apologies (type 1) are predicted to contain statements that translate into the following cognitive grammar: “I will demonstrate a more favorable Welfare Tradeoff Ratio with respect to you, such that I will no longer impose costs of that magnitude on you for benefits of that magnitude.” This kind of claim may be best validated by restitution or by indicating a willingness to incur a cost to repay the angry individual. The content of type 2 apologies should contain statements about the magnitude of perceived costs and benefits; for example, “I didn’t realize that would hurt you so badly; I thought I had a good reason for doing that, but I was wrong.”

Feature #4: The Role of “Face” and “Status”

Perceptions of formidability play a part in the setting of Welfare Tradeoff Ratios, particularly for males. As such, the Recalibrational Theory predicts that demonstrations of physical strength in humans should involve the same procedures as strength contests in non-human animals, such as: signals of challenge, escalating conflicts that start with low levels of violence (e.g., pushing contests or staring contests) and move either to more violent demonstrations (e.g., wrestling, punching, weaponry) or to signals of surrender that end the violence. These patterns fit the data on homicide quite well (Luckenbill, 1977).

Feature #5: Insults

The Recalibrational Theory predicts that anger-inducing insults can be understood as attempts to directly indicate a low Welfare Tradeoff Ratio with respect to another individual, and perhaps as attempts to influence others to hold lower WTRs with respect to the insulted individuals. Insults should, psychologically, translate to the form, “I do not value your interests highly.” More proximately, insults can be declarations of a deficit in a variable that is used to determine one’s WTR toward that individual. One such variable, for males at least, is physical strength. Fitting the theory, many insults leveled at men target the man’s strength - e.g. wimp, wuss, geek, nerd, bitch, girly-man, pussy, weakling (Harris, 1993; Preston & Kimerley, 1987). Although beyond the scope of this analysis, it seems likely that other insults fit into categories that make a man socially powerful or not, such as his intent to cooperate (e.g., asshole, prick, bastard [colloquial meaning]), his being unable/unwilling to function as a reliable cooperator or being otherwise unworthy of having others take his interests into account (e.g., punk, white trash, ghetto trash, bum), or his competence (e.g., idiot, fool, loser).

Feature #6: Arguments

The Recalibrational Theory predicts two primary functions of arguments: (1) to recalibrate the target's WTR, raising it so the target's decisions will take the angered person's welfare more fully into account, and (2) to recalibrate the target's perception of the costs and benefits imposed. When WTRs are largely based on relative fighting ability, one would predict arguments about aggressive potential – for example, "I could kick your ass" or "My dad could beat up your dad!" When one has an expectation of inherent value (such as with friends, kin, and others with whom long-term cooperation would be mutually beneficial), the theory predicts that statements of relative friendship quality would be used to boost another's intrinsic WTR toward oneself. For example, "I wouldn't do that to you" or "Remember when your mother was sick and I took notes for you in all your classes."

Secondary functions of arguments may include: (a) gathering information about the magnitudes of the values involved in the cost-benefit exchange (e.g., Why did you do that?), the offender's knowledge of the magnitude of the cost, benefit, and victim identity (e.g., "Do you know how much that hurt? "Do you know who you're messing with?"), the offender's perception of his or her WTR with respect to you ("I thought we were friends"), and other variables that are used to set WTRs; (b) testing the boundaries of one's WTR with respect to the other and vice versa (e.g., verbal bullying).

Feature #7: Universality

In contrast to other theories, the Recalibrational Theory clearly predicts that anger is an adaptation designed by natural selection and that its basic computational structure should be universal across cultures and should share a phylogenetic relationship with structures in closely related non-human animals, residing in similarly localized brain areas. Furthermore, like non-human animals, humans should use signals of aggressive intent based on enhanced features of formidability (e.g., facial and vocal expressions), physiological preparedness for aggression if necessary, and a structured functional set of causes and behavioral responses that are similar across cultures.

Conclusion: How to Account for Complex Design

Social science has had difficulty accounting for complex features of human behavior largely because it has ignored the one known cause of complex functional design in organisms: natural selection (Tooby & Cosmides, 1992). Without functional theories capable of generating testable predictions about many different aspects of the domain of study, researchers have had two choices: (1) retreat into smaller data sets that can be predicted and cogently summarized by one or two main effects or (2) posit intuitive concepts to account for a great range of data but remain computationally intractable and pliable enough to account for shifting datasets.

The alternative to computationally vague theories or theories that are specific but restricted to smaller data sets are computationally-specific, functional theories that posit many testable hypotheses based on a simple model of selection pressures and the logical extensions of them given what is known about human evolutionary history and the design of other animals.

Natural selection is the only process shown to be capable of organizing and designing organisms. It is the only process that could have designed anger,[2] and thus any functional design in the anger system (including facial expressions, vocalizations, physiological changes, recalibrational learning mechanisms, and behavioral responses) can be explained only by computational designs that could have solved the selection pressures that created anger. The selection pressures described in this paper may or may not be the ones most responsible for the functional structure of human anger, although they have had great early success in making predictions and explaining many of the most reliable and significant features of anger. Ultimately, the Recalibrational Theory will be judged by its ability to generate computationally specific explanations capable of organizing and explaining features of anger that have been intractable to intuitive theories and its ability to make novel predictions that lead to large, reliable effects. If it fails, the alternative must be another computationally specific, functional theory that is consistent with evolutionary biology. The dataset on anger is now too large to be described by simple learning mechanisms and too detailed to be accounted for by theories that do not computationally specify their primary components.

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Footnotes

1. Though the full selection pressure analysis of intrinsic WTRs is beyond the scope of this chapter, a quick starting point would be as follows: A subset of individuals in one's social world can improve one's welfare as a result of their existence, social power, and well being (e.g., a devoted friend, a caretaker of one's children, a generous acquaintance). Benefits given to them, even without their knowledge, will correspond to benefits to oneself.
2. If one prefers to theorize that anger is the result of learning, natural selection is the only process that could have designed the learning mechanism responsible for learning anger.