The Biologicalization of Morality: Morality as Instinct

By

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CERTIFICATE OF APPROVAL

Honors Thesis

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Sec 1. Introduction: The Biologicalization of Morality

"It is a characteristic of man that he alone has any sense of good and evil" (Aristotle, 1885/2000.) This perspective, expressed by the exalted Aristotle in the 4th century B.C.E., scarcely differs from the prevailing view of morality today. And while Aristotle was surely wise for his time, it is no longer acceptable to praise his words as literal and unalterable truths. Several hundred years of science have provided sufficient evidence to entirely dislodge our understanding of morality. And that is what should happen if we are ever to shake our unrealistic notion of our own species and our relationship to the rest of the life on earth. Many people wrongly assume that morality is a trait unique to humans. Some are willing to extend the reach of morality to a few other species possessing high-level cognitive ability, such as chimpanzees, whales, dogs, and rats (Rolands, 2003), but this is not nearly enough of an improvement, for morality is NOT a product of intelligence or self-awareness. Here, I propose that morality is ubiquitous among living organisms, present among species with which we do not endow the title of "intelligent", "conscious", or capable of "rational decisions." I contend that many species of insects are in fact far *more* moral than are humans (Fox-Skelly, 2018; Tofilski et. al., 2008.) These are the slippery, writhing, audacious, and ego-threatening concepts to be wrestled with in the biologicalization of morality.

I. Morality is Adaptive

In this thesis, I define morality as a driving force which compels individuals to invest time, energy, or resources in others. I refer to any behavior that involves individuals investing in others as a "moral behavior." Moral behavior can range from a simple single-celled bacterium

producing daughter cells, to a complex social creature adhering to the rules of its society. Morality exists in all species, whether or not they have any conscious conception of it (later I argue that we humans are far less conscious of it than we think.) I say "all species", because every species must reproduce. Reproduction is driven by the moral instinct in that it requires the parent to invest energy in other individuals, its offspring. An individual could use its resources to optimize its own growth, strength, and well-being, but instead is irrepressibly driven to expend resources on the production of offspring. What explains this seemingly selfless behavior? The solution lies in the fact that an individual's pre-determined life goal is not to do what is best for its body unit, but what is best for the genes housed inside. In an evolutionary context, "self" is not the physical body, but the genetic code the body carries and abides by. This distinction is important. Indeed, scientists consider a behavior to be "selfish" any time it enhances the survival of the genes that code for it. If we did not understand evolution or genetics, moral behavior would make no sense to us, and we would perhaps have to appease our restless brains by fabricating an explanation, such as the existence of an invisible moral realm from which we derive our values. But because we can look at behavior from a gene perspective, we can see that morality is no different or less selfish than what we consider to be basic instincts. An individual body that had absolutely no tendency to invest in other bodies would not spend resources on reproducing, and when this individual deteriorated after only a diminutive sliver of time, its genes would perish with it. Genes that do not make their body replicate are quickly eradicated. Genes that make their body replicate, and replicate better than everyone else under the current circumstances, are the ones perpetuated into the future. Thus, all living things today are a product of billions of years of organisms investing in the production of offspring. In this sense, morality

(at a minimum, the investment in the production of offspring) is a fundamental component of life, ingrained in all living things.

Morality exists in varying degrees in different species, depending on its importance to survival. For some organisms it may go no further than the reproductive instinct; they can successfully preserve their genes just by producing offspring, leaving them, and going about their asocial lives. Some organisms must continue to protect and provision their offspring after they are born to ensure their survival. Some organisms help promote their genes by extending investment to their kin, which share a large proportion of their genes. And some organisms must extend investment to unrelated individuals just to survive to give themselves an opportunity to someday reproduce. All the behavioral strategies listed are just gradients of the same fundamental process of investing in others, all serving the same function of enhancing genetic fitness. Yet, of all of them, the lattermost phenomenon is the only one for which people often demand special explanation. In reality, natural selection is the only explanatory power needed, and expounding this point is largely the purpose of my thesis.

With this conceptual framework laid out, I will now explore how biology and evolutionary theory explain different types of moral behaviors. Morality is often considered to be outside the grasp of biology, but I argue that the phenomenon is best explained from a biological perspective. In this thesis, I seek to "biologicalize" morality, emphasizing the explanatory power of natural processes and the lack of a need for "supernatural" explanations. I evaluate the conundrums of social cooperation, altruism, and charity. I dispute some common assumptions about morality with current scientific knowledge, dismantling many prevailing beliefs. I propose

that the *only* reason morality exists is because of its adaptive value (e.g. individuals enhance their own fitness by helping one another.) For morality, like all traits, is a product of natural selection.

Sec. 2. The Altruism Paradox

Perhaps the most extreme (and historically confounding) moral behavior is altruism, "unselfish regard for or devotion to the welfare of others" (Altruism, n.d.). True altruism, as conveyed by this definition, cannot and does not exist, because of one word – *unselfish*. If selfish behaviors are those that ensure the propagation of the genes that control them, then all major adaptive behaviors must be selfish to survive natural selection. However, they must not be selfish in outwardly obvious ways. Altruism then, in practice, is not selflessness, but well-disguised, highly inconspicuous selfishness. A truly unselfish behavior- one that does not benefit the genes which spawn it- is rare. Such a behavior can be explained as a genetic byproduct of a beneficial gene, a vestige of an ancestrally beneficial trait that has yet to completely disappear, or an anomalous mutation. Importantly, a truly unselfish behavior cannot be actively selected for. Oxymoronically, what scientists consider an altruistic act, even if superficially selfless, is ultimately self-serving, increasing the overall fitness of the altruist. There are several ways in which natural selection favors altruistic behavior.

I. Reciprocity

Reciprocity establishes that altruism is not performed unconditionally, but rather strategically. Common vampire bats, *Desmodus rotundus*, have become the so-called textbook example of this behavior. They live in caves, in colonies typically made up of 30 to 150 individuals (though in rare cases a colony may contain over 1000 individuals), and they feed

exclusively on blood ("Common vampire bat," 2017; "Common vampire bat biology," 2011). Within colonies, there are smaller groups of females, usually 8-12 individuals, who roost together closely, while single males roost separately ("Common vampire bat biology," 2011). The bats feed exclusively on blood and die of starvation after 70 hours without a meal (Carter & Wilkinson, 2013). In experiments, vampire bats who fed successfully were observed to share blood meals with other bats who did not feed successfully that night, and these incidences of sharing are not just with kin, but also unrelated individuals (Carter & Wilkinson, 2013). The instant consequence of this behavior is a cost to the giver, who now has a smaller meal as opposed to a larger one, and a benefit to the receiver, who now has a small meal as opposed to no meal at all. The giver helping an unrelated individual at a cost to himself seems altruistic. Looking solely at the instant consequence, this act makes no evolutionary sense. However, in a complex society, social relationships are much more elaborate than one-time exchanges, and the long-term consequences must be taken into account.

Bats do not arbitrarily share food with any bat who is hungry. Rather, a number of factors seem to predict whether a fed bat will donate to a hungry one. Carter and Wilkinson simulated the natural behavior of blood-sharing in the lab, removing individuals from an enclosure and fasting them for 24 hours before returning them to their fed groupmates and observing which individuals shared blood. They found that the largest predictor of food-sharing was food received in the past from an individual (Carter & Wilkinson, 2013). Bats most readily shared meals with individuals who had shared with them in the past (Carter & Wilkinson, 2013). Relatedness did not predict whether food-sharing occurred nor the amount of food that was shared (Carter & Wilkinson, 2013). This highlights the importance of reciprocity as opposed to kin selection as an

explanation for this altruistic behavior. Interestingly, it was found that reciprocity occurred even in parent-offspring relationships (Carter & Wilkinson, 2013). One would expect that young bats, who forage unsuccessfully on 30 percent of nights, would be fed by their mothers, but it is unexpected that the young would feed their mothers in return! Yet in all cases in the study, offspring who were fed when they were hungry repaid the favor to their mother when it was she who was hungry (Carter & Wilkinson, 2013). It is doubtful that the mother bats feed their offspring solely for the reciprocal benefits; more likely it is a result of maternal instinct. Thus one would think that the young bats may not *need* to repay their mother to continue receiving her favors. Perhaps the drive to reciprocate in this species is too strong to simply be shut off in the instance that the sharer happens to be kin. This detail is an example not only of the high importance of reciprocity in codependent, colonial species, but also of the marvelous complexity of the interplay between different selective pressures.

Another factor that predicted food-sharing among the bats was grooming previously received from the recipient (Carter & Wilkinson, 2013). Whereas food donations may make or break a bat's survival that night, the immediate benefits of grooming are probably less crucial. Indeed, it has been shown that grooming is not correlated with ectoparasite levels, and it occurs even when ectoparasites are not present at all (Carter & Wilkinson, 2013). Its main purpose seems to be in social bonding rather than in hygiene (Carter & Wilkinson, 2013). Yet, apparently grooming is still a valued commodity. Perhaps it serves a function in maintaining a positive relationship with roostmates. In the wild, bats may roost together for 12 years (Carter & Wilkinson, 2013). And food-sharing networks were shown to be consistent over the six-month period of the study (Carter & Wilkinson, 2013). It makes sense that such long-term relationships

would be worth maintaining. A bat who takes care of her relationships may be ensuring that there will be someone to help her out on a bad night. It is worthy to note that in the wild, adult males do not roost in groups and exhibit high rates of dispersal (Carter & Wilkinson, 2013). Thus, they do not have the opportunity to form tight-knit bonds like females do, and so males in the wild do not share meals (Carter & Wilkinson, 2013). But in captivity, where associations between males are more frequent and stable, they were observed to share food (Carter & Wilkinson, 2013). In order for social relationships to develop, individuals must have the opportunities to interact with the same individuals on a regular basis. Once reciprocal relationships are formed, behaviors (such as grooming) may serve to maintain and strengthen them. The point is, a relationship between two individuals is rarely limited to the exchange of a single commodity. More often it resembles what we think of as a friendship, with a great variety of commodities being exchanged, some more tangible or immediately pertinent to survival than others. An individual may have fed another bat more than the other bat has fed her, but perhaps she has received a disproportionate amount of grooming from the other bat, so the relationship can still be considered "fair". Reciprocity is not an exact trade. When a social relationship does not make sense to us, it may be because we are overlooking this complexity.

Blood-sharing may be considered altruistic in the short-run, but in the long-run it is a perfectly sensible, mutually-benefitting cooperative behavior. Those who can afford to give do so if they are likely to be repaid in the future at a time when that food is more valuable to them. The "altruistic" behavior is ultimately self-serving, as the cost of having slightly less food in a time of plenty will be outweighed by the benefit of having slightly more food in a time of hunger in the future.

II. Advertisements of Dominance

It has also been proposed that "altruistic giving may be an advertisement of dominance or superiority" (Dawkins, 2006a). Arabian babblers, *Turdoides squamiceps*, are social birds who have been observed to share food and give warning calls (Dawkins, 2006a). A zoologist who studies them, Amotz Zahavi, suggests that, unlike in the vampire bats, the advantage of food-sharing among the babblers is not direct reciprocity (Dawkins, 2006a). In fact, if a bird tries to repay the favor, the sharer responds with offense and refuses the offer (Dawkins, 2006a). If generous babblers are not repaid for their gifts, what is the advantage of such generosity? Zahavi suggests the behavior is an assertion of dominance. He believes that, by sharing food, a dominant bird is showing off how successful he is, how he is so wealthy that he can easily donate to a less-capable subordinate (Dawkins, 2006a). This demonstration of superiority may serve to win the bird status and mates (Dawkins, 2006a). This would explain why a dominant bird would adamantly reject a food offer, as it may be interpreted as a threat to his elite status. When I first read about Zahavi's hypothesis, I could not help but relate. Many of us have encountered a situation, such as a meal with coworkers or business partners, in which one individual says "it's on me" and insists on paying the bill. Our internal response to this situation is usually not a "hurrah free food!", but likely a more negative feeling, as we would prefer this person not buy our meal. Perhaps the feeling is that we now owe this person, or perhaps it's that we've been subordinated, and we now feel the lesser to the person who bought. If this person is a near-equal, such as a close friend, we may be more likely to argue about it, or at least insist on paying next time- a demonstration of reciprocity. But if this person is a business superior, we are more likely to feel uncomfortable in refusing his offer. Obviously he does not pay the bill with the

expectation that someone else will pay it next time, as, like the dominant babbler, he tends to resolutely decline any offers to do so. So what explains his generosity? Perhaps he too is proclaiming his dominance, reminding his peers that he is successful enough to be able to feed them all.

Sec 3. Winners Never Cheat and Cheaters Never Win

Winners never cheat and cheaters never win. Except sometimes they do. It all depends on the environment. In some species, in some environmental contexts, cheating can be a beneficial strategy, and in others it is actively combatted to the point that it rarely succeeds. Think about freeloading individuals, who accept favors but never return them. Shouldn't they eventually outcompete altruists since they would reap the benefits but never pay the costs of cooperation? There are several explanations as to why this isn't as prevalent as we might expect.

I. Social and Internal Enforcement of Rules

The rules of a society are often reinforced to the point that the long-term costs of freeloading are greater than the costs of playing fair. In some species, natural selection has favored internal and social deterrents to breaking the moral rules, as well as rewards for following them. We humans feel good internally when we play by the rules, but experience negative feelings when we break them. We want recognition from our societies when we've done the "right" thing and want others to be punished when they've done the "wrong" thing. We do not easily forget if we have been misled, cheated, or wronged. We may terminate social exchanges with our wrong-doer, or we may even help to propagate a bad reputation for the wrong-doer so that others have less trust for that individual too. Morality is not merely a

suggestion, but very much a rule-- often a literal one, as many of the official laws of any given society are based upon moral norms.

In humans, reputation is an essential component of success. Due to the extreme codependence of humans living together in a society, an individual can't get very far if everyone thinks negatively of them. It doesn't take long for an individual who makes promises but doesn't keep them, or borrows money but doesn't repay it, to obtain the reputation of being unreliable. An individual might benefit the first couple of times he engages in cheating or lying, but his reputation will make it very difficult for him to continue getting opportunities to do so. Not only do the advantages of immoral behavior quickly dissipate, but the bad reputation that comes along with it can be long-lasting and result in the cheater missing out on many of the social benefits in which well-liked individuals partake. The lasting costs of blatant cheating outweigh the fleeting benefits to the point that it rarely perpetuates, given cooperation as an alternative. In such cooperative and codependent societies, morally "good" behavior simply tends to be more successful. These sorts of situations are intuitively relatable if you think about intimate social groups, such as family members, classmates, and coworkers. When your drug-addict uncle calls asking for money, you ignore him, but when your reliable and supportive sister needs a ride to the airport, you are likely to help. But how do these rules apply to the public sphere of modern human society, where so many people are so interconnected that a single individual doesn't personally know the majority of the people with which they interact? Humanity has developed organized political, legislative, and economic systems that serve to maintain the social rules on a large scale. Rather than by intentional plan, such systems probably come to be naturally as product of our internal moral drives. As a society grows, it implements new ways to improve

moral policing that are effective on the large scale. In situations where it would be impossible to recognize the faces of everyone we see in day-to-day life and have a mental profile of personal experiences with them, we instead rely on social systems to decide whether to trust them in reciprocal exchanges. An individual who "breaks their promise" to pay their monthly rent or "borrows without repaying" a documented loan will have their reputation for unreliability branded on their identity via a bad credit score. You may not be able to tell from looking at a stranger whether you can trust them, but you can tell by looking at their credit score, and again, a cheater who has cheated once will find very little opportunity to cheat again.

Just as cheating is punished, cooperation is rewarded. Individuals who are generous tend to be well-liked and have positive interactions with their peers. Those who have consistently shown themselves to be reliable will be given more favors because others trust them to repay those favors. It could even be said that the benefits of reputation are in some cases so substantial that it's competitive, in that more reputable individuals are more liked and benefit more from others than do less reputable individuals, so much so that a hierarchy of reputability may be created.

The judges of the competition don't necessarily have to be of the same species. Cleaner fish and cleaner shrimp of a variety of genuses exhibit remarkable symbiotic relationships with several species of larger fish, such as groupers, who they cleanse of potentially harmful ectoparasites (Trivers, 1971). "Clients" rarely make a meal of their cleaners, as selection has acted against this, with cleaner fish generally being more valuable as cleaners than as snacks (Trivers, 1971). This is a case of reciprocity, in which cooperation may seem illogical for both parties as a one-time exchange, but makes sense in the long term by benefiting both in the future.

The cleaners help their clients by eating their ectoparasites rather than their protective mucus layers, even though the mucus is their preferred food (Trivers, 1971). The clients help their cleaners by allowing them to feed on their ectoparasites and not taking them as an easy meal as they swim through their gill chambers (Trivers, 1971). There are over 45 species of fish and six species of shrimp known to be cleaners, and they vary greatly in how much they depend on their cleaning (Trivers, 1971). Some species make a living almost exclusively from their cleaning jobs, while for others it is only a small supplement to their diet (Trivers, 1971). Cleaning species also vary greatly in how often they get eaten by their clients (Trivers, 1971). Remarkably, there is a strong correlation between the degree of dependence on cleaning as a food source and the likelihood of the cleaner being eaten (Trivers, 1971). Cleaners who are heavily dependent on cleaning as a feeding strategy are less likely to be eaten by clients than those who clean only occasionally. This correlation is best attributed to codependence between the two species. The species of cleaners which clients depend on most to rid them of ectoparasites are far more valuable as cleaners than as meals, so it is worthwhile to learn to recognize them and refrain from eating them. The consequence of a client fish eating such dedicated cleaners could be a detrimental infestation of ectoparasites. The consequence of eating a cleaner species that cleans only occasionally would be less noticeable, since the client fish only relies on them minimally and will likely still maintain low ectoparasite levels without their help. Because occasional feeders are less important to clients and clean less often, they are less likely to be recognized as cleaners and distinguished from prey, and thus more likely to be eaten. In the most cleaning-dependent genus of cleaner fish, *Labroides*, there are no reports of a cleaner ever being found in a client's stomach (Trivers, 1971). Species that only clean as a side job are more likely

to wind up as dinner. Just like in humans, codependence favors cooperation. Moreover, codependence favors enforcement of rules and punishment of cheats.

Studies have found that reputation matters for cleaner fish (Dawkins, 2006a). When a cleaner fish cheats by eating mucus, the client responds with a characteristic "jolt" (Pinto, Oates, Grutter, & Bshary, 2011). Other potential clients can judge the trustworthiness of the cleaner by observing whether the client being cleaned jolts many times. Cleaners are less likely to cheat when their clients are predatory species (apparently the potential punishment of getting eaten is an effective deterrent), so nonpredatory clients were used in this experiment, along with the cleaner wrasse *Labroides dimidiatus* (Pinto, Oates, Grutter, & Bshary, 2011). Clients were more likely to accept service from cleaners who they had observed to clean without causing their client to jolt (in other words, without cheating) (Pinto, Oates, Grutter, & Bshary, 2011). Thus, individuals who have shown themselves to be trustworthy are more likely to be "hired" again in the future. In addition, cleaners in the experiment were more likely to clean cooperatively when bystanders were present (Pinto, Oates, Grutter, & Bshary, 2011). This further indicates the importance of reputation. When cleaners know they are being watched, they make sure to play fair for the sake of their reputation, so that they don't lose potential clients to competitors who may possess better reputations. When there were no bystanders and their reputation was not at stake, they were more likely to make their client jolt, indicating that they cheated (Pinto, Oates, Grutter, & Bshary, 2011). Imagine a cleaner who always cheated, eating mucus off of every fish he cleaned. All the clients in the area would quickly learn to reject his service and take their business elsewhere. The cleaner, having lost the trust of the clients, would miss out on an important food source, likely reducing his fitness compared to fish with good reputations. It is

easy to see how selection has favored cooperation in this relationship. Cheating may still be beneficial, but only in moderation, and, most importantly, when no one is looking.

The crucial point is that the qualities and values we associate with the word morality are not just random things that make up "goodness." Rather, they are signals used to maximize the benefits and minimize the risks of living in a social group. These signals may be used to encourage others to trust us in social exchanges, or to determine whether we ourselves should trust another individual. What are generally considered morally "good" qualities, be they reliability, generosity, hardworkingness, or other, tend to result in good reputations, while what are generally considered morally "bad" qualities, be they unreliability, crookery, laziness, or other, result in bad reputations. Those with good reputations often benefit from society while those with bad reputations do not.

An experiment called the Ultimatum Game further demonstrates the power of indirect social influences on cooperative behavior (Gintis, 2016). In the game, two anonymous subjects are given the roles of Proposer or Responder (Gintis, 2016). Both are shown a certain amount of money, and the Proposer is instructed to offer any portion of the money to the Responder (Gintis, 2016). The rules, which the participants are aware of, are as follows: If the Responder accepts the offer, the money will be distributed as was proposed. If the Responder rejects the offer, neither subject receives any money (Gintis, 2016). Assuming both participants have at least some desire to maximize their earnings, this game provides fascinating insight into both cooperation and the social enforcement of norms. If the Responder was solely interested in earning money, we would expect him to accept any amount of money offered. If the Proposer was confident that any offer would be accepted, we would expect him to offer a minimal amount and keep as much

to himself as possible. Yet, this is almost never the actual result of the Ultimatum Game. Most often, Proposers offer much larger amounts, around 50%, and Responders tend to reject offers lower than about 30% (Gintis, 2016). Perhaps the most genius aspect of this game is that the power is ultimately in the hands of the Responder, capturing the highly codependent nature of social exchanges, where if the benefits are not mutual, neither individual can gain. Proposers have an intuitive understanding of what Responders will consider fair, and they likely know that an unfair offer will be rejected. This forces them to offer an at least fair, if not generous, amount, for if they are blatantly selfish they will receive nothing. Even more interesting is the reasoning behind the Responder's behavior. Why would a Responder reject an unfair offer when the alternative is nothing at all? Wouldn't it make more sense to accept a small amount than to choose to gain nothing? Responders who rejected offers often said that their reason was to punish unfair behavior (Gintis, 2016). Punishing the selfish Proposer may influence him to behave less selfishly in the future, but since the game is anonymous, the Responder will likely never benefit directly from disciplining the Proposer. Still, he is compelled to enforce social norms. This suggests the possibility that the behavior of social exchange is not prompted by logical decision-making, but by something deeply ingrained, such as a powerful internalization of norms or even an instinct. As demonstrated by the behavior of the Responders in the Ultimatum Game, humans are so highly cooperative that the drive to uphold norms of fairness often overpowers the desire for immediate personal gain. If this punishment of unfair behavior is driven by instinct, we would expect the behavior to be relatively universal. If punishment of unfair behavior is driven by cultural norms we would expect it to be more variable. Fortunately, the Ultimatum Game was conducted in several countries, providing some insight into the degree

of cultural variation (Gintis, 2016). The study "found that while the level of offers differed a small but significant amount in different countries, the probability of an offer being rejected did not. This indicates that both Proposers and Responders share the same notion of what is considered fair in that society" (Gintis, 2016). Later I discuss the extent of cultural consistency and variability that are observed when it comes to moral norms, and what they mean in regards to the idea of a moral instinct. I also revisit variations of the Ultimatum Game addressing more specific moral questions.

Sec 4. Charity

How can biology explain the phenomenon of charity? Why do we give to other people who we are unlikely to ever meet? If we never meet an individual we helped, or if we remain anonymous, then how can we ever receive reciprocation to make the action beneficial to us? Is charity an exception, or does it follow the rules of natural selection after all?

I. A Darwinian Mistake?

Oftentimes, evolution results in "an innate, typically fixed pattern of behavior in animals in response to certain stimuli"; an instinct (Instinct, n.d.). The most vital behaviors for survival tend to become instincts, because individuals who have fast, automatic responses to important environmental cues are most likely to survive and reproduce. Because of this, organisms operate primarily on instinct. Not all instincts are rigid, cookie-cutter responses to a given stimuli, but some are. The downside of such rigid instincts is that they have the potential to "misfire." During nesting season, birds have an instinct to feed anything that looks like the mouth of a begging baby bird in their nests (Dawkins, 2006a). Presumably, feeding their offspring with haste confers

a significant fitness advantage, most of the time. But occasionally, their instinct can be used against them, such as when a mother bird ends up with a brood parasite in her nest (Dawkins, 2006a). Brood parasitic species, such as cuckoos and cowbirds, lay their eggs in the nests of other bird species, relieving themselves of the immense burden of childcare so that they can use their resources elsewhere (Forbes, 2005). Once it hatches, the cuckoo chick begins life by ejecting any other eggs and chicks from the nest, taking all the parental care for itself -- it even has a cup-shaped indentation on its back to make sending its nestmates to their deaths all the more easy (Attenborough, 2014). A single cuckoo chick will grow larger than an adult of the host species, and consume as much as an entire clutch of chicks of the host species. Yet, amazingly, the naïve host parents will expend valuable resources to feed this fat chick of another species, even though she will receive no fitness payoff, all because her (normally beneficial) instinct is taken advantage of. When an instinctual response that is normally beneficial is hijacked, or triggered in a situation where it results in a net cost to the individual, this is what we call a misfiring. The instinct must be overall beneficial enough to still be selected for, despite the occasional misfiring. If misfirings occur often enough, at a large enough detriment to the individual, we may expect the population to evolve countermeasures to the misfiring, given enough time. For example, some species of birds that are common hosts of cuckoo eggs have evolved a very discerning eye for foreign eggs, allowing them to reject eggs that aren't their own (Attenborough, 2014). Cuckoos, in return, have evolved eggs that are incredible replicas of the eggs of the host species, making it more difficult for the imposter to be identified (Attenborough, 2014). Cuckoo chicks have even evolved to mimic the begging calls of host species chicks to minimize their conspicuousness- they mimic the sound of not just one host chick, but an entire

clutch of hungry host chicks, inducing the parents to give them more food (Attenborough, 2014). If a misfiring is detrimental enough, it will become a selective disadvantage, and we would expect to see an evolutionary change over time (even if the cheater still wins in the end.)

The idea of biological misfiring is relevant to the phenomenon called "warm glow." Warm glow describes the internal psychological rewards we receive after doing a "good" thing (Andreoni, 1990). Warm glow may have evolved to encourage humans to obey the moral rules of our societies even when they conflict with immediate selfish gain. It may make it easier for people to delay gratification in cases where they won't reap benefits from an action for a period of time. However, warm glow may sometimes be misfired, in that a person may perform a moral action solely for the good feeling they get from it. "Good feelings", which typically evolve as incentives or motivators for actions that benefit fitness, seem to be prone to misfirings. The motivator is hijacked to become the reward itself. Sometimes we may run just for the high of endorphins, take risks simply for the adrenaline rush, have sex solely for physical euphoria, or do nice things just for the warm glow. These examples could be considered "misfirings" because we are getting the "good feeling" without getting the associated fitness benefit. The good feelings of hormones and neurotransmitters may have no significant fitness benefit in themselves. But they do result in fitness benefits by encouraging us to do things that positively influence fitness, which works often enough for these instincts to still be important, and that is why they persist. Still, sometimes they cause us to do something as "wasteful" as feeding a chick that is not our own. Overall, psychological rewards such as warm glow are adaptive, but that does not mean that they have a fitness benefit in every single case they are employed.

Some have proposed that charitable behavior falls into the biological misfiring category (Dawkins, 2006a). In the hunter-gatherer societies of early hominins, individual survival likely depended heavily on group survival, just as it does today. Unlike today, there was probably a low dispersal rate, meaning that most individuals born into a group stayed in that group for life (Trivers, 1971). Each individual would have known every other individual in their group, so establishing reciprocal relationships was likely very beneficial, whereas open cheating and exploitation could be detrimental. In these small groups, escaping a reputation would have been impossible, and banishment most often resulted in death. Cooperation was vital for survival. Individuals in the same group likely shared food, cooperated against enemies and predators, cared for the sick, wounded, and elderly, and developed individual talents and specialties that could be exchanged with other group members (Trivers, 1971). These tendencies to cooperate, to help and share, to trade fairly, and to reciprocate acts of altruism may have been selected for so strongly that they became genetically-ingrained rules of thumb (Dawkins, 2006a).

Some have argued that charity is but an outdated vestige of these once-beneficial rules of thumb (Dawkins, 2006a). In Richard Dawkins' words: "In ancestral times, we had the opportunity to be altruistic only towards close kin and potential reciprocators. Nowadays the restriction is no longer there, but the rule of thumb persists. Why would it not? It is just like sexual desire. We can no more help ourselves feeling pity when we see a weeping unfortunate (who is unrelated and unable to reciprocate) than we can help ourselves feeling lust for a member of the opposite sex (who may be infertile or otherwise unable to reproduce.) Both are misfirings, Darwinian mistakes: blessed, precious mistakes." (Dawkins, 2006a). In order to avoid oversimplifying the phenomenon of seemingly altruistic behavior, I want to dissect this argument

carefully. It is too easy to dismiss all moral behavior as a misfiring and move on, overlooking critical truths. To continue Dawkins' analogy, yes, sexual desire remains even if the member of the opposite sex is unable to reproduce. But sexual desire is not simply a vestige of ancestral time when it encouraged individuals to reproduce. Instead, sexual desire still plays an integral part in fitness today. Firstly, sex *still* encourages us to reproduce; just because it doesn't result in conception every time does not mean it's not overall beneficial to fitness. Moreover, even when we have sex without reproducing, the activity often serves a function, such as social bonding, gaining social status, forming reciprocal relationships, stress relief, or many other possibilities, all which ultimately serve to benefit an individual. How can one dismiss all these potential benefits and say the urge to have sex without intent to reproduce is a biological misfiring? The rule of thumb for sex is still here, not simply because it is a remnant of evolutionary history, but because it is still overall beneficial today. The same, I argue, goes for our moral sense. Indeed, we may feel empathy for people who are unable to reciprocate our good deeds. But we do not simply help them due to misfired instincts, at no benefit to ourselves. Most often, we do reap real benefits from our moral behavior (even if not through direct reciprocity), just as we reap real benefits from sex (even if not through immediate reproduction.) Yes, we *occasionally* have sex or do nice things just for the good feelings. But even if moral behaviors are sometimes the result of misfirings, this certainly doesn't mean they are always the result of misfirings. Moral instincts, including charity, prevail primarily because of the direct benefits they confer. Moral behavior is far too prevalent to be explained solely as a "Darwinian mistake." Instead, I argue, it is part of the Darwinian plan. In other words, morality follows the rules of natural selection after all.

Our hunter-gatherer ancestry has indeed ingrained in us a moral instinct, but I believe that it is a very well-refined instinct, flexible to the individual's current environment. As I have stated, the way an instinctual response plays out is often dependent on the environmental context. Individuals are not reckless with their kindness, generosity, or empathy; rather, they are calculated. Whether in hunter-gatherer groups or global society, moral behavior is not distributed uniformly to all members of a group. Rather, it is given out unevenly, often depending on how much the giver is likely to benefit from the end result. Even though it is rare for an individual to cheat badly enough to be exiled or imprisoned, subtle cheating is common. Some individuals slack ever-so-slightly on their reciprocation, while others are especially generous in their reciprocation. Group members may catch on to this, interacting less with greedy individuals and more with generous ones. For the most part, we do not simply trust that we will be repaid, but actually keep track of the level of fairness in each of our relationships. Yes, humans have evolved to be moral, but not indiscriminately, unconditionally moral. As discussed in the previous section, we change our behavior towards others based on our experiences with them or their reputations. Selection may have favored a capacity to assess the result of our moral behavior, and to change it in response to what we've learned. Individuals ensure that their good deeds pay off. If they don't pay off, future interactions may be adjusted accordingly. Even though our species did not evolve in a global society, it still evolved in a society where too much giving could be a bad thing, and where end results mattered.

The way we employ our moral senses has historically been important enough that they have evolved a degree of "skepticism." Attempts at tricking our moral sense do not often work. Charities put a lot of thought into understanding our moral sense so that they can maximize the

effectiveness of their marketing strategies. Charities may have a much better understanding of human morality than most of their potential donors, and yet still have little success in getting donations. Our moral senses are actually very good at combating attempts to get us to give at little benefit to ourselves. When the benefit is not apparent, we find ways to justify our decision not to give. Sometimes we simply say we are not wealthy enough to give to charity, even if in reality we could afford to give a little without a noticeable impact on ourselves (Singer, 2009). Sometimes we say that the donation we could give is too small to make a difference, despite that fact that just a couple bucks could save lives (Singer, 2009). We may say that we prefer to give to something closer to us, or that we don't trust charities to make good use of our money (Singer, 2009). We may say that people in need are not our responsibility, or that they should help themselves rather than taking handouts, or that giving only makes them dependent on us, or even that saving lives will contribute to overpopulation (Singer, 2009). But for all these common justifications, pointing out their fallibility often does little to change the minds of the potential donor. It may even serve to anger them. Perhaps this is because their decision not to donate is not actually based off of reason, but instinct. Therefore, reason may do little to change their minds. Perhaps some part of their brains has already contemplated the proposal and determined it to be unworthy of the resources it would cost. Getting people to altruistically donate is very difficult, because, as we have seen, organisms are not actually altruistic, but self-interested. The point here is not to say that we're all scumbags, but simply that we're biologically inclined to be selfish. But still, charity does exist. So why do people give anything at all when they could instead give nothing? If, as I argued, charity is not usually the result of a misfiring, but rather an actively adaptive behavior, then how is it adaptive?

II. Part of the Darwinian Plan

Charity is probably not an altruistic concern for the needs of strangers, but usually a self-benefitting behavior. Charitable behavior may help an individual promote a reputation for generosity or trustworthiness, increasing his likelihood of being involved in future reciprocal interactions with those who know of his good deeds. It doesn't matter if he never has interactions with the strangers that he donated to, who may never even know of his existence. What matters is that the people around him, who he may interact with, perceive him to be a good person with good motives, resulting in more interactions in the future. All the benefits he will receive over time from this reputation may make up for the original cost. This is probably not a difficult requirement to meet, considering the average charity donation in the United States is less than 3% of the donor's income (Nelson and Greene, 2003). If we donate, it tends to be at a low relative cost to ourselves. The lower the cost, the lower the benefit needed to make the transaction overall beneficial. The donor may even receive reciprocation from the government, in the form of tax breaks, which also add to the mix of benefits working to alleviate the costs over time.

But the donor could also be a billionaire, who genuinely has no need to accumulate more wealth. The reciprocation does not have to be in form of money. It could be in the form of friendships, strengthened relationships, the fulfillment of being well-liked, or the power of influence. Perhaps the donor is a public figure, and his charitable behavior buys him the increased respect of millions of people, a widespread reputation for high generosity, perhaps even a legacy. Popularity with the public is an immense power. The donor may utilize the respect of the public to sway their votes, giving him the power to influence what legislation is passed.

One man's reputation can literally have an impact on an entire political atmosphere. To him, this benefit may be worth a large, say, $1 billion donation. Especially if he still has $20 billion to his name. At some point, there has to be a cap on the amount of material items worth having, a maximum quality of living that can be attained by buying things. Perhaps after this point, the pursuit of a reputation through charitable donations is simply the most beneficial way of using their excess money.

But what about anonymous donations? If no one knows about a person's charitable behavior, how can donating enhance his reputation? One thing to note is that even anonymous donations aren't entirely anonymous (Nelson and Greene, 2003). A donor's spouse, family, and close friends are likely to know of his personal sacrifice, and their opinions of him may have a greater impact on his life than anyone else's. They may think even more highly of him for donating anonymously, because it conveys to them that he did it out of "the good of his heart" rather than for "credit." So a possibility is that even "anonymous" donations may serve the reputation of the donor, even if only to a select few individuals. But it is hard to say if that seemingly small benefit could possibly outweigh the cost of a generous donation, and surely there are occasional donations in which the donor doesn't even tell his family or friends. In that case, there can be no argument for reputation and resulting reciprocity. So is there any other way charity can benefit the giver?

There is the possibility that in some cases, the effects of charity may indeed cause direct benefits to the giver. Donations are not always to irrelevant strangers across the planet. Actually, when we do donate, it is mostly to our own community, and not to outgroups. The United States ranks as the third most generous nation, but less than 10% of charity donations and volunteer

time go toward developing countries (Singer, 2009). The tsunami that devastated Southeast Asia in 2004 killed 220,000 people. Americans donated $1.54 billion to help the tsunami victims (Singer, 2009). While this is a lot of money, and surely did a lot of good, the next year we donated more than 4 times that amount ($6.5 billion) to our fellow Americans after Hurricane Katrina struck, which had a much lower death toll of 1600 people (Singer, 2009). Thus, our generosity is clearly not based on a logical calculation of need. There is a huge bias toward helping our own ingroup. We are far more likely to help someone we know even if a stranger needs that help more. We are far more likely to help an American even if someone in another country needs it more. Most people are probably aware of this bias, and most would probably attempt to justify it one way or another. But few people would justify it by saying that an internal donation is better because it is more likely to benefit them. But whether or not they are consciously aware of it, this is likely the truth. We are less likely to feel any immediate effects of people suffering across the world from us. But a disaster in the US could well have a direct effect on us. The faster we alleviate damages from a disaster here, the less our economy will suffer, for example. We may be inclined to care and to help in such a situation because we realize that it will immediately affect our own lives. However, distant events affect us all now more than ever, and this trend is likely to continue. In an increasingly global world, events in distant countries may be as likely to affect us as events in our country, and thus there is a possibility that someday the whole world will be our ingroup. Dependence breeds kindness. The more we depend on other groups of people, the more we will help them when they are in need, not because of altruism, but for our own good.

Charity is not an altruistic concern for the needs of others. It is a *selfish* concern for the needs of others. Humans are highly social organisms, making us mutually dependent. We invest resources to ensure others think highly of us. We help others because we can benefit from it, or because their wellbeing affects our own. If a charitable action holds no benefits for us, then we will generally not take it. Our moral instincts, rather than our sense of reason, dictate how we respond to others in need.

In some cases, charitable behavior may indeed be explained as a misfiring. People do donate to charities that help outgroups, and surely there are cases in which the cost of their donations far exceeds their gain from it. In such cases, the misfiring hypothesis may well be the best explanation. The person may have donated solely for the warm glow, which makes them feel good but doesn't confer a fitness advantage. Indeed, charitable behavior has been shown to activate the reward regions of the brain (Zak, Stanton, & Ahmadi, 2007). The biological misfiring hypothesis certainly has its place, but it is far from the sole explanation for charity. Any behavior that doesn't have immediately apparent evolutionary value should not just be haphazardly lumped into the "biological misfiring" category. This would be like looking at an optical illusion and saying it defies the laws of physics. Considering the breadth of phenomena the laws of physics do successfully explain, we should probably scrutinize the object further before calling it an exception to the rules. Likewise, a "biological misfiring" should be considered a relatively bold term to use, one that shouldn't be employed unless thorough studies have truly eliminated all possible benefits anyone could think of. It is much more reasonable to err on the side of selection and concede that most behaviors prevail because they are evolutionary beneficial, even if it requires a closer look to understand how so.

Historically, we are far too quick to say that a given behavior is counter to evolutionary theory, that it must be some special exception to the rules, just because the explanation is not immediately obvious. I wonder if that is because even scientists have a severe longing to feel special, and perhaps subconsciously they try to leave some things a mystery, so that God, humanity, or some other supernatural force can keep the credit rather than science taking it all away. Perhaps even lovers of truth have an innate bias to overlook things, for fear of having to revoke their preconceptions about a meaning to life. Indeed, scientists seem to love using the phrase "unique to humans" anywhere they can, promoting the idea that humans are somehow inherently special. To see one of my greatest idols Richard Dawkins, of all people, refer to empathy as a "blessed, precious mistake" very much struck me. Not every behavior confers a fitness advantage, and mistakes certainly do exist, but even those mistakes are completely explainable, and an integral part of the natural selection process. We can call our sense of empathy blessed and precious, but those are just subjective and often misleading descriptors. Empathy, as we will see, is but a chemically induced response to certain environmental situations in social organisms.

III. Oxytocin: The Fuel to the Moral Machine

Everything is controlled by chemical processes; our moral instincts are no exception. The direct chemical causes of our behaviors are amazingly complex, and we are far from a complete understanding of them. We have no intuitive understanding of the chemical processes occurring inside of us, and thus we don't tend to say things like "I did it because of combination of neurotransmitters my brain released at the time." We are more likely to communicate these

processes in terms of *feelings*, our subjective perceptions of these processes. Studies on the chemical mechanisms behind our feelings provide remarkable insight into human morality.

Oxytocin is a neuromodulator that promotes prosocial behavior in animals (Zak et al., 2007). Naturally, individuals prefer their own space and have a certain aversion to approaching others. Animals are careful and defensive. However, sometimes it is necessary or very useful to approach and interact with others. Oxytocin helps animals overcome avoidance of others (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). It has been linked to maternal care, pair bonding, sex, and social attachment (Kosfeld et al., 2005). In humans, it down-regulates amygdala activity, which may cause us to be less hesitant about giving up resources, thus promoting moral behaviors (Zak et al., 2007). A slew of experiments help us to understand how oxytocin is involved in human prosocial behaviors, including how it affects trust, generosity, and charitable giving.

In a study employing the Ultimatum Game (concept explained in Sec. 3-I), the receiver stated the minimum amount of money they would accept (Zak et al., 2007). This information was not shared with the giver, but was used to gauge the generosity of the giver, which was determined by how much more the giver gave than the receiver expected (e.g. how much more the giver gave than was necessary to avoid rejection) (Zak et al., 2007). Givers were randomly given oxytocin or a placebo (Zak et al., 2007). The givers who received oxytocin were 80% more generous with their offers (Zak et al., 2007). In another game, called the dictator game, the giver chose how much to give and the receiver had no choice but to accept whatever was offered (Zak et al., 2007). Oxytocin did not affect how much the giver offered in this game (Zak et al., 2007). Thus, generosity was only affected by oxytocin when the receiver had the ability to determine

the end result. When the receiver had no say, oxytocin made no difference. Perhaps oxytocin makes a person more cognizant of the receiver's perspective, giving them a better judgement of what will be considered fair, which may increase the likelihood of the proposed social exchange being accepted. If people given oxytocin are more motivated toward prosocial behavior, perhaps they are willing to give a little more to ensure that they get what they want out of their approach. Perhaps being more liberal with one's offer is a safeguard against rejection. If any of this were true, we would expect the oxytocin group to see lower rejection rates for their offers. Yet, the percentage of offers rejected in the ultimatum game were the same in the oxytocin group and the placebo group (Zak et al., 2007). So oxytocin did not help givers better gauge the receiver's conception of fairness. Oxytocin caused a spark in generosity, but the reason is not clear. The paper argues that oxytocin increases empathy, which in turn may increase generosity (Zak et al., 2007). However, if it increased empathy, why did it not affect generosity in the dictator game? Is empathy only employed when there is an opportunity to gain from it?

In another variant, the trust game, there was an investor and a trustee (Kosfeld et al., 2005). The investor could choose to transfer money to the trustee, and the trustee was made aware of this and given the choice to share the money gained from the investment (Kosfeld et al., 2005). The investor could increase his earnings by giving to the trustee, but only if the trustee chose to share the earnings (Kosfeld et al., 2005). If not, the investor got nothing back and the trustee gained all the benefits (Kosfeld et al., 2005). Naturally, there is hesitance to rely on a stranger's trust. This study hypothesized that one way in which oxytocin promotes prosocial behavior in humans is to increase trust (Kosfeld et al., 2005). One group of investors was given oxytocin and the other a placebo (Kosfeld et al., 2005). Those given oxytocin showed significantly higher trust

levels, as indicated by higher money transfers (Kosfeld et al., 2005). In a variation, called the risk game, the trustee didn't get to choose whether to share earnings with the investor; rather, a random mechanism made this choice (Kosfeld et al., 2005). Thus, the level of trust showed by the investor could have no impact on whether the trustee shared. In this game, there was no difference in investments between the oxytocin and placebo groups (Kosfeld et al., 2005). This further ties oxytocin to *social* behavior, as it only affected trust in the context of a social exchange, but not in general (Kosfeld et al., 2005). Just like in the previous study, on generosity, oxytocin only had an effect when there was potential to impact the result of the exchange. Perhaps oxytocin only increases generosity and trust in contexts where showing generosity or trust is likely to communicate something to the other individual that could make them respond to the interaction in a more favorable way. In a version of the trust game where the trustees were given oxytocin, it had no effect on their decisions to share their earnings (Kosfeld et al., 2005). So it seems that oxytocin does not cause an increase in prosocial behavior generally, since it specifically affected the investors and not the trustees. The article argues that oxytocin is primarily important for the initial engagement in social interactions (Kosfeld et al., 2005). The investor must decide whether to "approach" the trustee at all (Kosfeld et al., 2005). The trustee, it argues, does not rely on oxytocin to make their decisions on whether to share with the investor, because the trustee is operating on reciprocation rules (Kosfeld et al., 2005). Animal studies, particularly those on monogamous mammals and precocial ungulates, have also reflected this (Carter, 1998; Kosfeld et al., 2005). It has been shown that oxytocin decreases defensive behaviors in animals, making them more likely to engage a social situation (Kosfeld et al., 2005).

But, just like in this study, there is no evidence that it increases their reciprocation (Kosfeld et al., 2005).

But other studies have found oxytocin to increase giving even outside the context of social exchange or potential to benefit. In one experiment, study participants randomly received either oxytocin or a placebo before watching a short public service announcement about various social issues (Zak, 2015). Participants were given $5 to pay attention to the video, evaluated by whether they could correctly answer a factual question about it afterward (Zak, 2015). Then, participants were given the option to donate a portion of their $5 to a charity related to the issue in the PSA (Zak, 2015). This option was given as a computer question, and random participant identifiers were used, so all donations were anonymous (Zak, 2015). Those who received oxytocin donated 56% more money to charity (Zak, 2015). In another experiment, blood samples were taken before and after a group of people viewed one of the PSAs (Zak, 2015). The change in oxytocin levels as well as an arousal hormone called ACTH were measured (Zak, 2015). (An increase in ACTH would indicate that people paid attention to the PSA) (Zak, 2015). In those whose blood samples showed an increase of both oxytocin and ACTH, donations were 261% higher than when only one or neither biomarkers increased (Zak, 2015). The article argued that oxytocin increased empathy for the characters in the story, and that empathy caused people to be more generous (Zak, 2015). Unlike in the previous experiments, here oxytocin increased charitable behavior outside the context of social exchange. Participants given oxytocin donated more, despite the fact that those who benefitted from the donation had no opportunity to respond to the donor's generosity.

Another study specifically targeted the question of whether oxytocin generates increased empathy (Barraza & Zak, 2009). Participants watched either an emotional or control (non-emotional) video and were given a survey to assess what emotions the video triggered (Barraza & Zak, 2009). The intent of this survey was to evaluate empathy. Participants then played the classic version of the ultimatum game (the giver offered a portion of $40; the receiver accepted or rejected the offer; if the receiver rejected the offer, both parties received nothing) (Barraza & Zak, 2009). Those who played the ultimatum game were informed of their earnings afterward and given the option to donate a portion to charity (Barraza & Zak, 2009). Their blood was drawn before viewing the video and after playing the ultimatum game (Barraza & Zak, 2009). A control group, which watched the emotional video and did not play the ultimatum game, had their blood drawn immediately before and after the video (Barraza & Zak, 2009). Blood samples were tested for changes in oxytocin levels, as an indicator of empathy (Barraza & Zak, 2009). Watching the emotional video raised blood oxytocin levels by 47% on average compared to watching the non-emotional video (Barraza & Zak, 2009). The change in oxytocin levels was correlated with the level of empathy, as measured by the survey (Barraza & Zak, 2009). Higher levels of empathy, in turn, were associated with more generous offers in the ultimatum game (Barraza & Zak, 2009). Those who were more generous in the ultimatum game also donated more to charity (Barraza & Zak, 2009). Simply viewing an emotional video before engaging in an activity raised people's blood oxytocin levels, making them more empathetic, and causing them to be more generous and charitable. Could it be that emotional videos trigger misfirings in our social behavior, by tricking our bodies into producing oxytocin even though we aren't in a social exchange, thus artificially inducing us to be charitable?

Perhaps the oxytocin mechanism is one of the reasons that emotion is a better tactic for calling people to action than is logic. We frequently employ emotions to get other people to do things. We may not be aware of the underlying mechanism, but it is safe to say we have an intuition telling us that we can manipulate people using emotion. When people appeal to emotion, be they individuals we know, or organizations such as charities and nonprofits, are they (even if unknowingly) influencing this physiological system inside us in order to get us to give them something? Clearly, oxytocin has a huge influence on moral behavior. It seems that higher levels of oxytocin cause people to be more generous, more trusting, and more empathetic. Though the intricacies of the relationship are still open questions, that only means there are more experiments to be done. The fact that oxytocin levels increased generosity, trust, and empathy as compared to placebo groups, is, in the very least, a remarkable example of how malleable our behavior is. Show us a stimulus, change the neuromodulator levels in our bodies, change our behavior. Oxytocin caused people to behave differently in social exchanges. And while oxytocin was infused via nasal inhaler in many experiments, it was also increased in some simply through showing emotional videos and public service announcements. Oxytocin levels can be increased in a variety of ways, without any conscious knowledge of the process. In daily life, it may be physical contact, safe environments, and certain social interactions (Zak, 2007). This goes to show that our generosity, trust, and empathy are influenced by the outside forces of our environment. As in, a stimulus enhances our oxytocin levels, which then induces us to be more generous, trusting, or empathetic. Clearly, these simple processes are not the result of logical, conscious decisions. Rather they are automatic, physiologically-controlled processes happening

inside of us without our knowing, instructing us like robots on whether to engage in social, moral, and charitable behavior.

Sec. 5. Morality is Not a Social Construct

Biologist Marc Hauser has done extensive cross-cultural studies to investigate how people of various origins, cultures, and religions respond to ethical dilemmas (Dawkins, 2006a). He explains variations of the classic "trolley dilemma" and asks people to judge whether a particular action is morally permissible. In the trolley dilemma, there is a hypothetical trolley and a group of people standing in its track, facing imminent death as the trolley rolls toward them. You are in a position to prevent the trolley from hitting and killing those people, but doing so requires the sacrifice of an innocent person. (For example, say you can divert the trolley to another track, but there is one person standing on that track.) You must decide whether you should intervene and sacrifice one person to save a group of people. Slight variations to the trolley dilemma can make or break the decision of those surveyed, providing interesting insight into human moral behavior (Hauser, 2006). Fascinating though it may be, I won't go into detail on this. My point here is to address the degree of variation in responses to these ethical dilemmas. Hauser surveyed people across geographic, cultural, and religious barriers. (The trolley dilemmas were even translated to situations involving crocodiles and canoes so that an indigenous Central African tribe could be surveyed) (Dawkins, 2006a). For each variation of the dilemma, across these barriers, the people surveyed almost universally made the same judgements (Hauser, 2006). Even if their reasons differed or if they were unable to articulate their reasons, the vast majority of people still came to the same conclusions (Hauser, 2006). Thus, it seems that regardless of where you live, what you do, whether you practice a religion,

whether you are educated, whether you have access to modern technology, whether you are a hunter-gatherer or a US citizen, etc., you have the same sense of morality as everyone else.

If morality were simply a social construct, learned from one's society, we would expect there to be significant differences in the responses of people from different cultures. But instead, almost everyone, put in the same hypothetical scenario, made the same judgements. These results suggest the possibility that morality may be strongly genetic. Universally, we all use our moral sense in much the same way, and it is only our justifications for it that differ. Some may justify their moral decisions with moral absolutes, some with religion, some with their upbringing, and some with arguments from logic, but in truth, it seems, we owe all the credit to our biology. What I find most profound about Hauser's study is its impugnment of the concept of rational decision-making. It's as if our decision is already written in stone, and our only conscious power over it is deciding how to defend the choice we were already destined to make. We attempt to explain our judgements assuming that they were decisions, made using some sort of reason, but perhaps they weren't "decisions" at all, so much as simple application of internal instructions. Perhaps the only use in our justifications is to make it easier for us to believe that our moral judgements are the result of a conscious, individual choice.

If we all make the same moral judgements, what explains the seemingly drastic moral variation sometimes observed between cultures? Some societies abandon their elderly and commit infanticide (Stamos, 2008). In modern western civilization, where we extend care even to the most expendable members of society, these actions seem unthinkingly immoral. How do we reconcile such apparent contradictions to the idea of a universal moral instinct? We learned from Hauser's studies that people tend to make the same moral judgements about a given

situation. This does not mean that there are moral absolutes or that a given practice can't be permissible in some societies but not in others. I have argued that the moral instinct is not rigid, but flexible, able to adjust to different environmental contexts. It makes sense that natural selection would favor such flexibility, as there are situations in which a strict and uncompromising moral sense would be selectively disadvantageous.

Eskimos live in the Arctic, where the impossibility of farming makes nomadism the only option, and food is therefore scarce (Stamos, 2008). They do not have the luxury to care for the weak and elderly, as the cost of doing so would greatly outweigh the benefits, so much so that a tribe who was compelled to do so may not survive at all. In the western world, the expense of resources may be outweighed by the advantages of keeping the weak and elderly alive. As a society we have enough resources to afford to care for the weak and elderly, as well as a social structure that allows for them to remain beneficial to others, and government systems that allow them to still contribute to the economy. With an extensive specialization of labor, there are many occupations where physical strength and vigor aren't necessary. Moreover, elderly people can contribute to the health and wellbeing of their grandchildren by supporting them financially, sharing life skills, etc. In a nomadic society, those who can't hunt and gather effectively would present a huge burden to their tribe, offer no benefits to other individuals in their tribe, and have no further use in assisting the survival of their genes. The difference here is in environmental conditions, not in moral capacity.

In Eskimo tribes, mortality rate is much higher in males than in females, due to the dangers of hunting (Stamos, 2008). When male casualties are high, female infanticide becomes necessary to keep the sex ratio of the tribe even (Stamos, 2008). The conditions of living do not

allow females to raise more than one infant at at time, so females cannot simply have another child if they already have one (Stamos, 2008). If male casualties in the tribe are high, and there are many female infants, it is more beneficial to cut one's losses and start fresh with a male infant rather than continue many years of raising a female before being able to produce a male. Some may say the Eskimos are evil for practicing infanticide, but perhaps this is because they have trouble putting themselves in the Eskimos' shoes. In the same situation, anyone have to make the same compromise in order to survive and ensure a future for their genes. Abstaining from female infanticide would be detrimental to the Eskimos, whereas in western society the same environmental stressors are not present, and so infanticide is not necessary. Moreover, infanticide is illegal in the western world, and due to the consequences the practice is actually be quite detrimental to an individual. The behaviors that are optimal for an individual's survival and reproduction depend on the conditions of that individual's environment.

The fact that a behavior can be influenced by environmental conditions does not make it any less of an instinct. Sexual and violent inclinations are instinctual, and yet they can be enhanced or suppressed by situational factors. Moral inclinations are no different. Observed behavior is a dynamic interplay between internal programming and external conditions. In individuals, the genetic instructions are written, but how they are expressed depends upon environmental factors. For this reason, even instinctual behaviors vary among individuals. We know that different species exhibit different behaviors depending on what is beneficial for individuals of that species. Correspondingly, individuals of the same species exhibit different behaviors depending on what is beneficial for individuals of that species - in that specific environmental context. Some species are more aggressive than others, and some individuals are

more aggressive than others of the same species. It depends on the extent of aggression that is beneficial in a given environment. Some species are more moral than others, and some individuals are more moral than others of the same species. It all depends on the extent of morality that is beneficial in a given environment. We may make the same moral judgements about the same situation, but none of us live in the same situation, so our actual moral behaviors vary. The idea of a moral instinct does not require a universal set of moral rules or a lack of individual variation. It only requires that individuals are programmed to promote the survival of their genes.

Sec. 6. Conclusion: Morality as Instinct

Moral behavior is an outcome of natural selection, and ultimately selfish in that it serves to promote the continued existence of the genes that give rise to it. Moral behavior exists because it is adaptive, with moral individuals earning benefits such as reciprocity, reputation, and status. These benefits are just as present for humans in modern society as they were for our hunter-gatherer ancestors. Many species have evolved social systems that incorporate the enforcement of moral rules, resulting in benefits for "good" deeds and punishments for "bad" deeds. These systems help make it possible for selfish organisms to coexist in cooperative societies. Studies have shown that human generosity, trust, and empathy are influenced by chemical substances in the body. Different types of social interactions can increase the levels of these substances in a person's blood, altering the degree of generosity, trust, or empathy they display. Studies indicate that universally, people tend to make the same moral judgements about the same ethical dilemmas. Cultural variation exists because, like all instincts, the behavior expressed depends upon environmental conditions. Morality is neither a social construct nor an

endeavor of rationality, but primarily an instinct. As creatures who are both highly intelligent and highly social, humans are predisposed to believe in a higher moral realm, further complicating our ability to biologicalize the topic. But despite our complex cognitive delusions, we are no different from other animals in that we are wired to strive for the immortality of our genes. We are not moral because we're *good*; we are moral because we're *selfish.*

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