

Tattooing Commitment, Quality, and Football in Southeastern North America

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INTRODUCTION

Tattooing is not an evolved trait, but some of the cultural and psychological patterning of tattooing may be rooted in Darwinian processes. Evolution is about more than constructing a form or producing behavior based on genotypic blueprints. Common and widespread behaviors are assumed to be culminations of histories of gene-environment interactions. This assumption, known as the phenotypic gambit, is a useful strategy for developing and testing hypotheses about what seem to be evolved patterns of behavior. Behaviors observed over a long period of time and across human cultures, like body art in general and tattooing specifically, are likely to have a lower cost-benefit ratio than other possible behaviors in similar scenarios.¹

Tattooing appears to be the result of an evolved tendency to manipulate human bodies in meaningful ways with distinctive benefits. Advantages

¹Alan Grafen, “Modelling in Behavioural Ecology,” in *Behavioural Ecology: An Evolutionary Approach* (Vol. 3, 1991), 5–31; Bobbi S. Low, *Why Sex Matters: A Darwinian Look at Human Behavior* (Princeton University Press, 2015).

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include marking allegiance, identity, experience, or status; enhancing attractiveness; psychological catharsis; stimulation of the immune system; and spiritual and medical protection. The permanence of tattooing, which makes it an indelible form of decoration, enhances that meaning. In this chapter, we review these functions of tattooing from an evolutionary perspective, outline historic and prehistoric evidence from the North American Southeast, analyze biological implications, and discuss contemporary functions of tattooing among college football fans as a signal of commitment and quality.

TATTOOING AS CULTURAL BEHAVIOR WITH AN EVOLUTIONARY BASIS

In discussing evolution, it's important to distinguish between process, patterns, and level of evolutionary effects. The *process* of evolution involves nucleic acids and genes that code for proteins, which influence neurotransmitters. Neurotransmissions in synaptic clefts predispose organisms to behave in certain ways at the individual *level*. Such predispositions may be instinctual at a species level and *patterned* or stereotyped at population levels. The success of individuals carrying certain genes in producing offspring is the classic measure of reproductive fitness and Darwinian natural selection.

Body decoration is likely based in evolved behavioral predispositions. That is, there are likely no genes for self-adornment, per se—it is more likely humans have a predisposition to manipulate our bodies as part of interpersonal communication. Many animals decorate themselves—by covering, ornamenting, masking, or hatting themselves or via trash or shield-carrying. However, animal decoration occurs mostly in aquatic species where the weight costs of décor are reduced and where the primary function is as defense against predators and pathogens.² It is possible that, like other animals, our hominid ancestors had always used materials they found in their environment to self-decorate, but in the fossil record, we cannot see evidence of purposeful self-decoration until they began to alter the material in some way. Perforated beads made from marine shells dated to 76,000 years ago from Blombos Cave in South Africa and other locations in Africa and the Near East suggest that altering materials for

²Graeme D. Ruxton and Martin Stevens, “The Evolutionary Ecology of Decorating Behaviour,” *Biology Letters* 11, no. 6 (The Royal Society, 2015). doi:10.1098/rsbl.2015.0325.

self-decoration may be a defining characteristic of humanity.³ Red ochre, an iron-rich mineral used as a pigment throughout the Old World from antiquity to the present day for self-decoration and expression, is also regularly found at Stone Age sites throughout East and South Africa and shows traces of intentional human processing.⁴

Body decoration is likely rooted in genetics for grooming and impression management that extends from clothing and hairstyles to jewelry, cosmetics, and tattoos.⁵ The sociocultural importance of grooming—and, by extension, appearances—has been linked to the evolution of human language, development of art, and social complexity.⁶ Personal grooming through body art is likely part of an individual's "extended phenotype," or management of one's environment as a reflection of phenotypic self-identity. Tattooing represents a variety of such decoration but one that carries enhanced symbolic meaning because of its costliness and permanence.⁷

Evidence for early tattooing as a sign of social interdependence is not as old as body decoration in general, but the permanent, purposeful alteration of one's own body does appear uniquely human. Tattoos are etched into the skin, so it is difficult to date its antiquity, as skin does not usually preserve. However, archaeologists point to three lines of evidence suggesting that tattooing has been practiced for many thousands of years—anthropomorphic art, tattoo tools, and preserved skin. Hundreds of naturally and

³Ian Watts, "Ochre in the Middle Stone Age of Southern Africa: Ritualised Display or Hide Preservative?" *The South African Archaeological Bulletin* 57, no. 175 (Jun., 2002), 1–14.

⁴Christopher S. Henshilwood, Francesco d'Errico and Ian Watts, "Engraved Ochres from the Middle Stone Age Levels at Blombos Cave, South Africa," *Journal of Human Evolution* 57, no. 1 (7, 2009), 27–47. doi:<http://dx.doi.org/10.1016/j.jhevol.2009.01.005>; Ian Watts, "Red Ochre, Body Painting, and Language: Interpreting the Blombos Ochre," *The Cradle of Language* 2 (2009), 93–129.

⁵Obsessive-compulsive behaviors manifested as over-grooming have been linked to the SAPAP family of proteins and a deletion in the Sapap3 gene in mice (OJ Bienvenu et al., "Sapap3 and Pathological Grooming in Humans: Results from the OCD Collaborative Genetics Study," *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics* 150, no. 5 (2009), 710–720).

⁶Robin I. M. Dunbar, *Grooming, Gossip, and the Evolution of Language* (Cambridge: Harvard University Press, 1996).

⁷Rachael A. Carmen, Amanda E. Guitar and Haley M. Dillon, "Ultimate Answers to Proximate Questions: The Evolutionary Motivations Behind Tattoos and Body Piercings in Popular Culture," *Review of General Psychology* 16, no. 2 (06, 2012), 134–143. doi:10.1037/a0027908.

deliberately created human mummies have been found throughout the world with purposeful tattoos. The oldest are roughly 3700–5300 years old. The most famous is the Tyrolean “iceman” found in the Italian Alps, commonly known as Ötzi, which is around 5000 years old. The tattoos on Ötzi are mostly small, simple marks that align with acupuncture sites, suggesting a therapeutic use. It is likely that cultural knowledge of therapeutic tattooing developed over a long period of time, suggesting that, to develop this expertise, people were tattooing previous to Ötzi.⁸

While body decoration has advantages, there are significant costs to tattooing, which problematize it from an evolutionary perspective. Tattooing has been associated with infection, pain, social stigma, scarring, and the marring of attractiveness.⁹ Euro-American sanitation and hygiene standards today are relatively good, and tattoo-associated infection rates are low. However, in other parts of the world, tattooing still occurs in make-shift situations, without sanitization between clients, and intensively, with numerous people receiving tattoos in short time spans and close proximity, increasing potential for infection transmission.

Additionally, tattoos can range from a simple dot that takes one second to administer to full body pieces that take hundreds of hours. Small ones may scarcely produce a stress response, while intensive tattoos administered with traditional, manual tattooing tools may severely tax the immune system. Such extensive tattooing is especially interesting because it is common in marginal environments. Why would people whose daily lives are relatively unstable subject themselves or their families to painful and permanent procedures that risk infection? Furthermore, can we really compare such traditional tattooing practices to the contemporary “tattoo Renaissance” going on in Euro-America?¹⁰

⁸ Aaron Deter-Wolf et al., “The World’s Oldest Tattoos,” *Journal of Archaeological Science: Reports* 5 (2, 2016), 19–24. doi:<http://dx.doi.org/10.1016/j.jasrep.2015.11.007>.

⁹ Kris Sperry, “Tattoos and Tattooing: Part II: Gross Pathology, Histopathology, Medical Complications, and Applications.” *The American Journal of Forensic Medicine and Pathology* 13, no. 1 (1992), 7–17.

¹⁰ Arnold Rubin, “The Tattoo Renaissance,” in *Marks of Civilization: Artistic Transformations of the Human Body*, ed. Arnold Rubin (Los Angeles: University of California Museum of Cultural History, 1988), 233–262.

COSTLY HONEST SIGNALING OF CULTURAL AND BIOLOGICAL FITNESS

Psychologist Rachael Carmen and colleagues point out that most analyses of tattooing focus on short-term explanations, such as efforts to express individuality or attractiveness. However, there are also two basic evolutionary or long-term benefits that complement these proximal functions but are often ignored. The first is that, through tattooing, the body becomes a “human canvas,” advertising its individual and group-level qualities and value through symbolic mechanisms. The human canvas approach is especially relevant in considering prehistoric and historic tattooing cultures. The second evolutionary benefit is that tattooing is a means of “upping the ante” in terms of health risk by purposefully injuring the body to show off a good immune system. This is especially relevant in safe environments with demographic stability and may help explain tattooing’s contemporary popularity.¹¹

For decades, researchers have pointed with concern to associations between tattoos and skin or blood infections, especially among individuals whose tattooing was done by non-professionals.¹² Unlike such risky behaviors as childbirth, there is no biological imperative associated with tattooing and no direct reproductive benefit to engaging in it. Or is there? Behaviors that increase risk or jeopardize health may lack direct survival benefits but could make individuals more attractive to potential mates. Such behaviors are termed “costly honest signals” or “handicaps.” These concepts derive from the Darwinian efforts to understand seeming aberrations from strict natural selection, such as the peacock’s tail feather or giant deer antlers.¹³

The classic model of a costly phenotype in evolutionary biology is the peacock. The peacock carries a handicap in the form of a set of tail feathers that effectively says, “I can sport this awesome shiny and eye-catching encumbrance, successfully mate, eat, etc., *and* get away from preda-

¹¹ Carmen et al., “Ultimate Answers to Proximate Questions: The Evolutionary Motivations Behind Tattoos and Body Piercings in Popular Culture,” 134–143.

¹² S. de A. Nishioka et al., “Tattooing and Risk for Transfusion-Transmitted Diseases: The Role of the Type, Number and Design of the Tattoos, and the Conditions in which they were Performed,” *Epidemiology & Infection* 128, no. 01 (2002), 63–71. doi:10.1017/S0950268801006094.

¹³ Darwin, Charles. *The Descent of Man and Selection in Relation to Sex* (London: Murray, 1871).

tors—hence, my genes must be good, baby, so pick me.” Where peacock plumage signals genetic quality, tattooing on a human canvas may send similar information. Costly signaling is also commonly associated with the economic principle of “conspicuous consumption.”¹⁴ Along with being a cultural practice with biological implications, tattooing is economic in nature. In the modern tattoo industry, large-scale work over multiple sessions takes many hours and can cost the bearers thousands of dollars. In essence, large tattoos—especially large color tattoos—are visual advertisements of biological and economic means.

According to historical and ethnographic sources, tattoos have represented group identification, passage into adulthood, becoming human, and distinctiveness. There is circumstantial evidence from across cultures and history to support this claim, but do we need to look so far and wide?

THE HUMAN CANVAS IN NATIVE AND COLONIAL SOUTHEAST NORTH AMERICA

If tattooing has functions based in evolved patterns of behavior, we should be able to look anywhere humans live to see evidence. Humans did not settle in Southeast North America until 50,000–13,000 years ago, yet there is substantial evidence for the practice of tattooing in this region.¹⁵ Tattooing was a common practice among Native American tribes and later colonial Europeans.

Southeast Native American tattoos were administered by hand, typically with small and very sharp needles made from stone, animal bones or parts, pine needles, or sharpened hollow reeds.¹⁶ Ink was made from mixing fire pit ashes with urine, and plants were sometimes used to cre-

¹⁴Michael Spence, “Job Market Signaling,” *The Quarterly Journal of Economics* 87, no. 3 (1973), 355–374; Thorstein Veblen, *The Theory of the Leisure Class* (Oxford: Oxford University Press, 2007 [1899]).

¹⁵David G. Anderson, Ashley M. Smallwood and D. S. Miller, “Pleistocene Human Settlement in the Southeastern United States: Current Evidence and Future Directions,” *PaleoAmerica* 1, no. 1 (01/01, 2015), 7–51. doi:10.1179/2055556314Z.00000000012; Albert C. Goodyear, “Evidence of Pre-Clovis Sites in the Eastern United States,” in *Paleoamerican Origins: Beyond Clovis*, ed. R. Bonnichsen and others (College Station: Center for the Study of the First Americans, Texas A&M University Press, 2005), 103–112.

¹⁶Deter-Wolf “Needle in a Haystack: Examining the Archaeological Evidence of Prehistoric Tattooing,” 43–72; Joutel “Joutel’s Historical Journal of Monsieur De La Salle’s Last Voyage to Discover the River Mississippi,” 85–193; Montcalm *Journal Du Marquis De Montcalm Durant Ses Campagnes En Canada De 1756 À 1759*.

ate different colors.¹⁷ Motivations for getting tattooed were similar across tribes in the Southeast. Some of the most common were associated with ceremonies or feasts, rites of passage, marriages, elevations in social status or political position, tribal and clan identity, health, and beautification. Many North American tribes would use tattoos to mark higher-status individuals, while body paint emulated the tattoos of higher-ranking tribe members. Body paint and tattoos were used commemorate feasts and ceremonies.¹⁸ Similarly, during rites of passage ceremonies, young men and women were given tattoos to signal their entrance into adult life. Women's tattoos would signal their marriage eligibility, social status, family or clan, and eventually commemorate marriage and position, such as becoming a medicine woman or tribal elder.¹⁹ In some cases, tattoos also marked the birth of children. A boy's tattoos would signal his entrance into adulthood, his tribal position, such as a hunter, medicine man, or chief, and his skill in battle.²⁰ Many tribes, including the Tunica, Powhatan, Seminole, Cherokee, and Choctaw in the Southeast of North America, used lined tattoos to mark how many enemies they had killed, injured, or taken captive during battles.²¹

Tattoos also marked clan identification.²² A clan is a group of related families that typically trace their ancestry through a mythical being or spirit. Native American men and women may have gotten clan tattoos

¹⁷ Jean-Bernard Bossu, *Jean-Bernard Bossu's Travels in the Interior of North America, 1751–1762*, ed. Seymour Feiler (Norman: University of Oklahoma Press, 1962 [1771]).

¹⁸ David I. Bushnell Jr., "Drawings of A. Debatz in Louisiana, 1732–1735," (1927); Bushnell and de Morgues, Jacques Le Moyne, *Drawing by Jacques Lemoyne De Morgues of Saturioua: A Timucua Chief in Florida, 1564*; Lorant, *White, John White's Report, and Notes on John White*, 155–224; Sturtevant and White, *Ethnographic Details in the American Drawings of John White, 1577–1590*, 54–63.

¹⁹ Margaret Kimball Brown, *Cultural Transformations among the Illinois: An Application of a Systems Model* (East Lansing: Michigan State University Museum, 1979); John Reed Swanton, "Source Material on the History and Ethnology of the Caddo Indians," *Smithsonian Institution Bureau of American Ethnology Bulletin* 103 (1942).

²⁰ Nancy Bonvillain, *Native Nations: Cultures and Histories of Native North America* (Upper Saddle River, NJ: Prentice Hall, 2001); John Reed Swanton, "An Early Account of the Choctaw Indians," in *Memoirs of the American Anthropological Association*, Vol. 5 (Lancaster, PA: American Anthropological Association, 1918).

²¹ Bushnell Jr., *Drawings of A. Debatz in Louisiana, 1732–1735*; Lorant, *White, John White's Report, and Notes on John White*, 155–224; Swanton, *An Early Account of the Choctaw Indians*.

²² Sinclair, *Tattooing of the North American Indians*, 362–400; Swanton, *An Early Account of the Choctaw Indians*.

and even individual family tattoos that had the same symbolic functions as European family crests. Women received tattoos with their husband's clan symbols as well, commemorating her marriage or loss of virginity.²³ In fact, tattoos were often more important among women and was considered a method of beautification, much like cosmetics today. In some tribes, such as the Tunica and the Seminole, adult women without tattoos were considered ugly or not “real” women.²⁴

Tattoos were also given for protection and therapeutic treatment, such as for arthritis and other ailments, particularly around the joints and head.²⁵ Tattoos were thought to make a person stronger. For men, receiving a tattoo was a mark of bravery and distinction, and many tribes believed tattoos would make their warriors “harder” and stronger in battle.²⁶ Tattooing among the Chickasaw was reserved for men only, and many tattoos represented war honors.²⁷ An incident among the Arkansas (aka Quapaw) Indians related by French traveler Jean-Bernard Bossu highlights the importance of tattooing as a sign of status for warriors in a tribe and the cost of faking some symbolism. Reportedly, a young man of the tribe got a warrior tattoo to impress a girl in the tribe. However, when the elder tribal males discovered his transgression, they flayed the tattoo from his body in punishment.²⁸

European sailors and colonial traders also got tattoos for a variety of reasons, some of which were similar to Native Americans. In particular, identification of family, social status, and occupational roles were common themes.²⁹ Early colonists and traders adopted many Native American tattoo designs after interacting with tribes along the coast. European fur traders—especially the French—were known for being adopted into tribes, which included residing with the tribe full time, learning the language, marrying a Native American bride, and receiving clan and social status

²³ Swanton, *Source Material on the History and Ethnology of the Caddo Indians*.

²⁴ Bossu, *Jean-Bernard Bossu's Travels in the Interior of North America, 1751–1762*.

²⁵ Jack Frederick Kilpatrick and Anna Getts Kilpatrick, *Notebook of a Cherokee Shaman* (Washington, D.C.: Government Printing Office, 1970).

²⁶ Robert A. Brightman and Pamela S. Wallace, “The Chickasaw,” *Southeast*, ed. by Raymond D. Fogelson, 478–495, Washington D.C., Smithsonian Institution (2004).

²⁷ Brightman and Wallace, “The Chicasaw,” 2004.

²⁸ Bossu, *Jean-Bernard Bossu's Travels in the Interior of North America, 1751–1762*.

²⁹ Simon P. Newman, “Reading the Bodies of Early American Seafarers,” *The William & Mary Quarterly*, Third Series, Vol. 55, No. 1 (Jan. 1998), pp. 59–82.

tattoos.³⁰ These traders facilitated interactions between tribes and colonial powers.³¹ In addition, Southeastern tribes like the Tunica, Powhatan, and Chickasaw taught European colonists different tribal identification designs.³² This was done so colonists could recognize allied tribes. In particular, colonists and explorers were told specific tattoo designs signified “cannibals,” most likely in an effort to prevent alliances or trading between the Europeans and rival tribes.³³

Native Americans and Europeans of antiquity had many of the same reasons for getting tattoos. They shared in a unique exchange network centered on tattooing as an identifying signal through the colonization of the New World. Whether used to mark a sailor, a tribal warrior, adoption into a tribe, or a tribe’s identity, tattooing was a familiar and recognizable method of body modification in Southeast North America. But did it really make warriors stronger?

DOES TATTOOING REALLY SIGNAL BIOLOGICAL QUALITY?

Four studies have been conducted testing the function of tattooing in signaling biologically meaningful information. Two of those were cross-cultural studies. Anthropologists Lisa Ludvico and Jeffrey Kurland tested hypotheses to discern why scarification (including tattooing) appears worldwide and throughout history. Their hypotheses included the possibilities that scarification primes or improves the immune system, that it signals an already good immune system, or that it increases attractiveness to enhance reproductive success. Ludvico and Kurland used the Standard Cross-Cultural Sample to test this, which is an ethnographic dataset of 186 societies specific to time and place and not similar to each other in lan-

³⁰ Bossu, *Jean-Bernard Bossu’s Travels in the Interior of North America, 1751–1762*; Lorant, *White, John White’s Report, and Notes on John White*, 155–224; *Montcalm Journal Du Marquis De Montcalm Durant Ses Campagnes En Canada De 1756 À 1759*.

³¹ Bossu, *Jean-Bernard Bossu’s Travels in the Interior of North America, 1751–1762*; Lorant, *White, John White’s Report, and Notes on John White*, 155–224; *Montcalm Journal Du Marquis De Montcalm Durant Ses Campagnes En Canada De 1756 À 1759*.

³² Bossu, *Jean-Bernard Bossu’s Travels in the Interior of North America, 1751–1762*; Joutel “Joutel’s Historical Journal of Monsieur De La Salle’s Last Voyage to Discover the River Mississippi,” 85–193; Lorant, *White, John White’s Report, and Notes on John White*, 155–224; Sinclair, *Tattooing of the North American Indians*, 362–400.

³³ William F. Keegan, William F. 2007. Taíno Indian myth and practice: the arrival of the stranger king. (Gainesville: University Press of Florida, 2007).

guage or culture.³⁴ The only hypothesis that was supported in the worldwide sample was that adornment provides a mating advantage to some individuals independent of pathogen stress. This advantage of permanent self-decoration supports Carmen and colleagues' human canvas hypothesis, suggesting that we use our bodies as canvases to draw attention from potential mates. But for North America, Ludvico and Kurland also found a high rate of scarification related to a low rate of pathogenicity, which suggests that tattooing has a history of upping the ante or sending a signal that, "if things get dicey, you can count on me and my fitness."³⁵

A similar study compared scarification to the rate of pathogens in an environment. Numerous studies have found ratings of current physical attractiveness related to environmental pathogens, including one that surveyed 37 current cultures around the world.³⁶ The interpretation is that attractiveness is a signal of pathogen resistance that becomes more relevant when the possibility of getting sick is heightened. Since Ludvico and Kurland found that, worldwide, the most common association with scarification was with enhanced attractiveness, Singh and Bronstad hypothesized this association would be especially relevant where environmental stress from pathogens was highest. Furthermore, they felt that location of the markings on the body would be important—males and females might use them to draw attention to the qualities that are most indicative of good genes. For males, this is typically arms, chest, back, and shoulders, consistent with the association in males among health, attractiveness, and high shoulder-to-hip ratio. For females, stomachs, waists, lower backs, and breasts draw attention to the preferred high waist-to-hip ratio. The researchers found that females in cultures with high pathogen loads scari-

³⁴George D. Murdock and D. R. White, "Standard Cross-Cultural Sample," *Ethnology* 8 (1969), 329–369.

³⁵Rachael A. Carmen, Amanda E. Guitar and Haley M. Dillon, "Ultimate Answers to Proximate Questions: The Evolutionary Motivations Behind Tattoos and Body Piercings in Popular Culture," *Review of General Psychology* 16, no. 2 (06, 2012), 134–143. doi:10.1037/a0027908; L. R. Ludvico and J. A. Kurland, "Symbolic Or Not-so-Symbolic Wounds: The Behavioral Ecology of Human Scarification," *Ethology and Sociobiology* 16, no. 2 (3, 1995), 155–172. doi:10.1016/0162-3095(94)00075-I.

³⁶David M. Buss et al., "International Preferences in Selecting Mates: A Study of 37 Cultures," *Journal of Cross-Cultural Psychology* 21, no. 1 (March 1, 1990), 5–47. doi:10.1177/0022022190211001.

fied their stomachs more often than females in cultures with lower pathogen loads but no other meaningful associations.³⁷

These data affirm that tattooing is more than merely a *reflection* of good genes or inherent “toughness.” As many native beliefs suggest, tattooing may actually *create* toughness by stimulating the immune system to be more vigilant. However, why does our immune system need to be so vigilant? As we have pointed out, professional tattooists go to great lengths to ensure hygiene and safety, and tattoo-related infection rates are low. Nevertheless, the tattoo process is injurious, and being able to withstand the pain and discomfort of receiving a tattoo and heal efficiently from its trauma may be signs of biological quality. This seemingly counterintuitive strategy is consistent with the upping-the-ante hypothesis and the tendency across cultures for young people to engage in risk-taking behavior to highlight their mate value.³⁸

Two contemporary studies have tested this model in living populations. A study conducted in Poland found tattooing positively associated with bilateral symmetry.³⁹ Bilateral symmetry is an indicator of developmental stability, as all genotypes code for symmetry of features that occur in pairs on each side of the body. In other words, each eye should develop the same way in the same position on each side of one’s phenotype, respective fingers should be the same length on each hand, and so on. But most people have degrees of deviation from exact symmetry due to environmental influences during development. These are relatively normal deviations, known as fluctuating asymmetries, but they have been found to be negatively associated with attractiveness or trustworthiness—the more symmetrical one is, the better looking and more honest one is believed by others to be.⁴⁰ The Polish study found tattooing positively associated with bilateral symmetry in men but not women, which the authors interpreted

³⁷Devendra Singh and P. Matthew Bronstad, “Sex Differences in the Anatomical Locations of Human Body Scarification and Tattooing as a Function of Pathogen Prevalence,” *Evolution and Human Behavior* 18, no. 6 (11/01, 1997), 403–416.

³⁸Carmen, Guitar and Dillon, *Ultimate Answers to Proximate Questions: The Evolutionary Motivations Behind Tattoos and Body Piercings in Popular Culture*, 134–143.

³⁹Slawomir Koziel, Weronika Kretschmer and Boguslaw Pawlowski, “Tattoo and Piercing as Signals of Biological Quality,” *Evolution and Human Behavior* 31, no. 3 (5, 2010), 187–192. doi:10.1016/j.evolhumbehav.2009.09.009.

⁴⁰Randy Thornhill and Anders Pape Møller, “Developmental Stability, Disease and Medicine,” *Biological Reviews of the Cambridge Philosophical Society* 72, no. 04 (1997), 497–548.

to mean that tattoos draw attention to underlying biological quality. They suggest this association may be more important for men than women for number of reasons. Women do not compete as much for men as men compete for women. Women probably signal feminine or estrogen-dependent traits over symmetry. Women have higher pain thresholds than men and lower tendency to engage in risky body décor, and women are less prone to risk-taking.⁴¹ While their results are compelling, we disagree in part with their interpretation on the basis of the widespread tattooing of females and association with attractiveness in antiquity. Nonetheless, individuals who are more symmetrical demonstrate resilience to developmental environmental stressors. This poses a question: does tattooing actually have any interaction with or effect on the immune system?

We tested this question among people getting tattooed in Alabama by comparing a biological marker of immunity to tattoo experience.⁴² We collected saliva samples and questionnaire data from 29 people before and after they got tattooed at a few studios in the towns of Tuscaloosa and Leeds. From the saliva samples, we extracted immunoglobulin A and cortisol, and we used the questionnaires to assess total lifetime tattoo experience. Immunoglobulin A is a frontline mucosal defense of the respiratory and gastrointestinal tract and is more or less continually produced, thus relatively sensitive to environmental perturbations. Cortisol is one of the main “stress hormones” involved in fight-or-flight, which includes temporary suppression of immune responses. Persistent immunosuppression is one of the negative implications of extended stress and is associated with increasing susceptibility to upper respiratory tract infections. In other words, when people are really stressed out over a stretch of time, such as during college final exam periods or when going through major life crisis like divorce, they are at increased risk of getting sick. However, habituation to stress occurs when stressors are intermittent or applied systematically, such as with exercise, allowing the body to shift resource allocations to maintain or reestablish equilibrium. Thus, we predicted that the stress of tattooing would initially produce immunosuppression but that habitu-

⁴¹ Koziel, Kretschmer and Pawlowski, *Tattoo and Piercing as Signals of Biological Quality*, 190.

⁴² Christopher D. Lynn, Johnna T. Dominguez and Jason A. Decaro, “Tattooing to “Toughen Up”: Tattoo Experience and Secretory Immunoglobulin A,” *American Journal of Human Biology* (2016), n/a–n/a. doi:10.1002/ajhb.22847.

ation in people with more lifetime tattoo experience would enable the immune system to quickly rebound and demonstrate “toughness.”

We measured lifetime tattoo experience by calculating an index that included self-reported number of tattoos, tattooing sessions, and years tattooed and total hours spent being tattooed and percentage of body covered with tattoos. We compared this tattoo experience index to the difference in pre- to post-tattoo immunoglobulin A, controlling for the amount of time the tattoo they were getting took. We found that tattoo experience is a significant influence on immunoglobulin A. In people with lots of tattoo experience, immunoglobulin A increased in response to the body stress, irrespective of the immunosuppressant influence of cortisol. We interpreted this to mean that tattooing can stimulate an immunological boost when a person’s body is accustomed to the stress of tattooing. The sample was small, so this interpretation remains speculative, but it supports for the idea that tattooing may draw attention to a good immune system. A question remains as to whether this immunological benefit of tattooing influences a positive feedback system. Do people who heal well from tattooing because they have this good immune response tend to get tattooed more?⁴³

CONTEMPORARY SIGNALING VIA TATTOOING IN THE SOUTHEAST

Although the sanitation and hygiene practices among tattooists in the USA today are high relative to previous eras and infection rates low, the general public still has a perception of tattoos as painful and dangerous.⁴⁴ Thus, people may get tattooed to enhance their toughness or attractiveness—because they like the appearance of tattoos and because it is also a costly honest signal of the ability to withstand the pain and heal from the injury, but they may also get tattooed to show their pride in their affiliations.

⁴³ Ibid.

⁴⁴ Dermatologists insinuate potential disaster and, rightly, warn people to ensure their tattooist uses hygienic and sanitary standards. There seem to be some inks associated with higher rates of allergic reaction (Robin Ashinoff, Vicki J. Levine and Nicholas A. Soter), “Allergic Reactions to Tattoo Pigment After Laser Treatment,” *Dermatologic Surgery* 21, no. 4 (1995), 291–294. doi:10.1111/j.1524-4725.1995.tb00175.x.

Most people have numerous short-term affiliations throughout their lives, making tattooing to mark them, well, weird. In antiquity, tribal affiliations were important and tattoos signaled the group one belonged to, which was important in knowing who to trust in warfare and trade. But Alabamians are not fighting Mississippians or Tennesseans anymore—or are we? A contemporary analog of warfare—and one that mobilizes fierce rivalries, alliances, physical violence, and, yes, lots of tattoos—is football. Athletes in general and football players in particular are noted for their major role in portraying tattoo culture and inspiring young people to get tattoos.⁴⁵

If modern people get tattooed to highlight their fitness, one might expect athletes and other fit and attractive people to get tattooed at higher rates to draw attention to themselves above and beyond their athletic performances. One recent study of tattooing and piercing among 481 university undergraduates found that 23% of the sample was tattooed. There was no overall sex difference among those tattooed, but male athletes were more likely to have tattoos than male non-athletes.⁴⁶ However, a five-year follow-up survey at the same institution found a consistent overall rate of tattooing but no difference between athletes and non-athletes.⁴⁷ A study of 997 black and Hispanic US high school athletes found only 9% were tattooed.⁴⁸

Do these data suggest that the upping-the-ante model is wrong? Not necessarily. Perhaps the elite athletes do not need additional means to signal their fitness. Maybe it is the people who don't necessarily have other culturally relevant, systematic ways of drawing attention to their fitness that are more likely to get tattooed. In other words, what about the fans of these athletes? We suggest that fans may use themselves as human can-

⁴⁵ Eric Bain-Selbo, "From Lost Cause to Third-and-Long: College Football and the Civil Religion of the South," *Journal of Southern Religion* 11 (2009); Sarah Marx Quintanar et al., "You are Close to Your Rival and Everybody Hates A Winner: A Study of Rivalry in College Football," *Economic Inquiry* 53, no. 4 (2015), 1908–1918.

⁴⁶ Lester B. Mayers et al., "Prevalence of Body Art (Body Piercing and Tattooing) in University Undergraduates and Incidence of Medical Complications" Elsevier, (2002).

⁴⁷ Lester B. Mayers and Sheila H. Chiffriker, "Body Art (Body Piercing and Tattooing) among Undergraduate University Students: "Then and Now,"" *Journal of Adolescent Health* 42, no. 2 (2, 2008), 201–203. doi:<http://dx.doi.org/10.1016/j.jadohealth.2007.09.014>.

⁴⁸ Laura J. Benjamins et al., "Body Art among Minority High School Athletes: Prevalence, Interest and Satisfaction; Parental Knowledge and Consent," *Journal of Adolescent Health* 39, no. 6 (12, 2006), 933–935. doi:<http://dx.doi.org/10.1016/j.jadohealth.2006.06.012>.

vases to advertise their team loyalty, as well as means to suggest their own biological quality.

The zeal of fans for college football in the Southeastern region is nearly legendary. Religious studies scholar Eric Bain-Selbo describes college football as the “civil religion” of the US South. The extreme rivalry among college football fans is based as much on the region’s preoccupation with martial valor and honor as with the many years of football excellence in and around the Southeastern.⁴⁹ These rivalries are based around “games,” but games that are taken very seriously and, in many ways, are reflections of the culture in which they are embedded.⁵⁰ Andreas De Block and Siegfried Dewitte argue that sports are culturally evolved signaling systems that can be compared to courtship rituals in other animals.⁵¹ Perhaps uniquely, this cultural signaling extends beyond the players to the fans. This is not unique to US football—from the stadium cultures of the Greeks and Romans to those of the Mayans and other natives of the Americas, many communities have been built around ball courts, where associated cultural rites of intensification mirrored the “tailgating” observed around US football stadiums.⁵² In Tuscaloosa, Alabama, the stadium seats over 101,000 people and is built in the heart of the University of Alabama campus and the city of Tuscaloosa. During home game weekends in the fall, the population in Tuscaloosa swells well beyond the number of seats in the stadium, as fans descend en masse to participate in the football culture.

Furthermore, while fans have little to no influence on the outcome of a game, there is a surrogate winner/loser effect when one’s team wins or loses games, which is likely widely experienced with respect to college football in places like Alabama.⁵³ When one wins a contest of some sort,

⁴⁹Bain-Selbo, *From Lost Cause to Third-and-Long: College Football and the Civil Religion of the South*. Over the past ten years, nine teams from the southeastern USA have won national championships and five players have received Heisman Trophies for best overall college football player of the year.

⁵⁰Christopher Thomas Gaffney, *Temples of the Earthbound Gods* (Austin: University of Texas Press, 2008).

⁵¹Andreas De Block and Siegfried Dewitte, “Darwinism and the Cultural Evolution of Sports,” *Perspectives in Biology and Medicine* 52, no. 1 (2009), 1–16.

⁵²Eliot Dismore Chapple and Carleton S. Coon, *Principles of Anthropology* (New York: Holt, 1942); Allen Guttman, *From Ritual to Record: The Nature of Modern Sports* (Columbia University Press, 2004).

⁵³Lee Alan Dugatkin, “Winner and Loser Effects and the Structure of Dominance Hierarchies,” *Behavioral Ecology* 8, no. 6 (November 01, 1997), 583–587. doi:10.1093/beheco/8.6.583.

that person's testosterone goes up and makes her or him more likely to win again in a subsequent contest. This positive feedback system is called the "winner effect." The opposite is true if one loses—testosterone levels drop and increases the probability of another loss. In an unpublished 2009 study by Johnna Dominguez at the University of Alabama, fans' depression and well-being scores seemed to track with the success of the football team. The study was ultimately shelved and remains unpublished because, with each of three unexpected losses during the fall football season, participant response rates dropped precipitously. It is typical for subjects to tire of longitudinal studies, but, anecdotally, fans also described the losses as painful and the study an unpleasant reminder

Therefore, it is no surprise to see fans permanently marked with their football allegiances. A Google Images search using the terms "Alabama tattoos" elicits 62 different images of tattoos depicting the outline of the state of Alabama or icons affiliated with the University of Alabama or Auburn University, the universities with the largest (and, really, only) in-state football rivalry. Google Images further suggests permutations of this search, including "Auburn tattoos" and "State of Alabama tattoos," which produce dozens if not hundreds more (there are many repeats, duplicate images on multiple people, and reposts of tattoos in various stages of completion, so a systematic count was not made beyond the first search). Many online comments mock these people as overzealousness and insinuate a low-browness with football that has, not ironically, also been historically associated with tattooing. But there is no accurate stereotype for who these people are. When we posted a query to Facebook asking for our friends to send us photos of any Alabama tattoos they might have, numerous "academic" friends came out of the woodwork to share their Alabama tattoos. State or university pride extends from fraternity and sorority members to 30-something skateboarders observed at the local skatepark with "Birmingham" and "Roll Tide" tattoos alongside "Skate or die."

Football fans in the Southeast USA also very definitely up the ante with their tattoos. Every year, news outlets highlight ink that takes this rivalry to extremes, including getting rival team tattoos when losing bets over games or getting full back pieces dedicated to their favorite team. Among the top Google Images hits for "Alabama tattoos" is a back piece depicting the famous Paul "Bear" Bryant; a person with the iconic "Sons of Anarchy" picture but that says "Sons of Saban" (referring to current Alabama football coach Nick Saban) instead; and an Alabama "sleeve,"

or tattoo covering the length of an arm, featuring the state bird and state flower, the marquee from the Alabama Theater in Birmingham, the water tower from the historic Sloss Furnaces, a postcard setting from Alabama beaches at Gulf Shores, the statue of Vulcan that stands over Birmingham, a combo University of Alabama and Auburn University image, and even local celebrity weatherman James Spann.

As pointed out by an Alabama physician for preventative medicine in a *Huffington Post* article about the inoculation study we conducted, it's not recommended that people get numerous tattoos just to show that they're healthy.⁵⁴ It also does not appear tattooing will do anything to aid an unhealthy immune system and could have negative implications for people with autoimmune issues.⁵⁵ But extensive tattooing by fans has a secondary yield beyond conveying rabid fandom, which is, let's face it, relatively normal for football in the Southeast and begs another means of standing out. Extensive fan tattooing says, "Look at me, I'm really healthy." It may even say, "Consider me as a mate, but only if you're a big Alabama/Auburn/SEC/name-your-team football fan or at least appreciate the fact that I am." Finally, it marks individuals as members of culturally specific groups that, like Native American tribes, set them against other similar groups in competition, ritual, exchange, and other dynamics that require committed membership for power and import.

SUMMARY

In this chapter, we discussed tattooing as a form of symbolic and biological communication. Tattooing can signal group affiliation or commitment through using the body as a human canvas. Tattooing also provides cues about biological quality because it is an injury to the body, and the healing process on the surface of the skin is visible to everyone and impossible to fake. These factors make tattoos costly honest signals, consistent with evolutionary models in multiple species, including humans. We focused on tattooing culture in Southeastern North American. This region is not unique in its historical or contemporary tattooing practices, which is

⁵⁴ http://www.huffingtonpost.com/entry/multiple-tattoos-immune-system_us_56e1a321e4b0860f99d80ce6

⁵⁵ Thy N. Huynh, Jeremy D. Jackson and Robert Thomas Brodell, "Tattoo and Vaccination Sites: Possible Nest for Opportunistic Infections, Tumors, and Dysimmune Reactions," *Clinics in Dermatology* 32, no. 5 (0, 2014), 678–684. doi:<http://dx.doi.org/10.1016/j.clindermatol.2014.04.016>.

precisely what makes it an exemplar for our argument. Humans did not evolve in the North American Southeast or even in North America, but universal patterns of humanness should be evident everywhere humans live in cultural groups. And, indeed, as with indigenous cultures around the world and throughout history, North American natives practiced tattooing widely and for a variety of reasons, including advertising tribe, tribal status, and quality, among other things.

Tattooing is, in recent history, generally associated with countercultural fringe groups, whereas the US Southeast is largely characterized for its conservatism, especially among white Southerners. Despite this, tattooing is seemingly as widespread in this region as in any other part of the USA or world, and tattooing appears to cross all demographic boundaries. Tattooing in the contemporary USA is generally considered more individualistic than it was among tribal native peoples.⁵⁶ However, tattoos that mark affiliation with football, college, fraternities and sororities, the military, religion, and other traditionally conservative organizations defy simple stereotyping and suggest a synergy of individual or personal expression and an evolved tendency to exhibit prosocial behavior.

Despite the many studies of tattooing from a proximal, cultural perspective and examinations of the risks of permanently marking the skin, very little research has been conducted on tattooing as emblems of evolved patterns of behavior we all gravitate toward. But one of the exciting aspects of tattoo behavior is that it is so common it can be easily studied by anyone without recourse to labs, microscopes, or other stereotypical and costly trappings of science. There are several questions we encourage others to help us explore: How long do different sizes of tattoos take to heal on different parts of the body, and does it make a difference if you're a male or female? What are the odds of getting a more individualistic tattoo when you're younger versus when you're older and already have children or are past your reproductive prime? Who finds tattoos attractive, what locations of tattoos are most attractive, and what kinds of symbols are attractive? There are many more questions that have yet to be asked on this subject, but we will close with just one more: Does it make a difference if a potential mate wears an Alabama/Auburn/LSU/Florida Gators/fill-in-the-blank tattoo that covers his or her (but usually his) entire back?

⁵⁶Schwarz, *Native American Tattoos: Identity and Spirituality in Contemporary America*, 223–254.