Forum

The Emperor's Codpiece: A Post-Modern Perspective on Biological Asymmetries

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Once again, an isolated culture has provided scientists with a living laboratory. The remote kingdom of Glücklichtal, nestled high in the European Alps, is proving a boon to anthropologists and sociologists, and may be the envy of the world. According to a preliminary report filed by a multidisciplinary team from Harvard, jointly funded by the National Institute of Mental Health and the Anthropology Directorate of the National Science Foundation, the people of Glücklichtal sustain an extraordinarily high level of mental and emotional health. The team, led by Dr. B. I. Latteral, is unravelling the source of this well-being.

"What the Abkhazia region in the Caucasus is to studies of aging, and the Pacific island of Guam is to neurological disease, Glücklichtal could become to mental health" asserts Latteral. "Our findings might just possibly alter the course of human civilization." The report relates how two humble tailors stumbled upon the relationship between symmetry and well being, and then convinced the Emperor of Glücklichtal to mount a pioneering National Health and Education Plan (NHEP).

Sociologists first became aware of Glücklichtal when they followed up oral reports from itinerant tradesmen, travelling musicians, and restless emigrant youths displaying lip-thorns, nose-rings, and ear studs arrayed in precise symmetrical patterns. "This curious display of jewelry was the first clue to the surprising relationship between symmetry and well-being" reported Latteral. "Eventually, we traced the original discovery to two tailors, Andy and Randy Traumweber, known throughout Glücklichtal for their expert tailoring and loyalty to the Emperor."

The Traumweber brothers originally suspected the link between symmetry and well-being when the conductor of Glücklichtal's small symphony consulted them about his tuxedos. For years the maestro had noticed a puzzling correlation: audiences invariably seemed pleased with performances conducted in the Traumweber tuxedo, but dissatisfied when he performed in his imported tuxedo. On closer examination, Andy Traumweber discovered the imported jacket was less precisely made, most particularly in the tails: one was distinctly longer than the other. "Since the tails are the most prominent feature of a tuxedo, the Traumweber brothers surmised that tail asymmetry somehow signalled the maestro was not as well-suited to his task" says Latteral.

Intrigued by the tuxedo observation, the Traumweber brothers reviewed their meticulous records for additional evidence and discovered some customers were much more asymmetrical than others. More importantly, asymmetry seemed closely tied to well being: the greater the asymmetry, the less healthy, happy, and

successful the customer seemed to be. The tailors therefore suspected a universal principle: minor deviations from symmetry could unwittingly doom humans to physical, mental, and social mediocrity, if not misery.

Encouraged by these preliminary findings, the Traumweber brothers expanded their horizons with a casual search through the scientific literature. "We were astonished by their results" admits Latteral. "The tailors uncovered many correlations with subtle or fluctuating asymmetries that appear significant to human well-being". Some of the more intriguing ones include:

Symmetry and health

- An extensive literature review concluded that subtle deviation from symmetry "is an important marker of human health . . . where the sciences of evolutionary biology, developmental biology and medicine [are combined into an] . . . integrative framework [that] provides a significant addition to the growing field of Darwinian medicine" (Thornhill & Moller 1997) (this result prompted doctors in Glücklichtal to use calipers as a routine part of health assessment).

Symmetry and IQ

- More asymmetrical people had significantly lower IQ (Furlow et al. 1997), which led one scientist to note that therefore 17 to 50 per cent of the variation in IQ could now be attributed to the underlying causes of fluctuating asymmetry (Blinkhorn 1997).

Symmetry and attractiveness

- "The figure with . . . symmetrical breasts was judged to be most attractive and youngest of all other figures. It appears that men use . . . breast asymmetry in judging attractiveness and being willing to develop romantic relationships" (Singh 1995).

- Humans evolved the ability to discriminate subtle differences in the symmetry of potential mates to ensure the choice of a healthy one: "Human physical attractiveness and judgements about human physical attractiveness evolved in the context of parasite-driven selection [such] that both adults and children have a species-typical adaptation to the problem of identifying and favoring healthy [symmetrical] individuals and avoiding parasite-susceptible [asymmetrical] individuals" (Thornhill & Gangestad 1993).

- Symmetry could even be detected indirectly: "Normally cycling (non-pill using) women near the peak fertility of their [menstrual] cycle tended to prefer the scent of [tee-]shirts worn by symmetrical men" (Gangestad & Thornhill 1998).

Symmetry and sexual satisfaction

- "Women with partners possessing low fluctuating asymmetry . . . reported significantly more copulatory female orgasms than were reported by women with partners possessing high fluctuating asymmetry" (Thornhill et al. 1995).

Symmetry and physical prowess

- "For human females, there is a positive correlation between body weight and [fluctuating asymmetry] in adults" (Manning 1995), which in part accounts for the attractiveness of slender female body forms

in Western culture. Rather unexpectedly the pattern was reversed for males, but this was readily explained since "male body weight is condition dependent in that it is only individuals with the best genes who are able to develop and maintain large size".

- "Symmetric subjects had higher rankings for athletic ability (nostrils, $p < 0.001$ and ears, $p < 0.001$), lower best 800 metre times (nostrils, $p < 0.05$ and ears, $p < 0.01$) and lower best 1500 metre times (3rd digit, $p < 0.01$ and ears, $p < 0.05$) than asymmetric subjects" (Manning & Pickup 1998).

Symmetry and genetic fitness

- In human females, "breast fluctuating asymmetry is a reliable predictor of age independent fecundity" (Møller et al. 1995).

Symmetry and ovulation

- Asymmetry of soft tissue in women varies over the menstrual cycle, which may explain a lot of the variation in male ardor. "[Asymmetry] is highest at the beginning and end of the cycle, when women are generally infertile, and low in mid cycle, when fertility is highest" (Manning et al. 1996). Also, "symmetry in four paired soft tissue traits [size of the left and right ears, 3rd, 4th and 5th digits] showed a marked increase on the day of ovulation" (Scutt & Manning 1996). "Temporal changes in [cyclical asymmetry] could therefore be used by males to indicate a female's position in the [menstrual] cycle" (Manning et al. 1996).

Emboldened by these findings the Traumweber brothers approached the Emperor with a visionary health plan for Glücklichtal. They proposed to improve mental and emotional health by enhancing symmetry. Cleverly designed underwear and outerwear could create the illusion of symmetry in otherwise asymmetrical people. Similarly, make-up artists, hair stylists, and jewelers could rectify mismatches between sides of the body. Physical therapists and masseurs could contribute by stimulating muscle development in offending weaker, smaller muscles. Such adjustment mechanisms formed the core of the NHEP.

Latteral's team carefully documents the negotiations leading to the launch of the NHEP. Initially the tailors had difficulty selling the plan since the Emperor felt some of the reports seemed almost too good to be true. "Understandably, he also doubted that subtle deviations from symmetry could correlate so predictably with so many disparate phenomena" says Latteral.

But the tailors easily addressed the Emperor's concerns with compelling statistical and theoretical arguments:

- Meta-analyses consistently revealed significant overall correlations between subtle asymmetry and attractiveness, or between subtle asymmetry and fitness, for many organisms including humans (Leung & Forbes 1996; Møller 1997; Møller & Thornhill 1998). In addition, these correlations became more pronounced as sample sizes declined (Palmer 1999), thus confirming they were robust even when based on limited data.

- A theoretical analysis established the maximum potential correlation between attractiveness and subtle asymmetry in a particular trait (Gangestad & Thornhill 1999), thereby demonstrating decisively that 71 of the 140 tabulated correlations in one meta-

analysis (Møller & Thornhill 1998) exceeded the theoretical maximum. Clearly, the predictive power of subtle asymmetries far exceeded what the original authors had surmised.

- Although some scientists observed that subtle asymmetry in one morphological trait almost never correlated significantly with subtle asymmetry in another trait on the same individual, a major review nevertheless concludes that subtle asymmetries are reliably correlated with many measures of individual fitness, attractiveness or quality and are therefore of predictive value (Møller & Swaddle 1997).

- Dozens of researchers had explained how subtle asymmetries were extremely valuable for non-verbal communication because they were absolutely honest signals of fitness and well-being (Møller & Swaddle 1997). In other words, in the natural world, subtle departures from symmetry were so irrevocably tied to developmental noise — a relentless, inexorable, and universal process affecting all living things — that the level of subtle asymmetry simply could not be manipulated.

- Because humans are a product of the same evolutionary forces as other organisms, their nervous systems are likely hard-wired to interpret deviations from symmetry as honest signals of quality (Thornhill & Gangestad 1993) just like other animals are, which explained the original tuxedo affair.

Faced with such overwhelming scientific evidence, the Emperor agreed that subtle asymmetries were tightly coupled to perceptions of attractiveness and well-being. Yet, unwilling to implement a costly social program based on limited and possibly biased information from a single source, he commissioned the Glücklichtal Academy of Sciences to conduct a Symmetry Survey within the kingdom and beyond.

Latteral's team is still analyzing the results of this survey, which yielded a bewildering variety of asymmetries in other organisms, such as:

- Extinct Miocene beavers built spiral burrows, but dextral and sinistral spirals were about equally common (Martin & Bennett 1977), and Recent mud shrimp do the same (Dworschak & Rodrigues 1997).

- Goats exhibit a curious tendency to start grazing on the right side in experimental studies of forage preference (Elston et al. 1996).

- Some hens prefer to cock their head to the left side to check for avian predators after hearing a recorded rooster alarm call, whereas others prefer to cock their head to the right (Evans et al. 1993).

- Toads consistently evert their entire stomach from the right side of their mouth when vomiting (Naitoh & Wassersug 1996), and tree frogs tend to jump to the left when startled because of slightly longer right legs (Dill 1977).

- Individual constricting snakes prefer to use the same side of their body when subduing prey (Heinrich & Klassen 1985).

- Corkwing wrasses, a small marine fish, have a significantly higher incidence of copepod parasites in the left side of their lateral line system (Donnelly & Reynolds 1994).

- Male phallostethid fishes possess stunningly hypertrophied clasping structures to hold females during spawning; in some species they occur on either the right or left side, whereas in other species they are always on the same side (Parenti 1986).

- Dextrally coiled land snails can not mate properly with sinistral ones if their shells are flat-shaped, but coiling direction poses no problem for interchiral mating in tall-shelled species because of their different copulatory stance (Asami et al. 1998).

- Although honey bees detect smells symmetrically (Galizia et al. 1998), some bees within a hive prefer to waggle dance clockwise, while others prefer counterclockwise (Fergusson-Kolmes et al. 1992).

- Male spiders insert their pedipalps asymmetrically into the female when mating (Huber & Eberhard 1997).

- Palm trees in the northern hemisphere spiral to the left more commonly in the northern hemisphere but to the right more commonly in the southern hemisphere (Davis 1974), and this discrepancy increases with increasing latitude (Davis & Davis 1987).

The Latteral team is also assessing the significance of many other peculiar human asymmetries uncovered by the Glücklichtal Symmetry Survey:

- Human testicles are asymmetrical — the right is larger than the left — but the left tends to hang lower, as typically portrayed in antique sculptures (McManus 1976).

- Left-handers have shorter life spans than right-handers (Coren 1994).

- Fungal infections are more prevalent on the left hand, perhaps because left hands are sweatier (Bender et al. 1988).

- "More gay men demonstrated leftward asymmetry [in fingertip ridges] than did non-gay men" (Hall & Kimura 1994).

- "Musical talent was related to left-handedness and to anomalous [hemispheric] dominance; immune vulnerability was found in female musicians, and in subjects with reversed dominance for language functions as well as in male left-handers, independently of musical talent" (Hassler & Gupta 1993).

- Chiropractors reported that "the functional short leg is confirmed as a stable clinical reality" and implored their colleagues to adjust their treatments accordingly (Jansen & Cooperstein 1998).

- Humans could preferentially enhance either the rational or the emotional side of their brain by breathing through only the right or left nostril (Shannahoff-Khalsa et al. 1991); another scientist suggested a similar effect could be achieved by beaming light in one ear (Jones 1998).

- Mucociliary transport rates often differ between the right and left nostrils, particularly in individuals with impaired breathing (Nuutinen 1996).

- The left ear "might be a finer sensor [and] more sensitive to noise" (Job et al. 1998), and "a left-ear advantage was found in the recognition of true statements" (Fabbro et al. 1993).

- "An increased incidence of minor physical anomalies and fluctuating asymmetries [were observed] in both left-handers and extreme right-handers", suggesting that extreme

right-handedness may also be "associated with reduced fitness, neurodevelopmental disorders, and reduced neuroanatomical asymmetry" (Yeo & Gangestad 1993).

"When considering these diverse, complex patterns, it is essential to distinguish subtle asymmetries from conspicuous or predictable asymmetries" says Latteral. "Subtle asymmetries (e.g., fluctuating asymmetries) are typically small, random departures from perfect symmetry that reveal instability in development, whereas conspicuous or predictable asymmetries (e.g., directional asymmetry or antisymmetry) reflect genetically determined departures from symmetry that are presumably adaptive." Therefore, in the examples above, conspicuous or predictable asymmetries do not signal reduced fitness like subtle or fluctuating asymmetries are thought to do.

Finally convinced, the Emperor approved the NHEP for enhanced well-being through enhanced symmetry.

In documenting implementation of the NHEP to promote symmetry, however, Latteral notes that the first intervention was rumored to have promoted asymmetry. According to a palace informer, the Emperor was particularly anxious about his imperial private parts, which he felt were so asymmetrical that they deviated too far from the norm. Fortunately, the Traumweber brothers were able to allay his fears with a profound revelation: in certain very special cases, increased expression of a predictable asymmetry actually signals increased fitness, and one of those cases is testicles (Møller 1994), at least if men are like birds. That's why they subsequently fashioned the Emperor's codpiece to enhance his already conspicuous asymmetry, and thereby assure his subjects he was indeed most intelligent and fit for his job.

EDITOR'S NOTE: Until the Harvard team releases its final report, more detailed information about the asymmetry studies reported above, and others, can be found at:

http://www.biology.ualberta.ca/palmer.hp/asym/Curiosities/Curiosities.htm

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