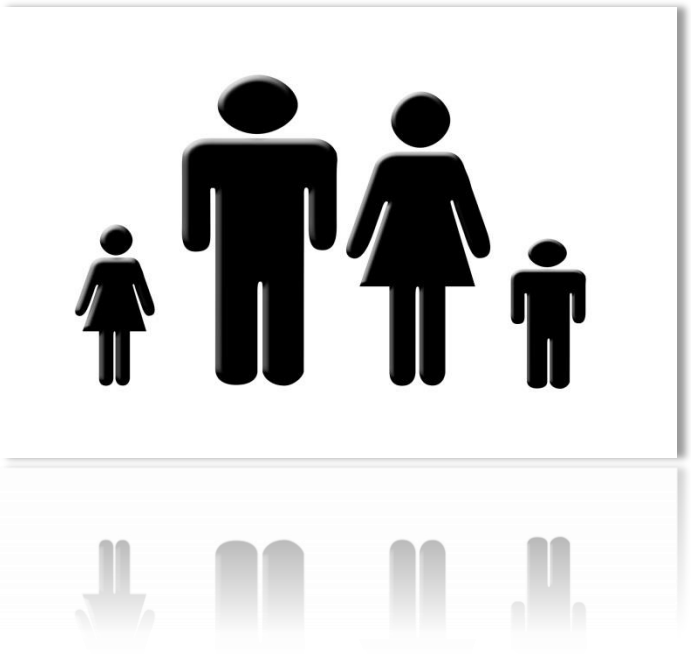


INTRODUCTION TO MAMMALIAN AND HUMAN DIMORPHISM: A BIOLOGICAL APPROACH TO UNDERSTANDING TRUE MASCULINITY AND FEMININITY

Alaric Naudé

ABSTRACT

Sexual dimorphism is highly observable throughout the animal kingdom; however, it is especially emphasized in mammalian physiology and biomechanics. Sexual dimorphism is a highly advantageous strategy that allows for specialization and increases the efficiency of the family unit in their attempts at survival. Several sexually dimorphic features in Homo Sapiens are discussed, spanning from innate ability to the biomechanical features that limit behavioral expression and form stable sociobiological hierarchies that are mutually beneficial to individual survival as well as that of offspring. This paper discusses how following the biological parameters of biology allows for happier individuals, both male and female, who are more supportive of their mates and better at rearing socially and emotionally stable children.

Key words: female, male, reproduction, sexual dimorphism, sociobiology

INTRODUCTION

Why are men and women often found in different roles and in different occupations? Why is it that men dominate in occupations where physical power are necessary as well as the competitive high end of business? Is this a result of a patriarchal system that has designated men and women to certain roles? While some cultures have historically had systems that favour one sex/gender over the other, it can be argued that a majority of social roles arise, not from social constructs, but from biology. Numerous species inhabit this planet. One group of animals is of special interest, the mammals. This group contains the most intelligent, complex and successful species that have ever walked our planet. When considering mammals as a group, it is easily observable that most mammals are sexually dimorphic with sex differences among highly social species being more pronounced.

Social mammals are designed to live within a particular hierarchy that allows each member of the group to fulfill his or her role in assisting the group in surviving. Sexual dimorphism names the physical differences between the two sexes that extend beyond the sex organs. In humans this means that the family unit is organized in a hierarchy of roles and tasks that optimize the unique skills of men and women which produces higher survival rates of children. The general rule for social mammals is that males tend to be larger and more powerful due to the reliance of many species on the males as the primary defense against predators, members of the same species, as well as in settling territorial disputes, a feature that can also be observed in humans. Sexual dimorphism is a key to survival as it creates a single familial or kinship-based unit that draws on the strengths or skills of each member of the group in order to secure the existence of the group as a whole. Sexual dimorphism in mammals acts to create a more efficient system for obtaining food, rearing young and maintaining healthy relationships with other members of the group.

Far from being a social construct, the core behavioral patterns of either gender depend on sex and are encoded in the deoxyribonucleic acid along with the biological features of the gender. Sex and gender should logically be viewed as synonyms with ample biological evidence across the plethora of mammalian species justifying doing so. The attempt to separate sex and gender into two unrelated fields is therefore not only erroneous and pseudoscientific but potentially dangerous to the physical safety of family members as well as the stability of the family unit.

Highly stable family units produce offspring that are more emotionally sound and have higher levels of happiness. Male and female familial roles in humans ensure the long-term mental health and wellbeing of children as they form a counterbalance to negative qualities that may be more pronounced

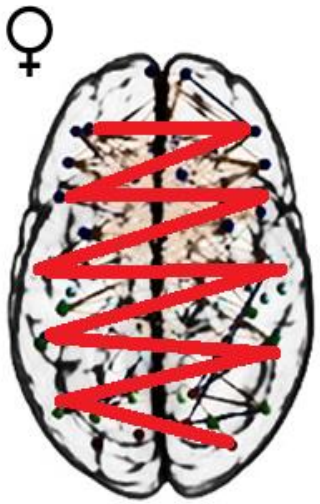
in one sex, as both sexes tend to have strengths and weaknesses in relation to biology as well as behavioral patterns. Throughout nature, truly powerful and successful familial unit depends on the biological parameters of the species. African Buffalo (Syncerus Caffer) and African Elephants (Loxodonta Africana) usually live in groups comprised mostly of females along with some young bulls, with bulls eventually moving to form bachelor herds as they mature (Sinclair). In gorillas, a powerful Silverback male will have several females and young in a troop while other males will be tolerated if they remain submissive. Gorillas show a striking degree of sexual dimorphism with the male being the primary protector against predators such as leopards, maintaining the social order of the group by intervening in disagreements (fights), and while female gorillas take the role of primary caregiver to the young, the Silverback male is important in the process of socializing his offspring and often spends time playing with his young (Robbins).

Humans have yet another more simplified group structure with the most stable groups consisting of a single female and single male and their offspring which may or may not be joined to a larger extended family unit. From this biological axiom, heterosexual family units have been shown to be superior to all other artificial structures in providing emotionally stable environments for children (Schumm). Social roles of males and females therefore extend from the biological constraints as per the design of the anatomical features of each sex. Understanding the differences and constraints of the two genders can therefore be of assistance to the individual in ascertaining their own physical, emotional and relationship roles within the familial unit as well as comprehending the limitations and strengths of their mate. Consider just some of the biological differences.

THE HUMAN BRAIN

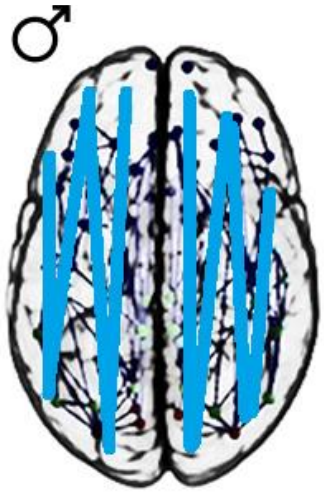
Males and females have brains of different sizes due to the differences in the size of the cranium. Males have an average brain mass of 1,370 grams and females have the average brain mass of 1,200 grams. While brain mass is an important factor in computational power and cognitive power (i.e. Intelligence Quotient) it cannot be said that females are less intelligent than males due to the unique neural structure in females that provides a type of compact model of the brain. It has been found that in females there was "…relative to cerebrum size, greater cortical grey matter volume, larger volumes of regions associated with language functions (e.g. Broca's area) (...) and white matter involved in interhemispheric connectivity. The number of neurons per unit volume, in the planum temporal, was also greater in women than men" (Goldstein 2001, 490-497). This difference in brain structure leads to differences in basic behaviours which depend on or are influenced by biological constraints which determine social roles.

Figure 1. Illustration showing the stronger interhemispheric connection in the female brain.



The Corpus Callosum which is responsible for interhemispheric connection of the brain has been found to be 25% larger in females which is one reason that females have in general, a greater skill in general linguistic acquisition. Feminine thinking habits extend in a web formation with strong interhemispheric communication. Females have a tendency to be interested in people and this is reflected in more of the frontal lobe which is associated with emotions being active in women. Linguistic aptitude is an important requisite for the formation of relationships; hence women are found at higher percentages in fields such as education and healthcare where there is a strong need for interpersonal communication. This is illustrated by the 2003 Women's Board report showing that 92.1% of registered nurses in the United States were female (United States Department of Labor, 2003). It can be inferred that this underlying instinct may create an unconscious bias in women that is favorable to employment requiring social interaction. This predisposition in females toward social interaction is derived from the necessity to build kinship thus expanding the accessible social unit and ensure offspring survive. Females therefore display a pluralistic thinking pattern that formulates in accord with potential needs that may arise in the process of child rearing, a trigger for being more sensitive and emotional in response to stimuli which could be of potential benefit or harm to their offspring.

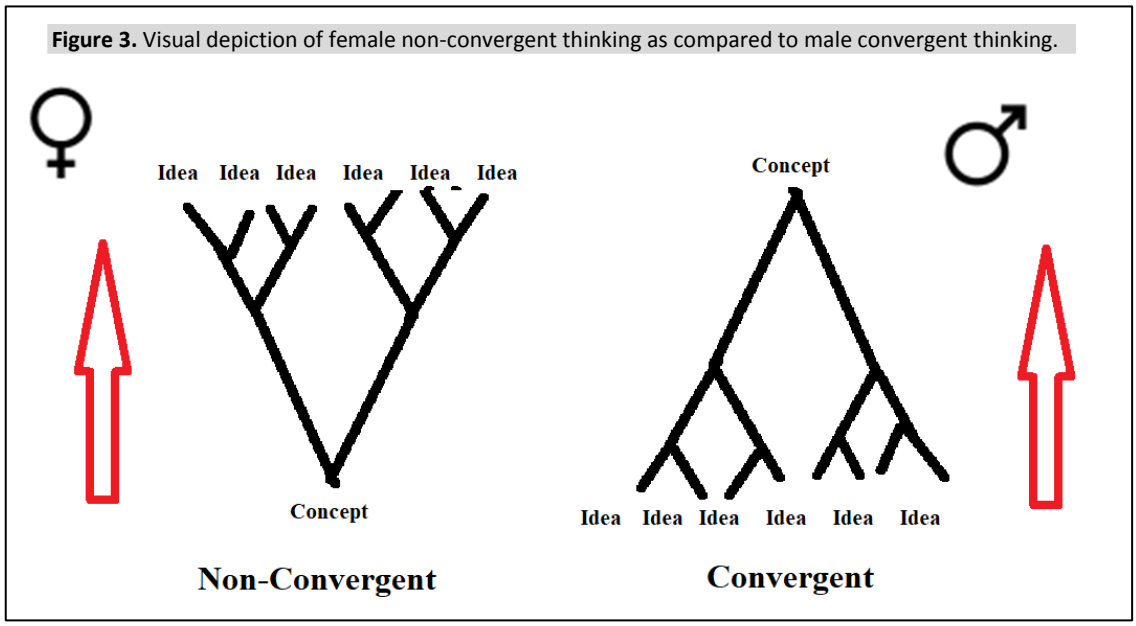
Figure 2. Illustration showing greater connection within the same hemispheres of the male brain.



In males, there is significantly stronger connection in the brain within the same hemispheres. Whereas females have a webbed thinking pattern, males have a linear pattern. In humans, a primary role of males is threat detection and protection as can be noted from the larger amygdala. The male brain has a tendency towards being logic driven, an essential protocol, as an overly emotional male brain is likely to regulate poorly the initial threat reflex triggered by the amygdala as the orbitofrontal cortex plays an important part in buffering this reaction (Öhman). Neuropsychiatric studies have found that frontal lobe dysfunction can lead to aggressive dysfunction and violent behavior while deficits in frontal executive function result in difficulties in controlling aggressive behavior (Brower & Price). It can be inferred that some of what can be termed as aloofness or disinterest in males is actually a buffer to promote emotional and mental stability in males.

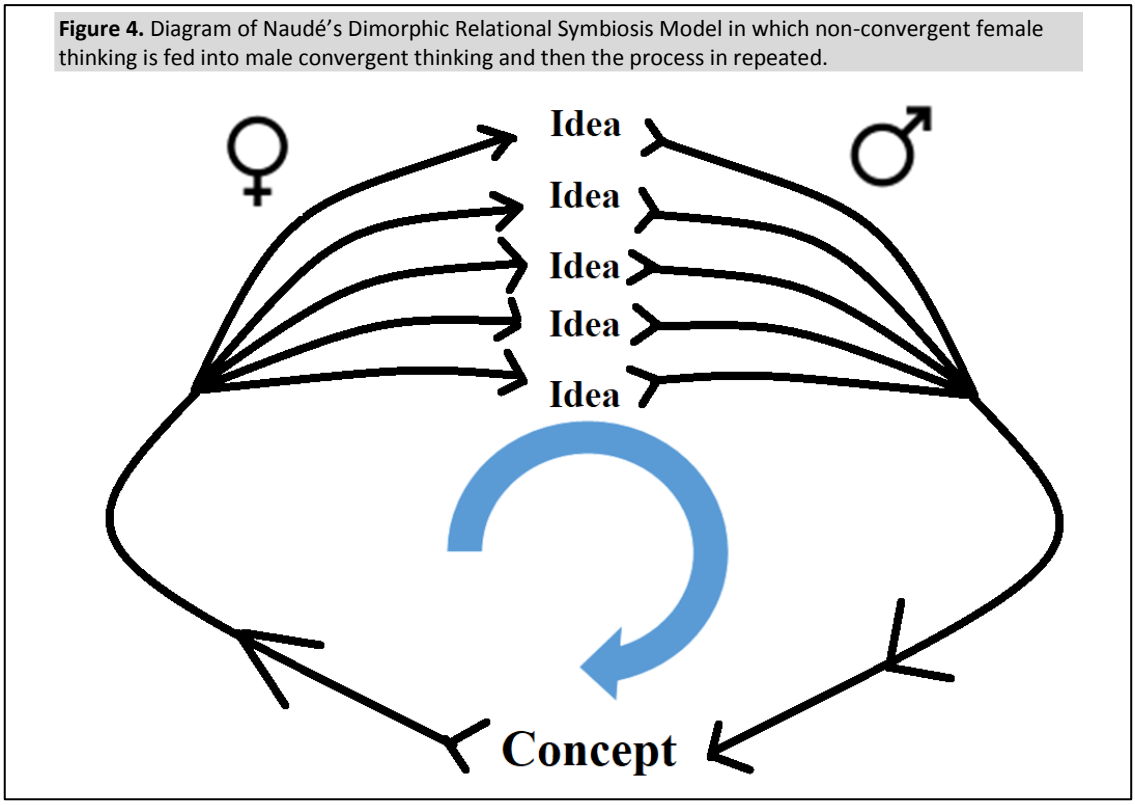
Males display a linear thinking pattern which enables them to focus on a single target and eliminate potential threats. The problem-solving mentality arising from the linear thinking causes males to become less interested in social interaction (compared to females) and more interesting in things or abstract potentials especially in relation to the survival of the familial unit. It also (in balanced males) makes them less emotional than females and more prone to blanking or ignoring extemporaneous stimuli. Defining the general thinking pattern of both genders/sexes allows for a clearer understanding of how to harness those differences for the greater good of the family. Female thinking patterns can be described as non-convergent: A single concept gives rise to multiple ideas. Male thinking patterns can be described as convergent: A multiple ideas gives rise to a single concept.

Figure 3. Visual depiction of female non-convergent thinking as compared to male convergent thinking.



The male and female cognitive and behavioral predispositions provide a useful counterbalance for offspring and produce stability within the familial unit. The image above illustrates the linear and convergent thinking of males compared to the expanding and web like thinking of females. In a social application, the male and female are not merely individuals but also complimentary halves of a binary whole (when not including children). The image below also displays thinking patterns which at first appear to be counterproductive or in distinct opposition. However, such a conclusion would be erroneous. Consider the way that this difference in thinking pattern can be used to compliment both male and female thinking styles; for names sake, the following model below will be referred to as "Naudé's Dimorphic Relational Symbiosis Model".

Figure 4. Diagram of Naudé's Dimorphic Relational Symbiosis Model in which non-convergent female thinking is fed into male convergent thinking and then the process in repeated.



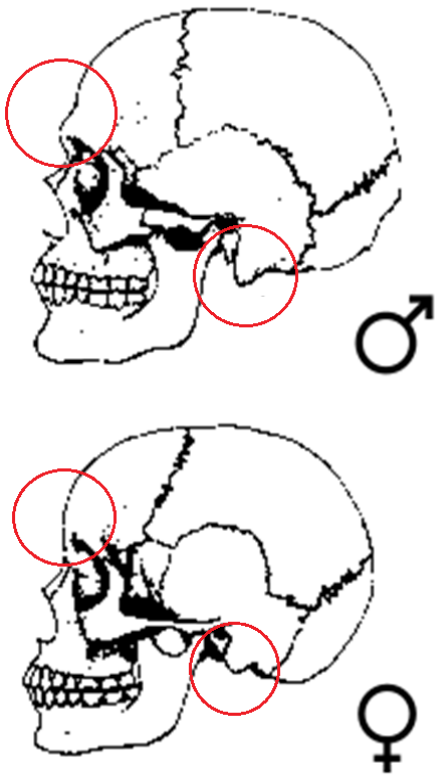
In "Naudé's Dimorphic Relational Symbiosis Model" the female non-convergent thinking is funneled into the male convergent thinking which is fed back into the non-convergent thinking in a continuous cycle. Through positive interaction, both mates provide a perspective that their mate may not readily observe. This positive interaction creates a positive environment wherein issues can be resolved and friction is minimized, leading to a stable unit and an environment that allows children to flourish. The brain is however not an isolated area of sexual dimorphism rather, this dimorphism extends to the physiological level.

THE SKELETAL SYSTEM

Built for defense and speed, the male skeletal system is elongated with narrower hips. Females have been shown to have a greater anterior pelvis tilt leading to more pressure on the lower spine (Cho et al). The wider female hips are necessary to facilitate childbirth; however, this also results in the biomechanics of the legs being impacted upon. The Q-Angle is the name given to describe the angle of the femur in relation to the hip socket and knee. Males have a Q-Angle of 13° and females 18°, a difference arising from the wider pelvis and need to maintain the general center of gravity during normal movement. In comparisons of male and female weight bearing athletes, it was found that females had a 13.2% greater shear force applied to the anterior of the tibia, a clear advantage for males (Nunley). The biomechanics of the Q-Angle illustrates the need for segregation in all fields of sport but especially

where the athletes are required to bear weight or land with force as well as fields where muscle mass provide advantages such as athletics, cycling and so forth. This scientific axiom trumps any attempt to argue that gender can in any way be changed.

Figure 5. Upper male skull shows raised bone at the brows and larger mastoid processes for cooling and gas exchange. Lower female skull shows rounded bone and smaller mastoid processes.



The mandible of males and females also differ significantly. The male mandible is thicker with on average larger teeth and follows straight angles resulting in a square appearance. Females have a greater indent in the mandibular ramus flexure and generally rounded bones leading to an oval or *v* shape frontal jaw line thereby giving a delicate or refined appearance (Loth & Henneberg).

When considering the rest of the skull, males have square eye sockets and the bone is raised at the brow (extra protection for the eye). Females have a smoother structure and no (or very little although this varies as per race) raised bone at the brow with rounder eye sockets ending with a sharper edge and the extra bone is absent due to the low need for physical combat. Geometric morphometric studies have demonstrated that women identify masculinity and strength of a male by the shape and prominence of the jawbone and the general attractiveness of a male by height as well as length of the jaw (Windhager et al).

The mastoid processes which assist in gas exchange and heat regulation are also larger in males, a logical finding considering the larger surface area and a need to cool the brain during strenuous physical activity (Patnaik).

It should be noted that many of the skeletal differences especially those of the skull only become evident after the onset of puberty, the prefrontal cortex develops at a greater speed in females for the necessity of developing the needed feminine instincts before the onsets of the limitations of the natural fertility window. Males do not have a fertility window and hence have less biological pressure quickly to develop the frontal cortex. The rate of bone growth is equal to the natural growth rate of the body as well as brain growth hence the lack of cranial dimorphic structures before puberty do not affect children's cognitive development.

MUSCULAR SYSTEM AND FAT DISTRIBUTION

Skeletal differences also naturally cause differences in muscle to arise along with fat distribution. The pear-shaped fat deposit pattern that is common to women (Gluteal-femoral adipose tissue) is thought to provide a safe and readily accessible lipid reservoir in females (Karastergiou). These fat deposits serve as a protection against metabolic diseases such as atherosclerosis and type 2 diabetes (Manolopoulos). When comparing individuals of the same body mass index it has been found that women on average have ~10% greater body fat than men and that this is a normal healthy range for females. The lipid reservoirs within the female body means that they are able to carry on physical exercise with greater stamina than men, however, males having greater muscle mass are able to give a far greater output of energy and power within a limited period. The same level of pressure applied to a male knee during exercise for example would cause serious risk of injury for a woman at the same energy output level.

In essence, the overall power of men is significantly higher than that of women. In most forms of sport women are simply unable to compete against men and risk long-term health damage if they do (due to bone, ligament or muscle injury).

CONCLUSION AND RECOMMENDATIONS

Denying the basic biological axioms of dimorphism and the resulting limitations and parameters are not only harmful but blatantly pseudoscientific. As can be clearly seen by the provided evidence, the sexual dimorphism in Homo Sapiens Sapiens guarantees a balanced sociobiological hierarchy that perpetuates the existence of the most basic building block of the species, the family, and therefore the entirety of the species itself. The human social hierarchy as demonstrated by "Naudé's Dimorphic Relational Symbiosis Model" is (and should be for stability and happiness) mutually beneficial, with male and female halves combining to form one whole by performing extended social roles within their respective biological constraints.

The two genders serve as a behavior counter balance to each other and are binaries of a whole. Knowing one's own general instinctive tendency (whether male or female) allows one to harness innate abilities to a fuller extent and to eliminate some of the negative behaviors that arise as a result of differences in biomechanical and physiological design. Yet, ideological assertions that run contrary to the well demonstrated biological parameters run contrary to the design of the species and hence cannot be expected to produce any positive result as they will undermine the stability of sociobiological roles.

This should not be misconstrued as meaning that males and females fit strict social stereotypes

but rather that there are sociobiological limitations as to the roles that an individual of said gender is physically, mentally and emotionally able to undertake. Whether male or female, both mates should understand their limitations and support their mate in areas of weakness while deferring to their mate in areas of strength. Positive communication habits will mean that the familial unit is able to analyze a problem from multiple perspectives to find the most satisfactory solution and avoid friction. Positive and balanced hierarchies in humans therefore lead to overall happiness and familial satisfaction resulting in balanced offspring.

REFERENCES

Brower, Montgomery C., and B. H. Price. Neuropsychiatry of frontal lobe dysfunction in violent and criminal behaviour: a critical review. *Journal of Neurology, Neurosurgery & Psychiatry* 71.6 (2001): 720-726.

Cho, S. H., J. M. Park, and O. Y. Kwon. Gender differences in three-dimensional gait analysis data from 98 healthy Korean adults. *Clinical biomechanics* 19.2 (2004): 145-152.

Goldstein, J. M. et. al. Normal Sexual Dimorphism of the Adult Human Brain Assessed by in Vivo Magnetic Resonance Imaging. *Cerebral Cortex*, 11(6), 2001.

Karastergiou, Kalypso et al. Sex differences in human adipose tissues - the biology of pear shape. *Biology of sex differences* vol. 3,1 13. 31 May. 2012, doi:10.1186/2042-6410-3-13.

Loth, S.R. and Henneberg, M., Mandibular Ramus Flexure: A New Morphologic Indicator of Sexual Dimorphism in the Human Skeleton. American Journal of Physical Anthropology, 99 (3), 1996.

Manolopoulos KN, Karpe F, Frayn KN (2010) Gluteofemoral body fat as a determinant of metabolic health. *Int J Obes* (Lond)34(6):949-59.

Nunley, Ryan M., et al. Gender comparison of patellar tendon tibial shaft angle with weight bearing. *Research in Sports Medicine* 11.3 (2003): 173-185.

Öhman, Arne. The role of the amygdala in human fear: automatic detection of threat. *Psychoneuroendocrinology* 30.10 (2005): 953-958.

Patnaik, V. V. G., and Ajay Phatak. Determination of sex from mastoid process by discriminant function analysis. *Journal of Anatomical Society of India* 59.2 (2010): 222-228.

Robbins MM. (2001) Variation in the social system of mountain gorillas: the male perspective. In: Robbins MM, Sicotte P, Stewart KJ, editors. *Mountain gorillas: three decades of research at Karisoke*. Cambridge (England): Cambridge Univ Pr. pp. 29–58.

Schumm, Walter R. Comparative relationship stability of lesbian mother and heterosexual mother families: A review of evidence. *Marriage & Family Review* 46.8 (2010): 499-509.

Sinclair, A. R. E. (1977) *The African Buffalo*. Chicago, The University of Chicago Press.

United States Department of Labor (2003) - https://www.dol.gov/wb/factsheets/qf-nursing.htm

Windhager, S., Schaefer, K., & Fink, B. (2011). Geometric morphometrics of male facial shape in relation to physical strength and perceived attractiveness, dominance, and masculinity. *American Journal of Human Biology*, *23*(6), 805-814.

Womersley J, Durnin JVGA. (1977) A comparison of the skinfold method with extent of overweight and various weight–height relationships in the assessment of obesity. *Br J Nutr*. 38:271–284. doi: 10.1079/BJN19770088.

AUTHOR PROFILE

Alaric Naudé EdD, PhD is a scholar and Professor of Linguistics at Suwon Science College and Seoul National University of Education in South Korea where he has taught courses for partnership programs with Griffith University (Australia) and the University of Queensland (Australia). His work draws heavily on sociolinguistic, historical and biological axioms in order to produce a functional understanding of social, linguistic and biological phenomena through an integrated approach. His courses cover Clinical English, general English, intercultural communication, translation, debating and public speaking to name a few. He is a member of the Heterodox Academy, Belgium-Netherlands Cognitive Linguistics Association, Global Listening Centre, National Research Foundation of Korea and many others.

Contact details: dr.alaricnaude@outlook.com