

A four-model approach to understanding our evolutionary psychology

Dr James Walter, Emeritus Adjunct Professor at Loyola University Chicago, USA, summarises research in evolutionary psychology focused on the natural selection effects of negative social behaviors that occurred in the Middle and Upper Paleolithic Ages. To this aim, four main factors are considered: natural selection, comparisons with our closest living relative, the chimpanzee, the social behaviors of modern hunter-gatherer societies, and human development during recorded history. With Dr Aasma Khan, Walter also discusses how considering social development could provide insights into our future.

Understanding our psychology from an evolutionary perspective has historically been limited to descriptions of a few behaviors, such as language characteristics, mate preferences, cooperativity, and moral biases. However, recent anthropology studies are extending evolutionary explanations to all of our psychological traits.

Experts generally agree that our psychology evolved in hunter-gatherer societies before the end of the last ice age, in the first cultures with full language abilities. In research studies, this ancient time is represented by current hunter-gatherer societies which exist in isolation. Anthropologist and primatologist Richard Wrangham reports on these societies; they are organized around highly egalitarian values. Enforcement of these values is conducted by three negative social behaviors ('3-neg-behav'): gossip/derision, ostracism, and in some cases, executions. These social behaviors also produced strong natural selection pressures for our character traits. The following four models provide the background and current understanding related to the '3-neg-behav' and their significance in human history.

MODEL 1: EVOLUTION THROUGH NATURAL SELECTION

Species survival, reproduction, and the evolution of new species occurs through the processes of natural selection. Taking the giraffe as an example, among a population of grazing mammals, individuals with longer necks could eat leaves from taller trees which increased their likelihood of survival and reproduction. Thus, the giraffes' longer necks evolved over thousands of generations. Natural selection also encompasses sexual selection, including reproduction, parental investments, competition for mating, and fitness indicators.

Genes are responsible for producing individual characteristics (phenotypes), and adaptations and new species depend on gene changes. Changes in the genes expressed during development, called homeobox genes, result in physical and behavioral changes. Hamilton described 'kin selection' where familial relationships are important (Bourke 2014). This type of selection is responsible for the existence of self-sacrificing and communal species, such as ant colonies.

As introduced above, '3-neg-behav' have been identified for the first *Homo sapiens*

culture with language and represents a new environment for our psychological adaptations. Important background information for '3-neg-behav' is presented in Model 2.

MODEL 2: A COMMON ANCESTOR

Comparing us to the chimpanzee can provide some insight into the evolution of our psychology. We shared a common ancestor with the chimpanzee from approximately seven million years ago. Wrangham compared human and chimpanzee reactive-aggressive behaviors by measuring the number of hits and fights that occurred in their natural settings. Despite the conduct of grooming within the chimpanzee troupe, chimpanzees are approximately 750 times more reactive-aggressive than us. The chimpanzees also lack conscience, expressing neither guilt, shame, or embarrassment after fighting or killing an infant. According to Wrangham, our common ancestor also had the same high levels of aggression as today's chimpanzees. This argument is based on evidence that the ancestor lived in the same tropical forests, and by comparisons to the gorilla and bonobos. For example, despite sharing a common ancestor with the chimpanzees from 1.5 million years ago, bonobos migrated into a different environment that introduced selection for self-domestication, which has reduced their aggression to approximately 375 times that of humans today. Thus, evolutionary psychology has become increasingly interested in explaining how and why aggression reduced so dramatically in our line.

In addition to aggression, our intelligence and personality also differ greatly from



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the chimpanzees. Nikolaas Tinbergen, Karl von Frisch, and Konrad Lorenz were awarded the Nobel Prize in 1973 for explaining the behaviors and characteristics of non-human species including chimpanzees. These animals exhibit a high degree of conformity or stereotyped behavior. It is generally agreed that adult chimpanzees reach an intelligence level of a 4- or 5-year-old human. We can understand their behaviors in terms of simple or complex reflexes, which are genetic in origin and therefore inherited. Simple reflexes are based on emotional attachments, fear, and anger, while complex reflexes require signals and signs. For example, chimpanzees respond to the rising sun (signals) in the morning by arising and starting foraging, a behavior they continue throughout the day. However, they cannot solve simple puzzles that require conceptual thinking. The majority of chimpanzee learning occurs through imitation and trial-and-error. In contrast, symbols related to abstract concepts and reasoning aid us in solving problems and moral thinking. Further, we possess a far greater variety of emotional traits, including happiness, sadness, surprise, etc. Finally, we have a broader range of personality expression in the areas of extroversion, agreeableness, openness, conscientiousness, and neuroticism. The next model explains the role of '3-neg-

behav' in our extensive psychological changes from the chimpanzee.

MODEL 3: THE ROLE OF '3-NEG-BEHAV' FOR OUR PSYCHOLOGICAL EVOLUTION

During the seven-million-year period from our shared ancestor with the chimpanzee and the first identified fossils of *Homo sapiens*, 300,000 years ago, three species stand out. 'Lucy' is a good representative of early hominin with both upright walking and an opposable thumb. *Homo habilis* (2.4 million years ago) and *erectus* (1.9 million years ago) are intermediate species. Wrangham presents evidence for some decreased reactive aggression in these three intermediate species shown by increased cooperativity needed for group activities, such as butchering and cooking shown in the archaeological records, as well as decreased sexual dimorphism shown in the fossil records. However, high reactive aggression by our hominid relatives would have been a major impediment to further development at the start of *Homo sapiens*, 300,000 years ago.

As introduced above, it is now recognized that during the Middle and Upper Paleolithic Ages, between 300,000 and 12,000 years ago, hunter-gatherers living in migratory bands evolved our psychology, including our low levels of

reactive aggression (see a more detailed review of this model by the same researchers in this publication, Walter and Khan). This perspective is based on the study of current hunter-gatherer bands that have existed in isolation since this earlier time and that represent the prior cultures. Anthropologists have described these bands: they have huts, polygamy, advanced tools, and animist thinking; these cultures are the first to have a fully-developed language. Their organization is based on highly egalitarian values, which are enforced by the '3-neg-behav'. These three social processes established a new environment for evolutionary adaptation for our early *Homo sapiens*. Individuals targeted for these types of aggression were usually reactively aggressive in nature (bullies) or were breaking a social norm. The '3-neg-behav' also included coalitional activities within the band. Importantly, targeting individuals resulted in their decreased life expectancy and paternity. It was concluded that the '3-neg-behav' were producing strong natural selection pressures to decrease reactive aggression traits and to increase altruistic traits (groupishness). Wrangham argues that these natural selection processes are the

Values Hierarchical			
The three ages in human history	Hunter-gatherers	Agrarian	Modern
Political	bad	good	bad
Economic	bad	good	middling-bad
Gender	bad	good	bad
Violence (war)	bad	middling-bad	bad
Measure of social development	6	36	200

Figure 1. Morris' measurement of social development and values for the three eras of human history (model 4). Social development is measured on a scale of 0 to 200. Values are presented on a 5-point scale of good, good-middling, middling, middling-bad, and bad.

Self-domestication is associated with decreased reactive aggression. Skeletal changes related to this syndrome include flattened faces and reduced brain size, as well as a decrease in body size. During the Middle and Upper Paleolithic Ages, these skeletal changes were identified in fossil records from our line, indicating self-domestication.

Surprisingly, Wrangham does not extend his arguments to explain other psychological traits such as language, intelligence, emotionality, and personality. However, he does provide evidence that similar selection pressures were occurring for these traits. Thus, it is reasonable to consider much of our psychological abilities as evolving from the same natural selection processes that led to our low level of reactive aggression.

MODEL 4: RECORDED HUMAN HISTORY

In this model, Walter and Khan review Dr Ian Morris' work, who concluded that culture and human history can best be understood by considering the evolution of human psychology before the end of the last glacial period. He argues that our motivations for social development had evolved by this time and are integral to human history. Morris states that, 'Social development is the bundle of technological, subsistence, organizational, and cultural accomplishments through which people feed, clothe, house, and reproduce themselves, and explain the world around them.'

His measurement of social development includes a summation of four factors: 1) energy utilisation (Kcal per day/person), 2) city size (number of people in largest cities), 3) information technology (writing and other technology), and 4) military capabilities (army size). Morris estimates that social development before the end of the last ice age had a value of six, which was determined primarily by how much energy individuals obtained in their food each day. During the second period, the agricultural era, a maximal factor of 36 was reached at the time of the Roman Empire. The modern age started in the year 1850 and is characterized by the increasing use of fossil fuels as well as increases in the other three factors,

which produced large increases in social development amounting to 200 for Tokyo in the year 2000. According to Morris, increasing social development is difficult to obtain for any culture and lower values can occur at any time. In addition, a lower social development factor means that society will have less ability to manage natural and social problems such as war, famine, and disease.

As a result of this new understanding of history, Dr Morris measures and explains the values for the three eras (figure 1). A highly egalitarian value system was instrumental for the low level of social development in the nomadic bands of the Middle and Upper Paleolithic Ages. A highly hierarchical value system was needed to support the farming age with its increased social development. The overriding need for labor and property rights contributed to these values. The value system also contributed to the development of institutions and cities. In our modern industrial age, there is high use of fossil fuels and much higher levels of social development. Farming no longer needs a large labor force and hierarchical values are much less extreme. Trade is now more productive than warfare and democracy has flourished. Thus, the reduced levels of hierarchical values support our high social development.

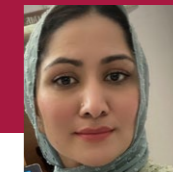
Morris' new analysis methods are better able to predict the future. For example, further social development since the year 2000 has promoted democracy, reduced death rate from war, and less extreme poverty. With social development expected to remain high, adequate management of future risks such as war, global warming, famine, and disease can be predicted.

In the Middle and Upper Paleolithic Ages, the '3-neg-behav' occurred naturally with the onset of language and resulted in the natural selection pressures for our current-day psychology. With greater social development as a primary result of our psychological evolution and the passage of time, human cultures can look forward to a bright future. These new perspectives are contributing to a new Scientific World View that includes the four models presented here (figure 2).

Behind the Research



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Research Objectives

Walter and Khan review four evolutionary psychology models.

Detail

Bio

Dr James Walter is Emeritus, Adjunctive, Associate Professor in Urology, Loyola University Chicago; and Emeritus Principal Investigator in Research Service, Hines Veterans Administration Hospital, in the USA. He is a specialist in neuroprosthetics for the urinary bladder and respiration, which were applied to patients with multiple sclerosis and spinal cord injury. He is a member of the International Neuro-Urology Society. Recently, he has been reviewing the literature in evolutionary psychology.

Collaborators

Aasma Khan, PhD cognitive psychology; Psy.D candidate in clinical psychology.

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Science World View

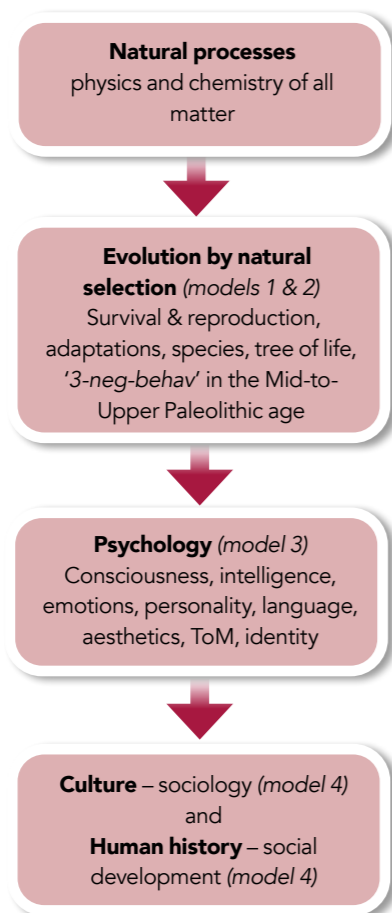


Figure 2. Scientific World View based on four processes. **Natural processes**, physics and chemistry that resulted from the 'Big Bang' explain the matter we see around us. **Evolution by natural selection** explains all of life and includes the '3-neg-behav' in the Middle and Upper Paleolithic Ages associated with our psychological evolution (models 1, 2). **Psychology** – our evolved traits including low reactive aggression, high intelligence, language, and Theory of Mind (ToM) (model 3). **Culture** and **human history** come from our psychological traits and the effects of social development (model 4).

best current explanation for our low levels of reactive aggression.

Status in the band was identified as having indirect natural selection effects through the outcomes of '3-neg-behav'. High status was attained by demonstrating exemplary skills in any of the ongoing activities within the band, and higher status meant that individuals were less likely to be targeted or have severe outcomes. Wrangham also states

that selection from the '3-neg-behav' led to the evolution of our conscience, including embarrassment, shame, and fear of ostracism – emotions that are not seen in the chimpanzee. In this way, direct and indirect natural selection pressures for our psychological traits were occurring.

Scientific support for these selection pressures and their adaptations are also demonstrated in fossil records.