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Techniques for Predicting the Collapse of Branching Patterns and Generation of Branching Patterns in Natural Populations and Artificial Populations

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Keywords: branching patterns; speciation; artificial populations; assortative mating; cloning; angiosperms; natural populations.

I. Introduction

I seek to introduce techniques of predictive science from physics and computer science to the biological sciences, and also show their relevance to predicting the collapse and generation of branching patterns in natural populations, and potential simulations of natural populations in computer science and biologically inspired computing. Given an individual organism taken at random from the natural population of any species, it is possible to predict that the distribution of characteristics of the natural population (which is a branching pattern of characteristics and adaptive properties across individual organisms in any species), will collapse or reduce in the population of clones derived or taken from the natural population. [1]

Moreover, given an individual unit taken or selected at random from an artificial population (that may simulate or model objects or units based on natural populations of technologies, like cars, cruise ships, space shuttles, cell phones, tanks, aircraft carriers, biological phenomena, like neurons or other cell lines, chloroplasts or mitochondria, individual organisms, colonies of organisms, or physical phenomena, like planets, stars, molecules, or crystal lattices), and cloned to produce a population of clones, it is possible to predict that the distribution of characteristics of the artificial population (or the shape or pattern of the artificial population), will collapse or reduce in the population of clones. As I shall discuss, comparing populations of clones to natural populations or artificial populations may be used to visualize or show branching patterns or other patterns in contrast or in relief to the populations of clones derived from the natural population or simulations of natural populations as artificial populations.

II. Branching Patterns and the Human Species

A simple example is the human species itself: In the event of selecting an individual at random from the natural population of the human species, and cloning the individual to produce a population of clones, the faces and facial characteristics, body types and physical characteristics, and behavioral characteristics including intelligences, talents, capacities, and personality characteristics, collapses or reduces in a population of clones; that is, the branching pattern of characteristics of the human species reduces or collapses in a population of clones. Thus, this strategy reduces or collapses a branching pattern, but it also facilitates the identification and visualization of a branching pattern or series of branching patterns in the evolution of the human species. That is, to reverse the perspective of the comparison of clones to natural populations, human evolution itself, from the earliest human populations to contemporary human populations distributed across societies around the world, involves increasing and diversifying the faces and facial characteristics (including eye, nose, chin, and cheek positioning, hair colors and hair textures, eye colors), body types and physical characteristics, and intelligences, talents, and personality characteristics that are collapsed in a generation of clones. and the capacity for assortative

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mating across categories of dissimilar characteristics and similar characteristics reduces or collapses in the population of clones.

No Darwinist or neo-Darwinist has ever identified or recognized this branching pattern or branching geometry of characteristics in the human species. Since no Darwinist has ever identified or recognized this branching pattern in the human species, what explains this larger branching pattern of characteristics?

III. In a Population of Clones Derived or Taken from a Natural Population, Quantities from the Natural Population are Reduced

In the event of an individual organism of the human species selected at random from the natural population of the human species, and cloned to produce a population of clones, it is possible to predict that a number of quantities from the natural population are reduced in the population of clones: faces and facial characteristics, body types and physical characteristics, behavioral characteristics including intelligences, talents, and personality characteristics, and also assortative mating across the categories of similar characteristics and dissimilar characteristics in the population of clones compared to the natural population (or compared to a random sample of the natural population of the human species).

Darwinists and neo-Darwinists commonly treat natural selection as a constant or near constant across primate species and also species in the Genus *Homo* including the human species. However, assortative mating has been increasing in the evolution of primordial human species in the Genus *Homo*, and assortative mating has been increasing in the evolution of the human species; that is, dissimilar characteristics across individual organisms in the evolution of the Genus *Homo*, and categories of similar characteristics in the evolution of the Genus *Homo*, have been increasing and diversifying (particularly compared to primates species), and thus assortative mating across categories of similar characteristics and categories of dissimilar characteristics has been increasing in the evolution of the Genus *Homo* and in the evolution of the human species (particularly compared to primates). As suggested, biologists and sociobiologists in the Darwinist theoretical tradition commonly treat natural selection as a constant or near constant across primates, species in the Genus *Homo*, and the human species. However, for centuries, physicists have recognized that explaining a variable with a constant is not possible.

Thus, it is possible to suggest that the principle of organization of the branching pattern of human evolution, or series of branching patterns of characteristics of human evolution, is assortative mating. It is possible to recognize that assortative mating across dissimilar characteristics and categories of similar characteristics has been increasing in the evolution of the genus *Homo* including the human species; by contrast, Darwinist commonly treat natural selection as a constant or near constant across primates, the Genus *Homo,* and the human species, i.e., Darwinists claim that natural selection explains the evolution of primate species and Darwinists claim that natural selection explains the evolution of the Genus *Homo* including the human species. The strategy of this section also suggests that in a artificial population of clones derived from an artificial population (that simulates some natural population, or functions as a simulation of some branching pattern or other pattern or shapes), the distribution of quantities of the artificial population reduces in the population of clones derived or taken from the artificial population. The exception or set of exceptions is if the artificial population from which the population of artificial clones was derived was itself a population of clones.

IV. On the Nature of Language and Culture in the Evolution of the Human Species

It is also interesting to ask, what is the nature of culture and language in the evolution of the Genus *Homo* and the human species? There is a substantial literature in the biological sciences and related fields that are concerned with the emergence of greater complexity in the evolution of species, from the simplest life forms, prokaryotes and eukaryotes, to the evolution and differentiation of complex multicellular organisms across species, to the emergence of language and culture (including technology) in human species. [2-9]

Functionalist perspectives in linguistics, anthropology, and biology have asked what culture does and what language does. [9-17] Language and culture increase the number and diversity of qualities across individual organisms in the genus *Homo* including the human species; thus, language and culture increase assortative mating in the evolution of the Genus *Homo* including the human species by increasing the number and diversity of qualities across individuals and groups. By contrast, primates do not have assortative mating within particular cultural patterns, i.e., languages, ethnic groups, religions, or access and familiarity with particular sets of technologies of human societies; moreover, primates have far less assortative mating across dissimilar characteristics and categories of similar characteristics, i.e., 'opposites attract' or mating and interaction across dissimilar or complementary characteristics, and 'like with like' or mating across similar characteristics; in the language of contemporary social media, human culture generates 'likes' and 'dislikes' across individuals that are entirely absent in primates.

Thus, culture and language increase the number and differentiation of qualities across human faces or across human individuals.

Physicist and mathematician Michio Kaku [18] comments that computer scientists have greater difficulties in accurately simulating the features of human faces, such as in live action video games or live action films using computer graphics than any other object, including other organisms, cities, or mountains. This suggests that the human brain has developed cognitive abilities to consciously and unconsciously discern facial differences and facial variation related to assortative mating; since culture and language increase the qualities across faces even more than the physical variation across faces themselves, increasing culture may have played a role in increasing the number, diversity, and differentiation of facial characteristics and inheritable behavioral characteristics, intelligences, talents, capacities, and personality characteristics that interact with and express themselves in cultural patterns (i.e., languages, religion, science, mathematics, technology, literature, the arts, or different divisions of labor in economies, organizations, or families).

Darwinists in the biological sciences commonly treat natural selection as a force of evolution that is constant or near constant across primate species, proto-human species in the Genus *Homo*, and the human species. By contrast, intraspecific assortative mating has been increasing in the evolution of the Genus *Homo* and the human species, and culture has been increasing in the evolution of the Genus *Homo* and the human species.

V. Brain Encephalization and Branching Patterns

Eminent biologist Edward O. Wilson, in his *Sociobiology*, provides a classic discussion of a paradox of human evolution: Darwinism posits that evolution is intensely gradual; however, the evolution of species in the genus *Homo* is faster than the evolution of primates and various mammals, and the evolution of *Homo Sapiens* is faster than the evolution of primordial human species in the genus *Homo*: "The cerebrum of *Homo* was expanded enormously during a relatively short span of evolutionary time . . . Three million years ago *Australopithecus* had an adult cranial capacity of 400-500 cubic centimeters, comparable to that of the chimpanzee and gorilla. Two million years later its presumptive descendant *Homo erectus* had a capacity of about 1000 cubic centimeters. The next million years saw an increase to 1400-1700 cubic centimeters in Neanderthal man and 900-2000 cubic centimeters in modern *Homo sapiens*. The growth in intelligence that accompanied this enlargement was so great that it cannot yet be measured in any meaningful way . . . no scale has been invented that can objectively compare man with chimpanzees and other living primates." [19, cf. 20-21]

Thus, it is possible to ask, what explains the faster rates of evolution of primordial species in the Genus *Homo* and the human species itself compared to primates, and what explains greater brain encephalization in the evolution of the Genus *Homo* and the human species compared to primates? In the co-evolution of human biology and culture, culture and assortative mating explain greater brain encephalization in humans compared to primates, and explain the greater branching pattern or branching geometry of characteristics across individual organisms (faces and facial characteristics, body types and physical characteristics, and behavioral characteristics, intelligences, personality characteristics, and talents) than primates. (It is also possible to conjecture that increasing faces and facial characteristics, body types and physical characteristics and behavioral characteristics including intelligences, personality characteristics, and talents, are isomorphic or partly isomorphic with increasing brain encephalization and increasing structural and functional differentiation and complexity in the evolution of the brain in the Genus *Homo*, and, more generally, in the evolution of mammals, marsupials, birds, reptiles, amphibians, fish, sharks, and rays).

VI. Darwin's "Abominable Mystery" and the Co-Evolution of Angiosperms and Insects, Bees, and Birds by Assortative Mating

Charles Darwin claimed that the faster rate of evolution of angiosperm plants compared to ancestral species of plants and non-flowering plants was an "abominable mystery," and Darwin's "abominable mystery" is still debated by contemporary botanists. In addition to the faster rate of evolution of angiosperm plants compared to ancestral species of plants and non-flowering plants, angiosperm plants also have a greater diversity of characteristics than ancestral species of plants (e.g., ferns) and non-flowering plants. Darwinists commonly treat natural selection as a constant or near constant across angiosperm species of plants, ancestral species of plants, and non-flowering plants; however, the general pattern is that *interspecific assortative mating* between angiosperm plants and bee species, insect species, and bird species has been increasing in the evolution of angiosperm plants compared to ancestral species and plants and non-flowering plants (in which such interspecific assortative mating is absent or largely absent).

Moreover, it is possible to recognize that interspecific assortative mating has been increasing in

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the co-evolution of angiosperms or flowering plant species, and bees, insects, and birds, and that the number of insect species and bird species that co-evolve with flowering plants has been increasing in the evolution and diversification of angiosperm species. Thus, interspecific assortative mating may play a role in increasing the rate of evolution of angiosperm plants compared to ancestral species of plants and non-flowering plants, and also increasing the rate of speciation across angiosperm plants and also the insect species and bird species with which they co-evolve. (This is because angiosperms have a faster rate of evolution than ancestral species and non-flowering plants; angiosperms have evolved more species than non-flowering plants and ancestral species of plants; the number of insect species, bee species, and bird species that have co-evolved with angiosperm plants as distinct species has been increasing over generational time compared to non-flowering plants or ancestral species of plants that may engage in different or limited forms of interaction and mutualism with other organisms).

Moreover, it is also possible to conjecture that assortative mating plays a role in reducing the number of genes and genetic material required for generating larger branching patterns of characteristics across individual organisms in the human species and angiosperm species: the genes and genetic material required for generating branching patterns of characteristics across organisms in the human species compared to primate species are relatively small; that is, the branching patterns of characteristics across organisms in the human species are much larger than the branching patterns of characteristics across organisms in chimpanzee species or primate species, though they do not require a number of new genes commensurate with the complexity of the branching patterns of characteristics across organisms of the human species compared to primate species. Estimates by most scientists of the number of genes in the human genome were originally 60,000-100,000 or more; by 2001 the number of genes in the human genome was revised to 30,000, and this was met with scientists in the US and Europe proclaiming what a shocking finding it was that there were only 30,000 genes or only a third greater than the approximately 20,000 of nematode worms [22]; estimates of the human genome have since been revised to 20,000 or less.

Moreover, the genes and genetic material required for generating branching patterns of characteristics across angiosperm species compared to ancestral species and non-flowering plants are also relatively small; that is, the branching patterns of characteristics across organisms in angiosperm species are much larger than the branching patterns of characteristics across ancestral species of plants and non-flowering plants, though they do not require a number of new genes commensurate with the complexity of the branching patterns of characteristics across angiosperm species compared to ancestral species of plants or non-flowering plants (in most cases, non-flowering plants and ancestral species of plants have more genes and genetic material than angiosperm species, even though the angiosperm species have larger and more complex branching patterns of characteristics than non-flowering plants or ancestral species of plants).

I thus also conjecture that assortative mating, including interspecific assortative mating, may increase the alteration of functions of genes in species, thus reducing the number of genes and genetic material required for the growth and emergence of complex branching patterns of characteristics in angiosperm plants compared to ancestral species of plants, and in the human species compared to proto-human species in the Genus *Homo* and primate species.

Thus, as suggested, assortative mating may generate larger branching patterns of characteristics in the evolution of angiosperm species (interspecific assortative mating in the co-evolution of bee species, insect species, and bird species) than natural selection on its own, and assortative mating may generate larger branching patterns of characteristics in the evolution of the human species (intraspecific assortative mating in the co-evolution of human biology and cultural patterns) than natural selection on its own.

VII. On the Organization and Shape of Branching Patterns

More generally, it is possible to ask: what shapes and organizes biological variation in the evolution of species? What shapes and organizes branching patterns of characteristics across individual organisms within species, and branching patterns of characteristics and adaptive structures across species?

Branching patterns are fundamental to science, and their simulations in computer science, or their modeling and abstraction in mathematics: different kinds of phenomena are considered or classified as branching patterns, including crystals, electric discharges, the tree of life, cellular differentiation of plants, animals, and other organic branches of life, branching patterns of characteristics across individual organisms in species, branching patterns of characteristics and adaptive structures across species, languages and linguistic groups, religions and religious sects, and also families, organizations, and human societies.

Natural selection is constantly shaping and organizing branching patterns of characteristics across individual organisms in species across generational time; however, *assortative mating may generate larger branching patterns or branching geometries of characteristics across individual organisms in species* *than natural selection on its own*: Angiosperm plants that participate in interspecific assortative mating with bee species, insect species, and bird species have greater branching geometries of characteristics than ancestral species of plants that do not participate in interspecific assortative mating with insect species, bee species, and bird species; Species in the genus *Homo* that participate in intraspecific assortative mating, including the human species, have faster rates of evolution than primates (analogous to angiosperms compared to ancestral species of plants), have greater differentiation of characteristics and faster rates of differentiation of characteristics across organisms than primate species (analogous to angiosperm species compared to ancestral species of plants), and have greater branching geometries of characteristics, including behavioral characteristics and the expression of intelligences and personality characteristics, than primate species. (Intraspecific assortative mating is less in primate species since assortative mating within a shared language is absent in primates, and assortative mating across cultural characteristics is absent or far less than in humans or even primordial species in the genus *Homo*).

VIII. Ranking Forces of Nature by their Capacity to Generate Branching Patterns

Physicists, computer scientists, and Noam Chomsky, have sometimes expressed concern that biologists in the theoretical tradition of Darwinism emphasize or overemphasize Darwinism or natural selection to the exclusion of other forces that may explain or shape variation across biological species and biological systems.

Identifying assortative mating as a force in evolution raises a new set of questions in the biological sciences: How to rank the forces of nature in the biological sciences by their capacity to generate branching patterns?

In contrast with genetic mutation, gene duplication, recombination, and sexual reproduction (natural forces that increase the number and differentiation of characteristics across individuals in species), natural selection, in any generation, tends to decrease the number and differentiation of characteristics across individuals in species. Darwin and Wallace established the theory of evolution by natural selection, i.e., that given constant slight variations in the characteristics of individual organisms within species, less favorable variations for survival and reproduction will be eliminated, and more favorable variations will be selected and retained. As Darwin recognized natural selection is a conservative force that explains the gradual nature of evolution ("Natura non facit saltum"), and explains the conservation or retention of adaptive structures; thus, genetic mutation, gene duplication, sexual reproduction, and recombination are forces that tend to increase the number and differentiation of characteristics across individual organisms in any given generation in contrast with natural selection, and they tend to increase the rate of evolution in contrast with natural selection per se. However, natural selection may "increase" the rate of evolution over generations by conserving or retaining adaptive structures or adaptive properties that facilitate an increase in the rate of evolution and species diversification, like the differentiation of forelimbs from hindlimbs, the retention of vertebrata, the retention of bilateral symmetry, the retention of sexual reproduction, the retention of pollinating flowers, the retention of warm blood, the retention of mammary glands, or the retention of organisms with larger and more complex brains.

Given genetic variability and inheritance, natural selection shapes and organizes branching patterns of characteristics across individual organisms in species in generational time; however; assortative mating may generate larger branching patterns or branching geometries of characteristics than natural selection on its own. It also may be possible to assimilate the influential work of Susumu Ohno to this approach: Susumu Ohno suggests that gene duplication is more important for the emergence of new gene functions than point mutations and mutations at the level of genes and alleles. [23-25] Gene duplication is analogous to cloning, and it is possible to re-state Ohno's conjecture in a new way. Ohno's view is in effect that the differentiation of gene functions by gene duplication and genome duplication is greater than by genetic mutation per se (i.e., point mutations or mutations affecting the expression the individual genes and alleles).

From this standpoint, gene duplication produces branching patterns in the evolution of species, i.e., the differentiation of gene functions by gene duplication and genome duplication generates branching patterns of (new) adaptive structures in the evolution of species (in conjunction with natural selection, or in conjunction with natural selection and assortative mating, as discussed). Gene duplication and whole genome duplication events are viewed as being responsible for the emergence of various adaptive structures in the evolution of species, including vertebrata in the evolution of vertebrates, the eye, and the emergence of structures available for pollination in angiosperm plants. Ohno's work may be re-formulated: the differentiation of gene functions by gene duplication and genome duplication is greater than by genetic mutation on its own, and *the emergence of branching patterns of adaptive structures in the evolution of species are greater by gene duplication and genome duplication than by genetic mutation on its own*. Thus, to incorporate Susumu Ohno's work to this perspective, gene duplication and whole genome duplication events have a greater capacity to generate branching patterns than genetic mutation on its own (which also may be restated: gene duplication and whole genome duplications events have a greater capacity to generate branching patterns of characteristics in the evolution of species than genetic mutation and natural selection on their own). Similarly, *sexual reproduction and recombination have a greater capacity to generate branching patterns of characteristics across individual organisms in species, and in the evolution of species, than asexual reproduction of organisms*.

Cloning? It is an interesting question of how to assess the capacity of cloning to produce branching patterns. Sexual reproduction and recombination have a greater capacity to produce branching patterns of characteristics across individual organisms in species in generational time than the asexual reproduction of organisms, and sexual reproduction and the alternation of generations have a greater capacity to generate branching patterns of characteristics across individual organisms in species, and in the evolution of species, than asexual reproduction. However, cloning produces branching patterns when there are multiple lines of clones that may be differentiated across functions, as in multiple cell lines that differentiate into the different cell types, tissues, organs, and adaptive structures of complex organisms; more limited cases compared to cellular differentiation of complex organisms are the multiple kinds of cloned individuals and castes of some eusocial insects that fulfill different functions across the eusocial organism. (Major transitions of evolution have included new cell lines and new cell types that have emerged as new adaptive structures in the evolution of species, and also clonal castes of individual members in the emergence of eusocial species).

IX. In a Population of Pure Clones, the Darwin-wallace Pattern of Constant or Perpetuating Slight Variations Across Organisms in Species is Absent or Disappears, and this Suggests a Rule in the Biological Sciences

In a population of pure clones, opportunities for natural selection are absent since the Darwin-Wallace pattern of constant or perpetuating variations across individual organisms disappears or is absent in a population of pure clones. This also suggests a rule in biological systems: In biological systems clones reduce or eliminate opportunities for natural selection in the line of clones or generations of clones; however, the presence of clones, as in cell types and cell lines in multicellular organisms or castes of individuals in eusocial insects, thereby moves the unit of natural selection to a higher level of organization. This may be the individual organism in a species of individual organisms with variations across its members, the eukaryotic cell that incorporates symbionts as organelles to be cloned in reproduction (as in mitochondria or chloroplasts), or some eusocial colonies or eusocial species that have clonal castes instead of sexually reproducing castes. The strategy in this section also suggests that in biologically inspired computing in which artificial populations are constructed to simulate the Darwin-Wallace pattern, or cases of Darwin-Wallace patterns across different species, selecting units at random from artificial populations simulating Darwin-Wallace patterns, and cloning them to produce a population of clones or populations of clones, collapses the Darwin-Wallace pattern in any artificial population simulating a Darwin-Wallace pattern; that is, an artificial population of clones derived from an artificial population simulating a Darwin-Wallace pattern collapses the Darwin-Wallace pattern of the artificial population, and opportunities for natural selection or opportunities for simulated natural selection are absent in the artificial population of clones. [cf. 26-27]

X. Predicting the Collapse of Branching Patterns and the Generation of Branching Patterns in Natural Populations and Artificial Populations

The techniques of predictive science that I have introduced may be useful beyond the biological sciences. That is, since it is possible to predict that, selecting an individual organism from any species, and cloning them to produce a population two or more (or a 1,000 or a 1,000,000 or more), will collapse or reduce the distribution of characteristics of the natural population of any species from which the population of clones are taken, derived, or modeled, it is also possible to use this strategy for other phenomena besides biological species and biological phenomena.

A simple example would be cloning a population of cruise ships: It is possible to establish standards for ships or boats that are identifiable as cruise ships, thereby establishing a natural population of civilian cruise ships (that would not include military vessels such as aircraft carriers or destroyers, or smaller boats and vessels that did not meet the standards of being a cruise ship). Given a natural population of cruise ships, in which cruise ships would differ in their characteristics in various ways, such as by size, weight, engine horsepower and torque, engine efficiency and ability to reduce pollutants or emissions, and functional and aesthetic design features, it is in principle possible to select an individual cruise ship at random, and then clone the cruise ship by constructing a population of identical cruise ships. In that case, the population of cloned cruise ships would reduce or collapse the

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distribution of characteristics of the natural population of cruise ships.

The limited branching pattern of characteristics across cruise ships would be reduced or collapsed in the population of clones; given different samples from the natural population of cruise ships, in principle, different samples from the natural population of cruise ships may be used to establish different design traditions, trajectories, different patterns in the design of cruise ships over the generations of the construction of cruise ships. (Examples such as these may be multiplied across other designed constructions, whether houses, churches, temples, civilian or military buildings, cars, trucks, planes, trains, civilian vehicles or military vehicles, or space shuttles).

Thus, identifying and establishing a natural population of individual units (or a set of individual units in mathematics, or a set or artificial population of individual units computer science), and then selecting an individual unit from the natural population (or artificial population in mathematics or computer science) and cloning them to produce a population of clones or two or more (such as a 1,000 or 1,000,000 or more) collapses or reduces the distribution of characteristics of any natural population from which the clones are taken or derived (which is usually a branching pattern of characteristics, but may be some other fundamental shape or pattern that is reduced or collapsed in the population of clones). An exception would be if the natural population from which the population of clones is derived (or the artificial population from which the clones are modeled or derived), is itself a population of clones.

In that case or set of cases, the distribution of characteristics of the natural population would not reduce or collapse in the population of clones since the natural population was itself a population of clones (in principle, in the case of an artificial population that is constructed or simulated as a set of clones, then selecting an individual unit from the artificial population of clones would not collapse or reduce the distribution of characteristics of the artificial population since the artificial population was itself a population of clones).

Moreover, since computer science and different branches of science and engineering have been doing simulations of branching patterns since earlier in the 20th century, it may be highly useful to different branches of science, engineering, and computer science to use the techniques for predictive science introduced in my work to reduce or collapse branching patterns in natural populations (or artificial populations), and more easily visualize and identify branching patterns and their properties; moreover, it is also possible to consider how the properties of the individual organisms (or units of some other natural population or artificial population) taken or selected at random from some natural population of organisms or units (or artificial population), may differ in some respects from the branching pattern of characteristics of the larger natural population (or artificial population) from which they are taken or selected, and thereby be used to set the conditions for the emergence of new branching patterns compared to the natural population or artificial population from which they were derived, taken, or modeled.

In this work, I have introduced techniques from physics and computer science to generate new predictions of phenomena in the biological sciences: for example, in the case of an individual organism taken or selected at random from any species and cloned to produce a population of clones (such as 1,000 or 1,000,000 or more), it is possible to predict that the distribution of characteristics of the natural population (which is a branching pattern of characteristics across individual organisms in any species) will collapse or reduce in the population of clones or genetic identicals. Similar claims may be developed for *artificial populations*: that is, given the establishment of any artificial population of units (that may be simulated or constructed in computer programs, such as man-made technologies like cell phones, cruise ships, or ICBMs, physical properties like crystal lattices, or biological systems such as individual organisms from different species or different cell lines, tissues, and organs in the cellular differentiation of organisms), it is possible to predict that selecting an individual unit at random from any artificial population, and cloning them to produce a population of clones or identicals, will collapse or reduce the distribution of characteristics (that may be a branching pattern or other fundamental shape or pattern) of the artificial population from which the clones or identicals are taken or produced. Thus, this strategy may be useful for multiple purposes, including contributing to identifying patterns in natural populations and potentially different patterns in artificial populations by contrasting them with cloned populations based on or derived from random samples of natural populations and artificial populations.

It has not escaped my notice that, the strategy introduced in my work, of identifying different forces of nature and ranking forces of nature by their capacity to generate branching patterns or other fundamental patterns or shapes, is different than the strategy or attempt to unify all of the forces of nature in a single grand field theory or "theory of everything." (by physicists such as Michio Kaku, Edward Witten, Gabriele Veneziano, Ram Brustein, or others, [28-31])

That is, the strategy introduced in my work involves identifying forces of nature from each other, separating or identifying them and their effects in relation to each other instead of unifying them all, and involves ranking the forces of nature by their capacities to generate branching patterns or other fundamental patterns or shapes in nature. "Theories of everything," have been criticized in various ways, including for not being empirically testable. [esp. 31] Moreover, it is questionable whether inventors or engineers have ever attempted or succeeded in designing different technologies, such as military or civilian vehicles, military weapons systems, satellites, space shuttles, cell phones, or other devices, with the mathematical physics of string theory that attempts to unify all of the forces of physics, electromagnetism, gravity, and the strong and weak forces, with a single theory. However, this work introduces a new way of evaluating and criticizing attempts to unify the forces of physics in a single theory; that is, instead of attempting to unify all of the forces of physics in a single theory, it may be more useful for science, technology, engineering, and computer science, to rank the forces of nature, in the physical sciences or the biological sciences, by their capacity to generate branching patterns or other fundamental forces of nature (such as wavelengths).

Earlier in the 20th century, Einstein famously attempted to unify all of the forces of physics in a single theory, and following generations of physicists have similarly attempted to unify the fundamental forces of physics, electromagnetism, gravity, the strong force, and the weak force, in a single unified theory or "theory of everything." Possibly the most famous and influential protagonist of contemporary "theories of everything" is the physicist Edward Witten. Witten states that "string theory has, even among theoretical physicists, the reputation of being mathematically intimidating." Witten claims that "string theory force(s) us to unify general relativity with the other forces of nature." [30] There are critics of string theory, however, such as physicist Peter Woit, that claim that string theory is not empirically testable, and does not succeed in unifying all of the forces of nature in a single theory. [31]

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Christopher Portosa Stevens is author of *The Branching Patterns of Human Evolution and the Acceleration of Human Evolution.*

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