ZOLTÁN BARABÁS · INDEPENDENT RESEARCHER · 2026

The Pillars of Human Nature

Every living thing, from a single cell to a human being, brings four drives to life. Each individual holds them in its own mixture, and the mixture always sums to 100%.

$Nature_i = P + I + C + U = 100\%$



One individual's nature, divided among the four pillars. A sample profile.

A composition, not a score

More of one pillar means relatively less of the others. Individuality is a unique mixture, not a position on separate scales.

No pillar is ever zero

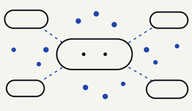
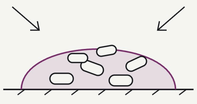
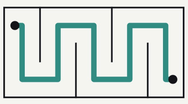
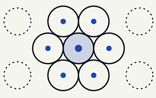
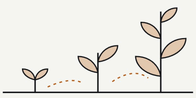
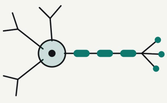
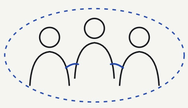
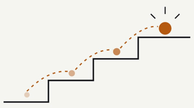
P, I, C, U > 0. Every organism has all four to some degree; complete non-participation is incompatible with life.

Analysed with log-ratios

Proportions carry only relative information, so empirical work uses compositional statistics (Aitchison, 1982).

Four drives, one object: life itself

THE SAME STRUCTURE AT EVERY LEVEL OF LIFE

PILLAR	01 · P **Participation** Engagement with, and embeddedness in, the environment and other living things.	02 · I **Improvement** Moving from the present state to a better one, from surviving to thriving.	03 · C **Control** Regulating the self and shaping the world so outcomes stay within preferred bounds.	04 · U **Understanding** Sensing, modelling and anticipating: the drive to know and make sense.
Single cell bacteria, yeast, slime mould				
	Quorum sensing: bacteria release and read signals, then act together as a population. Miller & Bassler, 2001	Chemotaxis: *E. coli* runs longer whenever conditions are getting better, and tumbles when they are not. Adler, 1966 · Berg & Brown, 1972	Homeostasis and biofilms: cells hold pH and ions in range, and colonies build shelters that reshape their surroundings. Cannon, 1932 · Miller & Bassler, 2001	*Physarum*, one giant cell, finds the shortest route between food sources in a maze, and learns to anticipate repeating cold spells. Nakagaki et al., 2000 · Saigusa et al., 2008
Multicellular plants, animals, tissues				
	Cells coordinate into tissues and bodies; in social species, bodies coordinate into groups. West et al., 2007	Growth, learning and development carry the organism toward greater capability. Darwin, 1859 · White, 1959	Allostasis: regulation that adjusts in advance of predicted demand, and action that changes the world to match. Sterling, 2012 · Friston, 2010	With nervous systems, modelling the world becomes perception, learning and memory. Friston, 2010 · Lyon, 2015
Human reflective, cultural, self-aware				
	The need to belong, relatedness, and shared intentionality: joining in joint goals and culture. Baumeister & Leary, 1995 · Tomasello, 2009	Competence, mastery and self-actualization; collectively, technology, medicine and institutions. White, 1959 · Maslow, 1943	The need for control, self-efficacy and autonomy; we prefer choice even when it pays nothing extra. Bandura, 1977 · Leotti et al., 2010	Curiosity, science, philosophy and religion. Information itself is rewarding, even with no practical use. Loewenstein, 1994 · Kidd & Hayden, 2015

Nature is not the condition

THE HUMAN CONDITION

What life presents to us

External and existential. The same givens for everyone. Belongs to self-aware beings.

Arendt, 1958 · Camus, 1955 · Yalom, 1980

Isolation	> Participation
Mortality	> Improvement
Freedom	> Control
Meaninglessness	> Understanding

The condition poses four existential problems; human nature supplies four drives that answer them.

HUMAN NATURE

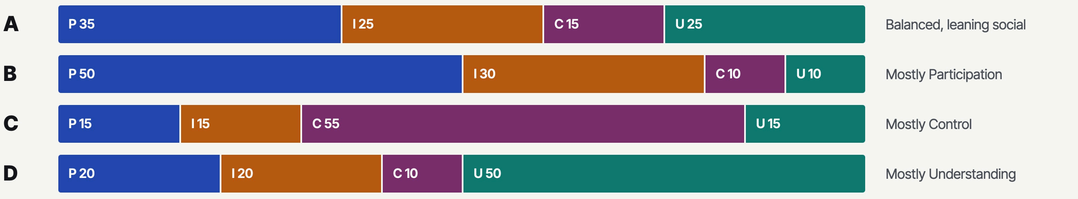
What each of us brings to life

Internal drives. A unique composition in every individual. Shared by all living organisms.

The Pillars framework

Same four pillars, different natures

Illustrative profiles · each sums to 100%



The Pillars of Human Nature:

An Original Compositional Framework of Human Nature, Distinct from the Human Condition

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Abstract

This paper introduces the Pillars of Human Nature, an original framework holding that the nature of any individual is composed of four drives directed at life itself: **Participation** in life, the desire to **Improve** life, the desire to **Control** life, and the desire to **Understand** life. The framework departs from existing accounts in three ways. First, it defines nature as a *composition*: each individual holds the four pillars in proportions that sum to 100%, so that individuality is a unique mixture rather than a position on independent trait scales. Second, it claims *biological universality*: the same four-part structure is present, in functionally equivalent forms, in every living organism from the single cell to the human being. Third, it draws a sharp distinction between human *nature*, what an organism brings to life from within, and the human *condition*, the existential circumstances that life imposes, such as mortality, freedom, isolation, and the search for meaning. To evaluate the framework, the paper draws on converging evidence from autopoiesis theory, homeostasis research, bacterial chemotaxis and quorum sensing, basal cognition, the free-energy principle, and human motivation science. It then formalizes the 100% constraint as a compositional model, distinguishes the framework from self-determination theory and existential accounts of the human condition, and explains why it is a theory of what nature is rather than a psychometric or sociometric instrument for measuring people. It closes with testable predictions. It concludes that the Pillars of Human Nature offer a novel, cross-level synthesis whose compositional claim warrants empirical testing.
Keywords: human nature, human condition, motivation, basal cognition, autopoiesis, active inference, compositional models

Introduction

Questions about human nature are among the oldest in philosophy and among the most contested in the behavioural sciences (Kronfeldner, 2018; Pinker, 2002). Two weaknesses recur in the answers offered. First, *human nature* is frequently conflated with the *human condition*, so that accounts of what people are become accounts of what people face. Second, most psychological frameworks, such as hierarchies of needs (Maslow, 1943), lists of fundamental motives (Baumeister & Leary, 1995; Ryan & Deci, 2000), and trait taxonomies (Goldberg, 1990), are built from human data and stop at the boundary of the species. They rarely ask whether the motives they describe are elaborations of something all living systems share.

This paper introduces an original framework, the Pillars of Human Nature, designed to address both weaknesses. Its central statement is that *an individual's nature is composed of their participation in life, the desire to improve life, the desire to control life, and the desire to understand life*. These four components, referred to here as **Participation, Improvement, Control, and Understanding**, are present in every individual in differing proportions that sum to

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100%. One person may be composed predominantly of Understanding, another of Control. The specific mixture *is* that individual's nature, and no two mixtures need be the same.
The framework makes a second, broader claim: the four pillars are not a human peculiarity but a general property of life. A single-celled organism participates in its environment, acts to improve its chances to survive and thrive, regulates itself and its surroundings to accomplish those goals, and gathers information about itself and its environment. On this view, human nature is the most elaborated expression of a structure that began with the first cells, and it can be studied with the same concepts at every level of biological organization.
The paper proceeds as follows. It first separates human nature from the human condition and sets out what is original about the framework. It then establishes a theoretical vocabulary that allows goal-directed language to be applied to non-human organisms without unwarranted anthropomorphism, and examines each pillar in turn, tracing evidence from microorganisms to humans. It next formalizes the 100% constraint as a compositional model, contrasts it with existing personality and motivation research, and explains why it should not be confused with psychometric or sociometric testing. It closes with limitations, testable predictions, and directions for future research.

Human Nature Versus the Human Condition

The *human condition* refers to the circumstances of existence that every human being confronts by virtue of being alive and self-aware. Arendt (1958) identified its conditions as life itself, natality, mortality, worldliness, plurality, and the earth, and stressed that these conditions shape human existence without fully determining it and should not be mistaken for a human nature. Existential psychology describes the condition through four ultimate concerns: death, freedom, isolation, and meaninglessness (Yalom, 1980). Camus (1955) framed it as the confrontation between the human demand for meaning and an indifferent universe. Sartre (2007) went further, denying that any human nature exists at all; for him, existence precedes essence, and people define themselves through their choices.
The Pillars of Human Nature accept that the human condition is real but insist that it is a different object of study. The condition describes what life *imposes* on a person; nature describes what a person *brings* to life. The condition is the same for everyone; nature varies from one individual to the next. The condition, as usually theorized, depends on reflective self-awareness and so belongs to humans; the pillars, by contrast, are present in every living organism. Table 1 summarizes the distinction.

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Table 1
Human Nature, as Defined by the Pillars Framework, Contrasted with the Human Condition

Dimension	The human condition	Human nature (the four pillars)
Question answered	What does existence present to us?	What does each of us bring to existence?
Locus	External and existential: the givens of life	Internal: the organism's own drives
Variation between individuals	None; the givens are shared by all	Defining; each individual has a unique composition
Scope	Self-aware human beings	All living organisms, from single cells to humans
Grounding	Philosophy and existential psychology	Biology, cognitive science, and motivation science
Representative accounts	Arendt (1958); Camus (1955); Yalom (1980)	The present framework

The two are related rather than opposed. The pillars can be understood as the internal structure with which an organism meets its condition. A notable correspondence emerges when Yalom's (1980) four ultimate concerns are set beside the four pillars: isolation is met by Participation, mortality by Improvement and the striving to survive and thrive, the burden of freedom by Control, and meaninglessness by Understanding. On this reading, the human condition poses four existential problems, and human nature supplies four drives that answer them. The framework also offers a reply to Sartre's (2007) denial of human nature: the pillars are given by biology, but the *proportions* in which they are expressed, and the uses to which they are put, leave room for the self-definition that existentialists emphasize.

The Originality of the Framework

Each pillar, considered alone, has precedents in the scientific literature reviewed below. The originality of the framework lies in the structure that unites them. Five features distinguish it from existing accounts.

1. **A single referent: life itself.** All four pillars share one object. The organism participates in *life*, improves *life*, controls *life*, and understands *life*. Most motivation theories list needs with different objects, such as food, safety, esteem, or affiliation; the pillars instead describe four modes of relating to the same object.
2. **Nature as composition.** Rather than measuring how much of each trait a person has, the framework describes how a fixed whole is divided. Individuality is defined as a unique mixture summing to 100%, a structure that trait models such as the Big Five do not provide (Goldberg, 1990).
3. **Biological universality.** The framework applies the same four categories to bacteria, slime molds, animals, and humans. Research on basal cognition documents cognitive capacities in simple organisms (Baluška & Levin, 2016; Lyon, 2015) but does not organize them into a motivational structure that continues unbroken into human personality.
4. **Understanding as a fundamental drive.** Self-determination theory identifies relatedness, competence, and autonomy as basic needs (Ryan & Deci, 2000). The pillars framework adds Understanding as a co-equal fourth pillar, consistent with evidence that information is intrinsically rewarding (Kidd & Hayden, 2015).
5. **A clear separation of nature from condition.** By defining nature as internal, variable, and universal across life, and the condition as external, shared, and specific to self-

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aware beings, the framework resolves a conflation that runs through much writing on human nature.

The framework is also not a test. Unlike psychometric and sociometric models, which measure how people score or how they relate to one another, the pillars make a claim about what an organism's nature consists of. That difference is developed in detail later in the paper.

Theoretical Background

Teleonomy and the Language of Desire

To say that a bacterium "desires" anything invites the charge of anthropomorphism. Comparative psychology has long cautioned against attributing higher mental faculties to behaviour that can be explained by simpler processes (Morgan, 1894). Biology resolved a version of this problem by distinguishing *teleology*, purpose imposed by a conscious agent, from *teleonomy*, the apparent goal-directedness of systems whose behaviour is governed by an evolved program (Mayr, 1974). A teleonomic system behaves *as if* it pursues an end, and its organization was shaped by natural selection because pursuing that end conferred fitness. Dennett (1987) similarly argued that adopting an "intentional stance" toward a system is legitimate when it yields reliable predictions, regardless of whether the system has conscious states.

In this paper, the word "desire" is used in that functional sense when applied to non-human organisms. The claim is not that a cell experiences longing, but that it possesses evolved mechanisms whose function is to bring about particular states of itself and its environment. In humans, the same functions are accompanied by conscious experience, deliberation, and culture. The pillars are therefore proposed as functional invariants whose subjective character varies with the complexity of the organism.

Autopoiesis and Self-Maintenance

Maturana and Varela (1980) defined living systems as *autopoietic*: networks of processes that continuously produce and maintain the components and boundary that constitute them. An autopoietic system is necessarily in ongoing exchange with its environment, drawing in matter and energy and exporting waste, consistent with Schrödinger's (1944) observation that organisms sustain their order by drawing on external sources of free energy. Di Paolo (2005) extended this account, arguing that autopoiesis alone is insufficient for agency; living systems must also be *adaptive*, able to monitor and regulate their trajectory relative to the boundaries of viability. Thompson (2007) argued that this self-producing, self-regulating organization is the minimal basis of mind, a position known as the strong continuity of life and mind.

Homeostasis, Allostasis, and Active Inference

Cannon (1932) described homeostasis as the coordinated regulation that keeps an organism's internal conditions within viable bounds. Sterling (2012) refined this with the concept of *allostasis*, regulation that anticipates demands before they arise rather than merely correcting deviations after the fact. Friston's (2010) free-energy principle generalizes both ideas: any self-organizing system that persists must minimize the long-run surprise of its sensory states, which it does by updating internal models of the world (perception) and by acting to bring the world into line with its expectations (action). Kirchhoff et al. (2018) argued that this framework applies to all living systems, each of which is separated from its environment by a statistical boundary, or Markov blanket, across which it senses and acts.

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Basal Cognition

A growing literature on *basal cognition* contends that cognitive capacities such as sensing, memory, valence, and decision-making are present in organisms without nervous systems (Baluška & Levin, 2016; Lyon, 2006, 2015). Lyon (2015) reviewed evidence that bacteria integrate multiple signals, retain short-term memory of past conditions, and coordinate collective behaviour. Levin (2019) proposed that a biological "self" can be defined by the spatiotemporal scale of the goals a system can pursue a scale that expands from cells to tissues to organisms. Taken together, these frameworks supply a vocabulary in which the four pillars can be stated as properties of living systems in general: exchange with an environment (Participation), maintenance and enhancement of viability (Improvement), regulation of self and world (Control), and modelling of self and world (Understanding).

Pillar One: Participation in Life

Participation is defined here as the organism's engagement with, and embeddedness in, its environment and its community of other living things. It is the most fundamental pillar because no organism can exist in isolation. As an open thermodynamic system, every living thing must exchange matter, energy, and information with its surroundings to persist (Maturana & Varela, 1980; Schrödinger, 1944).

Cellular Level

At the cellular level, participation is visible in the constant traffic across the cell membrane and in social interaction among microorganisms. Bacteria communicate through *quorum sensing*, secreting and detecting signaling molecules whose concentration reflects local population density; once a threshold is reached, populations coordinate gene expression to produce collective behaviours such as bioluminescence, virulence, and biofilm formation (Miller & Bassler, 2001). West et al. (2007) documented that microbes engage in cooperation, public-goods production, division of labour, and even exploitation of cooperators, demonstrating that social life predates multicellularity. A microbe is thus not only *in* its environment but an active contributor to a shared ecological and chemical community.

Multicellular and Human Levels

In multicellular organisms, participation scales to coordination among cells, and in social species to coordination among individuals. In humans, it takes the form of a powerful need to belong. Baumeister and Leary (1995) reviewed extensive evidence that people are motivated to form and maintain lasting, positive interpersonal bonds, and that deprivation of belonging produces adverse effects on health, adjustment, and well-being. Self-determination theory identifies *relatedness* as one of three basic psychological needs whose satisfaction supports intrinsic motivation and wellness (Ryan & Deci, 2000). Tomasello (2009) argued that humans are distinctive in the extent of their shared intentionality, the capacity to participate in joint goals and cultural practices.

Synthesis

Across levels, Participation describes the organism's orientation toward exchange and engagement. Individuals high in this pillar would be expected to prioritize connection, contribution, and immersion in shared activity; individuals low in it would be more self-contained, though never fully disengaged, since complete non-participation is incompatible with life.

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Pillar Two: The Desire to Improve Life

Improvement is defined as the organism's orientation toward moving from its present state to a better one: from threatened to secure, from surviving to thriving, from less capable to more capable. At its foundation lies the logic of natural selection, which favours variants that improve survival and reproduction relative to alternatives (Darwin, 1859).

Cellular Level

The clearest cellular example is bacterial chemotaxis. Adler (1966) demonstrated that *Escherichia coli* migrates toward nutrients such as sugars and amino acids. Berg and Brown (1972), tracking individual cells in three dimensions, showed that bacteria alternate between straight "runs" and random "tumbles," and that they lengthen runs when conditions are improving. The cell compares present chemical concentrations with those of the recent past and biases its movement toward a better environment, a mechanism mediated by receptor methylation that functions as a short-term memory (Wadhams & Armitage, 2004). In functional terms, the bacterium is continuously asking whether things are getting better and acting accordingly. This is the minimal form of the Improvement pillar.

Multicellular and Human Levels

In complex organisms, improvement extends from physiological regulation to growth, learning, and development. In humans, White (1959) proposed that organisms possess an intrinsic motivation toward *competence*, an urge to interact effectively with the environment that explains exploration and play even in the absence of biological deprivation. Self-determination theory incorporates competence as a basic psychological need (Ryan & Deci, 2000), and Maslow (1943) placed self-actualization, the tendency to become everything one can become, at the apex of his hierarchy. At the collective level, the human desire to improve life drives technology, medicine, and institutions designed to enhance well-being beyond the individual.

Synthesis

Improvement describes a directional orientation toward betterment. Individuals high in this pillar would be expected to be growth-oriented, ambitious, and restless with the status quo, whether their focus is on themselves, others, or the world at large.

Pillar Three: The Desire to Control Life

Control is defined as the organism's tendency to regulate itself and to shape its environment so that outcomes fall within preferred bounds. Whereas Improvement concerns the *direction* of change, Control concerns the *regulation* of change: holding variables steady, managing uncertainty, and exerting influence.

Cellular Level

All cells exhibit homeostatic control, regulating internal pH, ion concentrations, and osmotic balance within narrow viable ranges (Cannon, 1932). Bacterial chemotaxis also displays precise adaptation: after responding to a change in attractant, the signaling system returns to its baseline sensitivity, allowing the cell to remain responsive across concentration ranges spanning several orders of magnitude (Wadhams & Armitage, 2004). Beyond self-regulation, microbes control their environments. Through quorum sensing, bacterial populations construct biofilms, protective extracellular matrices that modify local chemistry and shield the community from external threats (Miller & Bassler, 2001). Organisms therefore do not merely endure their surroundings; they alter them.

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Multicellular and Human Levels

In the free-energy framework, control is one of the two routes by which organisms reduce surprise: when the world does not match the organism's expectations, it may act to change the world (Friston, 2010). Sterling's (2012) allostasis model emphasizes that effective regulation is anticipatory, adjusting the body in advance of predicted demands. In humans, the need for control is well documented. Leotti et al. (2010) reviewed evidence that the perception of control is a biological necessity, that animals and humans prefer choice even when it confers no additional reward, and that the loss of control is associated with stress and helplessness. Bandura's (1977) concept of self-efficacy, the belief in one's ability to produce desired outcomes, is a robust predictor of persistence and achievement. Self-determination theory frames a related need, *autonomy*, as the experience of self-direction over one's own behaviour (Ryan & Deci, 2000).

Synthesis

Control describes the drive to regulate and influence. Individuals high in this pillar would be expected to seek structure, authority, predictability, and the capacity to shape outcomes; individuals lower in it would tolerate ambiguity and allow events to unfold.

Pillar Four: The Desire to Understand Life

Understanding is defined as the organism's acquisition and use of information about itself and its environment. It is the epistemic pillar: the drive to sense, model, anticipate, and ultimately comprehend.

Cellular Level

Even organisms without nervous systems build and use internal models of their environments. Tagkopoulos et al. (2008) showed that *E. coli* gene networks associate temperature and oxygen changes that co-occur when the bacterium passes into a host's gut, so that a rise in temperature triggers preparation for low oxygen before that change arrives. Mitchell et al. (2009) found comparable anticipatory regulation in yeast and bacteria, in which one environmental stimulus prepares the organism for a stimulus that typically follows. The slime mold *Physarum polycephalum*, a single giant cell, can find the shortest path through a maze (Nakagaki et al., 2000) and anticipates periodic environmental events, slowing its movement in advance of an expected cold, dry interval after only three exposures (Saigusa et al., 2008). These findings indicate that the capacity to encode regularities about the world, the rudiment of understanding, is present at the single-cell level (Lyon, 2015).

Multicellular and Human Levels

In the active inference framework, perception is the process by which organisms update internal models to better predict sensory input, the complement of action (Friston, 2010). With nervous systems, this modelling becomes learning and memory; with humans, it becomes curiosity, science, philosophy, and religion. Berlyne (1960) distinguished perceptual curiosity from epistemic curiosity, the drive for knowledge itself. Loewenstein (1994) characterized curiosity as a response to an information gap between what one knows and what one wants to know. Kidd and Hayden (2015) reviewed neuroscientific evidence that information can be intrinsically rewarding, engaging dopaminergic circuits that also respond to primary rewards, and Gottlieb et al. (2013) showed that information-seeking is a computationally distinct process that guides attention.

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Synthesis

Understanding describes the drive to know and to make sense. Individuals high in this pillar would be expected to be inquisitive, reflective, and motivated by explanation, sometimes valuing knowledge independently of any practical use.

The Compositional Model

Summary of Evidence Across Levels

Table 2 summarizes how each pillar is expressed across levels of biological organization, with representative supporting sources.

Table 2

The Four Pillars Across Levels of Biological Organization

Pillar	Single-celled organisms	Multicellular organisms	Humans	Key sources
Participation	Membrane exchange; quorum sensing; microbial cooperation	Cell-to-cell coordination; social living	Need to belong; relatedness; shared intentionality	Miller & Bassler (2001); West et al. (2007); Baumeister & Leary (1995)
Improvement	Chemotaxis toward better conditions	Growth, learning, development	Competence motivation; self-actualization	Adler (1966); Berg & Brown (1972); White (1959)
Control	Homeostasis; sensory adaptation; biofilm construction	Allostasis; action to change the environment	Need for control; self-efficacy; autonomy	Cannon (1932); Leotti et al. (2010); Bandura (1977)
Understanding	Anticipatory gene regulation; learned timing in slime mould	Perception, learning, memory	Curiosity; information-seeking; science	Mitchell et al. (2009); Saigusa et al. (2008); Kidd & Hayden (2015)

Formalizing the 100% Constraint

The central structural claim of the framework is that an individual's nature is a mixture of the four pillars whose proportions sum to 100%. Formally, the nature of individual *i* can be represented as a composition:

$$\mathbf{f(x)i = (}P_i + I_i + C_i + U_i\mathbf{),}\ P_i + I_i + C_i + U_i = \mathbf{1,}\ P_i + I_i + C_i + U_i > \mathbf{0}$$

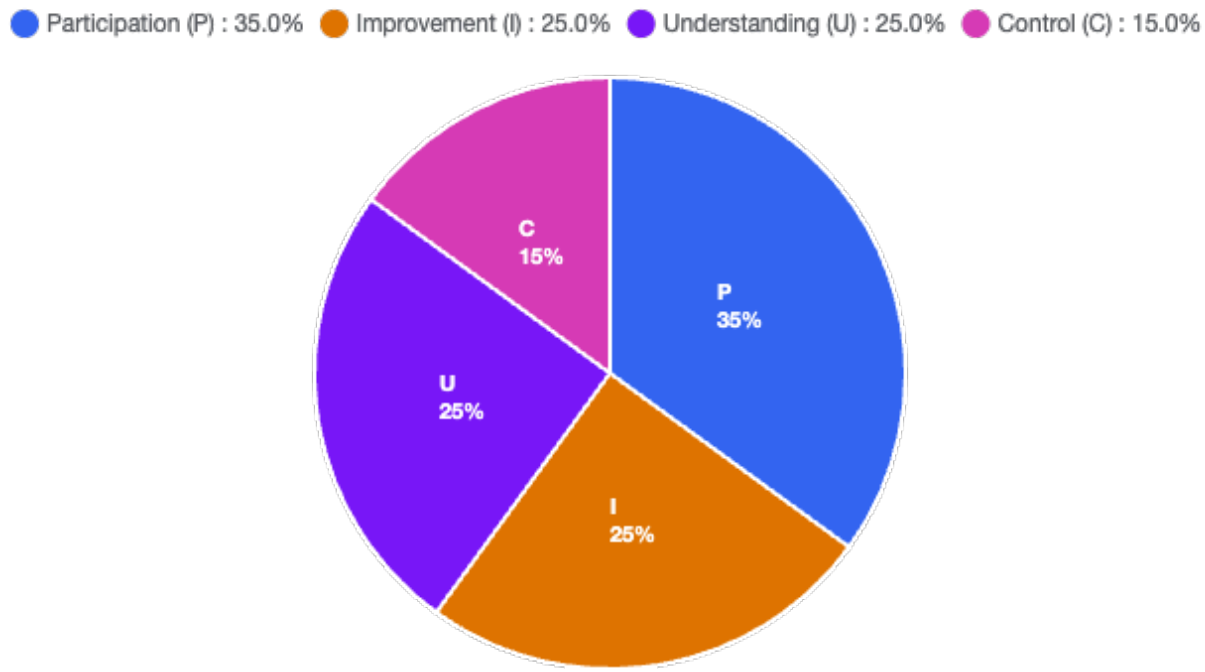
where P, I, C, and U denote the relative weights of Participation, Improvement, Control, and Understanding. The strict positivity condition expresses the claim, supported by the cross-level evidence above, that every living organism possesses all four pillars to some degree. Data of this kind are *compositional*: they carry only relative information, and standard statistical methods applied to raw proportions can produce spurious correlations. Aitchison (1982) developed log-ratio transformations that allow compositional data to be analyzed validly, and these would be the appropriate tools for empirical work on the pillars.

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Sampling the 100% Constraint

visual representation of the
four pillars framework compositional formula, showcasing how an individual's nature is distributed across Participation, Improvement, Control, and Understanding to sum exactly to 100%.

Figure 1
Sample Compositional Profile of Individual ‘i’



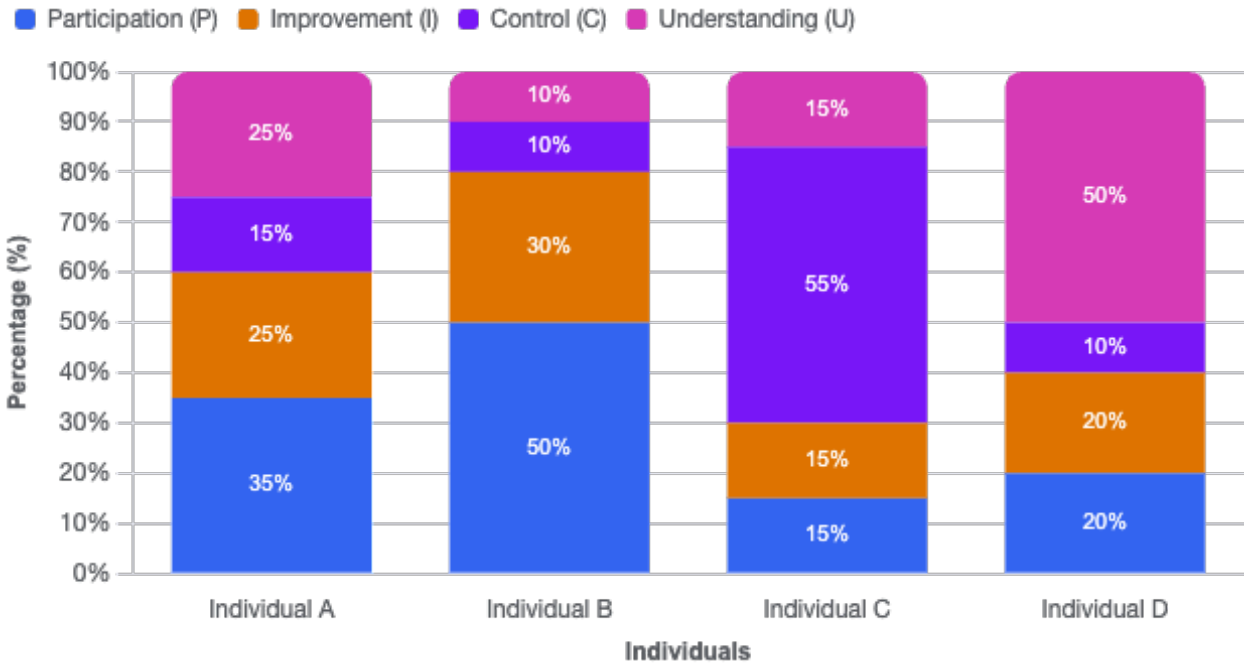
Key Properties of the Formula

- **Compositional Unity ($P_i + I_i + C_i + U_i = 1$):** Because the components are locked to a constant sum, an increase in any single pillar forces a relative decrease across the remaining pillars.
- **Strict Positivity ($P_i + I_i + C_i + U_i > 0$):** No pillar can ever equal 0%, meaning every organism inherently possesses all four traits to some degree.
- **Aitchison Log-Ratio Context:** Since standard linear statistical models assume independent variables, analyzing raw percentages like these directly introduces mathematical distortions (spurious correlations). To analyze this data empirically, the coordinates must first be transformed out of their restricted simplex space using log-ratio transformations.

Shifting Compositions Across Individuals
The stacked bar chart below compares four unique individuals. Even though every profile has vastly different internal priorities, each one perfectly resolves to **exactly 100% total composition**.

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Figure 2
Sample Pillar Weight Variations Among Individuals



Relation to Existing Models

The compositional structure is what most clearly sets the framework apart from existing models. In the Big Five, each dimension is scored independently, so a person can be high or low on all dimensions at once (Goldberg, 1990); the Big Five describe *how much* of each trait a person displays, not how a person's nature is *divided*. The Pillars model is instead *ipsative*: it describes the relative priority of drives within an individual. Ipsative measurement is well suited to comparing priorities within a person, though it limits direct comparison between people because the scores are interdependent (Baron, 1996). The nearest precedent is Schwartz's (1992) theory of basic human values, which treats values as a structure of competing priorities, but Schwartz's values are culturally learned and specific to humans, whereas the pillars are proposed as biological drives shared by all organisms. Self-determination theory is also related: relatedness aligns with Participation, competence with Improvement, and autonomy with Control (Ryan & Deci, 2000). The Pillars model goes beyond it by adding Understanding as a fourth fundamental drive, treating the four drives as a composition rather than as separately satisfied needs, and extending the structure beyond the human species.

The model need not assume that a profile is fixed. Fleeson (2001) showed that personality traits are best understood as density distributions of momentary states. Analogously, an individual's pillar profile may represent a stable central tendency around which momentary weights fluctuate with context, age, and circumstance.

Testable Predictions

1. **Measurement structure.** A forced-allocation questionnaire, in which respondents distribute 100 points across items representing the four pillars, should yield four separable factors after log-ratio transformation, with acceptable test–retest reliability.
2. **Behavioural validity.** Pillar weights should predict behaviour: high Understanding should predict information-seeking in choice tasks, high Control should predict a

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preference for choice over equal-value assignment (Leotti et al., 2010), high Participation should predict time allocated to social activity, and high Improvement should predict persistence on skill-building tasks.

3. **Trade-offs.** Under fixed resources of time or energy, increases in investment in one pillar should be accompanied by decreases in others, consistent with the compositional constraint.
4. **Cross-species continuity.** In microorganisms, the relative investment of a strain in exchange, growth, regulation, and sensing functions, measurable through gene-expression or metabolic budgets, should differ systematically across strains and environments, producing species- or strain-level profiles analogous to individual human profiles.

Why the Pillars Are Not a Psychometric or Sociometric Model

Because the framework assigns percentages to individuals, it can be mistaken for a personality test or a social-measurement tool. It is neither. The Pillars of Human Nature are a theory of what an organism's nature *is*; psychometric and sociometric models are methods for *measuring* people. The difference is one of kind, not of degree, and it rests on five distinctions.

What Psychometric and Sociometric Models Do

Psychometrics is the science of constructing instruments that quantify latent psychological attributes, such as intelligence, aptitude, or personality traits, from responses to standardized items (Lord & Novick, 1968). Its products are judged by technical criteria: reliability, construct validity, and fairness across groups (American Educational Research Association et al., 2014; Cronbach & Meehl, 1955). The Big Five inventories are the leading psychometric models of personality, and they were derived empirically from patterns of covariation in how people describe one another (Goldberg, 1990).

Sociometry, founded by Moreno (1934), measures the pattern of attraction, rejection, and influence *between* members of a group. Its instruments, such as peer nominations and sociograms, classify individuals by their position in a social network, for example as popular, rejected, neglected, or controversial (Coie et al., 1982). Its modern descendant is social network analysis, which models the structure of ties among actors (Wasserman & Faust, 1994).

Five Points of Difference

1. **Theory versus instrument.** A psychometric scale presupposes a theory of the attribute it measures; it does not supply one. Borsboom et al. (2004) argued that a test is valid only if the attribute exists and causes variation in test scores, which means the question of what the attribute *is* must be settled outside psychometrics. The Pillars framework operates at that prior level. It makes an ontological claim about the components of nature. Any questionnaire built from it would be one possible instrument for studying the theory, not the theory itself.
2. **Explanation versus description.** The Big Five summarize how people tend to behave and describe themselves; they were found by factor analysis of language, not derived from a model of why organisms act at all (Goldberg, 1990). The pillars are derived top-down from the functional requirements of being alive: exchange with an environment, maintenance of viability, regulation, and information-gathering (Friston, 2010; Maturana & Varela, 1980). They aim to explain *why* any organism has a nature, not only to describe how humans differ.
3. **Within the individual versus across a population.** Psychometric scores are interpreted against norms: a score means something relative to how others score. The

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pillars describe how a single organism's nature is divided among four drives. A profile of 40% Understanding is meaningful in itself, as the proportion of that individual's nature, without reference to anyone else. This intra-individual focus is consistent with evidence that the structure within a single person carries information that population averages conceal (Fleeson, 2001).

4. **The individual's orientation to life versus relations among people.** Sociometry measures relationships *between* individuals and locates each person in a group structure. The pillars describe each individual's relationship to *life itself*. Participation, the pillar closest to sociometric concerns, is not a person's popularity or network position; it is an organism's drive to engage with its environment and other living things, a drive present even in a bacterium that has no social standing at all (Miller & Bassler, 2001).
5. **All living things versus self-reporting humans.** Psychometric and sociometric methods require respondents who can answer items or name peers. The pillars apply to organisms that cannot, from single cells to animals, which no test or sociogram can reach. In non-human organisms, the pillars can be studied only through function, such as resource allocation, gene expression, and behaviour, which confirms that the framework is a biological theory rather than a test.

Table 3

The Pillars of Human Nature Compared With Psychometric and Sociometric Models

Dimension	Psychometric models	Sociometric models	The Pillars of Human Nature
Primary purpose	Measure latent traits or abilities	Measure relations within a group	Explain what an organism's nature is composed of
Type of claim	Measurement: how much of an attribute	Measurement: who relates to whom	Ontological: what nature consists of
Unit of analysis	Individual relative to population norms	Ties and positions in a group	Composition within one organism
Scope	Humans who can self-report	Members of a defined human group	All living organisms
Origin of categories	Empirical, from factor analysis	Empirical, from observed choices	Theoretical, from the functional requirements of life
Evaluated by	Reliability and validity	Network structure and status	Explanatory power and falsifiable predictions
Examples	Big Five inventories	Moreno's sociogram; peer nominations	The present framework

This distinction also clarifies the role of the testable predictions above. A forced-allocation questionnaire would be a psychometric *application* of the theory, useful for testing it in humans, but the theory would stand or fall on the full range of its predictions across species, not on the performance of any single instrument. The relationship is like that between the theory of temperature and a thermometer: the thermometer measures temperature, but it does not define what temperature is.

Discussion

The evidence reviewed supports the claim that four functionally distinct tendencies are present across the full range of living organisms: engagement with the environment, orientation toward

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betterment, regulation of self and world, and acquisition of information. Each has well-established mechanisms at the cellular level and well-documented elaborations in human psychology. The framework's original contribution is not the discovery of any single drive but the architecture that unites them. It gives all four a single object, life itself; defines an individual's nature as a composition of the four; extends that composition across the whole of biology; and separates nature, what an organism brings to life, from the condition, what life presents to the organism. No existing framework reviewed here combines these features, and none of the psychometric or sociometric models in common use attempts to, because they are tools for measuring people rather than theories of what an organism's nature is.

Limitations

Several limitations should be acknowledged. First, the pillars are not fully independent at the mechanistic level. Bacterial chemotaxis, for example, simultaneously involves sensing (Understanding), movement toward better conditions (Improvement), and adaptive regulation (Control). Future work must specify operational criteria that assign a given function to a single pillar or accept that some functions load on several.

Second, the use of desire-language for organisms without nervous systems remains philosophically contested. This paper adopts a teleonomic reading (Mayr, 1974), but critics may argue that the cellular phenomena are adequately explained by biochemistry without any reference to goals, consistent with Morgan's (1894) canon. The strength of the framework does not depend on resolving this debate, but its claims must be stated at the level of function rather than experience.

Third, the 100% constraint is a modelling choice that requires justification. It is plausible where resources such as time, energy, and attention are finite, but it is possible that some individuals are more strongly motivated across all four pillars than others. A compositional model cannot capture differences in overall motivational intensity, and a complete account may require a two-part representation: total drive strength plus its relative distribution.

Fourth, the framework has not yet been tested empirically. The predictions in the previous section are offered as a programme of research, and until a validated instrument exists, claims about individual profiles remain hypothetical. In keeping with Popper's (1959) criterion, the framework should be judged by whether its predictions survive attempts at falsification.

Future Research

Three directions are particularly promising. The first is psychometric: developing and validating a forced-allocation instrument and examining its relationship to the Big Five, Schwartz's values, and self-determination theory measures. The second is computational: active inference models could represent the pillars as distinct components of an agent's policy selection, allowing simulation of how different profiles produce different behaviour. The third is comparative: quantifying resource allocation to exchange, growth, regulation, and sensing functions across microbial strains and multicellular species, testing whether the compositional structure generalizes beyond humans.

Conclusion

The Pillars of Human Nature offer a new answer to an old question. They propose that an individual's nature is composed of their participation in life, the desire to improve life, the desire to control life, and the desire to understand life, held in proportions that sum to 100%. The framework is original in its structure: a single referent for all four drives, a compositional

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definition of individuality, a reach that extends from bacteria to human beings, and a clear distinction between human nature and the human condition. Where accounts of the human condition describe the givens that every person must face, the pillars describe the inner composition with which each person, and each living thing, meets those givens. The review presented here shows that each pillar corresponds to a fundamental, evolutionarily conserved function of living systems. Human nature, on this view, is not a break from the rest of biology but its most elaborate expression. The framework's central compositional claim now awaits the empirical testing that would establish it as a scientific theory.

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