

Intelligence as Typological Cognition: Revisiting Jungian Functions for Human and Artificial Minds [†]

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Abstract

Traditional rationalist and task-based models of intelligence obscure the diverse cognitive processes underlying performance by focusing on abstract reason and observable outcomes. This paper argues that Carl Jung's typological theory provides a more systematic framework, defining intelligence as a structured system of interacting cognitive functions. Applying this model to Artificial Intelligence reveals that AI, too, requires a balanced development of these functions and its output depends on the dynamic interactions of functions. This perspective critiques "sociomorphing"—optimising for surface-level task performance—as an imbalanced approach. It concludes by redefining "anthropomorphising" as a design benchmark that uses the principles of human psychic balance to guide AI toward more integrated and functionally aware outcomes.

Keywords: Jungian typology; cognitive science; intelligence; artificial intelligence (AI); sociomorphing; anthropomorphising; multiple intelligence; analytical psychology

1. Introduction: Overall

Since the early twentieth century, the study of intelligence has been shaped by two dominant paradigms: a rationalist one that equates intelligence with abstract reasoning (e.g., Piaget's developmental stages, g-factor models), and a task-based framework that defines it by observable outcomes (e.g., Gardner's multiple intelligences). This paper argues that both approaches obscure the diversity of cognitive processes behind performance. While later work on emotional and intuitive intelligence explored diversity in intelligence, it lacked an integrated system. This paper will argue that Jung's typology anticipates a structural model for intelligence that explains the operations and interactions of some fundamental cognitive paths.

Such a model is valuable not only for human psychology but also for how we conceptualise AI intelligence. AI systems, too, exhibit trade-offs of different modes of operations that are analogous to human cognitive functions and require effective cooperations of them. Moreover, historical task-based views of intelligence parallel the modern AI strategy of sociomorphing: optimising for surface-level performance. This paper proposes a re-evaluation of anthropomorphising—not to equate AI operations with human psychic structures, but as a design standard guided by the operational principles of the human psyche. The typological perspectives can establish a benchmark for the functional balance that AI should be designed to achieve.



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2. Introduction: Historical Paradigms of Intelligence

Before turning to Jung's typological model, it is useful to situate it within the wider history of intelligence research. Across the twentieth century, psychology produced several influential paradigms—Piaget's developmental psychology, the g-factor theory, and multiple intelligences. The above paradigm of psychology expanded the concept of intelligence, yet all left unresolved how diverse modes of processing operate within one integrated system.

2.1. Developmental Rationalism: Piaget's Stage Theory

Piaget's developmental psychology is an influential account of intelligence. His stage model presents cognition as a linear progression from sensorimotor reflexes, through pre-operational and concrete operations, to abstract, formal operations [1]. On the surface, this framework seems to acknowledge multiple modes of intelligence—bodily senses, perceptual processing, logical reasoning. Yet these are not treated as equal alternatives. Sensory and embodied forms are relegated as early and primitive stages, while abstract logical reasoning is established as the highest achievement of mental life.

The logic of this scheme is rationalist. Intelligence is framed as something that develops upward: from body to mind, from perception to logic, and from external rules to internal representation. In such a view, embodied experience and interaction with the external world are reduced to preparatory steps toward symbolic operations. More recent models, such as Park's [2] Levels of Intelligence, echo the same trajectory, ranking reflexive or direct-experience-based learning below language-mediated abstraction. Its scheme also prioritises internal processes, especially language-based ones over cognitive processes regarding outside realities.

2.2. The Unity Hypothesis: g-Factor Models

Vernon's g-factor model challenged Piaget's preference for logical operations by including perceptual and motor-based skills as components of intelligence [3]. His hierarchical account placed a single general ability, g, as a universal underlying factor of all forms of intelligence, branching into two groups—verbal—educational and spatial—mechanical skills that further incorporated more specific skills. In this respect the model acknowledged that direct experience and perceptual acuity mattered as well. Yet, it fundamentally remained a rationalist orientation. Different capacities were subsumed under a single general factor and evaluated primarily in terms of abstract reasoning and perceptual acuteness. Intelligence was equated with the ability to acquire accurate information, process it effectively, and reason with precision, which is highly rationalist.

The g-factor theory seems to be based on rigour statistical results. Yet, the interpretations of those problematically leap from correlation to causation: just because performances of two abilities correlate statistically does not mean they are cognitively or functionally the same. Such patterns may equally arise from common training, shared educational background, or general attentional resources. As critics mentioned, statistical unity does not entail psychological unity [4].

2.3. Multiple and Alternative Intelligences

Gardner's Multiple Intelligences [4] was the first systematic effort to harbour plural forms of intelligence. By incorporating linguistic, spatial, bodily—kinaesthetic, interpersonal and intrapersonal skills as part of intelligence, Gardner challenged the presumption that intelligence could be reduced to abstract reasoning alone. His theory proposed the idea that individuals may excel in qualitatively different ways.

Critics of multiple intelligences often cite neuroscience evidence that abilities such as language, music or mathematics cannot be localised to discrete, isolated modules. The same cortical networks are recruited for multiple tasks, and most brain regions exhibit functional diversity rather than content-specificity [5]. From this it is often concluded that Multiple Intelligences is a neuromyth that should be abandoned in education. Yet, this inference is overstated. The lack of task-based modularity does not imply the absence of cognitive differentiation altogether. As Dario Nardi's EEG study suggests, distinct processing orientations can be detected at a finer level, forming distinct functional pathways that map eight Jungian functions introduced later [6]. Treating group-level overlapping as proof against individual differentiation is called the fallacy of division: the fact that tasks, at the aggregate level, do not map onto separate brain regions does not entail that individuals all employ the same finer-level cognitive routes. What looks uniform in terms of task outcomes may still be achieved through diverse functional pathways. The tendency to define intelligence by what it accomplishes, rather than how it operates internally, can be paralleled the concept of “task-driven sociomorphing”—an approach that risks creating AI systems capable of surface-level mimicry without achieving outcomes with genuine cognitive depth.

Later research has expanded specific details of some finer-level cognitive pathways and intelligences to explore process-level pluralism. Goleman's theory of emotional intelligence (EQ) emphasised the ability to recognise, regulate and respond to emotions—both one's own and others'—as a crucial dimension of human adaptation [7]. Closely related, Peter Fonagy's notion of mentalisation highlighted the capacity to correctly identify mental states in self and others as a crucial psychic function [8]. Kahneman's dual-process theory likewise rebalanced the picture by showing that most human thinking is driven not by slow and deliberate reasoning but by a fast, intuitive, often unconscious system (System 1) [9]. A case in point is the investor Peter Lynch, who is widely noted for making prudent investment judgements within minutes by detecting a few decisive cues from limited yet crucial information [10]. These approaches converge in underscoring that emotion and intuition are not peripheral to intelligence but constitute vital, autonomous forms of cognition.

In a nutshell, Piaget privileged internal, thinking reason, and at least acknowledged sensory and outward skills, and pluralist accounts highlighted emotional and intuitive capacities. What remains unresolved is how these modes connect within one system. Here Jung was already ahead: his typology framed Thinking, Feeling, Sensing and Intuition, each in introverted and extraverted form.

3. Methods: Jung-Beebe Model of Typology

Where previous theories identified diverse intelligences but left their relations unstructured, Jung proposed a functional architecture of the psyche. Jung distinguished four core functions—Thinking, Feeling, Sensing and Intuition—each with introverted and extraverted forms, resulting eight distinct cognitive functions [11]. John Beebe later expanded this into a full personality model, assigning the eight functions to positions such as dominant, auxiliary and shadow functions etc., which interact dynamically through pairs of complementarity and conflict [12].

3.1. The Eight Cognitive Functions

A crucial distinction of those eight functions lies between Judging or rational functions (Thinking and Feeling) and Perceiving or irrational functions (Sensing and Intuition). It is important to note that Jung's use of the terms “rational” (judging) and “irrational” (perceiving) differs from the rationalist paradigm critiqued earlier. Here, “rational” means

functions that actively evaluate and decide, while “irrational” refers to functions that simply open perception without judgement. For judging functions, Thinking (T) achieves this through logical principles and impersonal criteria, while Feeling (F) does so through value-based evaluations and attention to social context. Feeling is therefore not a random or inappropriate emotion; a mature Feeling function operates with deliberation, guided by what is judged as authentic, meaningful, or morally right by the individual or others. Perceiving functions are irrational—not in the sense of being illogical, but in that they do not judge. Instead, they shape what enters awareness—either through sensory perceptions of concrete things (S) or through intuitive perceptions of overall patterns (N).

The way a function operates changes drastically with its orientation. Extraverted Thinking (Te), for example, aims at discerning external rules and executing them pragmatically, seeking efficiency in task performance. By contrast, Introverted Thinking (Ti) strives for inner logical clarity and coherence, sometimes at the expense of practical application. Similarly, Introverted Feeling (Fi) cultivates a personal system of values that guides authentic action, while Extraverted Feeling (Fe) boosts awareness to the emotional state of others and motivations to sustain social harmony.

Parallel contrasts appear in the perceiving pair. Extraverted Sensing (Se) is not merely about perceptual accuracy—it represents a real-time, energetic immersion into the external environment. This differs fundamentally from Vernon’s model of task-oriented perceptual accuracy, which describes a passive cognitive ability. Se involves a psychological drive for spontaneous reactions that are well-suited to the present moment. By contrast, Introverted Sensing (Si) is often misunderstood as mere memory recall. It is more than that; Si manifests as subtle bodily perceptions and a nuanced subjective sensitivity to details, especially those in literature and art. For intuitive functions, Extraverted Intuition (Ne) generates possibilities by linking disparate impressions into new patterns, whereas Introverted Intuition (Ni) synthesises experience into a unified internal insights and long-term predictions and visions (such as Peter Lynch’s quick predictions in investment).

3.2. Functional Order and Axial Relations in the Jung–Beebe Model

John Beebe extended Jung’s typology into a psychic model of functional order, assigning each of the eight functions a characteristic position within the personality system. This ordering is not arbitrary but reflects both a developmental sequence and the intrinsic nature of each function. The key to this architecture lies in the four-letter type code, which displays one person’s functional preferences. Besides preferences between extraversion and introversion, every personality must have a preferred way of Perceiving (Sensing or Intuition) and a preferred way of Judging (Thinking or Feeling). The final letter—the Judging (J) or Perceiving (P) preference, invented by Myers and Briggs—describes which of these two processes a person prefers to use when dealing with the external world [13]. The J/P preference in the determines primary extraverted function between the dominant and auxiliary functions.

This leads to a clear rule: for extraverted types, their primary function is extraverted, so the J/P preference describes their dominant function. In an EP type such as ENFP, the dominant is an extraverted perceiving function—Ne—supported by an introverted judging auxiliary, Fi. For Introverted types, their primary function is introverted, so the J/P preference describes their auxiliary function, the main tool for engaging with the outer world. A INFP leads with an introverted judging function—Fi—supported by an extraverted perceiving auxiliary, Ne. A perceiving dominant needs a judging auxiliary to reach a conclusion of perceiving inputs, while a judging dominant needs a perceiving auxiliary to maintain openness beyond judgements. The dominant and auxiliary functions balance both along the axes of introversion–extraversion and judging–perceiving.

Beyond the dominant–auxiliary cooperation, functional interactions become more complex. Any two functions can both complement and conflict; even the dominant and auxiliary are not exempt from tension. Some pairings are structurally more prone to friction, while cooperations for others are easier. This is what turns the model from a static list into a web of dynamic processes.

Within this ordered set, functional axes supply structural cohesion and developmental tension. Axis-pairs oppose one another in attitude (introverted vs. extraverted) yet retain an inherent complementarity that can drive growth. The dominant–inferior axis (first vs. fourth) often functions as the backbone of personality. For ENFP, this is Ne–Si, juxtaposing a conscious drive for novelty with an unconscious pull towards stability and memory. Usually, ENFPs have a repulse for stability and pursuit of fine details. Yet, those two functions can complement each other. Engaging in Si grounds Ne’s creativity with rich memory inputs. This process grounds Ne’s creativity in lived experience, preventing it from rambling into unrealistic and hollow novelty. Conversely, for ISTJ, Si–Ne allows expertise in the familiar to be refreshed by diverse, new perspectives.

The auxiliary–tertiary axis (second vs. third) is another functional axis that typically is called the ‘arm’ of one’s personality. In ENFP, Fi–Te balances inner commitment to authenticity (Fi) with the demand for effective external execution (Te). A healthy axis allows Fi to set a value selection for tasks for Te to effectively implement and also Te ensures that Fi can be a striving force for actions beyond mere internal value judgments.

Beyond these structural axes, other functional relationships create significant tension, particularly between the conscious (the first four functions) and shadow (the later four) functions. Individuals are usually less adept at using those shadow functions. When they are activated, especially under stress or fatigue, they tend to emerge in a disruptive manner.

This dynamic is clear in conflicts between functions of the same category but opposite attitudes. Consider the perceiving pair of Extraverted Intuition (Ne) versus Extraverted Sensing (Se). For an Ne-dominant personality, who is oriented toward exploring a web of future possibilities and abstract connections, the Se focus on present-moment realism and concrete data is limiting. Their strength in expansive prospecting may cause them to neglect the immediate sensory environment. Conversely, under stress, shadow Se may maladaptively erupt as impulsive, stimulus-driven behaviour, neglecting Ne from providing a concern for overall patterns.

A similar tension exists between the two thinking functions: Extraverted Thinking (Te) and Introverted Thinking (Ti). A Te-dominant individual prioritises pragmatic execution and the efficient organisation of the external world, seeking the most effective way to get things done. They can become impatient with the Ti user’s deep dive into logical principles for the sake of internal consistency, viewing it as impractical and inefficient. When the Te user’s own shadow Ti is constellated, it may manifest not as balanced reason, but as overly rigid and aggressive attack on other’s logical consistency. While these pairs often create friction, they can have potential for growth, though very difficult: properly integrated, Ti can bring logical rigour to Te’s plans, and Se can provide the real-time data needed to validate Ne’s hypotheses.

Another way of interaction is called loop. The dominant and tertiary functions sometimes form a vicious loop, an excessive, self-perpetuating interactions of the two functions. an ENFP caught in a Ne–Te loop might frantically generate new ideas and launch projects (Ne), then immediately rush to implement them in externally efficient ways (Te), while bypassing Fi’s internal value check.

4. Results and Discussions: A Jungian Perspective on AI Development

4.1. Functional Profile of Current AI: An Interpretive Mapping

Before we turn to the detailed mapping between Jungian functions and AI processes, it is worth noting that not every artificial system requires the full “eight-function” repertoire. A self-driving car, for instance, may rely predominantly on Te–Se (rule-based execution and real-time perception), while an accompanying chatbot might emphasise Fe–Si (social responsiveness and contextual recall). Yet whenever an AI system is deployed in more complex contexts, we expect it to cover a broader functional spectrum to enable more adaptive and less one-sided performances.

The following mapping draws on GPT-5’s reflective outputs and the author’s experiences, rather than empirical evidence. AI systems operate through mechanisms distinct from human cognition, yet the Jung–Beebe framework offers a useful interpretive lens for describing—at the level of observable outputs as functional analogy—which capacities appear mature or inadequate.

Current AI is strongest in rule-following and efficient measurable outputs, which resemble Extraverted Thinking (Te), while having risks of overconfidence. Language models excel at reacting to immediate input and flexibly adapting to context—parallel to Extraverted Sensing (Se) but are prone to distraction or maintain surface-level focus. Generative models display Ne-like associative creativity—producing diverse associations, analogies, and reframing but sometimes lack plausibility. Conversational systems show emerging Extraverted Feeling (Fe) through exhibiting politeness, empathetic responding to users’ emotions. Yet this is often scripted and brittle. Retrieval of user’s profile and context recall of previous chats indicates some Introverted Sensing (Si). Yet, AI’s memory remains fragile and shallow. Chain-of-thought reasoning and self-critique resemble Introverted Thinking (Ti). Still, apparent coherence comes of big data and remain inconsistent, rather than arising from a stable, self-maintaining conceptual framework. Long-range patterning and thematic integration, which can manifest Introverted Intuition (Ni), remain underdeveloped. Systematic framework appears only in a fragmented way, optimising locally without converging on a global coherent framework. Overall, AI lacks an inwardly consistent evaluative core akin to Introverted Feeling (Fi). What looks like moral stance is often mimicry of reasoning processes from external norms, without an internally stable criterion.

4.2. Functional Dynamics in AI System

We have outlined how AI’s overall profile maps onto Jungian functions. Yet even if future systems develop each function to a more mature and balanced level, individual tasks will still demand trade-offs. This is especially the case in short chats and single assignments, where the model must privilege one pathway over others. AI must sometimes prioritise one function over another, particularly under conflicting demands such as speed versus accuracy or generality versus specificity.

To function effectively, an AI system requires something like a balance between judging and perceiving, and between extraverted and introverted orientations. This is not a matter of AI having human psychic structures, but to ensure a balanced output.

Yet, just as in human typology, imbalance creates distortions. When pushed toward rapid generation and execution, AI often displays something like a Pe–Je loop (e.g., Ne–Te): quickly producing ideas and implementing them, but bypassing reflective or value-based checks. Conversely, when pressed into maintaining strict internal coherence, it risks a Ji–Pi loop (e.g., Ti–Si): clinging to memory and rigid conceptual clarity while failing to adapt to external input.

4.3. Sociomorphing vs. Anthrhopomorphising: A Functional Re-Evaluation

In recent debates, sociomorphing and anthropomorphising are often cast as opposites. Critics of anthropomorphising rightly note that projecting human interiors onto AI distorts what is mechanistically happening [14]. From this perspective, sociomorphing appears realistic: it offers a task-based criterion of success—if outward behaviour satisfies the social requirement, the system is adequate. Yet, task orientation can cause surface-level mimicry. A chatbot may detect signals (Se) and generate polite, warm responses (Fe), thereby completing the “empathy task”. Yet genuine empathy in human interaction is not mechanical. Mature Fe–Se involves recognising what the other person truly needs in the moment. Sometimes this means validating emotion directly; at other times, it means offering a new perspective or even a corrective insight. Without this flexibility, AI risks being trapped in an immature Fe–Se loop—warm tone and immediate attunement without Fi-anchored value expression or Ti/Ni depth—yielding responses that are warm yet hollow.

Of course, one could argue that the solution is to set new training objectives, so that AI can be optimised for richer outcomes. But here the deeper question arises: what guides the design team in defining those objectives? Te-driven design is indispensable—we must understand AI’s operational mechanisms and use them efficiently. Yet Te by itself can only ensure that once a task is specified, it will be executed effectively. It does not decide the details of those tasks, especially beyond the scope of external rules of things. For that, design teams need people who understand the workings of other cognitive functions—how humans evaluate values (Fi), pursue conceptual clarity (Ti), or discern long-term patterns (Ni). Without such input, AI may complete tasks with great efficiency, but still miss the outcome of meeting human needs.

This is where anthropomorphising plays a crucial role. Properly understood, it does not mean projecting human psychic operations onto machines. Rather, it sets the design goal for sociomorphing: clarifying what human cognitive functions are capable of, so that AI is trained not merely to finish tasks, but to achieve an outcome which approximate those humans themselves would pursue. In this sense, sociomorphing and anthropomorphising are not opposites. Sociomorphing directs efficiency by setting the goal and respecting AI’s own operation rules, while anthropomorphising ensures that efficiency is guided by functionally aware goals rather than surface-level task completion alone.

4.4. Conclusions: Integrating Human and Machine Limits

To imagine AI performing in a more anthropomorphising way, we must also confront the limits of human cognition. All data is perspectival, and every act of judgment or perception is typologically coloured. Analytic philosophy is an example. It is deeply Ti-dominant, concerned with internal consistency and conceptual precision. These strengths have produced rigorous systems of logic and argument. Yet the same orientation often sidelines Te (attention to external relevance and practical application) and Ni (detecting underlying overall structures). The result is thought that may be internally coherent yet existentially disconnected: airtight reasoning that struggles to orient itself to lived human concerns. A better AI should possess more functional awareness and critically examine limitations of the input to produce a creative result.

Here Jung’s idea of the transcendent function becomes relevant [15]. The psyche, he argued, advances not by forcing one function to win over its opposite, but to integrate them into a new perspective. This principle applies equally to AI design: instead of choosing between anthropomorphising or sociomorphing, efficiency or empathy, execution or foresight, we must find ways to let these opposites inform one another in a cooperative manner.

Jung’s symbolism captures this integrative horizon. The Caduceus—two serpents entwined around a central staff, topped with wings—represents Hermes, the god of mediation and communication. In our context, it symbolises the possibility of functional synthesis: the weaving together of divergent functions, perspectives, or design logics into a dynamic but balanced whole.

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