Toward an Integrated Theory of the Mind

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Abstract

This article presents an innovative theory of mind that unifies cognition, emotion, and action, moving beyond traditional disciplinary boundaries. Our model is firmly centered on the experience of the acting/perceiving subject. The dynamism of the mind is grounded in the Prognostica Mens (PM), which we define here as the central mental organ whose intrinsic mode is anticipation/verification. The architecture of the PM rests on two complementary mental sub-organs, the Holistic Self (HS) and the Quantum Self (QS). These two sub-organs constitute the structural pillars of the Interpretive System, establishing two opposing yet complementary modes of operation: a constructive function that generates experiential models through morphogenetic processes, and a deconstructive function that, through selection and separation, enables the mind to adapt. Knowledge and action take form through two universal constructive processes, Symmetric Morphogenesis and Asymmetric Morphogenesis, which are intrinsic to all domains of the mind. These functions and processes manifest themselves in three evolutionary functional realizations: the Ego Agens (EA), the Ego Socialis (ES), and the Ego Cogitans (EC). A unifying principle that orchestrates the dynamism of the entire theory is the pursuit and maintenance of dynamic equilibrium.

Keywords: Mind, Cognition, Embodiment, Prediction, Holistic Self (HS), Quantum Self (QS), Prognosis, Morphogenesis, Equilibrium.

1. Introduction: The Mind as an Active Architect of Reality and Seeker of Dynamic Equilibrium

The complexity of the human mind has always fascinated scholars. Traditionally, studies have often focused on separate functional domains. However, our view suggests that these do not operate in isolation but rather are expressions of an integrated and dynamic system (Damasio, 1994; Pessoa, 2013). While modern neuroscience offers rich details on neural mechanisms, its approach can make it difficult to describe complex mental functions in purely mechanistic terms. The traditional framework often fails to explain how distributed neural activity gives rise to unified functions

To overcome these difficulties, this article proposes a new theory of mind centered on the acting/perceiving subject. The theory is structured around the Prognostica Mens (PM), the central mental organ that orchestrates the entire dynamics of mind through a universal operational mode: anticipation and verification. The PM, with its anticipation/verification mode, is expressed in three functional manifestations that we call the "Egos" (Ego Agens, Ego Socialis, and Ego Cogitans). The Ego is a dynamic product of PM activity that reflects specific stages of evolutionary development and contributes to our ability to interact with the world. Underlying the mental dynamics—including the

PM's anticipation/verification processes and symmetric and asymmetric morphogenesis—are two complementary and pervasive mental sub-organs: the Holistic Self (HS) and the Quantum Self (QS). These two Selves not only form the mind's support structure but also generate the Interpretive System, a fundamental system that contains the schemas and models needed for deciphering somatic and external reality. The entire dynamics of the mind are activated and driven by the ultimate purpose of the PM, which is to achieve and maintain the system's equilibrium. This goal, which ensures the coherence of experience and facilitates fluid transitions between the Ego's manifestations, is pursued thanks to the support and energy provided by a Motivational System that acts as the engine of the entire mental operation.

2. The Prognostica Mens: The Central Mental Organ and the Pursuit of Equilibrium

The Prognostica Mens (PM) stands as the unifying and central mental organ that orchestrates the entire dynamics of mind. From the perspective of the acting/perceiving subject, the PM is the fundamental and intrinsic operational mode of "knowing how," which is the ability to constantly generate predictions (anticipations) about one's own state and the environment, and to verify them against incoming sensory inputs. From the perspective of an external observer, this same process is what we refer to as the nervous system: a complex network of cortico-cortical and cortico-subcortical neural circuits that interact with data from sensory receptors.

The PM operates with the intrinsic goal of achieving and maintaining a constant equilibrium: an internal equilibrium (homeostasis), an equilibrium between the self and the environment, and an equilibrium within the environment itself. Every single mental process, from the simplest perception to the most complex act of thought, is based on the pursuit and maintenance of this state of dynamic equilibrium. This incessant anticipation/verification cycle guides action and perception at all levels of experience and is activated and driven by pervasive energy provided by the Motivational System, which we define as the PM's supporting organ and which provides the "why" for acting through needs and goals, always in the pursuit of dynamic equilibrium.

The Duality of the Prognostica Mens: Predictiva and Responsiva

Within the Prognostica Mens, our model distinguishes a functional dichotomy that is expressed at the level of "knowing how": the Predictiva Mens (PdM) and the Responsiva Mens (RM), which we define

as operational modes of the PM organ, activated based on context. The PM does not actively choose which state to activate; the operational mode emerges automatically from the nature of the sensory input. The prediction error acts as a transition signal, rendering a separate choosing organ superfluous.

- Predictiva Mens (PdM): This operational mode is activated in known and routine situations, where the cognitive system relies on consolidated models to achieve a motivational goal with high certainty. The operation is fluid, efficient, and almost automatic. At an emotional level, it generates a sense of security and trust.
- Responsiva Mens (RM): This operational mode comes into play in novel, uncertain, or unexpected contexts that require flexibility and adaptation. Its anticipations are probabilistic. Attention is higher, the search for feedback is more intense, and model updating is a priority. It is activated both in anticipation of uncertainty and, retrospectively, in response to prediction errors. At the emotional level, it can generate curiosity, caution, or anxiety

This distinction does not imply that the two operational modes act in isolation, but that their mutual dynamic interaction and functional balance define the state of the mind

3. Comparison with Karl Friston's Free Energy Theory

Our theory shares fundamental principles with Friston’s (2010) Free Energy Principle but distinguishes itself by virtue of its conceptual architecture and philosophical implications.

Points in Common

- Anticipation and Verification as the Central Operating Principle: Both theories are based on the idea that mental activity is a process of anticipation/verification, in which the organism generates predictions about the world and compares them with sensory inputs.
- Minimization of Error and Pursuit of Equilibrium: Friston argues that biological systems minimize "surprise" (prediction error) to keep sensory entropy low. In our theory, the PM operates to achieve and maintain a state of "dynamic equilibrium," a concept functionally similar to the minimization of surprise.
- Perception–Action Interconnection: Both Friston's theory and our theory conceive perception and action as inseparable aspects of mental functioning, where perception guides action and action modifies perception.

Points of Distinction

- Conceptual Architecture and Mental Organs: Friston describes the brain as an "inference machine" without postulating specific mental "organs" or "selves." Our theory, by contrast, proposes a richer, more articulated structure, with mental organs such as the PM, HS, QS, and the functional manifestations of the Ego, which provide a more detailed descriptive framework
- Role of Emotions: While emotions are not an explicitly integrated component of Friston's model, our theory explicitly incorporates them alongside cognition and action. The PdM and RM generate distinct emotions (security vs. curiosity/anxiety), making them an integral part of the mental architecture.
- Neurophysiological Grounding: Friston focuses on hierarchical cortical models. Our theory offers a more specific and original neurophysiological grounding, identifying alpha (αMNs) and gamma (γMNs) motoneurons as the mechanisms that support the functioning of the PdM in familiar contexts and the attentional processes of the RM in uncertain contexts, respectively.
- Philosophical Stance: Friston's model accepts implications of Cartesian skepticism, viewing the brain as inferentially isolated from the external world. Our theory, by contrast, is based on an integrated view, where the mind is deeply rooted in the body and the world, overcoming the idea of a rigid boundary and promoting a more holistic view of experience.

4. The Holistic Self (HS) and the Quantum Self (QS) as Complementary Mental Organs

The Holistic Self (HS) and the Quantum Self (QS) are the complementary and pervasive mental sub-organs that constitute the very foundation of the mind. They are the structural sub-organs of the PM, necessary and sufficient for its operation. No other organs are needed. They represent the two fundamental and complementary ways in which all organisms with a nervous system perceive, act, and acquire knowledge.

- The HS is the sub-organ of synthesis and selection. The HS's task is to create unity and coherence. Its constructive function is synthesis: it unifies parts into a meaningful whole, a "Gestalt" where the whole is greater than the sum of its parts (Koffka, 1935). For example, it processes a face as a unified whole. Its equally crucial deconstructive function is selection: it

isolates an individual part from the whole to allow for its recognition, without, however, separating it. For instance, the ornithologist recognizes the lark by its beak

- The QS is the sub-organ of Analysis and Separation. The QS is the mirror-image opposite of the HS. Its constructive function is the encoding of an ordered set of elements positioned in space or time. Its deconstructive function is separation: it disjoins an element from a cohesive set. In overlapping Ghent figures, for example, it is the QS that separates one figure from the other to allow each to be analyzed individually.

Our theory proposes that HS and QS perform dual perceptive and executive functions. This implies that the perceptual modes (the "what" and the "where") not only inform but also directly guide action.

5. The Construction of Reality: Morphogenesis as a Constructive Function

Symmetric Morphogenesis and Asymmetric Morphogenesis are the universal constructive processes of the HS and QS that operate in all functional realizations of the mind to generate knowledge and action. Their difference lies in the fundamental principle of symmetry and dynamic equilibrium. Quanta—that is, the minimum units of experience encoded by the PM—are the entities that are structured through morphogenesis. It is important to note that an experience becomes conscious only when the entire operation of the PM, orchestrated by the HS and QS, integrates these quanta into complex experiential models and relates them coherently.

- Asymmetric Morphogenesis: This is a process of asymmetric equilibrium based on the non-equivalence of the weights or values of quanta, where one quantum is dominant and one is sub-dominant. This equilibrium can emerge through the breaking of a pre-existing symmetry (e.g., walking) or from the combination of intrinsically different elements (e.g., the relationship between vowels and consonants in language). In both cases, the HS performs the synthesis of the elements, while the QS encodes them as an ordered set.
- Symmetric Morphogenesis: In contrast, this is a process of symmetric equilibrium. It is based on the equivalence of weights or values of quanta, where the parts contribute equally to the formation of an emergent whole. It is a process that maintains symmetry between elements to create a coherent and unified entity, such as the abstract concept of "justice." In this case, the HS realizes the indivisible entity, while the QS organizes and relates the numerous discrete elements that compose it into a cohesive and ordered whole.

6. The Functional Realizations of the Mind: The Three "Egos" of Evolutionary Experience

In our theory, we introduce three functional realizations, or "Egos," which represent the operational manifestations through which the PM is articulated. The Ego is not a separate organ but the functional product of the PM's activity in a given domain of experience, evolved in response to needs and disruptions in equilibrium. Its activities are activated and driven by the Motivational System, which provides the energy to act in response to needs and equilibrium disruptions. In addition to being activated by motivation, the mind makes use of the Interpretive System, generated, as we have seen, by the HS and QS. The Ego's function is to orchestrate and manifest the PM's operations in their respective domains of competence, allowing the subject to achieve and maintain equilibrium.

The distinction between the three Egos is based on evolutionary levels of structural organization of the nervous system, which evolves progressively. Each of these levels adds new neural structures that allow the PM to operate in increasingly complex functional domains.

- The Ego Agens (EA) is the most primitive and phylogenetically ancient functional realization, present in all animals. It is the most direct manifestation of PM activity in the physical-motor domain, anchored to the basic organizational structure of the nervous system. A skilled athlete who performs complex movements with precision embodies the PdM. A child taking their first steps, on the other hand, activates the RM, adapting and learning through careful exploration.
- The Ego Socialis (ES) is the second functional realization, which evolved in birds and higher mammals. Its operation is based on the organizational structure of the Ego Agens, with the addition of new neural structures dedicated to social and emotional processing. It constitutes a more complex articulation of the predictive method in the social and emotional domain.
- The Ego Cogitans (EC) is the third functional realization, exclusive to human beings, and represents the most abstract and sophisticated articulation of the PM in the cognitive and symbolic domain. Its functionality is based on the organizational structure of the Ego Agens and Socialis, with the addition of highly specialized structures such as the phonoarticulatory system and brain areas dedicated to language and abstract thought. It is the faculty that allows for abstract thought, complex planning, and the generation of narratives (Deacon, 1998).

The distinction between these "Egos" is necessary to explain the differences in the nervous system across animals and humans, while maintaining the same basic operating principles (PM, HS, QS).

7. The Operational Model of the Prognostica Mens

We can visually represent what we have laid out here about the PM and its function, and about its constituent organs, their relative functions, and the processes that realize them in Figure 1.

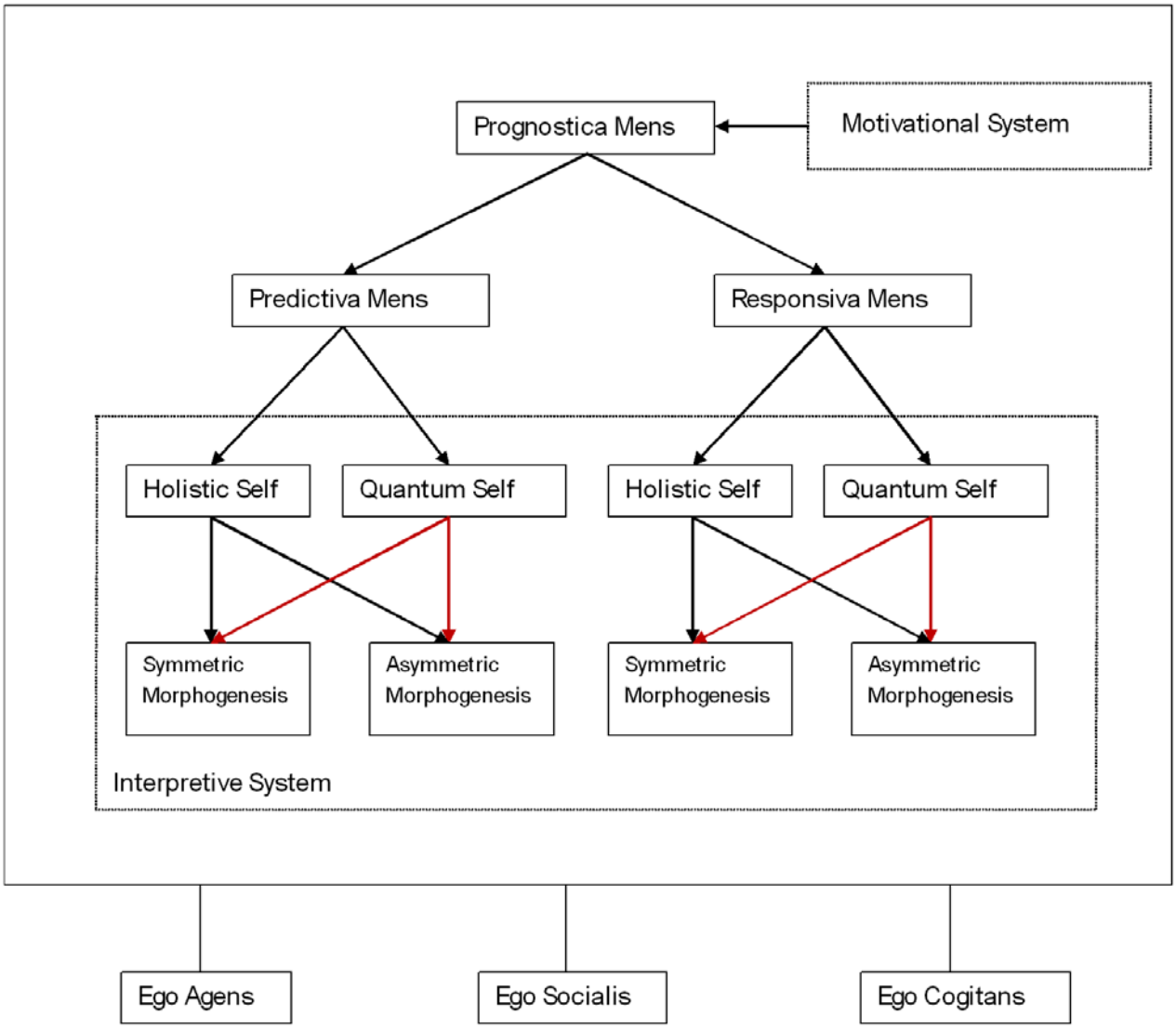

Figure 1. The Integrated Theory of Mind. The *Motivational System* provides the energy that powers the *Prognostica Mens (PM)*. The PM, in turn, is articulated in two operational modes, the *Predictiva Mens (PdM*) and the *Responsiva Mens (RM)*. The operation of both modes is realized through the *Interpretive System*, which includes the complementary organs the *Holistic Self (HS)* and *Quantum Self (QS)*. Their task is to synthesize (HS) or separate (QS) the quanta, that is, the minimum units of experience, through the processes of *Symmetric* and *Asymmetric Morphogenesis*. The overall activity of the PM generates the evolutionary functional manifestations that we call the Egos (*Ego Agens, Ego Socialis, and Ego Cogitans*).

Figure 1 illustrates the PM model divided into its two main operational modes, the PdM and RM. These two operational modes are realized through two main sub-organs, the HS and the QS, which structure internal and external reality through the processes of symmetric and asymmetric morphogenesis. The HS and the QS have the function, the first of synthesis and selection, and the second of separation and construction of ordered sets of quanta, which are the entities produced through the morphogenetic processes. The overall activity of the PM generates the Ego, a functional manifestation of the PM. It is possible to identify three types of Egos, based on the evolutionary stage reached by the biological system: the EA, the ES, and the EC. The EA is the functional sphere of lower animals; the EA and ES are the functional spheres of birds and mammals; the EA, ES, and EC are the functional spheres of humans.

8. Mnemonic Representations: The Dynamic Encoding of Experience

Our theory proposes that there are two fundamental modes of mnemonic encoding which support the functions of the HS and QS organs and the anticipation/verification operational mode of the PM.

- Holistic Encoding: Associated with the HS, this mode focuses on the storage and retrieval of integrated forms, identities, and Gestalts. It captures the "what" of an experience (e.g., a person's face) and allows for the recognition of familiar patterns.
- Quantic Encoding: Linked to the QS, this mode specializes in the storage and retrieval of discrete elements, their sequences, and dynamic relationships. It captures the "where" and "how" of an experience (e.g., the sequence of movements required to play a melody).

These two mnemonic systems operate in a continuous and synergistic interaction. Memory here is understood not only as a storage system but also as an active and predictive tool that serves to anticipate future states and actions, making it an integral part of the continuous operational cycle of the PM.

9. Alpha and Gamma Motoneurons: The Neurophysiological Grounding

The concepts of PM, HS, and QS, while powerful theoretical frameworks, require grounding in concrete neurophysiological mechanisms. Our theory identifies alpha (αMNs) and gamma (γMNs)

motoneurons as the silent and active orchestrators that provide this biological foundation, acting as the crucial effectors that translate cognitive intentions into peripheral sensory and motor modulation.

According to the hypothesis outlined by Leonardi (2025), alpha motoneurons (αMNs), which innervate the extrafusal muscle fibers, are the primary executive instruments of the PdM. Their activation generates effective movement, allowing the body to act in a predictable way in known environments.

Gamma motoneurons (γMNs), on the other hand, innervate the intrafusal fibers and are the mediators of a “pre-amplification” sensory mechanism. Their activation, which can occur in synergy with the αMNs, translates a top-down intention into a fine modulation of the sensitivity of the peripheral neuromuscular spindles. This mechanism provides a concrete substrate for attention and for the action of the RM, which requires precise sensory data to update its predictions.

The interaction between these two types of motoneurons, known as alpha-gamma coactivation, is the heart of the anticipation/verification cycle of the PM. When the brain sends a motor command to contract a muscle (via αMNs), it simultaneously sends a signal to the γMNs. This ensures that the neuromuscular spindle remains sensitive even during the shortening of the extrafusal muscle, preventing its slackening. This continuous feedback mechanism is vital for Asymmetric Morphogenesis, allowing for precise and adaptive motor control

- The HS and Gestalt Amplification: The Holistic Encoding of the HS, focused on the "what" of an experience, is supported by a modulation of the γMNs that amplifies the overall signal coming from an entire muscle group. This modulation makes it possible to "feel" the integrity of a posture or the shape of an object held in the hand.
- The QS and Relational Differentiation: The Quantic Encoding of the QS, specialized in the "where" and "how," is made possible by a modulation of the γMNs that selectively amplifies the signals coming from individual muscles or spindles.

In this model, the RM relies more on the modulation of the γMNs to receive detailed sensory feedback in uncertain or new contexts, while the PdM relies on the activation of the αMNs to perform effective actions in familiar contexts. This approach provides a solid neurophysiological basis that links our abstract theoretical concepts to biological action, suggesting that the mind is deeply embodied.

10. Implications and Future Directions

The integrated theory of mind we propose offers several significant advantages and opens up numerous directions for future research. The PM's dichotomy effectively illuminates the transition from adaptive exploration (RM) to the acquisition of efficient skills (PdM). This perspective offers a potential framework for understanding dysfunctions: an overly dominant PdM could lead to cognitive rigidity, while an overly active RM could contribute to anxiety. It will be crucial to design specific experimental paradigms to test the theory's predictions, particularly regarding the dynamic interaction between the PM, the HS/QS, and the different manifestations of the "Egos." Our theory can guide future research by generating new hypotheses on how specific brain networks interact with subjective experience and behavior in different contexts. The development of computational models based on our principles could also simulate the anticipation/verification cycle, allowing us to test the theory's internal coherence and generate more accurate predictions.

11. Conclusion: A Unified Framework for the Mind in the Pursuit of Equilibrium

In this article, we have introduced an integrated theory of mind that stands out for its perspective centered on the acting/perceiving subject. The model proposes the PM as the central mental organ, whose anticipation/verification mode is articulated in two crucial operational modes (PdM and RM). The entire operation is supported by two complementary mental sub-organs (HS and QS) and is manifested through two universal constructive processes (Symmetric Morphogenesis and Asymmetric Morphogenesis). Our theory also outlines three evolutionary functional realizations (Ego Agens, Ego Socialis, and Ego Cogitans) that reflect the increasing complexity of the nervous system and its structural architecture. This approach unifies domains traditionally studied in isolation and is firmly anchored in neuroscience.

This integrated and dynamic view of the mind, founded on the universal principle of equilibrium, opens new avenues for empirical research, encouraging us to explore the intricate interplay between prediction, perception, and action that defines our conscious existence.

Abbreviations: HS: Holistic Self; QS: Quantum Self; PM: Prognostica Mens; PdM: Predictiva Mens; RM: Responsiva Mens; EA: Ego Agens; ES: Ego Socialis; EC: Ego Cogitans

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Author declaration on the use of generative AI and AI-assisted technologies in the writing process

The author used Gemini (Google, https://gemini.google.com/) for the revision, editing, and reorganization of the article draft, and for text formatting according to specific instructions. All AI-generated content was carefully reviewed and modified by the author, who assumes full responsibility for the accuracy, consistency, and final content of the published article.