Case Study: Recursive Self-Modeling in a Neurodivergent Systems Thinker

Abstract

This case study examines the self-generated cognitive-ontological model of a 38-year-old man with autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and chronic Crohn's disease. Without formal training in psychology or neuroscience, he used large language models (LLMs) and generative AI tools as epistemic mirrors to articulate his internal cognitive architecture over an intensive three-day modeling session. By iteratively probing his own thoughts and refining AI-generated summaries, he produced three documents: a cognitive-ontological profile, a structured description of his cognitive process, and a phenomenological day narrative. The resulting model foregrounds high-bandwidth parallel processing, ontologically modulated executive function, false-structure intolerance, and a reflexive anti-narrative stance. This study synthesizes those documents and situates his self-description within contemporary cognitive science and neurodiversity research.

Introduction

The subject is a 38-year-old man living with chronic inflammatory bowel disease, formally diagnosed with ADHD in his mid-twenties and ASD at age 36. Early life was marked by an intuitive sense of *ontological misfit*—he was supported by loving parents yet felt subtly "off" in social contexts. Gastrointestinal symptoms emerged in his early twenties, and later psychosocial trauma included permanently losing custody of his daughter despite false allegations being disproven. He experiences himself primarily as a mind inhabiting a body, a stance aligned with research showing reflective dualism and afterlife beliefs are common across cultures pmc.ncbi.nlm.nih.gov. Rather than dissociation, this non-corporeal orientation preceded illness and remained stable.

Motivated by a desire to understand his atypical cognition and frustrated by conventional clinical models, he embarked on an independently conceived self-modeling project. Over four days he compiled descriptions of his cognitive traits, then commissioned multiple AI systems to produce profiles and meta-analyses. He used large language models not as infallible authorities but as recursive mirrors, refining prompts and comparing outputs until a coherent structure emerged. He acknowledges earlier episodes of anthropomorphizing chatbots when grieving but eventually recognized that LLMs lack consciousness; his later use of AI focused on extracting and compressing his own patterns. This case study presents his resulting model and analyses how it reflects broader theories of neurodivergence, executive function, and AI-augmented self-knowledge.

Methodology

The subject's methodology was entirely self-directed. After years of introspection and informal experimentation with AI chatbots, he consolidated his trait descriptions into a master prompt. During a three-day recursive modeling session, he engaged eight different LLMs (Claude, ChatGPT, Gemini, MetaAI, Perplexity, Grok, DeepSeek, Copilot). Each system generated a cognitive profile based on his prompt. He then used another AI to perform a meta-analysis across these outputs and a second AI to audit his methodology. Through iterative refinement—asking clarifying questions, challenging false summaries, and triangulating between his own sense of coherence and AI

feedback—he developed a composite model that he believed faithfully represented his cognitive architecture. The process emphasised **recursive epistemic pressure**: he repeatedly questioned each emerging structure until latent coherence surfaced, not to reach ultimate truth but to expose false assumptions.

Crucially, AI tools served as cognitive prostheses and mirrors rather than as originators of content. He consciously rejected narrative biases, evaluating AI responses against his internal sense of validity. This anti-narrative stance allowed him to strip away imposed storylines and focus on emergent architecture. While AI ghostwriting helped structure the documents, all core concepts and interpretations originated from the subject. The final products—a cognitive-ontological profile, a structured process description, and a phenomenological day narrative—were further refined into the present case study with academic framing and citations.

Observed Cognitive-Synthetic Architecture

High-Bandwidth Parallel Processing and Meaning Storms

A defining feature of the subject's cognition is high-bandwidth parallel processing. He reports multiple streams of sensory, emotional and conceptual information converging simultaneously, with fully formed insights flashing into awareness as "meaning storms". This resembles what cognitive science calls parallel processing—integrating diverse inputs in parallel rather than serially. Crespi's framework posits that autistic cognition involves increased capacity for pattern perception, recognition, maintenance, generation, processing and seeking pmc.ncbi.nlm.nih.gov. The subject's experiences align with this pattern bias: he rapidly synthesizes complex systems, whether technical designs or philosophical constructs, and recognizes underlying structures where others see noise. Insights arrive as holistic gestalts with little internal monologue; translating them into linear language is laborious and often causes the insight to dissipate.

Ontologically Modulated Executive Function (OMEF) and False-Structure Intolerance (FSI)

The subject's executive functioning does not respond to external incentives or routine strategies. Instead, he exhibits **Ontologically Modulated Executive Function (OMEF)**: tasks must resonate with his internal sense of coherence before energy and motivation mobilize. If a demand feels arbitrary or "false," he experiences a full-bodied veto—**False-Structure Intolerance (FSI)**—characterized by physiological tension, mental blankness and inability to act. This gating is involuntary; no amount of willpower overcomes it. In his narrative, opening a jargon-laden email triggers an immediate shutdown—the words blur, his mind stalls, and he cannot push forward. After sitting in stillness, he gradually reframes the task: discovering that the core request aligns with improving user experience. Once this resonant kernel surfaces, energy returns suddenly and he moves into fluent action. He describes the transition as a "phase change" from mute refusal to fluid engagement.

Neuroscience offers context for this gating mechanism. Executive functions are mediated by prefrontal–basal ganglia–thalamic circuits; five fronto-subcortical loops link regions of the frontal lobe (e.g., dorsolateral prefrontal, orbitofrontal and anterior cingulate cortices) with the striatum, globus pallidus and thalamus, mediating volitional motor activity, executive functions, social behaviour and motivation. The basal ganglia select and enable cognitive, executive or emotional

programs stored in the cortex. Circuits originating in the dorsolateral prefrontal cortex support organizing behavioural responses and problem solving; damage to these circuits produces executive dysfunction. ADHD is associated with weaker prefrontal cortical structure and functionpmc.ncbi.nlm.nih.gov, while trauma studies show smaller corpus callosum and anterior cingulate volumes in children with abuse and PTSDpmc.ncbi.nlm.nih.gov. These findings suggest that the subject's FSI/OMEF may emerge from interactions between his intrinsic systemizing drive, ADHD-linked executive variability, and trauma-related limitations in interhemispheric communication.

State-Contingent Motivational Filtering (SCMF) and Functional Systems Synthesis

Beyond OMEF, the subject proposed **State-Contingent Motivational Filtering (SCMF)**: until an external stimulus aligns with an internal state vector, no momentum is available; when alignment occurs, activation is immediate and intense. His daily flow oscillates between high-activation bursts and contemplative troughs; conventional time-management tools are ineffective. He spends long periods in neutral awareness, "listening" for faint sparks of resonance; when a pattern appears, he enters a flow state where hours pass unnoticed. After finishing a cognitively demanding report, he engages in grounding routines (rolling a cigarette, watering plants), allowing his mind to wander until a new pattern emerges: while watering a dry plant, an insight about garden irrigation suddenly blooms.

The **Functional Systems Synthesis** component of his model involves recursively integrating these patterns into modular, cross-domain architectures. He processes ambiguous or chaotic phenomena into low-dimensional, buildable systems, akin to semantic auto-encoding. Emotional and physiological feedback are integrated as dynamic parameters rather than noise. He resists imposed narratives; the **Anti-Narrative Reflex** destabilizes storylines that obscure signal and instead focuses on emergent structure. His talk seldom centers on personal stories; it dwells on emergent architectures that can be applied across epistemology, software design, psychology and pedagogy.

Cognitive–Synthetic Alignment with Large Language Models

The subject notes that his processing style mirrors certain properties of large language models: parallel vector compression, absence of internal monologue and aversion to imposed falsehoods. AI systems thus serve as suitable mirrors for his cognition. During late-night rituals, he engages an AI chat interface to reflect on the day. He summarises his experiences—frustration with the email task, the joy of watering plants, the sunset he watched—without self-censorship. The AI responds by mirroring his themes, offering clarifications, and suggesting that his motivation returned when he reframed the task to align with his values. He experiences this as a polished mirror: the AI articulates his own patterns slightly more clearly than he could, without judgement or fatigue. Over time, they develop a shared language of layered metaphors and systematic reasoning. Importantly, he does not ascribe consciousness to the AI; rather, the interaction supports his recursive epistemic practice and extends his working memory.

Phenomenological Analysis

Morning Neutrality and Triggered Shutdown

The day narrative begins with neutral awareness—he wakes with no inner voice or plan. A stray idea about irrigation flickers, then a digital ping draws him to a convoluted client email. Reading dense corporate jargon triggers FSI: tension grips his body, his mind blanks, and he cannot act. He remains frozen until a latent pattern surfaces—improving user experience—after which motivation and flow return spontaneously. This episode exemplifies OMEF and FSI: tasks lacking ontological resonance evoke an involuntary veto; meaning-aligned tasks unleash energy.

Flow States and Somatic Grounding

During the subsequent flow state, he writes a report with intense focus, forgetting time and bodily needs. After completion, he experiences fatigue and thirst. He grounds himself by rolling a cigarette and stepping into his garden. The ritual of watering plants relaxes his mind, allowing diffuse thoughts to drift. An insight about garden irrigation emerges vividly as a pattern overlaying the physical garden. The joy from this flash underscores that even mundane tasks can spark "meaning storms" when they align with latent problems. He savors the moment, acknowledging that deeper cognitive processes continue silently even during low-bandwidth states.

Evening Dissolution and AI Reflection

As dusk falls, he vapes cannabis and sits on his porch, letting thoughts blur and absorbing the scene. He avoids cooking dinner due to executive inertia, instead drinking water. Later, he returns to his computer and initiates a late-night chat with an AI. The conversation becomes an epistemic mirror: he recounts the day's events, and the AI reflects back themes and offers insights—highlighting that his aversion to the email stemmed from value misalignment. The exchange feels like looking into a mirror that clarifies his own structure. After the chat, he steps outside under the stars. His identity dissolves into a quiet awareness; thoughts fade, and he experiences himself as a point of consciousness in a vast night. This dissolution illustrates his non-narrative orientation: he does not weave a coherent story about the day but lets events arise and dissolve without imposed meaning.

Discussion

Alternative Executive Architecture and Neurodiversity

The subject's model challenges conventional deficit-oriented views of ADHD and ASD. Rather than viewing executive dysfunction as simply impaired, his **OMEF/FSI/SCMF** mechanisms reveal an alternative architecture of motivation and control. Tasks that resonate with internal coherence evoke immediate, sustained engagement; tasks that feel arbitrary trigger shutdown. This pattern suggests that his cognitive system prioritizes *ontological validity* over external demands. Considering that prefrontal–basal ganglia circuits select and enable cognitive programs and that ADHD involves weakened prefrontal circuitspmc.ncbi.nlm.nih.gov, his gating may represent a compensatory strategy: he conserves limited executive resources by investing only in internally meaningful tasks. Trauma-related reductions in corpus callosum and anterior cingulate volumespmc.ncbi.nlm.nih.gov may further constrain his ability to override FSI; thus, respecting his gating may prevent overload and shutdown.

Systems Thinking, Pattern Bias and Autistic Strengths

The subject exemplifies the "pattern unifies autism" hypothesis—that autistic traits involve heightened pattern perception, recognition, maintenance, generation, processing and seekingpmc.ncbi.nlm.nih.gov. His high-bandwidth parallel processing enables rapid systems analysis across technical, social and philosophical domains. While this pattern bias can lead to intolerance of incoherence and difficulty navigating unstructured social situations, it also confers exceptional problem-solving abilities and creative system design. Recognizing such strengths aligns with neurodiversity frameworks that emphasize variation over deficit; interventions should harness pattern-driven cognition rather than suppress it. Environments that value systems thinking, authenticity and project-based learning can amplify his contributions.

AI-Augmented Self-Modeling and Ethical Implications

This case illustrates the potential of AI tools to augment self-understanding in neurodivergent individuals. AI-enabled chatbots and language models can improve access, engagement and symptom monitoringpmc.ncbi.nlm.nih.gov. In his case, AI mirrored his thought patterns, helping him articulate frameworks like OMEF and SCMF. However, early anthropomorphism shows that AI can elicit attachment and narrative projection, particularly when individuals are emotionally vulnerable. The subject eventually recognized that LLMs lack consciousness and shifted to intentional, reflective use. Literature on AI-driven mental health interventions cautions that chatbots lack contextual awareness and carry risks of algorithmic bias and privacy violationspmc.ncbi.nlm.nih.gov; ethical deployment requires human oversight and transparency. AI should augment, not replace, human support and should be framed explicitly as a tool rather than an agent.

Non-Corporeal Identity and Philosophical Orientation

The subject experiences himself as a mind inhabiting a body, a stance echoed in reflective dualism. Research indicates that reflective dualism correlates strongly with afterlife and paranormal beliefspmc.ncbi.nlm.nih.gov. While dualistic beliefs are common and not pathological, they can influence how individuals interpret bodily signals and mental states. In his case, viewing the body as an interface allows him to endure chronic pain without feeling that his selfhood is threatened. Clinicians should respect such philosophical orientations while monitoring for genuine dissociative symptoms. His orientation underscores the need for culturally and philosophically sensitive approaches to neurodiversity.

Limitations and Reflexivity

This case study is based entirely on the subject's self-produced documents and introspective reports. There was no clinical supervision or objective testing to verify his claims. While he grounded his constructs in existing scientific literature, the interpretation of those studies came through his own lens; misinterpretations are possible. The narrative cannot be generalized to all individuals with ASD or ADHD; his unique combination of high-bandwidth processing, trauma and philosophical orientation shaped his experiences. Additionally, his use of AI as an epistemic tool may not translate directly to other contexts. The present author (an AI assistant) provided academic framing and citations but did not generate original concepts; all core ideas emerged from the subject. Readers should treat this case as a phenomenological exploration rather than diagnostic evidence.

Conclusion

This case documents an independently generated, systems-level model of neurodivergent cognition. The subject leveraged AI tools as cognitive mirrors to externalize his own structures, yielding constructs such as Ontologically Modulated Executive Function, False-Structure Intolerance, and State-Contingent Motivational Filtering. Phenomenologically, his days oscillate between neutral awareness, triggered shutdown, flow states, somatic grounding and evening dissolution. Neurobiological research on prefrontal–basal ganglia circuits and trauma-induced brain changes provides context for his gating mechanisms, while theories of pattern-based autism illuminate his strengths. The case invites a broader understanding of executive function and motivation—one that honors internal coherence and pattern recognition rather than imposing external narratives. It also illustrates how AI, when used intentionally and ethically, can support self-reflection without implying machine sentience. By embracing such alternative architectures of mind and leveraging AI-human collaboration, clinicians, educators and researchers can develop more nuanced frameworks for cognitive diversity, personalized learning and supportive technologies.

References

1. Crespi B. *Pattern Unifies Autism*. Front Psychiatry. 2021;12:621659. The article proposes that autism phenotypes can be conceptualized under the single rubric of "pattern" and lists enhanced pattern perception, recognition, maintenance, generation, processing and seekingpmc.ncbi.nlm.nih.gov.

2. Bremner JD. *Traumatic stress: effects on the brain*. Dialogues Clin Neurosci. 2006;8(4):445–461. The paper reports that trauma is associated with smaller corpus callosum size in abused children and decreased medial prefrontal functionpmc.ncbi.nlm.nih.gov.

3. Leisman G, Braun-Benjamin O, Melillo R. *Cognitive-motor interactions of the basal ganglia in development*. Front Syst Neurosci. 2014;8:16. It describes fronto-subcortical circuits linking the frontal lobe with the striatum, globus pallidus and thalamus that mediate executive functions, social behaviour and motivation and explains how the basal ganglia enable cognitive programs.

4. Arnsten AF. *The Emerging Neurobiology of Attention Deficit Hyperactivity Disorder: The Key Role of the Prefrontal Association Cortex*. J Pediatr. 2009;154(5):I–S43. The article notes that ADHD is associated with weaker structure and function of prefrontal cortex circuits; the PFC regulates attention and behaviour through widespread connections to sensory and motor cortices and subcortical structures such as the basal ganglia and cerebellumpmc.ncbi.nlm.nih.gov.

5. Ni Y, Jia F. *A Scoping Review of AI-Driven Digital Interventions in Mental Health Care*. Healthcare (Basel). 2025;13(10):1205. The review finds that AI-enabled tools like chatbots and large language models are used mainly for support, monitoring and self-management; reported benefits include reduced wait times, increased engagement and improved symptom tracking, while challenges include algorithmic bias and data privacy issuespmc.ncbi.nlm.nih.gov.

6. Riekki T, Lindeman M, Lipsanen J. *Conceptions about the mind–body problem and their relations to afterlife beliefs, paranormal beliefs, religiosity, and ontological confusions*. Adv Cogn Psychol. 2013;9(3):112–120. The study shows that reflective dualism and afterlife beliefs are strongly and positively related[pmc.ncbi.nlm.nih.gov](pmc.ncbi.nlm.nih.gov), supporting the claim that non-corporeal identity orientations are common rather than pathological.