Douglas Hofstadter: "Strange Loops" and the Origin of the "I"

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Abstract

In this article, I address the idea that concludes the "Awareness of Complexity" block: if the observer is part of the observed system (Article 4), then what happens when the system attempts to describe itself? Douglas Hofstadter, an American cognitive scientist and author of the famous book "Gödel, Escher, Bach," provides an answer to this question that turns our understanding of consciousness upside down. The "I" is not a thing, not a soul, not a substance. It is a "strange loop" - a process of self-reference arising in a sufficiently complex symbolic system. I show that this idea is a direct development of Foerster's ideas on observation recursion and that it underlies my concept of epistemological recursion (Article 1). Furthermore, I demonstrate that the "strange loop" can and should be developed through pedagogy: the eleven mental mechanisms of the CCFP (Article 5) are precisely the toolkit that makes the symbolic system (the brain) complex enough to create "strange loops." Thus, Article 5 completes the "Awareness of Complexity" block and prepares the transition to the "New Approaches" block (Articles 6-8).

Keywords: strange loop, self-reference, symbolic "I", emergence, Gödel's incompleteness theorem, recursion, epistemological recursion, communicative-cognitive framework of personality.

The Scientist Who Saw the "I" as a Dance of Mirrors

In the previous article, I relied on Heinz von Foerster and showed that the observer is part of the observed system, and that this creates recursion. But Foerster left one question open: what if it is precisely this recursion that is the source of consciousness? What if the "I" is not a "thing," not a "soul," not a "substance," but a process arising in a sufficiently complex system capable of referring to itself?

This question became central for Douglas Hofstadter, an American cognitive scientist, philosopher, and writer whose works forever changed our understanding of what consciousness is and where the "I" comes from. Douglas Hofstadter was born in 1945 into the family of Nobel laureate in physics Robert Hofstadter. In 1979, he published his magnum opus, "Gödel, Escher, Bach: An Eternal Golden Braid" [1], for which he received the Pulitzer Prize in 1980. This book is not just a scientific work. It is a philosophical and artistic journey in which mathematics, art, and music intertwine into a single fabric, showing how meaning is born from soulless symbols, and consciousness from soulless neurons. In 2007, Hofstadter published another key work, "I Am a Strange Loop" [2], where he brought his idea to its utmost clarity. It was this book that became one of my main intellectual discoveries and directly formed the basis of my concept of epistemological recursion [3].

Hofstadter asked a question that sounds simple but turns everything upside down: where does the "I" come from? And he answered: the "I" is not a thing. The "I" is a strange loop.

Here it is appropriate to recall the Ouroboros, the ancient symbol of a snake biting its own tail. This image is found in the mythologies of various peoples: in Ancient Egypt, Greece, Scandinavian sagas, and Hinduism. The Ouroboros symbolizes eternal return, infinity, self-sufficiency. The snake bites its own tail - and in this act, it is simultaneously both the subject and the object. It devours itself and generates itself. This is a "strange loop" in its most ancient guise. Hofstadter says: the "I" is such an Ouroboros. The brain creates the symbol "I," and this symbol begins to influence the brain that created it. The symbol devours the system that spawned it and generates it anew. This is not a closed circle - it is a spiral in which each turn raises the system to a new level.

What is a "Strange Loop"?

To understand the essence of Hofstadter's idea, one must understand what he calls a "strange loop." A strange loop is a system that, ascending through levels of hierarchy, unexpectedly returns to its starting point. This is not just a closed circle - it is a cycle in which a system, having passed through several levels, discovers that it is back at the starting point, but already at a different level of understanding.

Imagine Maurice Escher's famous lithograph "Ascending and Descending." It depicts a monastery with a staircase on which monks walk endlessly upwards - and at the same time endlessly find themselves at the same point. They climb, but climb nowhere. They descend, but descend nowhere. This is a "strange loop" - a visual embodiment of the paradox of self-reference. Another example is the famous phrase of Epimenides: "All Cretans are liars." If Epimenides is a Cretan, then he is lying, which means Cretans are not liars, which means he is telling the truth, which means Cretans are liars... We get stuck in an infinite cycle from which there is no exit. This is a "strange loop" - a logical one.

Hofstadter asserts: the "I" is exactly such a strange loop. It is a process in which a symbolic system (the brain) creates a symbol denoting this very system. The brain creates the symbol "I," and this symbol begins to influence the functioning of the brain that created it. This is recursion - observation observing itself. Imagine two mirrors placed opposite each other. An infinite corridor of mirrors is reflected in them. Each mirror reflects a mirror that reflects a mirror... This is a "strange loop" - a visual one. And the "I" is the same kind of loop, but inside the brain.

Here it is appropriate to recall Lewis Carroll's "Through the Looking-Glass." Alice passes through the mirror and finds herself in a world where everything is upside down, but logical in its own way. In this world, she meets herself - but not as a reflection, but as a living character. The infinite corridor of reflections, in which Alice sees Alice seeing Alice, is exactly a "strange loop." And this is exactly what happens to the brain when it creates the symbol "I." The brain sees itself in the mirror of the symbol - and this vision changes it. It becomes the "I."

Gödel, Escher, Bach: Three Facets of One Idea

The title of Hofstadter's book is not a coincidence. He shows that three geniuses - mathematician Kurt Gödel, artist M.C. Escher, and composer Johann Sebastian Bach - independently of each other arrived at the same idea: the idea of self-reference, the idea of a "strange loop," the idea of a system referring to itself. Kurt Gödel in 1931 proved his famous incompleteness theorem: any sufficiently complex formal system (such as mathematics) contains statements that can neither be proved nor disproved within that system. Moreover, the system cannot prove its own consistency. In simple terms: mathematics cannot fully explain itself. There will always be "blind spots" in it - statements that are true but unprovable. This is a "strange loop" in mathematics: the system tries to describe itself - and fails.

Hofstadter shows: what Gödel discovered in mathematics, Escher discovered in art, and Bach in music. All three - by different paths - arrived at the same idea: self-reference is a fundamental property of complex systems. M.C. Escher in his lithographs created visual "strange loops" - impossible figures, infinite staircases, hands drawing themselves. His works are not just beautiful pictures. They are philosophical statements about the nature of reality and consciousness. Johann Sebastian Bach in his "Musical Offering" and "The Art of Fugue" created musical "strange loops" - canons that, ascending through keys, return to the beginning. His music is not just harmony. It is a mathematical structure embodied in sound.

The "I" as an Emergent Process

The central thesis of Hofstadter, which I consider one of the most important for my hypothesis: the "I" is not a thing, but a process [2]. This radically differs from our usual understanding. We tend to think of the "I" as some kind of substance - a soul, consciousness, an inner observer who "sits inside the head" and looks at the world through the eyes. Hofstadter says: no. The "I" is not a substance. The "I" is an emergent process arising in a sufficiently complex symbolic system.

Imagine a whirlpool in water. A whirlpool is not a "thing." It is a process - the movement of water organized in a certain way. If the water stops, the whirlpool disappears. But as long as the water moves in a certain way, the whirlpool exists - as a real, observable phenomenon, although it is not a "thing." In the same way, Hofstadter asserts, the "I" is a whirlpool in neural activity. It is not a "thing," not a "soul," not a "substance." It is a process that arises

when the brain becomes complex enough to create symbols denoting this very brain. This means that the "I" is not an illusion, but neither is it a "thing." It is a real process existing at the level of organization, not at the level of substance.

Imagine a melody. A melody is not a "thing." You cannot touch a melody, put it in your pocket. But a melody is a real phenomenon existing at the level of the organization of sounds. In the same way, the "I" is a real phenomenon existing at the level of the organization of neural activity.

The Symbolic "I": How the Brain Creates Itself

Hofstadter proposes a specific mechanism through which the "I" arises. He calls this the symbolic "I." The brain is a symbolic system. It creates symbols denoting objects of the external world: "table," "tree," "person." But at a certain point, the brain becomes complex enough to create symbols denoting this very brain. The symbol "I" appears. And here the "strange loop" arises. The symbol "I" begins to influence the functioning of the brain that created it. The brain that created the symbol "I" now acts in accordance with this symbol. The symbol "I" becomes part of the system it denotes.

Imagine that you wrote a book about how to write books. Your book is a symbol denoting a process of which you yourself are a part. And now, when you read your book, you begin to write differently - in accordance with what you wrote. The symbol influences the system that created it. This is a "strange loop." In the same way, Hofstadter asserts, the symbol "I" influences the brain that created it. The brain that created the "I" now acts as the "I." And this creates the illusion (or reality - Hofstadter leaves this question open) of an "inner observer," a "soul," "consciousness."

Why is this Important for the "Hard Problem of Consciousness"?

Hofstadter does not just offer an interesting metaphor. He offers a specific answer to the "hard problem of consciousness" formulated by David Chalmers [4]. Chalmers showed: we cannot explain why neural processes are accompanied by subjective experience. Between neurons and qualia, there is an "explanatory gap." Hofstadter answers: this "gap" is not a problem. It is a fundamental property of complex symbolic systems. Consciousness is not "reduced" to neurons - it emergently arises at the level of organization when a system becomes complex enough to create self-referential symbols.

Imagine you ask: "Why is the movement of water molecules accompanied by a whirlpool?" The question sounds strange - because the whirlpool is exactly the movement of water molecules organized in a certain way. In the same way, Hofstadter asserts, consciousness is exactly neural activity organized in a certain way - namely, in a self-referential way. This does not solve all problems. But it shifts the focus: instead of looking for the "place" where consciousness "appears," we must study the process through which the brain creates self-referential symbols.

And it is here that my hypothesis takes the next step. I assert: the development of mental mechanisms is exactly the training of the brain's ability to create such "strange loops." MM-5 (Socratic dialogue) and MM-6 (critical thinking) are exactly those tools that allow the brain to reflect on itself, to create symbols denoting the very process of thinking [5].

Connection to My Hypothesis: Why CCFP is Hofstadter's Answer

My hypothesis is a direct development of Hofstadter's ideas into a specific pedagogical program. Allow me to show this as clearly as possible. Hofstadter asserts: the "I" is a strange loop arising in a sufficiently complex symbolic system. I show: the eleven MM of the CCFP are exactly those tools that make the symbolic system (the brain) complex enough to create "strange loops" [5]. MM-5 (Socratic dialogue) teaches the brain to ask questions about the very process of thinking. MM-6 (critical thinking) teaches the brain to question its own foundations. MM-11 (strategic forecasting) teaches the brain to hold multiple perspectives, including the perspective of its own "I."

Hofstadter asserts: consciousness is an emergent process, not a substance. I show: therefore, consciousness can be developed through the development of those very processes that generate it. The development of MM is exactly the development of those very processes that create the "strange loop" of self-reference [5]. Hofstadter asserts: the brain creates the symbol "I," and this symbol begins to influence the functioning of the brain. I show: therefore, we can purposefully shape this symbol through pedagogy. By developing certain mental mechanisms in children, we

construct a certain type of "I" - more reflective, more capable of self-understanding, more capable of solving the "hard problem of consciousness" [3], [5].

Hofstadter shows that self-reference is a fundamental property of complex systems. I show: epistemological recursion, which I talk about in my main article [3], is exactly self-reference at the level of cognition. A brain studying a brain is a "strange loop" in its purest form. And for this loop not to be a "closed circle," but to become a tool of cognition, the cognitive apparatus of the observer must be developed. And this is the task of CCFP pedagogy [5].

Specific MM as Tools for Creating "Strange Loops"

Allow me to show exactly how specific mental mechanisms of the CCFP allow the brain to create the "strange loops" Hofstadter spoke of. MM-5 (Socratic dialogue) is a tool that allows the brain to ask questions about the very process of thinking. When a student engages in Socratic dialogue, they do not just answer questions - they reflexively explore their own foundations. This is the creation of a "strange loop": thinking exploring thinking itself [5]. MM-6 (critical thinking) is a tool that allows the brain to question its own foundations. When a student develops critical thinking, they learn to see their own cognitive limitations, their own "blind spots." This is the creation of a "strange loop": thinking seeing its own limitations [5]. MM-1 (Establishing deep cause-and-effect relationships) is a tool that allows the brain to see multi-level connections, including the connection between the observer and the observed. When a student develops this MM, they learn to understand how their own thinking influences what they think. This is the creation of a "strange loop": thinking understanding its own inclusion in the process [5]. MM-11 (Forecasting and strategic thinking) is a tool that allows the brain to hold multiple perspectives, including the perspective of its own "I." When a student develops this MM, they learn to calculate the development of events several steps ahead, including the consequences of their own mental acts. This is the creation of a "strange loop": thinking anticipating its own consequences [5]. MM-10 (Spatial imagination and 3D visualization) is a tool that allows the brain to hold multidimensional models, including a model of its own brain as part of the observed system. When a student develops this MM, they learn to intuitively grasp the recursion of observation, to see how the brain studies the brain. This is the creation of a "strange loop": thinking seeing its own recursiveness [5].

Thus, the eleven MM of the CCFP are not just a "set of skills." They are a specific toolkit for creating "strange loops," designed to solve a specific task - the task of understanding the brain through understanding one's own "I."

Hofstadter and the Problem of Free Will

Hofstadter makes another important conclusion from his concept, which I consider critically significant: if the "I" is a "strange loop," then free will is not an illusion, but neither is it "substantial freedom." It is freedom arising at the level of organization [2]. Imagine that you make a decision. From the point of view of neurobiology, this decision is determined by neural processes. But from the point of view of the "strange loop," this decision is determined by the symbol "I," which influences the neural processes that created it. This is not "freedom from causality" - it is freedom arising at the level of self-reference. Hofstadter does not definitively solve the problem of free will. But he shifts the focus: instead of asking "is the will free from neural processes?", we must ask "how does the symbolic 'I' influence the neural processes that create it?" My hypothesis takes the next step: the development of mental mechanisms is exactly the development of that very ability of the symbolic "I" to influence neural processes. Through CCFP pedagogy, we do not just "teach children to think" - we construct a certain type of freedom, a certain type of "I," a certain type of responsibility [3], [5].

Key Quote: The Phrase That Changes Everything

Here is a quote from Hofstadter that should become an anchor for the reader and that has become one of the cornerstones of my hypothesis: "The 'I' is a peculiar kind of cycle that arises in a sufficiently complex symbolic system when that system becomes capable of referring to itself" [2]. This phrase is the essence of Hofstadter's concept. It shows that the "I" is not a "thing," not a "soul," not a "substance." It is a process arising in a sufficiently complex system capable of self-reference. My hypothesis takes the next step: this process can and should be developed through purposeful pedagogical activity. Through the formation of the CCFP [5]. Through the development of the eleven MM.

Bridge to the Next Article: Francisco Varela and Neurophenomenology

Hofstadter showed that the "I" is a "strange loop" arising in a sufficiently complex symbolic system. But he left an open question: how exactly can we study this "strange loop"? How can we investigate consciousness if it is a process, not a "thing"? This question becomes central for the next scientist - Francisco Varela. Varela, a Chilean neurobiologist and philosopher, one of the founders of neurophenomenology, proposed a specific method for studying consciousness that combines rigorous "first-person" methods (introspection, meditation, phenomenological reduction) with "third-person" methods (fMRI, EEG, neuroimaging). Varela asserted: to understand consciousness, one must not just scan the brain - one must train the "mental mechanisms" of attention, introspection, and meta-awareness. This is exactly the "first-person" toolkit Varela dreamed of. My CCFP model develops this idea: the eleven MM are exactly the toolkit that allows the researcher to "hear the music" of neuroscience, not just look at the spectrogram [5]. But more on that in the next article.

Practical Conclusion: How Hofstadter's Idea is Used in CCFP Pedagogy

Hofstadter's idea of the "strange loop" has direct practical application in my pedagogical model. Development of metacognitive reflection through MM-5 and MM-6. Hofstadter showed that the "I" is a process of self-reference. Within the CCFP, this means the purposeful development of MM-5 (Socratic dialogue) and MM-6 (critical thinking) [5]. The student learns not just to fix facts, but to reflect on their own process of thinking, to ask questions: "How do I think? Why do I think exactly this way? What foundations lie at the basis of my thinking?" Formation of the symbolic "I" through MM-1 and MM-11. Hofstadter showed that the "I" arises through the creation of symbols denoting the system itself. Within the CCFP, this means the development of MM-1 (cause-and-effect analysis) and MM-11 (strategic forecasting) [5]. The student learns to create complex symbolic models, including a model of their own "I." In the context of neuroscience, this means: the ability to understand how the symbolic "I" influences neural processes. Cultivation of scientific responsibility through MM-3 and MM-7. Hofstadter showed that the "I" is not an illusion, but neither is it a substance. It is a process for which we are responsible. Within the CCFP, this means the development of MM-3 (emotional intelligence) and MM-7 (constructive debate) [5]. The student learns to understand that their "I" is not a "given," but a process they construct through their thoughts, actions, and choices. Preparation for a scientific revolution through MM-9 and MM-10. Hofstadter showed that self-reference is a fundamental property of complex systems. Within the CCFP, this means the development of MM-9 (information search and analysis) and MM-10 (spatial imagination) [5]. The student learns to see their own cognitive limitations and develop tools to overcome them. In the context of neuroscience, this means: the ability to "rise above the labyrinth" and see the problem from a new angle. Formation of transdisciplinary thinking. Hofstadter showed that self-reference manifests in mathematics, art, and music. This means that to understand consciousness, one must go beyond a single discipline. Within the CCFP, this means cultivating transdisciplinary thinking - the ability to see connections between neuroscience, philosophy, pedagogy, mathematics, and art [5]. The eleven MM are exactly those "cross-cutting tools" that work at the intersection of disciplines.

Conclusion

Douglas Hofstadter showed that the "I" is not a "thing," but a "strange loop" - a process of self-reference arising in a sufficiently complex symbolic system [2]. He linked together the ideas of Gödel, Escher, and Bach, showing that self-reference is a fundamental property of complex systems. My hypothesis is a direct development of Hofstadter's ideas into a specific pedagogical program. The eleven mental mechanisms of the CCFP [5] are exactly the toolkit for creating "strange loops," designed to solve a specific task - the task of understanding the brain through understanding one's own "I." And this is the task of pedagogy, understood as a strategy for the evolution of the species [3], [5].

Connection to the Overall Architecture of the Series

This article is about how the "I" is born from recursion. Hofstadter shows that the "strange loop" is not just a metaphor for consciousness, but a mechanism of self-reference that arises in a sufficiently complex symbolic system. For my model, this has direct significance: the CCFP is not just a set of mechanisms, but a system capable of self-reference. Without the ability for self-reference (MM-5, Socratic dialogue; MM-6, critical thinking), the system cannot "see" its own limitations - and therefore cannot go beyond the limits of an exhausted paradigm. In Article 1, I showed that the hard problem is a paradigmatic problem. Hofstadter explains why it is paradigmatic: because it requires self-reference - the ability of a system to describe itself. In Article 4 (Foerster), I showed that this self-reference creates recursion from which it is impossible to escape by simple methods. Hofstadter shows that this recursion is not a "trap," but the source of consciousness. What is clarified in this article: the concept of the "strange loop" is linked to

the concept of "epistemological recursion" (Article 1). The "strange loop" is an ontological mechanism (how the "I" arises); "epistemological recursion" is a methodological principle (how to cognize systems that include the observer). Both concepts complement each other: the first explains what we cognize; the second, how we do it.

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