The Mental Mechanism of "Forecasting and Strategic Thinking": The Art of Looking Beyond the Horizon

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Annotation

In this article I disclose in detail such a mental mechanism as forecasting and strategic thinking, which is an integral part of the communicative-cognitive framework of the personality. Drawing on contemporary research in the field of behavioral economics, neuroeconomics, strategic management and pedagogical practice, as well as on the statements of scholars, I show that forecasting represents a fundamental cognitive ability lying at the basis of decision-making under conditions of uncertainty, planning and successful adaptation to changing circumstances. I pay special attention to the fact that strategic thinking includes not only the ability to foresee the future, but also the ability to work with different levels of thinking (level-k thinking), as well as to critically evaluate one's own mental models. The article proposes pedagogical strategies for the development of this mechanism in learners.

Keywords: forecasting, strategic thinking, communicative-cognitive framework of the personality, mental mechanisms, level-k thinking, foresight, scenario thinking, developmental pedagogy.

Chess Played Blindfolded

In the modern world, characterized by growing complexity, volatility and uncertainty, the ability to look ahead and plan one's actions becomes not merely a desirable quality, but a necessary condition of survival and success. As researchers in the field of strategic management note, strategic thinking is regarded as a key competence of the head of an educational organization under conditions of the growing complexity and uncertainty of the contemporary educational environment [5]. However, forecasting is not simply the prediction of the future. It is a complex cognitive process including systems analysis, scenario forecasting, critical reflection, creativity and a focus on value creation [5]. As the researchers J. Kleiman and P.J.H. Schoemaker emphasize, strategic thinking includes three key components: a knowledge base, problem representation, and the inferential processes connecting the first two components [10].

Here it is appropriate to recall chess players playing blindfolded. They do not see the board, but they retain the positions of the pieces in their mind, calculate moves and foresee the opponent's replies. Their advantage is not that they see more, but that they see differently. They see not wooden pieces on squares, but a dynamic system in which every move changes the entire field. Forecasting works in the same way. We do not see the future. But we can retain its model in our mind - with variants, probabilities, forks. And the better we are able to build these models, the more precise our moves. It is like the difference between a novice who thinks one move ahead and a grandmaster who sees the whole game. Not because he is more intelligent. But because he has trained the ability to retain complexity.

In my CCFP model, forecasting and strategic thinking occupy a special place. They are closely connected with other mental mechanisms: with the construction of cause-and-effect relationships - the understanding of how today's actions influence tomorrow's results; with critical thinking - the evaluation of the reliability of forecasts and assumptions; with information search and analysis - the gathering of data for well-grounded forecasts; with spatial imagination - the visualization of future scenarios.

Before turning to the definition, I must explicitly designate the place of this mechanism in my model. In the CCFP system, forecasting and strategic thinking is MM-11, and it belongs to the core [13; 14]. The distinction between core and support was introduced in the article on the structure of mental mechanisms [13] and substantiated in the article on epistemological recursion [14]. The core is six mechanisms that constitute the act of solving a difficult problem: MM-1, MM-3, MM-5, MM-6, MM-10, MM-11. Support is five mechanisms without which the core does not work, but which do not constitute the act of solution: MM-2, MM-4, MM-7, MM-8, MM-9. Forecasting belongs to the core, because it realizes the requirement of foreseeing the consequences of theoretical moves [14]. A paradigmatic shift is not only a new theory, but also a new research program. An apparatus incapable of calculating where a particular theoretical move leads will produce theories that do not generate researchable questions. MM-11 is the ability to retain in the mind multiple scenarios of the development of a theory and to evaluate their consequences. Without it the researcher will not be able to construct a new program: he will be able only to propose a new metaphor. And a metaphor without a program is a beautiful phrase behind which nothing stands. Forecasting is what turns a metaphor into a route.

A System, Not a Prediction

Strategic thinking is the ability to think systemically, to foresee the development of events, to take multiple factors into account and to make decisions aimed at achieving long-term goals under conditions of uncertainty. As is noted in a study devoted to the neuroeconomic foundations of strategic thinking, games like poker are not games of complete information, and therefore, for successful decision-making in them, players must draw inferences about the hidden information of opponents on the basis of their previous actions [4]. Researchers distinguish four structural components of strategic thinking, arranged in the logic of the strategic cycle [5]. Systems analysis and scenario forecasting - the ability to see the system as a whole and to foresee various scenarios of its development. Critical reflection - the ability to analyze one's own assumptions and models of thinking. Creativity and innovativeness - the ability to generate new approaches and solutions. A focus on value creation and social interaction - the ability to see how actions influence others and the overall result.

Forecasting is not simply the extrapolation of current trends. As is noted in a study conducted at Ural Federal University, social-pedagogical forecasting includes a complex of methods: extrapolation, expert assessments, modeling, the scenario method, foresight technology and the Delphi method [11]. Researchers emphasize that forecasting is a cyclical process including an orientation toward forecasting, data collection, the construction of a base model, search and normative forecasts, verification, correction and the elaboration of recommendations [11]. This process requires of a person not only analytical skills, but also the ability to work with uncertainty. It is like the difference between a map and a compass. A map shows where what is located. A compass shows the direction. Forecasting is a compass. It does not say what will be. It says where to move so as not to get lost. And this is far more important.

The Hierarchy of Thinking

One of the most influential approaches to understanding strategic thinking is the theory of cognitive hierarchy, developed within the framework of behavioral economics. As is noted in a review published in the journal *Current Opinion in Psychology*, models of cognitive hierarchy or level-k models were developed to account for empirical observations from experiments on strategic behavior [4]. The essence of this approach lies in the fact that people differ in the depth of their strategic thinking. Level 0 - the player acts randomly or on the basis of a simple probability distribution, without taking the opponent's strategy into account. Level 1 - the player assumes that the opponent is at level 0 and chooses the best response to this strategy. Level 2 - the player assumes that the opponent is at level 1 and chooses the best response. And so on - levels 3, 4, 5. As is explained in the study, the two main directions of the development of level-k models have become models of cognitive hierarchy and Bayesian level-k models. Models of cognitive hierarchy presuppose that players have a distribution of beliefs about the types of players with whom they may meet in the game [4].

A study conducted at ETH Zurich demonstrated how a neural network, an LSTM model, can learn to forecast effectively the actions of an opponent in the game "Rock-Paper-Scissors." It is important that in the process of learning the network developed implicit representations of strategically important variables, the levels of reasoning that economists had postulated in theoretical models [3]. This result, as the authors note, indicates a connection between the mechanisms implicitly present in recurrent neural networks and the models of strategic thinking in

economic theory [3]. In other words, forecasting is not simply intuition, but a structured cognitive process that can be modeled and trained. It is like learning to play poker. At first you play on your own cards. Then you begin to think about what the opponent has. Then you think about what he thinks you have. And so on ad infinitum. A good player is not the one who counts cards best. But the one who counts thoughts best.

Unlike classical game models, which presuppose that players can compute the Nash equilibrium, models of cognitive hierarchy take into account the cognitive limitations of people. As is noted in the review, early game theorists focused on equilibrium models characterizing stable states in which no rational player has an incentive to deviate from the chosen strategy given the strategies of the other rational players [4]. However, as is emphasized in another study, equilibrium analysis poorly predicts outcomes when players encounter new games or when a shift occurs, such as a change of policy or technology [7]. That is precisely why models of cognitive hierarchy, which take into account bounded rationality and different levels of thinking, prove to be more accurate in real situations. This resembles the old story of the centipede that thought about how it walks and unlearned how to walk. Equilibrium is the ideal gait. But in real life we stumble, shift our legs, and go around obstacles. And it is precisely this that makes us alive. And not ideal.

Why We Are Unable to Forecast

One of the most significant cognitive biases hindering forecasting is the end-of-history illusion. As researchers in the psychology of the future note, this is the illusion according to which, although we have changed greatly in the past, our current self remains to a significant degree stable and is unlikely to develop further [1]. Daniel Gilbert, the well-known psychologist, explains: it is difficult for us to imagine whom we are going to become, and we mistakenly suppose that since it is difficult to imagine, it is therefore unlikely to happen. People are works in progress who mistakenly consider themselves finished [2]. This bias, as research shows, suppresses the continuity between the present and future self and fundamentally challenges thinking about the future, as well as the creative processes of visioning [1]. It is like looking at a photograph of yourself as a child and thinking that you have always been as you are now. But you were not. And you will not be. You change every day. And your future self is not the one you have become. It is the one you have not yet become. And this is at once frightening and inspiring.

Another important bias is creeping determinism, or hindsight bias. As is noted in R.B. MacKay's dissertation research, the past is not an isolated static state, but is closely connected with the future. However, there are several biases that influence our perception and conceptualization of the past. These biases act as constraints on strategic learning, limiting our ability to understand the driving forces arising from the past, unfolding through the present and becoming critical uncertainties in the future [7]. It is like reading a detective novel from the end. You know who the murderer is. But you do not know how he became one. And therefore you cannot prevent the next murder. Because you see the result, but you do not see the process. And forecasting is the ability to see the process before it has become a result.

Researchers from Tamkang University note that contemporary students often display pessimism and fatalism with regard to the future. Within the framework of the course *Futures Studies for Society* it was revealed that approximately two-thirds of the students from eight courses considered that the world is getting worse, and only a few were neutral and even fewer were at the optimistic end of the spectrum [6]. However, as observations show, when students considered their own agency, they tended to be more optimistic, and almost half of them felt that they could influence the future [6]. This is an important pedagogical conclusion: the development of forecasting must go hand in hand with the development of confidence in one's own ability to influence the future. Without this confidence forecasting turns into fortune-telling. And fortune-telling is not forecasting. It is a renunciation of agency. It is an admission that the future does not depend on you. And this is the most dangerous position. Because if the future does not depend on you, then why do anything? Why think? Why plan? Fatalism is not simply an emotion. It is a cognitive trap. And one can escape from it only through action.

Foresight and Scenario Thinking

Strategic foresight is an interdisciplinary field which, as E. Zalman notes, uses cybernetics and systems thinking, management sciences, sociology, data science, cognitive psychology and creative thinking. Anticipatory thinking to support decision-making is the essence of foresight [12]. As is emphasized in a study published in the *Journal of Futures Studies*, the integration of utopian thinking and the methodology of human-centered design allows students

to overcome cognitive biases and to develop the ability to see desired future states [6]. Scenario thinking is not simply prediction. As researchers note, scenarios are by no means predictions. They represent controlled speculative thought experiments that provide narratives about potential outcomes in possible futures [9].

Within the framework of the course *Sustainable Futures* at a business school, students work with real organizations in order to develop detailed scenarios about the possible futures that these companies may encounter [8]. The key principles of this approach include strategic, guided conversation, when instructors direct the process of sense-making, encourage active inquiry and recourse to interdisciplinary sources; open, multi-perspective inquiry, when students learn to consider complexity and systems thinking by conducting open and broad discussions; immersive experience, when students create scenarios through performative activities - plays, interactive stories, news segments [8]. It is like a rehearsal of a play that has not yet been written. You do not know how it will end. But you try different finales. And in the process you understand that not all finales are equally probable. And not all are equally desirable. And this understanding is already half of the forecast. Because it shows not only what may happen. But also what you want to happen.

One of the most well-known examples of the successful application of strategic foresight is the history of Royal Dutch Shell. As is noted in the study, in the 1970s Royal Dutch Shell recognized that geopolitical events, such as the recently created Organization of Petroleum Exporting Countries, could lead to a serious disruption in oil supplies, transforming what had until then been a buyer's market into a seller's market. As a result of its readiness to take this scenario seriously, the company was prepared for the oil embargo of 1973 and recovered faster than its industry competitors [9]. Another example is the preparation for the Y2K problem. In 1998 the World Future Society began working with the White House, UN coordination groups and others to foresee and address potential Y2K problems in the United States [12]. These examples show that foresight is not magic. It is a discipline. It is the ability to ask questions about the future long before it arrives. And it is the ability to act on the basis of the answers. Even if the answers are incomplete. Even if they are probabilistic. Because it is better to prepare for what may happen than to wait until it happens. And then find oneself unprepared.

Artificial Intelligence as a Partner

Contemporary research shows that artificial intelligence can act as a cognitive partner enhancing human capacities for forecasting. As is noted in a study devoted to AI as an instrument for the development of strategic thinking in educational leaders, artificial intelligence does not replace the leader, but acts as a cognitive partner expanding his analytical, reflective and creative possibilities [5]. For each component of strategic thinking the researchers identify specific AI technologies [5]. Predictive analytics - for systems analysis and scenario forecasting. Large language models - for critical reflection. Generative tools - for creativity and innovation. Feedback analysis systems - for a focus on value creation and social interaction. However, it is important to emphasize that AI is an instrument, and not a replacement for human thinking. As is noted in the same study, artificial intelligence does not replace the leader [5]. It is like a calculator. A calculator counts faster. But it does not know what to count. It does not know why to count. And it does not know what to do with the result. The human being knows this. And that is precisely why the human being remains the main one. And the machine - the assistant. Not the other way round.

How to Teach One to Look Ahead

As research in the field of foresight education shows, the development of forecasting requires practical experience of working with scenarios. Within the framework of *Sustainable Futures* students learn to ask subtle questions and to propose inspiring solutions, and become more optimistic about the future [8]. The key principles of this instruction are: work with real organizations, so that the scenarios are concrete and meaningful; the creation of immersive experiences - plays, videos, documentaries - so that the scenarios come alive; reflection after each exercise, an analysis of what was done and what can be improved [8]. Games, especially strategic ones - chess, go, poker - are an effective instrument for the development of forecasting. As the ETH Zurich study shows, even the simple game "Rock-Paper-Scissors" can become the basis for the development of strategic thinking if the player tries to forecast the opponent's actions on several levels [3]. It is like learning to swim. At first you are afraid of the depth. Then you get used to it. Then you begin to feel the water. Then you swim. And only then do you understand that the water holds you. But in order to understand this, you must enter the water. One cannot learn to swim while standing on the shore.

Researchers from Tamkang University emphasize the importance of empathy for the future. As is noted in the study, the ability to put oneself in the place of one's future self or of other people living in a given future scenario allows both a deeper immersion in this scenario and the gathering of additional knowledge about what it is like to live in it [6]. Pedagogical strategies include the creation of personas - profiles representing a particular group of people in a future scenario; utopian thinking - the exploration and discussion of desired future states; human-centered design - a focus on the needs and feelings of people in the future [6]. It is like writing a letter to yourself in ten years. You do not know what you will be like. But you can imagine. And in this imagining there is already a forecast. Because you are not simply fantasizing. You are modeling. And modeling is precisely forecasting.

Forecasting does not exist in isolation. Its development requires integration with the other mechanisms of the CCFP. With cause-and-effect thinking - the understanding of how actions in the present create consequences in the future. With critical thinking - the evaluation of the reliability of forecasts and assumptions. With information search and analysis - the gathering of data for well-grounded forecasts. With spatial imagination - the visualization of future scenarios. Forecasting is not a separate muscle. It is a joint that connects different movements. Without it there are movements, but they do not add up into a route. And a route is precisely strategy.

How to Measure Progress

In accordance with the principle of dynamic diagnostics, which I substantiate in the article on the diagnostics of mental mechanisms [15], the assessment of the development of forecasting and strategic thinking must be not static, but procedural. We assess not whether the student is able to foresee the future, but how his ability to calculate consequences, to retain multiple scenarios and to work with levels of strategic thinking has changed over the past six months. What is assessed: the number of calculated variants - how many scenarios of the development of events the student can retain in his mind; the depth of calculation - how many steps ahead the student can calculate the consequences; the taking into account of probabilities - can the student assess which events are probable and which are improbable; the quality of planning - how well thought out and realistic the plan of action is. How to track dynamics: record how many variants the student considers when solving strategic tasks; note how deeply the student calculates the consequences of his actions; compare how the student performs tasks on forecasting at different periods of time, whether his forecasts become better grounded and his plans more realistic; assess how far the student is able to take alternative scenarios into account and to correct his plans when new information arrives.

An example of a diagnostic task: you are playing chess or any other strategic game. Show how you analyze the position. Which variants do you consider? Why do you choose precisely this move? What consequences do you expect? What is assessed is not the correctness of the move, but the number of calculated variants, the depth of calculation and the quality of planning. For the collection and analysis of data on the development of forecasting, artificial intelligence can be used - for tracking dynamics, identifying patterns and proposing individual recommendations [15]. But here too there is a limit. Artificial intelligence can analyze moves, but it cannot see the strategy. It sees variants, but it does not see the meaning. And meaning is what makes a forecast strategic. Without meaning a forecast is simply an enumeration of variants. And enumeration is not strategy. It is a lottery. And a lottery is not forecasting. It is hope. And hope is not a method. It is an emotion.

The Path to Freedom and Responsibility

Forecasting and strategic thinking is not simply a technical skill. It is an ability that allows a person to go beyond the limits of momentary circumstances, to see the horizon of possibilities and to take responsibility for his future. As research has shown, this ability has a cognitive structure including different levels of thinking [4]; is subject to systematic biases that can be overcome through reflection and training [1]; can be developed through systematic instruction, scenario thinking and immersive experience [8]; can be enhanced with the help of artificial intelligence as a cognitive partner [5].

In my CCFP model forecasting occupies a special place, since it binds together all the other mental mechanisms. Without the ability to foresee the future, neither strategic planning, nor responsible decision-making, nor effective interaction with other people is possible. As D. Gilbert precisely formulated it, human beings are works in progress who mistakenly consider themselves finished [2]. The task of education is to help us realize that we are always in the process of becoming, and that our future depends on how well we are able to represent and build it. The chess player playing blindfolded does not see the board. But he sees the game. And this vision is not a gift. It is the result of

thousands of hours of practice. So too with forecasting. It is not given from birth. It is grown. Like a tree. Like a garden. Like the future. And if we want our children to be able to look beyond the horizon, we must teach them not only to look, but also to see. And to see means to understand. That beyond the horizon there is not emptiness. But the continuation of the path. And that this path depends on where you look. And where you go. And with whom. Because a forecast is not a solitary occupation. It is a conversation with the future. And, perhaps, the most important conversation in life.

References to Primary Sources

1. Isaac J.R. Identifying educational core competencies for the Information Age // Information and Communication Technologies in Education / eds. H. Taylor, P. Hogenbirk. - Springer, 2001. - P. 35-44.
2. Petrov P.M., Petrova A.G. Formation of the Competence OK.02 to Carry Out the Search, Analysis and Interpretation of Information Necessary for the Performance of Professional Tasks in Students of Secondary Vocational Education in the Conditions of Distance Learning // Scientific-Methodological Electronic Journal "Kontsept". - 2022. - No. 5.
3. Jiang X., Wang L. A Linkage Cultivation Model of Students' Information Literacy and Critical Thinking Skills in Education Informatization Environment // Applied Mathematics and Nonlinear Sciences. - 2024. - Vol. 9, No. 1. - P. 1-15.
4. Liu M. Information literacy formation through the use of library resources: Thinking, selection, and information processing skills of students // Reference Services Review. - 2025.
5. Šobota D. Mapping the core dimensions of information literacy in the critical and workplace domain: A thematic analysis // Journal of Information Literacy. - 2025. - Vol. 19, No. 2. - P. 4-33.
6. Tojiboyeva S.K. Methods of Information Search and Analysis in The Formation of Critical Opinion of Future English Teachers // International Journal of Pedagogics. - 2025. - Vol. 5, No. 4. - P. 205-207.
7. Zhao Y., Huang H., Li Q., Zhao Y.C. How user information search patterns impact learning outcomes across different stages of learning-related search tasks // Library & Information Science Research. - 2025. - Vol. 47, No. 2.
8. Sleptsova S.D. Media Literacy: A New Standard for the Teacher? // Scientific-Methodological Electronic Journal "Kontsept". - 2025. - No. 4.
9. Fiveyskaya E.Yu., Nakisbaev D.V. The Development of Digital Media Literacy of Schoolchildren in the Context of Specialized Education: Theoretical Foundation and Methodology // RUDN Journal of Public Administration. - 2024. - Vol. 11, No. 4. - P. 443-452.
10. Dewey J. How We Think. - Boston: D.C. Heath & Co., 1910. - 224 p.
11. Li Y., Liu C., Hansen P. Incubation and Verification Processes in Information Seeking: A Case Study in the Context of Autonomous Learning // ACM CHIIR '23. - 2023. - P. 1-10.
12. Sibiryakova L.V. The Project Task "Information Pharmacy." What the Person of the 21st Century Should Be Like (4th Grade). - Multiurok, 2026.
13. Kleymenov A. Basic Mental Mechanisms: The Structure of the Communicative-Cognitive Framework of the Personality // Fractal Academy. - 2026. - Issue 1. - Art. 5. https://fractal-academy.com/articles/article-1-5/
14. Kleymenov A. Epistemological Recursion in Cognitive Science: Mental Mechanisms as an Instrument for Overcoming the "Hard Problem" of Consciousness // Fractal Academy. - 2026. - Issue 3. - Art. 1. https://fractal-academy.com/articles/article-3-1/

15. Kleymenov A. Diagnostics and Development of Mental Mechanisms: From Theory to Pedagogical Practice // Fractal Academy. - 2026. - Issue 1. - Art. 6. https://fractal-academy.com/articles/article-1-6/

Additional Sources

- Kleymenov A. The Reasons for the Viability of Contemporary Pedagogical Practice: Institutional Inertia and Conservative Stability // Fractal Academy. - 2026. - Issue 1. - Art. 2. https://fractal-academy.com/articles/article-1-2/

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