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PROSPECTS FOR INCORPORATING FRACTAL THEORY IN PSYCHOLOGY AND ADJACENT FIELDS OF STUDY

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Abstract:
This article is dedicated to the analysis of the possibilities and prospects of integrating fractal theory in the field of psychology and related scientific areas. It examines various approaches to the application of fractal principles in the study of psychological phenomena, including psychodynamic, social-psychological, sociological, and linguistic perspectives. Special attention is given to the analysis of how fractal theory can enrich traditional approaches, providing new tools for understanding complex patterns of behavior and human interaction with the surrounding world. The article offers a multidisciplinary view on fractal models in social sciences, revealing the potential of fractal theory in expanding the boundaries of understanding the human psyche and sociocultural processes.

Keywords: fractal theory, psychology, social sciences, linguistics, psychoanalysis, multidisciplinary approach, mathematics.

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Introduction

In the socio-humanitarian sciences, there is an expanding application of fractal theory, based on the ideas of mathematician B. Mandelbrot [1], for the analysis and description of sense-making processes in various cultural and social systems [2, 3]. This theory offers a unique approach to analyzing repeating structures and patterns, revealing their dynamics and complexity. It provides analytical tools for studying both static and changing aspects of social interactions, allowing for deeper penetration into the essence of cultural and social phenomena. Fractal theory offers a platform for interdisciplinary dialogue, serving as a bridge between exact and socio-humanitarian disciplines, enriching the latter with new perspectives and approaches to research.

At the current stage of development in socio-humanitarian sciences, fractal theory is experiencing a period of establishment and is typically used as an analogy or model for psychological research on processual phenomena [4]. Key attributes of fractals include self-similarity, iterativity, recursiveness, and scale transitions. Self-similarity reflects the essence of the fractal as a fundamental phenomenon, symbolizing the dynamic integrity and stability of the transformation process. Iterativity and recursiveness indicate the repeatability of the same pattern, where each new transformation cycle begins after the completion of the previous one, creating a potentially infinite sequence. Scale transitions demonstrate that, regardless of the observation level, the overall pattern (algorithm) of transformations remains constant. Fractal theory offers an innovative view of familiar phenomena, allowing us to see in them repeating yet uniquely transforming patterns. It sheds light on how minor changes in cultural and social practices can lead to significant and even radical transformations at a higher level of organization. This approach facilitates a deeper and more comprehensive analysis, revealing hidden connections and dynamics within seemingly chaotic and unpredictable social phenomena.

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Moving to a more detailed analysis, we propose to examine similar psychological phenomena, using various scientific perspectives. This will allow for a comprehensive investigation of how fractal patterns can be revealed and interpreted in different areas of psychology and related scientific fields. A key step is the analysis of traditional approaches to studying behavioral and psychological phenomena similar to fractal structures, which will determine how the fractal approach can uncover new aspects of understanding for psychological science. Traditionally in psychology, repeating patterns of behavior and thinking, their causes and mechanisms of occurrence, and their impact on human behavior are studied. Topics such as obsessive thoughts, habits, repeating rituals, and stable personality traits are often considered in psychology in terms of their origins and functions. The fractal approach in psychology may offer a new perspective for studying these and similar phenomena, suggesting that behavior and thinking might demonstrate self-similarity and scale invariance, similar to fractal structures in nature.

Psychodynamic Perspective: S. Freud emphasized the importance of studying repeating patterns in human behavior, especially in the context of unconscious pathological forms of behavior, by exploring the phenomenon of "compulsive repetition" based on his own clinical observations [5]. Freud noted that patients often return to the same traumatic experiences, manifesting in the repetitive nature of their neurotic disorders. He attached significant importance to individual experience, especially that acquired in childhood, which forms stable patterns of behavior and interaction. According to his theory, these patterns can be reproduced in various situations of adult life, often without the individual's awareness. Freud's psychoanalytic approach reveals how personal, often childhood, experiences become the source of forming these stable patterns of interaction. He also emphasized that compulsive repetition is not limited to neurotic manifestations but represents a widespread phenomenon in the psyche, manifesting in character, habits, and even a person's fate. Freud analyzes socially typical forms of behavior, such as religious rites, and asserts that they are based on the same unconscious mechanisms as obsessive neurotic states, considering them as a "pathological copy of the development of religion" [6].

Freud's analysis of compulsive repetition and its connection to personality formation and sociocultural practices can be reinterpreted through the prism of fractal theory. Behavioral patterns, manifesting in various forms and contexts, resemble fractal structures, where the basic elements are repeated at different levels of behavior, from simple interactions to habits and stereotypes, which condition significant choices in human life.

The theory of transactional analysis by E. Berne, which develops Freud's ideas in an interactionist key, offers additional understanding of the mechanisms of sense-making and stable behavioral patterns [7]. Berne introduced the concept of a life script, which is formed based on significant childhood events and stable forms of interaction in the family context. This script, or "protocol," then becomes a repeating and stable pattern of behavior and experiences in an adult's life, sometimes leading to neurotic manifestations and problems with social adaptation. Berne identified various repeating forms of behavior, such as scripts, games, and rituals, observed in people with similar childhood experiences. These forms of interaction are socially typical, and a person participating in a neurotic game often finds themselves trapped in an unconsciously accepted role. Transactional analysis, thus, also seeks to identify these stable patterns of behavior, which can manifest at various levels - from individual interactions to general tendencies in a person's life. Berne described these repetitions with infinite regression, similar to scale transitions

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in the understanding of fractal theory, where each element of the script is reproduced in different variations: “In the script, its components are also repeatedly played out in various variants (analogous to the famous 'flea' example: on the backs of fleas sit even smaller fleas biting them, and on these smaller fleas sit even tinier fleas, and so on ad infinitum). Thus, a patient's life is his or her script on a large scale; the annual 'reenactment' of the same plot (for example, getting fired from a job) is a reduced version of the same matrix, and during the year, he or she may run through his or her script weekly... A perceptive observer can see how a patient 'runs through' one of the script's versions during a single session of group psychotherapy” [7, p. 96]. Berne did not believe that all repeating forms of behavior are necessarily pathological. In his opinion, there are also life scripts of winners, and the role of the psychoanalyst is to help people transform maladaptive scripts into socially adaptive ones. K. Steiner, a student of E. Berne, showed that alongside individual scripts, there are also typical or group scripts, which are linked to the cultural characteristics of a country or social class [8].

Social-Psychological Perspective: The study of stable forms of interaction in social psychology represents a multifaceted field of research that reflects various approaches to the analysis of behavioral patterns. Within the classic framework of K. Lewin's formula (B= f (P, E)), researchers may focus on individual characteristics (P), the influence of context (E), or the normative forms of interaction (f) between a person and others and their environment. D. Neutson, a successor in the research traditions of K. Lewin, was one of the first to note the possibility of applying the fractal approach in social psychology. He demonstrated that a specific action could be represented as a fractal structure, broken down into smaller movements, the structure of which is similar to the action as a whole, and that assessments of dimensionality at different levels of action analysis converge [9]. Ecobehavioral research by R. Barker, also developing key ideas of K. Lewin, makes a significant contribution to understanding repetitive socio-psychological phenomena. The main concept of ecobehavioral theory is the behavioral setting, which represents an interaction zone between human activity and its environment, for example, a classroom or a store. The behavior of people in these conditions is characterized by socially typical features, where individual traits are minimized. R. Barker adapts K. Lewin's formula, completely eliminating the influence of the individuality factor and considering behavior as conditioned solely by the external environment – "B = f (E)". The connection between stable behavioral patterns and physical objects R. Barker denotes as synomorphs, emphasizing their "identical structure". The stability of synomorphs is maintained through the mechanism of self-regulation of behavioral patterns, based on the principle of feedback between the components of behavior and the environment.

In the linguistic perspective, the fractal principle also finds its application in the study of meaning-making mechanisms based on human interaction with the surrounding world. The works of G. Lakoff and M. Johnson [10] significantly expand the understanding of this process, proposing the idea that human sense-making relies not only on language as a carrier of ready-made meanings but also on personal experience of activity and its interpretation. Lakoff and Johnson emphasize that the properties of the surrounding world are the result of active human interaction with this world, not inherently inherent qualities of objects. Knowledge conveyed through language has a metaphorical nature and can be represented as cognitive structures, defined as "image schemas". These schemas include such basic linguistic concepts as "part-whole", "path", "balance", "container", "up-down", "front-back, and others, and are constantly reproduced in the process of

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physical interaction of a person with reality. "Image schemas" are closely related to key anthropological aspects of human interaction with the world, including the structure of the human body (perceptual apparatus, motor functions, intellectual abilities, emotional sphere, etc.), the nature of interaction with the material environment (movement in space, various ways of interacting with material objects, consumption of food, and other natural actions), and interaction with other people within a specific cultural context. Lakoff and Johnson describe the stable patterns of human interaction with the surrounding world as "empirical gestalts". These gestalts form cognitive structures that, in turn, influence the meaning-making process. This approach allows for the consideration of meaning-making as a dynamic and multi-level process, and it also opens new perspectives for understanding the complexity of language structures and meaning-making processes within the framework of fractal theory in psychology.

The Sociological Perspective adds a significant dimension to the understanding of stable behavioral patterns through the concept of social rituals. As studies by E. Durkheim and his followers show, rituals play a key role in forming and maintaining religious systems and societal values. Modern sociological theories view rituals as symbolic actions with important functions in both religious and secular aspects of social life [11]. In the context of fractal theory, a ritual can be seen as a cultural analogue of an algorithm. V.V. Tarasenko, the creator of the concept of fractal semiotics, notes the fractal features of the ritual, conditioned by its recursiveness and cyclicity, and its clearly defined action scheme. He views the ritual as a "fractal machine", algorithmically closed and yet purposeless, existing in space and time in accordance with cultural requirements [3]. Religious rituals, as E.V. Nikolaeva notes, reveal the doctrinal meaning of religious ideas through their symbolic structure [2]. The role of rituals in the dissemination of culturally conditioned metaphors and values is also emphasized by G. Lakoff and M. Johnson. They argue that rituals are an important mechanism in the reproduction of culture, which is often based on metaphors [10].

Considering the diversity of perspectives and approaches presented in the article, it is appropriate to discuss how the features of fractal theory, including phenomena such as self-similarity, iterativity, recursiveness, and scale transitions, are reflected in these research directions. In the psychodynamic perspective, exemplified by the works of S. Freud and E. Berne, fractal principles manifest in the repeating patterns of behavior and neurotic disorders. The self-similarity of these patterns can be seen in the striking similarity of the same person's behavior in different contexts, while iterativity and recursiveness are expressed in the continuous reproduction of the same traumatic experiences or neurotic scenarios. Scale transitions are observed in how these behavioral patterns repeat at different stages throughout life. The social-psychological perspective (in the research tradition of K. Lewin) emphasizes the importance of studying the context of the formation of behavioral patterns. Here, fractal aspects are manifested in how behavior is reproduced in the same way across different sociocultural settings, demonstrating self-similarity and recursiveness of social interactions. In the application to linguistic research (G. Lakoff and M. Johnson), fractal theory helps to understand how meaning-making mechanisms are generated by repeating patterns in the structure of human experience. Self-similarity here is manifested in the metaphorical structures of language that reflect general aspects of human experience, iterativity and recursiveness - in the consistent use of these metaphors in different contexts. The phenomenon of scale transitions can be found in the ability of these metaphorical structures to cover a wide range

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of human activities and interactions. Finally, the sociological perspective, examining rituals as social structures, can also be correlated with fractal principles. Rituals, being stable and structured practices, demonstrate self-similarity in their repetition across different cultural contexts, iterativity and recursiveness are manifested in their regular reproduction, and scale transitions - in their ability to reflect multilevel cultural and social patterns.

Thus, fractal theory offers a largely unique perspective for research in the field of psychology and related sciences, enabling an in-depth exploration of complex and repeating patterns in human behavior and sociocultural processes. By combining the sociological perspective with linguistic, social-psychological, and psychodynamic analyses, fractal theory offers a new view on the study of stable patterns in human social behavior. This approach allows for an assessment of how cultural algorithms, such as rituals, form and maintain social structures and values, and how these structures and values, in turn, influence individual behavior and meaning-making.

Applied in psychology, fractal theory opens up unique opportunities for future research. For instance, researchers can study how basic personality traits manifest in various aspects of human behavior, creating unique yet self-similar patterns. In the context of cognitive psychology, recursiveness can help understand how repeating thought processes form stable cognitive structures, such as beliefs and value orientations. Understanding scale transitions in social interactions can reveal how small-scale social processes (e.g., the dynamics of interpersonal relationships) can impact larger social structures and phenomena, such as cultural norms and public movements. Thus, fractal theory not only allows for a reinterpretation of known psychological phenomena but is also capable of expanding the boundaries of understanding human behavior and cognitive processes.

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