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NEW MATERIALITY: FASHION, TECHNOLOGY, AND THE SEMIOTICS OF SURVIVAL

The article conducts a comprehensive semiotic analysis of the phenomenon of "Independent New Fashion" (INF) – a new layer of material and digital culture, including the newest clothes, footwear, accessories, and jewelry, created using advanced technologies for creating clothing (the World Wide Web (WWW), the Internet of Things (IoT), Artificial Intelligence (AI), smart clothes: the wearable computing and e-textile, NNI, 3D/4D printing, biotechnologies, smart materials, etc.). Emphasis is placed on one of many aspects − increasing the autonomous provision of vital physiological and communication functions of a human consumer. The study is based on the thesis that INF is not another trend in the traditional spiral of fashion cycles, but acts as a powerful semiotic marker, a material and digital agent of a qualitative socio-cultural transition − from the paradigm of mass consumption to the paradigm of situational survival and energy sovereignty in the face of global crises. The purpose of the article is to rethink the classical theories of cyclicality and fashion development (P. Nystroma, S. Kaiser, J. Lipovetsky) through the prism of technologically determined new materiality as a culturological category. Methodologically, the study employs a semiotic analysis of specific artifacts and discourses that constitute the field of Independent New Fashion (INF). The analytical material comprises real-world projects and cases: energy-generating "smart" garments, such as Wearable Solar and Vollebak jackets; open-design and local manufacturing platforms like Open Source Fashion and PrusaPrinters; as well as biotechnological experiments, for instance, The Algae Dress. This approach enables a shift from the level of abstract generalizations to the analysis of concrete practices. An original theoretical model for the analysis of INF is proposed, based on three interrelated principles: 1. Energy independence (transformation of a new object (clothes, footwear, accessories, and jewelry) into an active life support system). 2. Network decentralization (extra-institutional production and consumption). 3. Semiotics of the direct function (the formation of signification based on the demonstration of efficiency, and not only aesthetic citation). The term "semiotics of direct function" is separately elucidated and conceptualized. It differs from classical functionalism or utilitarianism in that the pragmatic efficacy of an object itself becomes the primary communicative message, its signified. As a result of the study, it is proved that the technological synthesis of advanced technologies for creating clothes (the World Wide Web (WWW), the Internet of Things (IoT), Artificial Intelligence (AI), smart clothes: the wearable computing and e-textile, NNI, 3D/4D printing, biotechnologies, smart materials, etc.) forms a fundamentally new material basis for the spiral of development of a new type. This spiral is characterized not by the repetition of aesthetic forms of the past, but by the return and technological reboot of the archetypal functions of clothing as a tool of protection and survival. In this way, the INF marks a shift in the axis of fashion evolution from the demonstration of status to the demonstration of sustainability and personal, independent control over resources, constituting a new paradigm. In it, material and digital culture becomes a tool for proactive adaptation to global risks. The article's interdisciplinary findings posit that Independent New Fashion (INF) functions as a prototype for a future hybrid material reality. In this reality, artifacts converge physicality, interface properties, and a novel identity rooted in autonomy, thus unveiling a new domain for inquiry within cultural studies.

Key words: Independent New Fashion (INF), new materiality, semiotics, independence, spiral development, fashion cycle, innovations, energy independence.

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НОВА МАТЕРІАЛЬНІСТЬ: МОДА, ТЕХНОЛОГІЇ ТА СЕМІОТИКА ВИЖИВАННЯ

У статті здійснюється комплексний семіотичний аналіз феномена «Незалежної Нової Моди» (ННМ) – нового шару матеріальної та цифрової культури, що включає новітній одяг, взуття, аксесуари та ювелірні вироби, створені за допомогою передових технологій створення одягу (інтернету (WWW), інтернету речей (IoT), штучного інтелекту (ШІ), smart clothes: the wearable computing and e-textile, NNI, 3D/4D друку, біотехнологій, розумних матеріалів тощо). Акцентується один із багатьох аспектів − підвищення автономного забезпечення життєво необхідних фізіологічних і комунікаційних функцій людини-споживача. Дослідження ґрунтується на тезі, що ННМ є не черговим трендом у традиційній спіралі модних циклів, а потужним семіотичним маркером, матеріальним і цифровим агентом якісного соціокультурного переходу – від парадигми масового споживання до парадигми ситуативного виживання й енергетичного суверенітету в умовах глобальних криз. Мета статті полягає в переосмисленні класичних теорій циклічності та розвитку моди (П. Ністрома, С. Кайзер, Ж. Ліповецького) через призму технологічно детермінованої нової матеріальності як культурологічної категорії. Методологічно робота спирається на семіотичний аналіз конкретних артефактів і дискурсу, що формують поле ННМ. Як аналітичний матеріал розглядаються реальні проєкти й кейси: «розумний» одяг із функцією генерації енергії, наприклад, куртки Wearable Solar і Vollebak, платформи відкритого дизайну та локального виробництва Open Source Fashion, PrusaPrinters, а також біотехнологічні експерименти, наприклад, водоростева сукня The Algae Dress. Це дає змогу перейти від рівня абстрактних узагальнень до аналізу конкретних практик. Пропонується оригінальна теоретична модель для аналізу ННМ, що базується на трьох взаємопов'язаних принципах: *енергетична незалежність* (перетворення нового предмету (одяг, взуття, аксесуари, ювелірні вироби) на активну систему забезпечення життєдіяльності); *мережева децентралізація* (позаінституційне виробництво та споживання) і *семіотика прямої функції* (формування знаковості на основі демонстрації ефективності, а не тільки естетичного цитування). Окремо розкривається й концептуалізується термін «семіотика прямої функції», який відрізняється від класичного функціоналізму чи утилітаризму тим, що сама прагматична ефективність об'єкта стає основним комунікативним повідомленням, його означуваним. У результаті дослідження доводиться, що технологічний синтез передових технологій створення одягу формує принципово нову матеріальну основу для спіралі розвитку нового типу. Ця спіраль характеризується не повторенням естетичних форм минулого, а поверненням і технологічним перезавантаженням архетипічних функцій одягу як знаряддя захисту й виживання. Таким чином, ННМ знаменує зсув осі модної еволюції від демонстрації статусу до демонстрації стійкості й особистого, незалежного контролю над ресурсами, конституюючи нову парадигму. У ній матеріальна та цифрова культура стає інструментом проактивної адаптації до глобальних ризиків. Висновки статті міждисциплінарного характеру вказують на те, що ННМ є прототипом гібридного матеріального світу майбутнього, де будь-який артефакт поєднує фізичність, інтерфейсність і нову ідентичність, основану на автономії, що відкриває нове поле для культурологічних досліджень.

Ключові слова: Незалежна Нова Мода (ННМ), нова матеріальність, семіотика, незалежність, спіральний розвиток, модний цикл, інновації, енергетична незалежність.

The field of fashion as an integral part of culture, classically described through the theory of cycles and the spiral return of styles, today is undergoing a paradigm shift determined by wars, environmental crisis, the desire for energy autonomy, etc. The phenomenon of "Independent New Fashion" (INF), a new layer of material and digital culture, including the latest clothing, shoes, accessories and jewelry created using advanced technologies for creating clothes (the World Wide Web (WWW), the Internet of Things (IoT), Artificial Intelligence (AI), smart clothes: the wearable computing and e-textile, NNI, 3D/4D printing, biotechnologies, smart materials, etc.) acts as a catalyst for this transition. The INF radically rethinks the very nature of a thing, its signification and function in a risk society. It does not fit into the logic of the simple recycling of aesthetic codes described by Paul Nystrom as the economy of the fashion cycle (Nystrom, 1928, p. 12). Instead,

the INF proposes a spiral development of a new type: the return of the archaic utilitarianism of clothing as a tool of survival, but at a fundamentally new technological and semiotic level. It is analyzed how the technological materiality of the INF transforms the classical theories of the cyclical nature of fashion, giving rise to a new model of evolution, determined not by the capital of style, but by the capital of functional independence. The purpose of the article is to rethink the classical theories of cyclicality and the development of fashion (P. Nystroma, S. Kaiser, J. Lipovetsky) through the prism of technologically determined new materiality as a culturological category.

Methodologically, the research is grounded in semiotic analysis aimed at identifying the signifying mechanisms embedded not in aesthetic form, but in the technological function and communicative strategy of INF artifacts. The empirical basis comprises specific projects and cases, such as solar-panel clothing, open-source 3D design platforms, and biotechnological experiments, which allows for tracing the translation of theoretical principles into material practice.

1. The classical model of the fashion cycle proposed by Nystrom (introduction – rise – peak – decline – decline) (Nystrom, 1928, p. 45), as well as the spiral theory, where the past is aesthetically reinterpreted (Kaiser, 1997; Lipovetsky, 1994), are based on the change of sign systems that are separated from the direct material function. Gilles Lipovetsky saw in this spiral a movement towards individualism and democracy through the ephemerality of forms (Lipovetsky, 1994, p. 78). However, the INF introduces material and technological determinism into this dynamic. Thus, advanced technologies for creating clothes, shoes, accessories and jewelry become the engine of a new spiral. INF is based on three interrelated principles: energy independence, network decentralization, and direct function semiotics.

WWW, IoT, AI and energy independence do not just add function, but create a new class of objects, where the update logic shifts from the field of appearance to the field of technical upgrade (software, battery capacity). This breaks the traditional cycle, because the object does not decline aesthetically while it is functionally relevant.

3D/4D printing institutionalizes the idea of customization that Susan Kaiser spoke about (Kaiser, 1997, p. 102), moving it from the level of choosing the ready-made to the level of creating the unique. This is not a spiral of styles, but a "spiral of personalized utilitarian forms", where each iteration is optimized for specific environmental conditions and body needs. Biotechnology introduces the cyclical nature of the biological order – growth, decomposition, and restoration. It is a return to organic materiality, but at the level of scientific synthesis, creating a "biotechnological spiral" where clothing can live, age, and recover under new laws (Tocca, Colapinto, 2021, p. 15).

Thus, INF does not deny cyclicity, but complicates it by adding to the aesthetic spiral the dimension of technological evolution and biological imitation.

2. Roland Barthes' semiotic analysis revealed fashion as a language that constructs meaning through the relationship between the signified and the signified (Barthes, 1990, p. 56). In the traditional model, the signifiers are former styles, artistic trends, social codes. The INF makes a semiotic break with this logic. Its symbolism – "semiotics of direct function" – is based not on a precedent-setting style, but on a demonstration of efficiency and independence. This directly transforms the very mechanism of fashion dynamics. To clarify, the proposed concept of a "semiotics of direct function" identifies a process where meaning is generated primarily through an artifact's utilitarian performance. Its form is perceived as a direct manifestation of that performance. Thus, it differs from standard functionalism by making the very fact of functional efficiency the central message being communicated.

The source of innovation is shifting from ateliers and fashion houses to laboratories of materials scientists, IT engineers and biotechnologists. The criterion of relevance ceases to be exclusively aesthetic (trend) and becomes technologically utilitarian (this works and provides autonomy and independence). The classic fashionable principle of repetition (recirculation) takes on a new meaning. We don't see a repeat of the cocktail dress of the 50s, but we do see the return of the archetype of protective armor, which after millennia materializes in the form of a jacket with heating elements and sensors. A clear example of this transition is the "Algae Dress" project. In this case, the dress – grown from microalgae – uses its very form and materiality to communicate its

CO_2-absorbing function rather than any historical reference, effectively converting environmental performance into a core semiotic message. It is a spiral at the level of deep functions, not surface forms (Entwistle, 2015, p. 231).

Thus, INF introduces not a cycle of styles, but a cycle of technological generations of functional artifacts, where each new repetition of the survival archetype occurs at a higher level of technological complexity.

3. Historically, fashion has been associated with the demonstration of wealth, status, belonging. Elizabeth Wilson rightly emphasized her role in constructing modernity and identity (Wilson, 2003, p. 34). The INF introduces a new axis around which the current evolution of fashion revolves: the "axis of energy independence". This radically changes the spiral vector: the social significance of a fashion item is now measured not by its value or rarity, but by the fact that what level of independence from external infrastructures (energy, communication) it provides. It is a return to the values of self-reliance, but in a hyper-technologized form. Traditional fashion functions through centralized institutions (shows, magazines, boutiques). INF, especially in the context of 3D printing and open-source IoT solutions, cultivates decentralized, networked distribution models (Morozov, 2013, p. 91). For example, platforms such as Open Source Fashion, where users exchange files for 3D-printing footwear or accessories, embody this principle of network-based decentralization, disrupting the linear fashion brand – manufacturer – market. This is not a cyclical postulate where everything comes back, but now a network postulate that occurs everywhere at the same time, which breaks the linear pattern of trend propagation from top to bottom.

Biotechnological materials and materials with shape memory (4D printing) carry an internal logic of development, independent of the vagaries of seasonal collections. Their evolution is closer to biological than market, indicating the formation of a new, hybrid spiral of development, where technological and biological cycles are intertwined with sociocultural survival needs (Fletcher, Tham, 2015, p. 120).

The phenomenon of the INF acts as a key marker of the transition from the classical cyclical model of fashion to the more complex spiral of technological-utilitarian evolution. The INF does not cancel, but radically complicates the theory of fashion cycles. It adds to the aesthetic spiral measurements of technological iteration, digital generation and biological simulation. This gives rise to a multidimensional spiral where development occurs simultaneously in the planes of form, function, material and mode of production. The semiotics of the INF is based on a break with the cyclical nature of precedent styles and a transition to semiotics of the direct function. Repetition occurs at the level of archetypes (protection, warmth, security) and not at the level of specific historical forms. The new axis around which the spiral of contemporary fashion revolves is energy autonomy, which leads to the decentralization of creation and distribution chains. Thus, Independent New Fashion (INF) marks a qualitative transition in the development of fashion as a cultural phenomenon: from a spiral of styles driven by capital and media to a spiral of technologically advanced survival artifacts, driven by the pursuit of personal independence in the context of global instability. This indicates the emergence of a new paradigm of hybrid material-digital culture, in which objects become not merely reflections of society but active tools for its proactive reprogramming based on the principles of survival, adaptation, and personal sovereignty. This opens a broad field for interdisciplinary research at the intersection of cultural studies and other sciences.

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