ALIENATION, DEPRESSION, DEMENTIA: EFFECTS OF DIGITALIZATION DIAGNOSED BY THE SOCIOLOGY OF HARTMUT ROSA, THE SOCIAL PSYCHOLOGY OF JEAN MARIE TWENGE AND THE NEUROSCIENCE OF MANFRED SPITZER

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ABSTRACT: This article aims to approach the formation of the digitalization of the world in contemporary modernity and the different scientific explanations of its forms and effects, demonstrating how interdisciplinarity can be useful in understanding this social problem in its totality. Using the interdisciplinary method that connects Hartmut Rosa's sociology, Jean Marie Twenge's social psychology and Manfred Spitzer's neuroscience, we developed a theoretical research to articulate the scientific diagnoses of the three areas of knowledge. We took as our axis of analysis three central objects of study in Rosa, Twenge and Spitzer in the context of digitalization, respectively: alienation, depression and dementia. The effort to use interdisciplinarity stems from the need to understand digitalization as a complex social phenomenon, strengthening a sociological analysis capable of capturing the negative effects of digitalization from different angles and expanding the senses of the critique of modernity for contemporary social theory.

KEYWORDS: Digital. Pathologies. Interdisciplinarity. Modernity.

***RESUMO**: O presente artigo pretende abordar a formação da digitalização do mundo na modernidade contemporânea e as diferentes explicações científicas sobre suas formas e efeitos, demonstrando como a interdisciplinaridade pode ser profícua para compreendermos este problema social em sua totalidade. Utilizando o método interdisciplinar que conecta a sociologia de Hartmut Rosa, a psicologia social de Jean Marie Twenge e a neurociência de Manfred Spitzer, elaboramos uma pesquisa teórica para articularmos os diagnósticos científicos das três áreas do conhecimento. Tomamos como eixo de análise três objetos de estudo centrais em Rosa, Twenge e Spitzer no contexto da digitalização, respectivamente: alienação, depressão e demência. O esforço de utilização da interdisciplinaridade advém da necessidade de compreender a digitalização como um fenômeno social complexo, fortalecendo uma análise sociológica capaz de captar os efeitos negativos da digitalização sob diferentes ângulos e dilatar os sentidos da crítica da modernidade para a teoria social contemporânea.*

***PALAVRAS-CHAVE**: Digital. Patologias. Interdisciplinaridade. Modernidade.*

***RESUMEN**: Este artículo pretende abordar la formación de la digitalización del mundo en la modernidad contemporánea y las diferentes explicaciones científicas de sus formas y efectos, demostrando cómo la interdisciplinariedad puede ser útil para comprender este problema social en su totalidad. Utilizando el método interdisciplinar que conecta la sociología de Hartmut Rosa, la psicología social de Jean Marie Twenge y la neurociencia de Manfred Spitzer, hemos elaborado un estudio teórico para articular los diagnósticos científicos de las tres áreas de conocimiento. Tomamos como eje de análisis tres objetos de estudio centrales en Rosa, Twenge y Spitzer en el contexto de la digitalización, respectivamente: alienación, depresión y demencia. El esfuerzo por utilizar la interdisciplinariedad surge de la necesidad de entender la digitalización como un fenómeno social complejo, fortaleciendo un análisis sociológico capaz de captar los efectos negativos de la digitalización desde diferentes ángulos y ampliando el significado de la crítica de la modernidad para la teoría social contemporánea.*

***PALABRAS CLAVE**: Digital. Patologías. Interdisciplinariedad. Modernidad.*

Introduction

Hartmut Rosa is a German philosopher and sociologist who teaches Sociology at the University of Jena and currently serves as Director of the Max Weber Kolleg in Erfurt. The theory of social acceleration, the identification of multiple forms of alienation as effects of accelerated modernity, and the theoretical development of a sociology of our relationship with the world are at the core of his research interests (Rosa, 2016; 2019a; 2019b).

Jean M. Twenge is a social psychologist born in the United States of America, where she teaches Psychology at San Diego State University. Her empirical research on the psychosocial characterization of hyperconnected youth and on the psychopathological effects of excessive use of digital media goes beyond the field of psychology, granting Twenge international credibility in this area (Twenge, 2018).

Manfred Spitzer is a German neuroscientist and psychiatrist who works in Germany as Medical Director, Professor, and President of the Psychiatric Hospital of Ulm University (Universitätsklinik für Psychiatrie). For decades, Spitzer has devoted himself to the study of the neurological and psychological effects of new technologies, ranging from television to computers, from the web to smartphones (Spitzer, 2013; 2019).

In light of the presentation of these scientists from different fields and with distinct research agendas—only apparently unrelated—the following question arises: what phenomenon of social reality can unite the three scholars mentioned? Seeking greater scientific rigor in formulating this question: what object within the social world is capable of generating interdisciplinary linkages among three distinct areas of knowledge—sociology, social psychology, and neuroscience?

Our hypothesis is that digitalization constitutes this object. It is the object of study that, in light of the intellectual operation of the social theorist and the appropriate use of a theoretical-methodological framework, can sharpen the integration among these different scientific approaches.

The nature and effects of digitalization are observed, reflected upon, and analyzed—under different perspectives, paradigms, theoretical problematics, methods, and research procedures—by the three scientists in question. From the standpoint of the theoretical-methodological orientation of the present study, within the scope of complex scientific thought (Morin, 1998), we start from the premise that contemporary social theory must articulate interdisciplinary studies to comprehend complex and multidimensional social phenomena, such as digitalization.

Based on the construction of this object—digitalization—the aim of this article is to outline a sociological investigation, situated within sociological theory, that offers a critique of digital modernity through interdisciplinarity among Hartmut Rosa's sociology (which addresses the phenomenon of digital alienation), Jean M. Twenge's social psychology (which deals with the emergence of digital depression), and Manfred Spitzer's neuroscience (which points to the rise of digital dementia).

Digitalization of the World: Technological Ultra-Acceleration in Contemporary Modernity

Contemporary, or late, modernity is the expression of an acceleratory surge that has been propelled since the final decades of the twentieth century (Rosa, 2019a, p. 428). With regard to advances in digital technology, this is the historical period in which the global consolidation of the internet, the construction of the web, and the widespread presence of electronic computers, smartphones, portable devices, and gadgets in everyday life become entrenched, alongside the massive use of social networks (especially Facebook, WhatsApp, X, Instagram, and TikTok). The digital revolution of our time, combined with the technical acceleration of communication media, instant transmission, and information systems (big data, algorithms, databases), represents an unprecedented stage of technological ultra-acceleration[2].

Indeed, the digitalization of the world emerges as a process resulting from technological ultra-acceleration that drives contemporary digital revolutions. As Evgeny Morozov (2018, p. 7), author of *Big Tech: The Rise of Data and the Death of Politics*, argues, digital technology is not merely applied science—as suggested by more simplistic philosophies of technology—but rather a tangled web of geopolitics, global finance, unrestrained consumerism, and the accelerated corporate appropriation of our most intimate relationships.

In this sense, the concept of digitalization of the world refers to a new social system that, from the perspective of its technological infrastructure, is based on the formation of a network society (Castells, 2005)—digital networks of devices that generate, process, and

[2] Technical and technological acceleration, developed in modernity through processes of rationalization and modernization, constitutes a central category in Rosa's sociological thought. It is conceived as an essential driving force of the capitalist mode of production, transforming values, social change, social action, and human subjectivity. Among the most evident manifestations of this phenomenon are the acceleration of transportation, communication media, the production of goods and services, data flows, and information technology. From this perspective, the acceleratory intensification observed in the transition from the twentieth to the twenty-first century—which propelled the digital revolutions—represents a qualitative leap in processes of modernization and rationalization. It can be classified as a form of technological ultra-acceleration that intensifies and deepens preexisting patterns of acceleration, particularly in the sphere of data and information technology (Rosa, 2019a).

distribute information from data and knowledge accumulated in the nodes of these networks, under the paradigm of information technology. The digitalization of the world redefines how contemporary society organizes itself socially, economically, culturally, and politically. It is grounded in social life in the name of the "intelligentization of everyday life"[3] and "algorithmic regulation"[4] (Morozov, 2018, p.84–85, our translation).

To understand the negative effects of digitalization on the contemporary individual, we assume that the digital reconfigures how human beings experience, feel, think, act, and relate to themselves and to others. By articulating the perspectives of the sociologist Rosa, the psychologist Twenge, and the neuroscientist Spitzer—who will be presented and explained later—we can define digitalization as a multifaceted sociotechnical process: the progressive integration of digital technologies into everyday life alters modes of human interaction, social organization, and cognitive functioning. As will be detailed in subsequent chapters, digitalization—accompanied by global connectivity, digital compulsion, and technological dependence—constitutes a broad field of tensions. It can be conceived as a driver of social transformations and alienations, capable of challenging psychological, behavioral, and socialization patterns and, moreover, of threatening cognitive development and the mental health of an ever-growing number of individuals.

Digital Alienation: Hartmut Rosa's Sociological Thought

At the core of the critical theory articulated by the German sociologist Hartmut Rosa (2016) lies the diagnosis of different forms of alienation. In general terms, alienatory manifestations correspond to negative effects of ultra-accelerated modernity and are associated with human suffering, social malaise, loss of autonomy, social and psychic pathologies, physical and mental exhaustion, the problem of desynchronization between human beings and the social world, and the erosion of resonance between individuals and themselves, with others, with objects, and, ultimately, with the world. Alienation is portrayed as a pathological state characterized by the absence of relationship, that is, a condition in which the world cannot be

[3] Morozov links the concept to the promise of increased control, surveillance, and simultaneous tracking among ideologues of digital technology. The strategy of digital corporations such as Google, aimed at expanding their operating system to encompass all objects in the world, seeks to position these companies as intermediaries between human beings and things.

[4] According to the Belarusian writer, a new model of governance is being articulated in alignment with the political program promoted by Silicon Valley, in which Big Tech companies function as regulatory agencies of social life. They operate on the basis of a deep understanding of intended outcomes and rely on the functioning of artificial intelligence, data, metadata, and the mapping and analysis of users' activity records.

adaptively transformed and the points of resonance between the individual and the world remain mute and deaf (Rosa, 2019b, p. 184).

Rosa's sociological analysis of the sense of alienation is complex and graduated, distinguishing itself within critical theory from earlier formulations. His approach differentiates specific alienatory manifestations: alienation from space, alienation from things, alienation from actions, alienation from time, alienation from the self or from others, and alienation from the world (Rosa, 2016; 2019b). These distinct dimensions constitute the psychosocial structure of alienation rooted in ultra-accelerated modernity.

To achieve the objectives of the present study, and based on Rosa's sociological research, we focus on these different phenomenological forms of alienation only insofar as they correlate with the phenomenon of digitalization (that is, alienation as an effect of digitalization). Accordingly, we highlight the social contradictions of technological ultra-acceleration, using the psychosocial structure of alienation identified in the work of the German sociologist as an analytical paradigm for understanding the negative social consequences of the digitalization of the world.

From a sociological standpoint, it is first necessary to reflect on the phenomenon of spatial alienation. Understanding this diagnosis requires grasping the theoretical development of the sociology of our relationship with the world as outlined by Rosa (2019b). From historical, existential, and anthropological perspectives, social space constitutes the locus of human experience: it is where physical energies are retained and materialized, that is, the medium in which subjects are situated in the world. There is thus a mutual and constitutive relationship between human beings and physical and geographical space: "as human beings are necessarily embodied subjects, they inevitably experience the world as spatially extended and themselves as spatially situated" (Rosa, 2016, p. 148, our translation).

By contrast, within digitized globalization, flexibility and the negation of physical space characterize the phenomenon of spatial alienation, as one observes a process of detachment from the physical, geographical, and material environment. Virtualization—the representation and simulation of data, phenomena, or geographical elements in the digital medium—refers to the separation between physical and social proximity: for example, those who are socially close to us no longer need to be physically close (Rosa, 2016). Spatial alienation results from the fact that the virtualized environment of the web does not necessarily extend spatially into human experience, nor does it need to be spatially located.

The era of digitalization also generates other problems related to alienatory manifestations of existence, particularly the alienation from things. The high level of technological incorporation in contemporary capitalist society fosters the mass consumption of electronic devices and gadgets. The spiraling increase in the circulation of smartphones, laptops, and electronic devices is closely linked to the acceleration of production and consumption across the entire material processing of society, as well as to the speed of capital realization (Rosa, 2019a). Technological objects circulate within an incessant cycle of material exchanges, becoming replaceable and transient under the force of the capitalist imperative to acquire new products—a consequence of the industrial process known as planned obsolescence. In short, the prevailing economic imperative inhibits the formation of lasting bonds with things: objects are not meant to be repaired or maintained, but replaced by new commodities continuously produced and reproduced by the capitalist mode of production (Rosa, 2016).

The alienation from things is associated with another form of alienation addressed by Rosa: alienation from actions. Immersed in a society marked by intense technological incorporation, contemporary individuals are unable to assimilate the dizzying innovations, changes, and information emanating from the digital environment. Users of information technologies are generally incapable of fully mastering technological tools that are constituted through permanent processes of updating and recreation (Rosa, 2016).

It is worth noting that the problem of human inadequacy in relation to new technologies had already been anticipated in the 1940s by the critical theory of technology developed by the German philosopher Günther Anders (2011). By identifying the discrepancy between human beings and the complex technologies of industrial society, Anders drew attention to humanity's inability to comprehend the nature, uses, and effects of the products manufactured by modern society. Faced with this incapacity, human beings would be condemned to feel shame due to their condition of inferiority in relation to the high performance of machines[5].

Another form of alienation, closely linked to the diagnosis outlined in the previous paragraph, must be highlighted: the alienation of time, or more precisely, the alienation of subjective temporal experience. This type of alienation affects the temporal resources of human experience and the faculty of memory.

[5] Alluding to the Myth of Prometheus—who stole fire from the gods of Olympus to give it to mortals—Anders conceptualized this constraint as Promethean shame, referring to a form of shame before things produced by human beings themselves, whose high quality exposes the limits of human understanding.

The diffusion of electronic activities, such as watching television and browsing the web, leads to episodes of action that do not become fixed in individuals' memory due to two fundamental factors (Rosa, 2019a). The first is desensualization, insofar as electronic screens offer limited or null sensory stimuli (tactile, olfactory, and gustatory), resulting in an extremely passive response. The second is decontextualization, whereby episodes of action generated and viewed on electronic monitors or digital media often do not reflect real experiences lived in everyday life, becoming a-contextual and non-situated events, perceived as alien narratives that do not endure in people's memory. The alienation of subjective temporal experience lies precisely in the way electronic activities, associated with the digitalization of the world, produce episodes of action that are perceived as brief at the moment of execution, providing immediate satisfaction but leaving no lasting imprint on individuals' memory. This significantly distorts personal experience and, consequently, human mnemonic capacity.

At this point, one arrives at the problem of the alienation of others—social alienation—the paradigmatic form of estrangement and disconnection in interpersonal relations in the digital age. Social alienation represents a harmful mode of existence that shifts toward the social issue of crises of sociability.

The South Korean philosopher Byung-Chul Han (2018) is among the authors who most incisively describe the intensification of these crises during the period of world digitalization. According to him, in contrast to the idea of masses—typically associated with specific social formations of the twentieth century—the formation of clusters in the virtual environment represents the constitution of the digital swarm, characterized by liquidity and by its rapid formation, fragmentation, and dissipation. In the digital age, the mass is transformed into a swarm because it does not constitute itself as a mass and is not homogenizing; rather, it tends to amplify the optimization and maximization of the individuality of digital users who navigate the web. The term that best captures the prevailing feeling among members of the digital swarm is loneliness—digital loneliness—since hyperindividualism and social isolation increasingly prevail among individuals who are ever less inclined to build real interpersonal relationships.

Compulsion toward virtual action entails the phenomenon of self-alienation. In this context, self-alienation corresponds to the exhaustion of the self and is associated with psychopathological clinical conditions characteristic of the present time, such as digital addiction, attention disorders, anxiety, depression, and burnout syndrome (Rosa, 2016). These pathologies emerge and proliferate in a digitalized society due to the inability of the human body and mind to keep pace with the vertiginously fast rhythm of demands, processing, and

operations imposed by digital media, as well as due to other psychosocial factors that will be examined in subsequent chapters.

The use of smartphones, laptops, and portable technological devices also gives rise to a sense of bodily alienation. When such media are used, the eyes remain fixed on digitized screens, focused on monofocal activities that generate high levels of stress and physical and mental strain, while bodily tension progressively increases due to the lack of movement and a problematic physical posture toward the world (Rosa, 2019b).

In summary, in the era of the digitalization of the world, a fracture in the relationship between human beings and the world becomes evident. With regard to social relations and experiences lived within the context of digitalization, the world tends to be reduced to a channel of resonance that passes only through the dimension of digitized screens (Rosa, 2019b). In the digital realm, the subject experiences the sensation of being in another world, partially disconnecting from the world to which they belong and silencing the axes of resonance between the self and the natural world[6].

Digital Depression: Jean M. Twenge's Social Psychology

The American psychologist Jean M. Twenge is dedicated to the study of generational behavior, with particular emphasis on the formation of hyperconnected youth at the turn of the twentieth to the twenty-first century. The starting assumption is that the generation of individuals born from 1995 onward, known as *iGen*[7], has as its distinctive collective characteristic the way its members spend their lifetime: fundamentally online and in front of digitized screens. Unlike other media used by previous generations, smartphones and other digital devices permeate almost every moment of these young people's lives from early childhood onward (Twenge, 2018). By interpreting online time as a social and generational problem of iGen, some of the data employed by Twenge show that, on a global average, contemporary youth spend more than nine hours per day in front of electronic devices (Twenge, 2019).

[6] When the axes of resonance between the self and the world fall silent, the suppression of existential sensibilities—in their physical, mental, emotional, and cognitive forms—intensifies in the subject's interaction with the real world (Rosa, 2019b).

[7] The term can be translated as the "Me Generation" or the "iPhone Generation," since the expression *iGen* refers both to the individualistic behavior of young people and to their permanent and prolonged use of smartphones. With regard to periodization, 1995 is a pivotal year for the formation of this generation, as it marks the beginning of the commercialization of the internet worldwide (Twenge, 2018).

Twenge's research interest focuses on the negative impacts of excessive use of digital media on the behavior and mentality of young people living in the era of digitalization. She thus examines the influence of constant use of electronic devices on the formative process of iGen and on the behavioral and psychological development of these young individuals. Her empirical analysis—centered on the social reality of the United States of America—identifies a correlation between the widespread use of smartphones and the escalation of the mental health crisis among hyperconnected youth.

According to Twenge's research, the increase in unhappiness among young people in the United States coincides with the mass adoption of smartphones after 2012. Studies conducted by the American psychologist, in coauthorship with various researchers, on the behaviors and psychological state of iGen point to the following conclusion: engagement in so-called in-person activities (seeing friends face-to-face, practicing sports, engaging in school activities, and participating in religious, community, or social initiatives) is correlated with higher levels of happiness, positive emotions, and psychological well-being. Conversely, screen-based activities—which are increasingly embedded in the daily lives of hyperconnected youth—are correlated with rising unhappiness, negative emotions, and psychological disorders (Twenge, 2018).

Among the many harmful social and psychological effects, depression is the issue that most draws Twenge's attention in her effort to grasp the negative consequences of digital media for the collective development of iGen. It serves as the paradigm through which the causes and effects of psychological suffering among contemporary youth are examined.

The primary factor behind the rising rates of depression, anxiety, and suicide among young people is the replacement of real interaction with virtual interaction. That is, the problem of loneliness among children and adolescents who come to communicate essentially through social networks as a result of the decline of face-to-face interpersonal interaction.

Moreover, the frequent presence of smartphones during real social interactions compromises the quality of interpersonal contact, giving rise to the problem of disrupted social interaction. This issue is represented by the phenomenon known as *phubbing*: the act of ignoring someone in favor of focusing on one's cellphone.

As a consequence of digital social isolation, several psychological disorders highlighted by Twenge and other researchers can be identified as affecting the mental health of contemporary youth. First among these are psychological distress and deficits in self-control, social interaction, and expressions of affection. Children and adolescents who have become

heavy users of digital media exhibit difficulties in psychological and behavioral formation, as well as temperamental crises, anxiety, and irritability (Twenge; Martin; Campbell, 2018, p. 278).

Second, there is the growing incidence of sleep disorders and insomnia. Studies indicate that contemporary youth sleep less than previous generations while suffering greater sleep disruption due to excessive smartphone use and exposure to light emitted by electronic devices. Sleep disorders can trigger obesity as well as psychological and behavioral pathologies (Twenge; Krizan; Hisler, 2017).

Finally, digital addiction stands out (Twenge, 2019). It is associated with a range of psychological disorders caused by the excessive consumption of the internet, social networks, and electronic games. Addiction to digital devices constitutes a major risk factor for the emergence of depressive symptoms and suicidal ideation[8].

Research conducted by Twenge demonstrates a higher prevalence of depressive symptoms among adolescent girls as a result of their patterns of use. This occurs because they tend to be the primary victims of the perverse social ordering of social media: social comparison, the incessant search for prestige through likes or followers, cyberbullying, narcissistic concern with image and bodily exposure, and the broad availability of information about self-harm or suicide are significant risk factors for increased anxiety, distress, depression, self-harm, and suicide among girls and adolescents (Twenge, 2020).

When the widespread presence of digital communication media contributes to the proliferation of clinical cases of depression—alongside anxiety, self-harm, distress, social isolation, and suicide among children and adolescents—this phenomenon can be described as the paradox of the digital age, one of the most urgent problems of the historical moment of digitalization. The contradictions of an ultratechnological society thus become evident: a mental health crisis among youth as an effect of technical rationalization and of technological acceleration and expansion.

[8] The severe pathological condition diagnosed as nomophobia refers to the fear of being without a mobile phone and can be considered a psychological disorder associated with digital addiction.

Digital Dementia: Manfred Spitzer's Neuroscientific Perspective

The German neuroscientist and psychiatrist Manfred Spitzer has produced extensive work on the neurological and psychological effects of new technologies. He has dedicated his research to examining the impacts of computers and smartphones on the development of addictive behaviors, sedentary lifestyles, overweight, high blood pressure, diabetes, myopia, sleep disorders, detachment from nature and the real world, psychological problems, civil coexistence, and cognitive deficits (Spitzer, 2013; Spitzer, 2019). One of his principal contributions to the field lies in the identification and conceptualization of a new neural and psychological dysfunction of the era of digitalization: digital dementia.

Digital dementia is a neuropathological condition that represents an alteration of mental activities as a consequence of the abusive use of the internet and digital devices. It manifests through a lack of critical thinking, an inability to think clearly, and an incapacity to remain informed about what is happening in one's surroundings (Spitzer, 2013, p. 294). It has crystallized as a paradigm in the study of social and psychological pathologies of the present time, especially with regard to transformations in the cognitive activity of digital media users.

The primary cause of this clinical problem lies in the outsourcing of mental activity to the immediate responses provided by digital media, such as Google. Spitzer explains that technological dependence impairs neural functions and the process of brain learning, insofar as it ceases to stimulate the cognitive work of the human brain (Spitzer, 2013, p. 38). Technological dependence inhibits the full development of neural capacity because the brain, as a dynamic organ, develops only to the extent that it is exercised. By way of example, the use of technologies such as typing on a keyboard instead of developing writing and handwriting leads to a reduction in the number of synapses activated in the brain, thereby diminishing the depth of intellectual processing and human learning capacity (Spitzer, 2013, p. 70).

At this point, it is necessary to understand the set of cognitive symptoms that constitute the state of digital dementia. The first symptom addressed here is the deterioration of spatial awareness. Empirical studies cited by Spitzer show that some automobile drivers who rely on GPS[9] for navigation exhibit a significant reduction in the hippocampus, the region of the brain responsible for spatial orientation and navigation (Spitzer, 2013). By contrast, drivers who do not depend on such technology are able to develop this brain region more fully, achieving higher cognitive levels in spatial perception.

[9] The Global Positioning System (GPS) is a service that provides users with positioning, navigation, and timing technology.

Another pathological manifestation of digital dementia appears in the form of memory regression. When mental activity is outsourced to machines, memory traces fail to consolidate in the brain, revealing a weakening of neural performance as an effect of diminished mental effort (Spitzer, 2013). In short, technological dependence causes memorization effort to be replaced by digital processing and storage, thereby weakening cognitive capacities and, consequently, deeper forms of memory work.

The cognitive problem of attention deficit is also associated with digital dementia. Users of digital media tend to reproduce the phenomenon of media multitasking—performing multiple online and offline activities simultaneously—and multitasking constitutes a risk factor for increased distraction and the emergence of attention disorders (Spitzer, 2013).

Beyond the neuropathological cases mentioned above, research reported by Spitzer indicates that smartphones can generate thought disorders and hallucinatory sensations. One such problem involves clinical conditions classified as cerebral evasion, resulting from prolonged use of mobile phones (Spitzer, 2017). Even when not in use, smartphones impair the allocation of cognitive resources among heavy digital media users, as their cognitive functions remain engaged in inhibiting selective attention oriented toward the device.

Hallucinogenic sensations, in turn, correspond to other side effects of excessive smartphone use. According to data reported by Spitzer (2019), a study involving 320 smartphone users revealed that 80% of them experience auditory and tactile hallucinations, claiming to feel their smartphones vibrating even when the devices are turned off.

The incidence of thought disorders and hallucinogenic sensations must therefore be taken into account in order to understand the symptomatic formation of digital dementia. In both cases, the indiscriminate use of smartphones points to the problem of "disordered thinking" (Spitzer, 2017, our translation).

One indicator of digital dementia, as highlighted in Spitzer's argument, is the decline in intelligence quotient (IQ) observed among individuals in recent years (Spitzer, 2019). His hypothesis is that the integration of electronic devices and digital media into everyday life is the main factor explaining the reduction of human intelligence in the twenty-first century. For Spitzer (2016), contemporary technological advances have not resulted in an intelligent society (Smart Society)—as promised by lobbyists of the technology industry—but rather in an alarming decline in human intellectual performance.

Digital dementia encompasses neurological, psychological, and physiological clinical conditions grounded in transformations of personal mentality resulting from the excessive use

of digital devices. Ultimately, the pathological state of digital dementia produces changes in human subjectivity itself. In an effort to address this dimension, Spitzer introduced the term *smombie*[10] to describe the apathetic and abulic behavior observed among smartphone users, employing a metaphor that associates such conduct with the debilitated condition of zombies (Spitzer, 2016).

Final considerations

This study sought to incorporate contributions from different fields of knowledge into the sociological analysis of digitalization, with the aim of articulating a sociology of techno-digital effects. We started from the hypothesis that such a sociological endeavor, as proposed in this article, depends on a theoretical and methodological commitment to interdisciplinarity among sociology, social psychology, and neuroscience. The interdisciplinary method is capable of capturing different dimensions of social reality that are impacted by the penetration of digital technologies into social life.

This approach does not imply adopting a technophobic stance toward technological advances. Rather, it seeks to expand the analytical scope of the critical theory of contemporary modernity by revisiting the understanding of the dialectical unity between progress and barbarism—a conceptual movement that is central to the main representatives of first-generation Frankfurt School critical theory (Theodor Adorno, Max Horkheimer, Walter Benjamin, Herbert Marcuse). Our analytical effort extended to examining how the technical-scientific progress of the productive forces generates deleterious social, psychological, and neurological effects for a growing number of individuals situated in the age of digitalization.

Assuming that digital technologies directly affect human experiences and social relations in contemporary modernity (Rosa, 2016, p. 73), it can be concluded that alienation, depression, and dementia emerge as paradigmatic categories for understanding the new pathologies of a digitalized society.

[10] Popularized internationally after being named the word of the year in Germany in 2015, it is a critical neologism coined by Spitzer by combining the words “smart” (referring to the smartphone) and “zombie.”

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