# CROWDWORKING AS INTENSIFIED REAL SUBSUMPTION: REREADING HUMAN- MACHINE RELATIONS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

BERNA AKDOĞAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF SOCIOLOGY

JANUARY 2024

Approval of the thesis:

**CROWDWORKING AS INTENSIFIED REAL SUBSUMPTION: REREADING HUMAN- MACHINE RELATIONS**

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# ABSTRACT

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Master of Science, Sociology
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January 2024, 140 pages

This thesis provides a critical account of autonomist Marxism's perspective on human-machine relations in contemporary capitalism. It conducts this criticism through the examination of specific digital labor called crowdwork that supplies the training data for machine learning. Examination of crowdworking relies on various qualitative and quantitative studies about crowdworkers and crowdworking. Through a detailed analysis of crowdworkers' relationship with machine learning algorithms, this thesis suggests that crowdworking is the intensification of real subsumption. This thesis aims to show that, as opposed to the claims of autonomist Marxists, the novel forms of technology do not grant emancipatory conditions in the realm of immaterial labor.

**Keywords:** Crowdworking, Real Subsumption, Autonomist Marxism, Human-Machine Relations

# ÖZ

REEL BAĞIMLILIĞIN YOĞUNLAŞTIRILMASI OLARAK KİTLE BAZLI ÇALIŞMA: İNSAN-MAKİNE İLİŞKİLERİNİN YENİDEN OKUNMASI

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Ocak 2024, 140 sayfa

Bu tez, otonomist Marksizmin güncel kapitalizmde insan -makine ilişkisine dair eleştirel bir bakış sunmaktadır. Tez, bu eleştirisini dijital bir emek biçimi olan ve makine öğrenmesi için eğitme verileri sağlayan kitle bazlı çalışmanın incelenmesi aracılığıyla yapmaktadır. Kitle bazlı çalışmanın incelenmesinde çeşitli niteliksel ve niceliksel çalışmalar baz alınmıştır. Kitle bazlı çalışanların makine öğrenmesi algoritmalarıyla olan ilişkilerinin detaylı analizi aracılığıyla, tez, kitle bazlı çalışmanın reel bağımlılığın yoğunlaşması olduğunu savunmaktadır. Bu tezin amacı; otonomist Marksistlerin iddialarının aksine, yeni teknolojilerin maddi olmayan emek alanında özgürleştirici koşullar sunmadığını göstermektir.

**Anahtar Kelimeler:** Kitle bazlı çalışma, Reel bağımlılık, Otonomist Marksizm, İnsan-Makine İlişkileri

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# CHAPTER 1

# INTRODUCTION

After the crisis of the Fordist model around the 1970s, various theoretical endeavors have tried to articulate the new dimensions of the economy. Apart from mainstream neoliberal theories such as the "knowledge-based economy" and the "information age," critical leftist theories and concepts emerged and proliferated. Post-Fordism as an interpretive category has appeared to stress the flexible mode of accumulation and decline of regulation. Theories that focused on knowledge and technology as the kernel and driving factor of contemporary capitalism and the counter-arguments that emphasize the continuation of the centrality of exploitation of living labor in capitalist production also developed. The reality and pervasiveness of new technologies and their relevance in economic production and social formation remains a critical and poignant question that needs to be reworked in this stage of capitalism fueled by information and communication technologies (ICT) and statistical data analysis for commercial and managerial purposes.

Contemporary technology studies have been interested in technology's role in the division of labor, communication, and configuration of the public sphere and employment relations, control, and surveillance. "Big Data Surveillance," "Surveillance Capitalism," and "Platform Economy" are historically relevant concepts that introduce the potential tools to understand the algorithmic management of labor, knowledge, and social relations. (Scholz 2013, Zuboff 2015, Lyon 2014). The interest in technology's role in productive and social relations was inevitable due to intensifying digitalization and computerization that triggered the "dataquake" of the 2010s. (Alpaydin 2016). At the intersection of economy, society, and technology resides "statistical big data analysis," which is rebranded as "Artificial Intelligence" in contemporary technological discourse (Katz 2017). It can be said that AI is making a comeback after the "winter of symbolic AI" at the end of the 1980s. Machine Learning has become the central technological paradigm behind AI, enabled by the vast and diverse data concentrated on the technology companies and

states (Steinhoff 2021). Machine learning already powers these tech giants through targeted advertisement, consumer analysis, and mental and manual labor automation. Currently, the most pervasive deployments of Machine learning are detected “in the background of activities conducted on smartphones and computers; in search engine results, social media feeds, video games, and targeted advertisements; in the acceptance or rejection of applications for bank loans or welfare assistance” (Dyer-Witheford 2019,2)

Technological corporations, which already possess extensive amounts of data and metadata, have invested significantly in artificial intelligence, and the talk of “AI races” and “AI domination” has been circulating as tech giants get caught up in competition (Writer 2023; Likos 2023). However, as critical AI studies have discussed, AI hype is also effective in public discourse and serves to mistify the way in which AI is actually deployed in the economy, AI's own production process, and its functional properties as it relates to the political economy of contemporary capitalism (Pasquinelli 2023, Katz 2017). In the contemporary paradigm of capitalist production, it is vital to critically consider the relationship between labor, automation, and the effects of new technologies.

The discussions around automation and its relevance to the transformation of waged labor could be characterized by a bifurcation that appears as the minimalist and maximalist understanding of automation (Dyer-Witheford et al. 2019). The minimalist approach to the automation question emphasizes an understanding of technology as an ideological functioning that serves the capital. It manifests as a weapon to be used against the working class under the threat of unemployment and deskilling. Some minimalist approaches to automation are so dismissing that they classify contemporary automation technologies as a “charade” deliberately fabricated by capitalists to disempower the workers. (Taylor 2018). Moreover, the development of technology has been observed to intensify human labor. These accounts emphasize the dependence of capital on labor and suggest the inevitability of the direct exploitation of labor power.

Maximalist approaches are varied, but most have a dominantly optimistic view of automation and information and communication technologies. These approaches

attribute primary importance to the role of technology and claim that it has the power to radically transform relations of production and the exploitation of living labor. Post-capitalism theories stress the possibility of amelioration and possible abolition of the exploitation of waged labor via automation and signal a future where people could finally have free time for enjoyment, socializing, or political engagement. (Srnicek 2015; Mason 2015) Concepts such as "the end of work" and "fully automated luxury communism" have begun to circulate incrementally as automation and the development of artificial intelligence advanced (Bastani 2019).

One of the most comprehensive theoretical approaches that place significance on the novel forms of technology is post-operaismo, sometimes also called Italian Autonomist Marxism or cognitive capitalism theory. Post-operaismo theorists have articulated the terms of specific mutations in capitalism, claiming a fundamental shift from the direct exploitation of labor to the exploitation of collective intelligence and invention power mobilized in the brains of humans connected through active networks of computers (Moulier-Boutang 2012, 36) This post-operaismo approach is also called "cognitive capitalism theory," and it is different from post-capitalism theory in that although it posits the obsolescence of exploitation of labor understood in the industrial paradigm, it also establishes living knowledge's prominence over dead knowledge congealed in constant capital. They formulated the antagonism of "dead knowledge" and "living knowledge" as opposed to traditional terms of opposition between dead labor and living labor to emphasize the driving role of knowledge, and they also emphasize the secondary place of fixed capital in contemporary capitalism. (Jeon 2010)

It must be noted that cognitive capitalism theorists prefer "fixed capital" rather than "constant capital" to refer to the machines. "Fragment on Machines" in Grundrisse by Marx has deeply impressed cognitive capitalism theory. Marx uses the term fixed capital instead of constant capital in Grundrisse, and these theorists almost always use the term fixed capital when they talk about machines. The term constant capital causally appears in some discussions among these theorists as well. For instance, in the postface written by Negri (2019) for the book called: Cognitive Capitalism, Welfare, and Labour: The Commonfare Hyphotheis, Negri discussed the work of Fumagelli (2019), who explicitly wrote: "An essential character of bio-cognitive

capitalism is the dematerialization of fixed capital and the transfer of its productive and organizational functions to the living body of labor power." (67) However when Negri discussed his work in the postface, he wrote: "...with a fundamental dematerialization of constant capital and the transposition of productive and organizational functions of capital onto the living body of labor-power." (Negri 2019, 175) It is clear that Negri uses the terms interchangeably to mean "machines." However, for Marx, there is a difference.

In the Marxist paradigm, constant capital and variable capital dichotomy is different from fixed and circulating capital dichotomy. In the first dichotomy, Marx stressed that constant capital only transfers its value to the product; it never creates " additional" value, while labor power creates "surplus value" to be appropriated by the capital. This separation is about the role of value creation. That is why labor power is defined as a "variable" since it can create new value. All the "instruments of labor" are constant capital. Fixed-circulating capital separation is related to the mode of circulation of the productive forces. Marx explicitly talks about raw and auxiliary materials to illustrate the difference between constant and fixed capital. While raw and auxiliary materials do not create additional value and hence they belong to the category of constant capital, they are defined as "circulating capital" by Marx (1993) since: "they are completely consumed in every labour process that they enter into, and therefore, with each new labour process, they must be completely replaced by new items of the same kind. They do not preserve their independent use-shape as they function. And so no part of the capital value, either, remains fixed in their old use-shape, their natural form."(239-240). Fixed capital, according to Marx, is the portion of the constant capital that maintains its use form after one production period.

It is not certain that the Autonomist Marxists in question intentionally use fixed capital as the complementary unit of variable capital to emphasize their position on the obsolescence of the law of value. (They never assert that machines can actually create value but claim that the direct exploitation of labor time is not the source of value in cognitive capitalism). However, it is apparent that when they use fixed capital, what they essentially mean is "machines".

The central argument in the cognitive capitalism paradigm revolves around immaterial/cognitive labor and its radically different relationship with contemporary machines. They claim that cognitive capitalism is a result of the crisis of real subsumption of labor under capital that has been realized most successfully in the Fordist paradigm. The rise in the importance of cognitive labor has resulted in the dematerialization of fixed capital. “The fixed capital’s productive power has been transferred to the living body of labor power” thanks to the diffused intellectuality arising from the welfare states and the transforming nature of machines that enabled linguistic networks to flourish (Fumagelli 2019, 67) In the industrial factory paradigm, the introduction of machines into the production process transformed workers into appendages to the machines; their work had been compartmentalized and reduced. Organization of their work aimed at the efficiency of the performance to reduce the time the working day workers produce their subsistences and increase the portion of the day workers produce surplus value. This kind of surplus value is called relative surplus value, and fixed capital’s social function is to produce this surplus value. Workers’ production is rendered wholly contingent upon the operation and mechanism of the machines. According to Marx, this process marks a radical distinction from the formal subsumption era of the pre-industrial stage, where workers were only dependent on capital in a monetary relationship.

In the pre-industrial stage, the work process was relatively independent of capital management, and the only way to increase profit was to extend the working day to extract absolute surplus value. In the stage of formal subsumption, workers had holistic knowledge of the nature of work and command over the means of production. The division of labor was subjective, meaning tools were arranged according to the virtuosity of the workers. The proper “abstract labor” emerges when the conditions of real subsumption are enabled by the introduction of the machinery system into the production process. Labor eventually becomes deprived of content and is treated universally as the expenditure of human labor.

According to Autonomist Marxists, when cognitive labor becomes hegemonic, and capital valorization essentially depends on it, real subsumption of material production also becomes obsolete because of the work's dependence on living knowledge and the fixed capital's dematerialization (transposition of the productive

forces to the body of the living knowledge).(Vercollene 2007; Fumagalli 2019,67). Thus, in the stage of cognitive capitalism, the major characteristic of industrial capitalism, the real subsumption of labor by capital, turned back to the formal subsumption of the pre-industrial era for the individual worker in the sense that the worker is only dependent upon capital out of the need for money because the capitalist valorization is no longer dependent upon the "machines," "constant capital" and their determining role in the production process. Fixed capital is embedded in the living knowledge of the workers, "dematerialized," and now resides in the collective power of living and institutional knowledge. The knowledge and power relationship is transformed to the degree that "the force that regulates the labor process both in terms of the control of working methods and the intensity of labour, remains incorporated in the living knowledge of the collective worker"(Vercellone 2007,20). Therefore, cognitive capitalism theorists mark a qualitative transformation in capital-labor relations. They suggest capital, as in the stage of industrial capitalism, does not really manage and control the labor process but only manages the finance to maximize shareholder value, and the cooperation between workers is independent of the capital because the hegemonic labor form became cognitive/ immaterial. Thus, the profit has become "rent extraction" in this stage of capitalism.

Immaterial labor is considered to intrinsically provide cooperation mechanisms necessary for production. (Hardt, Negri 2004) Therefore, these theorists see a potential for autonomy and free cooperation between workers even though they are subjugated to rent extraction. Moreover, their claim that there is a crisis in the measure and control of labor since cognitive labor could not be measured scientifically by hours and the distinction between work and free time evaporated has led them to dismiss the law of value. However, the extraction of surplus value is still valid in the form of the extraction of commons or general intellect since the extraction of surplus value is the kernel of capitalism. However, they stress that this capture happens outside of production relations (or rather, whole social relations are turned into the productive realm) and is hence not related to fixed capital. The essential exploitation happens through the capture of "externalities," "general intellect," or"the commons," which refers to natural resources and comprehensive abstract knowledge of society that is being produced collectively on an everyday basis. They conceived exploitation as not limited to the extraction of labor but as the

core determining factor in labor's social form of alienation regarding the content and aim of social production. (Hardt, Negri 2009; Vercellone, Dughera, 2019)

The hegemony of cognitive/immaterial labor and the dematerialization of fixed capital are critical concepts that inform their analysis of mutation in contemporary capitalism. Cognitive capitalism theorists suggest a critical transformation of the labor-capital relationship in which capital becomes parasitic and does not manage and organize the production process from the "inside" but manages finance capital in consistency with its "rent extraction" regime. The transformation of the capital-labor relationship involves the idea that capital does not foster and does not even care about the development of the forces of production, unlike its role in the industrial stage of capitalism.

The dematerialization of fixed capital goes hand in hand with the concept of human-machine hybridization. Dynamic, relational machines depend on the living knowledge of the workers, making the two inseparable in the production process. This concept is adopted to stress that machines in contemporary capitalism do not have an antagonistic relationship with living labor. Dead labor congealed in machines does not face the worker as an alien entity such as they used to do in the industrial stage of capitalism. These theorists' approach to the latest technological advancements- like informational and communicational technologies- stresses living knowledge's centrality for the proper functioning of technology in production. They proposed that since the current machines are dynamic and relational, that makes them dependent on the human worker as human workers depend on them. For example, computer-aided manufacturing necessitates knowledgeable workers. Vercellone (2007) wrote: "From the moment in which knowledge and its diffusion is affirmed as the principal productive force, the relation of domination of dead labour over living labour enters into crisis" (26). Since the new relational machines- unlike the "fixed" machines of the industrial stage- depend on knowledge in the brains of the workers, the hierarchy of dead labor to living labor evaporates. Fumagelli (2019) suggests that as the inseparability between humans and machines in the production process becomes more apparent " it is the living labour to dominate the dead labour of the machine, but inside the new form of labour organization and of social governance." (79)

These theorists also recognize the technology's role as ambivalent in that according to how it is used. Technology can also create neo-Taylorism conditions that subjugate workers in a highly scientifically calculated division of labor for efficiency, which they interpret as reminiscent of the industrial era. However, ultimately, the nature of contemporary machines is posited as emancipatory, as can be seen in Hardt and Negri's 2017-dated collaborative work in which they claimed that human-machine hybridity makes possible "reappropriation of fixed capital by living labor" to be integrated into machinic assemblages, a constituent of subjectivity (122).

It must be noted that the question regarding machines - fixed capital as autonomist Marxists preferred- is central to the cognitive capitalism paradigm as their arguments on real and formal subsumption, the primacy of immaterial labor, and living knowledge are directly related to the qualification of the machines in the production process. The theorists of cognitive capitalism are mostly focused on computerization and digitalization as the epitome of novel technology. This study aims to inquire about the nature of machine learning as fixed capital, which is born out of the flow of data that has been enabled by digitalization and computerization. In this thesis, the term fixed capital will be used to indicate technology used in the production process to maximize surplus extraction and expedite circulation. The primary reason for using "fixed capital" as opposed to constant capital is entirely related to the language of cognitive capitalism theory, which will be of primary interest in this thesis.

In the post-Operaismo paradigm, the difference between industrial machines and contemporary technologies like computerization in terms of their primary role in production is a central line of argument that connects with the concept of immaterial labor, human-machine hybridization, and the transformed relationship between capital and labor that manifests in the division of labor. The difference between industrial machines and contemporary computation technologies needs to be inquired, and particular interest must be shown in their role in the production and relationship to living knowledge. In cognitive capitalism theory, the cancellation of real subsumption is built upon the claim that the knowledge and power relationship is transformed and workers are no longer commanded by the dead labor in machines. Their antagonistic relationship has ended, and with the hegemonic immaterial labor,

the productive powers of the machines are embedded in living labor, which creates a human-machine hybridization that facilitates mutual dependence and sometimes even superiority of living labor. Therefore, the question of the nature of fixed capital is also directly related to the immaterial labor and autonomy of the workers

This thesis focuses on the contemporary relationship between machines and workers in the production process, specifically machine learning systems that are embedded in narrow Artificial Intelligence. The scope of this thesis does not allow for a discussion that covers every deployment of machine learning in the economy. However, the central claim that will be questioned in this thesis will be that the inseparability of humans and machines in the production process yields emancipatory possibilities in which workers can reappropriate fixed capital. Therefore, a specific digital labor called crowdwork will be analyzed. Concerning crowdwork, the separation between humans and machines is not easily detected in the production process, where humans act like algorithms to provide training data for them. The traditional manager-employer relationship is obscured via algorithmic management and the fact that labor is executed through virtual space.

Crowdwork will be thoroughly discussed to address and discuss these comprehensive claims. Apart from being an interesting example of "human-machine hybridization" involving ML, this labor is chosen because it is a critical and invisible part of Artificial Intelligence. Crowdwork's analysis and the discussion of the workers' experience make it possible to understand AI in its social and economic complexity beyond the technological mystifications of artificialness and alienness. Discussion on its history, technicality, and the experience of the workers facilitates a comprehensive understanding of the relationship between data, the internet, automation, and AI, which is absent in the mainstream depiction of AI.

This study relies on an extensive literature review of digital labor platforms and crowdwork, including quantitative and qualitative research explicitly focused on crowdworkers. Qualitative research in the study consists of ethnomethodological styles based on content analysis in online worker forums and participant observation of the researchers who formed close relationships with crowdworkers as design activists and attended technology summits. Additionally, the crowdwork platform's websites and blog posts, the media depictions of crowdwork and related digital labor

practices, commentary from the crowdwork platforms' managers or owners, and some remarks and discussions from technology gatherings and conventions will also be a part of this study.

Crowdwork is referred to with concepts such as "digital sweatshops" or "platform as a factory," suggesting the re-emerging of the factory paradigm in the domain of digital and computer technologies. (Uddin 2012; Altrenried 2020). This labor form emerged from the latest technological advancements and was later developed and organized entirely on the basis of AI operations. It is also referred to as "hidden labor behind AI" by Altenried (2020) and "ghost work" by Suri and Gray (2019). Crowdwork operates through virtual marketplaces in which a set of data processing and data collection tasks are offered to a "crowd" of global digital workers for monetary compensation. Crowdworkers perform a fragmented part of data processing, labeling, annotation, gathering, or correction. The completed parcelled-out tasks are then selected, brought together, and integrated into computer systems with designed algorithms. Tasks offered to workers generally involve content moderation, information collection, survey completion, categorization and classification of products, transcription, and problems that artificial intelligence could not yet solve, such as perceptual tasks and natural language analysis. It should be noted that other than "survey completion," which is offered as a task in platforms by academic and market researchers, all the other tasks are related to "taking the place of algorithms." Algorithms could be regarded as the most primitive structural building blocks of AI. If a given algorithm could efficiently moderate content on a site, crowdworking would not be needed for that purpose

Crowdwork contributes significantly to the process called human computation, which means the collaboration of humans and computers on problems that neither could solve alone. The human annotators- crowdworkers- manually label data sets for the training of machine-learning systems and later evaluate them for their unconfident solutions, which ultimately helps machines to recognize patterns better. The organization and management of labor are orchestrated mainly through algorithms, and contact between workers themselves or between workers and employers is infrequent, even through digital means. Therefore, the relationship between employers and the labor force is complicated by the intertwining of humans

and computers and the heavy presence of information and communication technologies in production. This complication stands out as ambivalence on the part of the crowdwork platforms which choose to present as technology companies specialized in data management for artificial intelligence distancing themselves from their labor-intensive cores for the financial market. The erasure of labor-intensive background is more stressed in high technology companies such as Google, Alphabet, Apple, or Amazon, which invest incrementally in artificial intelligence and use crowdworkers for human computation.

The inquiry into the emergence of crowdwork as a type of digital labor and its primary function regarding labeling and the classification of data illuminates the nature of narrow AI that is based on data analysis. How crowdwork emerged and transformed in consonance with the changing dynamics of internet usage by online masses portrays the way in which the internet started to become a sphere for the extraction of collective intelligence. Digital labor of the masses created "big data" that later fueled Machine learning to become the driving technique behind AI. The discussion of crowdwork suggests that the contemporary relationship between living knowledge and machines should be looked at from the lens of "data" and how ML learns from it to objectify living knowledge. Moreover, the question of autonomy and subsumption stressed by cognitive capitalism theorists is discussed in the case of crowdworkers to evaluate the nature of "human-machine hybridization" that crowdworkers experience with ML.

A literature review of the research into the conditions of crowdworkers shows that crowdworkers are digital precariats that do not have traditional employment rights. Researches into the condition of the crowdworkers demonstrate that there is a significant representation of crowdworkers from underdeveloped countries. Workers are mostly financially unstable and lack social protection. They are kept in the dark regarding algorithmic decisions about their work and face challenges when they want to communicate with managers about the operations of their work, including the rejection of work and payment. Considering workers' legal status and discussing some legal cases involving digital platforms further show that the technology's penetration into the work complicates the categories of "workforce" and

management, which companies use to their advantage to avoid legal liabilities rather than workers who have autonomy being more prone to appropriate fixed capital.
The development of AI, as it is dependent on highly skilled software engineers and research and development is dependent on this type of labor as well, without which training for machine learning systems would be impossible. Crowdworking's goal is to remove its necessity from machine learning since it classifies "training data" to make machines eventually not dependent on this human labor. However, over the years need for this labor has increased as AI operations spread to new areas like insurance, banking, retail, translation, medical diagnosis, and self-driving cars. Additionally, the efforts for the development of AGI (artificial general intelligence) by initiatives like OpenAI, which targets the creation of an intelligent agent that is capable of learning to achieve any intellectual task, also fueled the need for clean and structured data which this moment still depend on human annotators.

Crowdwork/ human computation and post-Marxist theories that emphasize the centrality of concepts like general intellect, commons, immaterial labor, living knowledge, and real and formal subsumption in the new stage of capitalism (post-operaismo, autonomist Marxism, proponents of cognitive capitalism) are discussed in relation to each other in this thesis because the critical aspect of human computation in the form of crowdwork is that this labor type is entirely based on "what machines can not do yet." This labor type is defined by what precisely lacks in algorithms, software, and machines, and further, it is designed for a role in the training of the machine when they cannot produce human-like results related to perception and cognition. Therefore, the theoretical orientations that privilege living knowledge against machines' dead knowledge in the production process are important for evaluating the crowdwork and its implications regarding the relationship between machines and human labor. Crowdwork might demonstrate a different version of "human-machine hybridization." in which living knowledge is absorbed and transformed into machinic dead knowledge.

In this thesis, the aim is to show that contrary to arguments of cognitive capitalism theorists, the reality of crowdworkers evinces that dynamic and relational technology that accommodates and cooperates living knowledge creates the conditions for an intensified real subsumption in which the workers produce for the needs of machines

rather than the other way around. The labor of the crowdworkers was formerly unnecessary until data-driven machine learning became possible. The labor process is entirely determined by the needs of the machine learning algorithms. The work is parceled and scientifically organized around the requirements of clean and structured data to be fed to the machines.

All the attributes of real subsumption, the parcellation of work, deskilling, scientific installation of the division of labor, and the polarization of knowledge, could be seen in the process of crowdworking. Moreover, while the real subsumption in industrial capitalism involves machines at the service of humans, producing for humans, contemporary crowdworking provides an interesting instance where workers primarily produce for machines. Therefore, this thesis analysis of crowdworking provides counter-arguments to cognitive capitalism theory, especially arguments that are related to the sublation of real subsumption and the potentially emancipatory relationship between humans and contemporary machines in the production process arising from the inseparability of humans and machines.

The presence and conditions of this labor indicate that for the development of the ultimate machine of automation, the co-existence of advanced R&D projects, the employment of highly skilled software engineers that are few in numbers, and the organization of less skilled labor force consisting of "crowds" willing to sell their labor for less than minimum wage is a necessary condition. When Caffentzis (2013) said, "the computer requires the sweatshop and the cyborg's existence is premised on the slave." (122), what he actually meant was that through uneven development of the world economy as capital-intensive and labor-intensive branches, capital-intensive branches are able to extract surplus value from the total pool in proportion to the magnitude of its fixed capital even though those branches employ and manage less labor power. However, in the situation of hidden crowdworkers, this complementary dichotomy of labor and capital that is crystallized in the polarization of knowledge happens in the same branch of the AI industry. Pasquinelli (2023) also asserts,

> The replacement of traditional jobs by AI systems should be studied together with the displacement and multiplication of precarious, underpaid, and marginalised jobs across a global economy. AI and ghost work appear to be, in this view, the two sides of the one and same mechanism of labour automation and social psychometrics. (28).

The technical significance of crowdwork can also demonstrate how Machine Learning operates and how living knowledge is transferred and adapted to machines, which further opens up a way to think of AI as a dynamic process of techno-scientific objectification of living knowledge.

The central purpose of this thesis is to question and problematize the notion that dynamic relational machines do not have an antagonistic relationship with living labor, and they are not even ontologically two distinct things. Through the detailed discussion of crowdwork and crowdworkers concerning autonomy and human-machine hybridization, this thesis seeks to problematize the notion that in contemporary capitalism, unlike the industrial stage, dematerialized fixed capital, "relational, dynamic" machines do not incorporate dead labor that commands the living labor in the production process. The thesis shows that the fact that machine learning is dynamic and relational does not provide a situation in which dead labor in the machines can no longer command living labor. Contrary to the emancipatory perception of cognitive capitalism theorists and autonomist Marxists, "human-machine hybridization" can actually result in the invisibility of the workforce and create a specter of technology that serves to obscure social and economic relations.

The second chapter of the study will discuss the general functioning of crowdwork, its historical development, its convenience for business models, its various forms based on different technological infrastructures, and the social and working conditions of crowdworkers. The concept of crowdsourcing will be explained to give a framework of how crowdwork historically developed out of a mentality rooted in leveraging the online activity of crowds on the social web. The human computation concept concerning crowdwork will be discussed. What is called artificial intelligence problems, such as perceptual and complex cognitive tasks, could be fragmented and assigned to numerous individuals acting like computers, and then fragmented tasks are assembled together to "train" artificial intelligence. In this process, humans and machines are intertwined and train each other in a continuous feedback loop called human-in-the-loop in technological discourse. The crowdwork platform's transformation in relation to the changing needs of training data for AI will be discussed in the section called Human in the Loop. Lastly, quantitative and qualitative studies from different years regarding crowdworkers, their conditions, their working processes, and their problems with the functioning of the crowdwork

will be compared. Crowdworkers are classified as “independent contractors” by the platforms. However, this status is not definitive in a legal sense. Mostly, the platforms define their role as sole intermediaries, providing only technological infrastructure for customers and workers. However, the reality is more complicated, as seen in the misclassification of employment cases in the US. Some of these cases will be discussed since they reveal some crucial matters regarding the control and management of the workers obscured by the technological sophistication of the companies.

In the third chapter, before outlining the arguments of cognitive capitalism theories, Marx’s thoughts on the machines and their contemporary interpretations by some post-Marxist theories will be discussed. Autonomist Marxists and cognitive capitalism theorists alike were heavily influenced by Grundrisse, especially its part called “fragment on machines.” The obsolescence of the law of value directly emerged from that part. Therefore, how that part causes deviations from orthodox Marxist understanding will be briefly discussed. How the seeds of cognitive capitalism theory are grounded in the Italian New Left will be provided to give a coherent historical framework. The concepts of immaterial labor, its relevance to the law of value, and the development of a new revolutionary subjectivity called “Multitude” will be laid out. How the concept of immaterial labor is developed in relation to informatization and computerization is significant. The central propositions of cognitive capitalism theories regarding the subsumption of labor and the varying approaches of subsumption in the same theoretical line will be examined. Automist Marxists’ understanding of “fixed capital” and the role of fixed capital in the production process directly influence the form of subsumption and the form division of labor in the stage of cognitive capitalism.

In the fourth chapter, AI as a concept and as a reality already invested in the contemporary economic paradigm in the form of “narrow AI” will be explained. Artificial intelligence initiatives have a rich history, beginning as military projects after the end of WW II. The definitions of AI have been changing following the technological developments in computer science. Without deeply engaging with immense philosophical debates around artificial intelligence, its definitions and goals will be discussed since the economic significance of AI could only be understood in

its historical trajectory. The advent of Machine Learning created the increasing necessity for refined data that ultimately resulted in crowdwork. Once AI is taken as fixed capital, its hidden, labor-intensive part in its development becomes more transparent, and the crowdworkers' labor conditions in which the laborer confronts the machines as an "alien power" can be grounded.

Crowdwork's labor conditions will be evaluated concerning the "subsumption" and "autonomy" arguments of the cognitive capitalism approach. Crowdworkers' understanding of their labor and the ultimate result of the labor will be problematized concerning contemporary kinds of subsumption. Since crowdwork is a special instance of human-machine hybridization, the theories around fixed capital- variable capital/ capital-labor relationship are significant in evaluating this labor. The main question will be what kind of human-machine hybridization is adopted in the human-in-the-loop system. How human-machine hybridization is mystifying AI and causes the dehumanization of the laborers will be discussed. What kind of fixed capital ML is and how it is different than industrial machines will be discussed based on the analysis of the concepts of "subsumption," "human-machine hybridization," and "autonomy."

In the last chapter, a summary of the whole thesis will be provided, and the general discussion points regarding the capital-labor relationship in the age of cognitive labor concerning crowdwork will be laid out.

# CHAPTER 2

# CROWDWORK

## 2.1 What is Crowdwork?

Crowdwork functions globally through online platforms connecting numerous firms, organizations, and individuals, granting potential employers and employees a hub to engage in a temporary and "just in time" work relationship. Workers are expected to perform specific tasks that vary in complexity and time and are paid according to their completion of the tasks. Crowdwork platforms offer two types of work to the global market of workers. The first kind of tasks is more innovative and involves some kind of problem-solving like "the creation of a logo, the development of a site or the initial project of a marketing campaign" (Kittur et al. 2013; Leimeister, Durward 2015). Conversely, the other types of work are highly menial and repetitive. The inherent idea in the second type of menial work is based on parceling out enormous and complicated work processes and assigning them to individuals who operate in a global digital market. This study deals with the second type of crowdwork, which is more common and increasingly becoming dominant due to the developments in artificial intelligence.

Crowdwork platforms have been flourishing since the first decade of the 2000s. Although the precise estimation of the workforce of the crowdwork platforms could be problematic because of the temporality and informality of the work or unwillingness of the platforms to give out information, the data collection of the primary crowdwork platforms suggests that this phenomenon should not be overlooked. (De Stefano 2016) In research into the "on-demand" economy, Amazon Mechanical Turk's workforce has been estimated as 500.000; CrowdFlower estimated workforce reached 5.000.0000; and Crowdsource has an 8.000.0000 workforce. (Smith 2015, 3) All these notable crowdwork platforms have been operating on a global level, and they are focused on providing a fungible workforce that otherwise would cost employers more time and money. The scale and the speed

that crowdwork platforms offer to firms, researchers, software engineers, or app developers are highly significant since they make it possible for them to access a vast pool of global workers ready to handle on-demand tasks without the legal status of an employer.

It would not be hyperbolic to suggest that crowdworkers' overall contribution makes the internet run smoothly by ensuring that queries for search engines would not show up with pornographic content, random results, or violent and inconvenient outcomes. Besides, the most used social media sites, Facebook, Twitter, and Instagram, also rely on crowdwork to establish and enhance their "no graphic violence" and "no hate speech" policies. These social media companies use software filtering systems based on artificial intelligence and machine learning to automatize their removal of inconvenient content. However, whatever level of competence artificial intelligence could achieve, it might still be troublesome for it to distinguish a thumb from a penis, and it is undoubtedly harder for them to correctly identify hate speech from an ironic text (Gray, Suri 2019, 7-9).

Human judgment and algorithms work together to ensure a safe and harmless experience on the internet. Editing search engine results in response to user queries - a common type of labor crowdworkers perform- is also significantly essential for firms that advertise online since their visibility depends upon the functioning of the search engine fluently. New business models increasingly emerge with the intention to establish their "on-demand" labor force that could do mundane but necessary tasks behind the scenes. (Gray, Suri 2019, 10) The meaning and the practicality of the crowdwork on the part of the capitalists could be seen in the words uttered by the founder CEO of the CrowdFlower:

> Before the Internet, it would be really difficult to find someone, sit them down for ten minutes and get them to work for you, and then fire them after those ten minutes. But with technology, you can actually find them, pay them the tiny amount of money, and then get rid of them when you don't need them anymore. (Marvit 2014)

In this explanatory quote, the CEO of CrowdFlower basically gives voice to the fact that through technological means, capital could work its way around the limitations of space and time and legal barriers that work to protect worker rights.

## 2.2 Crowdsourcing and Crowdwork

In order to seek historical traces of how crowdwork emerged as a form of digital labor, the emergence of the social web and how it influenced business mentality at the beginning of the 21st century needs to be considered. Crowdwork is inherently related to the concept of "crowdsourcing" which Jeff Howe (2006) used for the first time in a Wired magazine article. The article opens with this line: "Remember outsourcing? Sending jobs to India and China is so 2003. The new pool of cheap labor: everyday people using their spare cycles to create content, solve problems, even do corporate R & D." (1). He describes the financial and research and development potentiality that could be harnassed from online crowds. The crowd contains anyone who might be willing to contribute to online content from any part of the globe.

Howe (2008) then expanded his ideas in a book called "Crowdsourcing: Why the Power of the Crowds Is Driving the Future of Business". In that book, Howe explains that crowds are basically amateurs who do not necessarily perform under the expectations of compensation but could be motivated by a spirit of collaboration. By the term "amateur" Howe explains that he does not mean the opposite of "professional" but talks about a spectrum of competencies. Online crowds who might be unsatisfied with their jobs and the operation of their skills turn to online communities for creative fulfillment. Howe discusses the speedy growth of Wikipedia as an open-source production model in which the work of the crowds from all layers of competence and skills outperforms a small group of professionals. The idea is that the crowd will always surpass a set of professional employees given the optimum conditions since people from the same social circles would tend to have similar outlooks and hence always have relatively attenuated problem-solving habits. Howe also explains that crowds do not only create content online but also help to control and supervise content with reviews, clicks, and rates. The emergence of online social networks, therefore, facilitated not just spontaneous online content creation but further allowed online content and users' engagement with it, paving the way for whole new marketability strategies based on data collection and refinement. Crowdsourcing came out as a new form of internet-based tool for maximizing profits by enabling firms to gain access to the global labor force, which consists of educated

and uneducated people who are generally under-employed or dissatisfied with the realization of their skills. Crowdsourcing might be regarded as a continuation of the decentralization strategy that began in the 1980s when capitalists realized that they could gain an advantage from the discrepancies in the wages between the global North and global South. However, outsourcing compels employers to deal with intermediary firms in which the workers are formal employees, while crowdsourcing enables capitalists to avoid the intermediary firms and directly approach the global labor force, which diversely contains freelancers, self-employed, self-educated, skilled yet uneducated people (Ettlinger 2016).

Crowdsourcing and crowdwork are often used as synonyms, and it is true that they coincide with each other in many cases. However, when the term is first coined, it is apparent that crowdsourcing referred to the unpaid labor of the online masses. Also, crowdfunding which means mobilizing the masses and collecting donations for a specific cause counts as crowdsourcing as well. As for crowdwork, it always involves financial compensation, however insignificant that compensation might be per task. It is a specific digital labor that, in its essence, the rationality of crowdsourcing lies. Digital labor platforms, or the "gig economy" generally function according to the principle of crowdsourcing. The idea inherent in platform-based work relies on distributing the work to an ambiguous "crowd" instead of outsourcing or contracting the job to a distinct business or people. Although platform-based works resemble each other, it would be beneficial to differentiate between two main types of platform work. Crowdwork which will be covered extensively in this study, functions through online platforms that connect abounding organizations and individuals across the globe. Crowdworkers perform labor only through online means, whereas in "work on-demand via app" workers perform some conventional types of work such as cleaning, babysitting, and transportation. In the second type of work, workers access the work through online platforms but perform the labor in their local neighbors. (De Stefano 2016)

### 2.3 Human Computation and Crowdwork

The first recognized crowdwork platform was born out of difficulties regarding artificial intelligence and data processing. In 2006, Jeff Bezos introduced a new digital service called Amazon Mechanical Turk that could allow technology

producers to crowdsource gigantic amounts of small data processing tasks such as transcription, image labeling, survey completion, informational research, or inappropriate context classification tasks (Irani 2015a). These data processing "microtasks" could not be executed by artificial intelligence algorithms either because they require some amount of culture-specific knowledge or context, and the quality of the data necessitates human cognition. Hence these microtasks are called "Human Intelligence Tasks" (HIT), and they involve a degree of human-computer collaboration in which human labor is used as a complementary training tool to the algorithms in the manner of a feedback loop. This process is called "human computation".

The term human computation is first introduced by Luis von Ahn (2005). The term signifies the collaboration of humans and computers to carry out tasks that neither could do by themselves. However, the idea behind human computation goes back to the times when artificial intelligence was first introduced in scientific circles. Licklider (1960) proposed that humans and computers should work as different sides of the same coin and complement each other in the process (Licklider 1960; Quinn, Bederson 2011). As a matter of fact, before modern machines had been developed, computation was executed by humans. The term "computer" referred to a professional who does calculations for a living. This denomination was in accordance with the etymological roots of the term computation: "Originating from the Latin word 'computare', to compute is to "count, sum up or reckon together." (Law, von Ahn 2011, 1)

The first non-human computers were designed as "tabulating machines" which used pierced cards to make machines read and store information. Invented by Hollerith, this tabulating machine was named "The Hollerith Machine" and was adopted to calculate statistics about the United States population during the end of the 19th century. After the tabulating machines were recognized, they were distinguished from human computers by their acronyms that ended in "AC" which means automatic computers. (Law, von Ahn 2011). Back then professional human computers were a thing, there were instances of organized computation in which numerous people calculate or operate individually some simplified part of a more complex and broader problem, then these divided parts were brought together to

reach a result. Law and von Ahn (2011) exemplify this process by mentioning the calculation of the trajectory of the Halley Comet in the 1750s: “For example, to measure the quantity of interest (e.g., the trajectory of a comet), a scientist or mathematician would devise a mathematical formula, break down the formula into a set of simpler quantities that can be easily computed by an individual human computer, then re-assemble the results. (1)

These organized computations were based on precise instructions given to the human computers directing them through each move. Certainty and efficiency were crucial for these organized computations. The advent and development of modern computers have radically changed the content of these organized computations. Previously time-consuming mathematical problems that could take hundreds of hours for human computers could be solved in seconds by modern computers nowadays. Nevertheless, contemporary clogs in terms of computation stem from problems that are easy to handle by humans yet challenging for computer algorithms. Law and von Ahn (2011) directly call these problems Artificial Intelligence (AI) problems: “Such problems include perceptual tasks (e.g., object recognition, music classification, protein folding), natural language analysis (e.g., sentiment analysis, language translation), and complex cognitive tasks (e.g., planning and reasoning)” (2). In terms of AI problems, algorithms lean on machine-learning procedures which depend upon colossal amounts of training data. Collecting sufficient training data for the algorithms is difficult in terms of money and time. These training data sets have to be supplied through humans acting like computers. Some of these training data could be obtained through mundane activities of online users worldwide, such as users tagging videos and music on Youtube or sharing their knowledge and comments in Wikipedia, forums, and social media sites like Twitter.

Another example of leveraging online activity for the purposes of collecting training data for AI is reCAPTCHA which is an identity authentication mechanism that necessitates web users to decipher distorted text to prove that they are, in fact, human. Millions of users engage with reCAPTCHA a day since they are compelled to perform free cognitive labor if they want to get access to certain content.This web widget serves to protect websites from spam attacks while the data obtained by the completion of reCAPTCHA is adopted for the optical character recognition (OCR)

programs to adjust otherwise unrecognizable words making possible the digitalization of plentiful texts from the archives (Dickinson, Michelucci 2016). Crowdwork platforms emerged as an efficient way to organize and distribute tasks that could work to train artificial intelligence algorithms among global digital workers for monetary compensation.

Amazon Mechanical Turk is generally considered the epitome of crowdwork platforms, and its emergence is based on the facilitation and organization of human computation in the form of parcelled out “human intelligence tasks”. The previously mentioned promoter of crowdsourcing, Jeff Howe (2008), described Amazon Mechanical Turk microtasks as: “any number of dull, brainless, low-paid tasks that keep the Internet economy, for better or for worse, firing on all pistons…[AMT] allows clients to farm out the kinds of menial clickwork that we all wish computers could do, but can’t." (Quoted by Irani 2015a, 10) Amazon Mechanical Turk’s naming is of no coincidence. It is based on Wolfgang von Kempelen’s Chess Player Automaton, designed in 1770 and exhibited across Europe and America. It was introduced to the public as a pipe-smoking Ottoman automaton who are able to play chess in real-time in the same way a human being could. It was a highly captivating spectacle during its exhibition and managed to confront important figures as its competitors, such as Napoleon Bonaparte, Charles Babbage, and Benjamin Franklin (Ayteş, 2012). While the attraction came from a sense of wonder stimulated by the fact that an automaton could play chess as well as a human, the reality was that under the mechanism, a competent chess player was hidden, coordinating the moves of the automaton via sophisticated means. This figure of the phony automaton captures a sense of human computation except that in the case of human computation; the non-human element is supplemented, not directly animated by humans.

As has been indicated earlier, crowdwork platforms, in general, do not just organize human computational microtasks but also offer a virtual marketplace in which any kind of work that could be crowdsourced, such as design, content creation, research and development, and survey completion. Nevertheless, crowdwork platforms have created significant opportunities for high-speed and large-scale data procession that technology firms desperately need for gathering training data sets for machine learning. Law and von Ahn (2011) also recognized this opportunity when they

mentioned Amazon Mechanical Turk: “These new trends and systems present exciting new opportunities for AI: we can now build automated systems that leverage the computation of a huge number of human computers.” (3). One of the first instances of crowdsourced human computation that gained public attention was when Microsoft researcher Jim Gray disappeared with his yacht into the sea in 2007. After the search for him with the help of boats and helicopters proved hopeless, the DigitalGlobe satellite performed a scan of the area producing an enormous volume of images which were then loaded into the Amazon Mechanical Turk in order to crowdsource the help of searching through every image to look for traces of his yacht (Silberman 2007).

Today, crowdwork increasingly involves microtasks that require little skill and more focus on assembly-line piecework. Consequently, the crowdworkers in question could be described as “cognitive pieceworkers in service of employers and their computer systems.”(Irani 2015a, 2) The concept of human computation does not always correspond to paid digital labor as in the case of reCAPTCHA, yet microtasks performed by cognitive pieceworkers do. It is essential to distinguish the concepts of crowdsourcing, human computation, and crowdwork since they have been used interchangeably for years. It is crucial for the purposes of this study since the study is exclusively focused on paid, fragmented micro-labor which is increasingly used for data processing mechanisms for human computation. Especially, the initial part of the machine learning technique called “human in the loop” used for the creation of training data will be of primary interest. This technique is based on feedback loops between machines and humans and it is a special instance where human-machine hybridization is adopted for the appropriation of collective living knowledge.

### 2.3.1. Human in the Loop

According to computer scientist Kevin P. Murphy (2012), machine learning could be described as “a set of methods that can automatically detect patterns in data, and then use the uncovered patterns to predict future data” (1) Therefore the proper classification and the designation of data is crucial for the recognition of patterns. Human in the Loop Machine Learning is the practice of bringing together human and

machine intelligence to build competent pattern recognition algorithms. In this process, humans label/classify training data for machine learning algorithms and later correct inaccurate results in the evaluation and testing stage. The process involves both supervised machine learning and active learning. Supervised machine learning is the first classification of data sets that are to be fed to the machine. Human data annotators manually label data to develop sets of representative units so that machines could understand the data in the first place; with this training data, the machine learns "patterns recognize similar future patterns to predict results, correct false assumptions and build vocabularies." (Koch 2022)

Human annotators later evaluate and correct the machine-produced results, especially where the algorithm is not able to confidently produce results. Evaluation of low-confidence results by humans is called active learning. This process assures the further facilitation of the training of the machine so that correct results would be achieved automatically without the need for human intervention. The blending of supervised machine learning and active learning creates a continuous feedback loop that makes machines produce more accurate results each time. Furthermore, algorithms are also used for the organization and simplification of the manual labor of human annotators. In this continuous feedback loop, "humans and artificial intelligence train each other." (Schmidt 2019, 12)

Manual labor of data labeling is necessary because unstructured data is utterly useless to the machine learning process. Without human input, massive amounts of data could not be correctly labeled to give the machine a relevant framework to reach its planned outcome. Human in the loop system is significantly crucial for areas where algorithmic errors might yield damaging results such as machine algorithms for medical diagnosis or self-driving cars. In the areas of autonomous driving, medical diagnosis, object recognition, and the simultaneous transcription-translation models that depend on automatic speech recognition, the human-in-the-loop method is crucial for reliable results. An international company named Telus defines its role as providing "next-gen digital solutions for global and disruptive brands" and has provided information on its site regarding the human-in-the-loop method. According to their input, human-in- the-loop method is crucial for most AI projects:

> For most AI projects, humans are the ones behind the scenes spending a significant amount of time and effort selecting and gathering the right kinds of data and labeling it appropriately. In healthcare, that could mean collecting and annotating thousands of pictures of rashes to teach AI to identify skin cancer. In financial services, that could mean teaching systems to detect fraud by sifting through millions of micro-transactions [1] (Telus, n.d)

Data quality is one of the most troubling and vital parts of AI-related projects since the accomplishment of AI projects depend on clean and accurate data. Clean data is such an important part of the ML process that : " Amongst data scientists, jokes such as '80% of the job is cleaning data and the other 20% is complaining about how the data has been cleaned abound." (Lohr 2014 quoted in Dyer- Witheford 2019, 77)

According to Forrester Research Inc.'s report (FRI, 2020) named "Overcome Obstacles to Get AI at Scale", data poses an immense challenge for AI initiatives. Data quality is the most pressing matter, with 58 percent of the organizations expressing that they have issues regarding quality. The report says the data quality problem is further convoluted by the lack of well-curated training data for AI, which 45 percent of the organizations found troubling (FRI 2020, 4) The prevalence of data quality and data curation problems are attributed to the usage of a wide variety of data types for the training of AI including images, documents, graphs, structured relational data, audio, spatial, and texts. What this report presents as a "red flag" about AI initiatives is that respondents who happened to be responsible for AI strategies in their firms "simply do not know what their AI data needs are."(ibid, 4)

This red flag further shows that developing AI systems with data is a complicated, multilayered process that must be understood and worked through intricately with the help of diversified labor practices involving humans and computers. In a Wall Street Journal event, "Future of Everything" IBM Corp. seniorvice president of cloud and cognitive software Arvind Krishna said that the primary reason for the interruption and ending of AI projects is data-related difficulties. He added: "about 80% of the work with an AI project is collecting and preparing data. Some companies aren't prepared for the cost and work associated with that going in" (Council 2019). This is the primary reason the crowdwork platforms that facilitate human computation in the

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1 Human side of AI and data annotation accessed June,12,2023 https://www.telusinternational.com/insights/ai-data/article/human-side-ai-data-annotation?INTCMP=human-in-the-loop_tile_ai-data_related-insights)

form of microtasks have expanded over the years. However, crowdwork platforms are changing as AI projects develop and the training data needed for AI increasingly needs to be more high-quality. Generalist platforms such as Amazon Mechanical Turk or Clickworker choose to establish themselves as a mere intermediary between customers and workers, taking no role in the education of the workers and they do not hold themselves responsible for the quality of the data.

Additionally, these generalist platforms offer various types of tasks to the crowd such as content creation, accessing content on websites, or survey completion along with the data annotation for AI training. Yet, the specialist platforms such as Mighty AI, Hive, or Scale label themselves as "AI companies" that exclusively deal with training AI. They claim to provide 99 percent accuracy for training data sets. As opposed to generalist platforms, they train crowds, asses and evaluate them to supply high-quality data to their customers. (Schmidt 2019). As a matter of fact, old generalist platforms like CrowdFlower have changed their branding to reflect their new role in AI dominated market. CrowdFlower's new name is Figure Eight and on their site, they state their mission as: "a data enrichment platform with access to an online, on-demand workforce of millions of people who complete tasks that algorithms alone can't." [2] (Figure Eight, n.d)

### 2.4. Crowdworkers and Their Experiences with the Work

In this study, I will make use of the most comprehensive and latest surveys conducted by International Labour Organization (ILO) in the years 2015 and 2017. Although the most recent report on crowdwork by ILO that take into account both of the surveys is also more comprehensive, there are some platform-specific researches that rely on extensive observations that could be useful in shedding light on some of the discussion points about crowdworkers. The quantitative data from older studies than ILO will not be mentioned or discussed in this section. However, the textual answers from the workers will be made use of in discussing the conditions and motivations of the workers.

2 Crowdflower/ Figure Eight Homepage accessed June, 13, 2023, https://visit.figure-eight.com/People-Powered-Data-Enrichment_T).

Amazon Mechanical Turk, being the first recognized crowdwork platform, has grabbed the attention of scholars since its deployment. Therefore there was a special project called "Turkopticon" initiated by Lilly Irani and M. Six Silberman in 2009. The project aimed at disrupting worker invisibility and offered a platform for workers to rate and make comments about the "requesters" which is AMT's name for employers in the platform (Irani, Silberman 2013). Before implementing this project, Irani and Silberman had conducted informal surveys with the workers to understand their needs and complaints. Although their study is restricted to Amazon Mechanical Turk's workers; they have maintained and extended their projects in the following years while developing a relationship with the workers themselves. In this section, some of their findings will be discussed in relation to the results that ILO research provides. Similarly, the ethnomethodological study by Martin et al. (2014) that focuses on "Turker Nation", a subreddit managed and used by crowdworkers of AMT will also be a source of understanding workers' motivation.

Lastly, a study conducted by A. Florian Schmidt in 2018; published in early 2019, focuses on exclusively lately established AI training data providers for the self-driving car industry. These platforms -Mighty AI, Hive, Playment, Scale, and understand.ai- differ from general microtask platforms in that they offer clients "ground truth" data which is said to be at least 99 percent accurate. He conducted interviews with the workers from these platforms, and with the help of a web traffic analysis tool, he was able to detect crowdworkers' mobility patterns from specific countries into these recently established platforms. This study will be effective in discussing how economically disadvantaged people especially educated, underemployed people from countries in economic hardship, would be more inclined to perform crowdwork consistent with ILO research findings.

2018 dated ILO report is one of the first comparative studies that delve into the conditions of the crowdworkers who actively work in five global online microtask platforms through surveys conducted in 2015 and 2017, covering 3500 workers from 75 countries. "In 2017, the two surveys were combined to collect all information about the worker through the first round in order to avoid any problems in identifying the workers for the second round." (Berg et al.2018, 29). The 2015-dated survey only included workers from Amazon Mechanical Turk and CrowdFlower

while the 2017-dated survey included five major platforms. The microwork platforms are as follows: Amazon Mechanical Turk (Indian and US workers), Crowdflower, Clickworker, Prolific, and Microworkers. In this study, ILO Research Department collaborated with the Inclusive Labour Markets, Labour Relations, and Working Conditions Branch (INWORK). Surveys were supported with "in-depth interviews and other qualitative surveys conducted by researchers at IG Metall."(Berg et al. 2018, xiii). 2018 dated ILO report is a comparative study meaning they both take into account surveys that were conducted in 2015 and 2017 comparing the results and indicating the changes. The comparability was achieved through the designing of the surveys with the exact wording. Both surveys included open-ended questions at the end asking for workers' thoughts about what changes they would do to make crowdwork better and what they want to express about their overall experience. Qualitative data offered the researchers more extensive insights into the workers' conditions. Besides the common questions regarding socio-demographics such as age, occupation, hours worked education history, earnings, and job history; questions about health insurance, household income, and savings were also present. Surveys were offered to crowdworkers as a task on the platforms they work on without any restrictions to be accepted for the task. Participants were compensated monetarily in every survey. Because of the lack of a database on crowdworkers, researchers did not have a direct way of coming up with a random or representative sample therefore, they posted the task- the survey- multiple times in the day, and the first ones to engage with the task online were accepted as contributors. So, the participants selected themselves for the research.

Both of the surveys conducted by ILO had a global reach, with the 2015-dated survey covering 51 countries and 2017 dated survey covering 75 countries. According to the results, crowdwork has proven to be prevalent in urban areas, with four out of five workers living in cities. Almost all regions of the globe are represented in the research, some significant worker representations are from India, Indonesia, Brazil, the United States, and Western and Eastern Europe.(Berg et al. 2018, 31). While Amazon Mechanical Turk and Prolific had the least diverse global workers pool, Microworkers and Crowdflower had a diverse pool of international workers. Approximately 30 percent of the workers in Microworkers are from the United States, 10 percent were from India and the others were from 52 countries. The

number of countries where CrowdFlower workers reside has nearly stayed the same: 51 countries in the 2015 survey and 50 countries in 2017. “Further, in both years the workers largely came from Bosnia and Herzegovina, India, Serbia, United States, and Venezuela.”(Berg et al., 2018, 32) The complete data has shown that there are gender differences in inclination to do crowdwork, with only one out of three workers being a woman. In developing countries, gender difference was more stressed with only one out of five workers being a woman. In 2015, among the US AMT workers, there was a gender balance with 48 percent female and 52 percent male workers. However, regarding Indian AMT workers and CrowdFlower workers, male representation was higher than female representation in 2015. In 2017 gender imbalance was higher among AMT workers.

Among the workers who participated in the surveys, the average age was 33.2 years slightly lower than in 2015 (34.7 years). The majority of the participants were between the ages of 25-40 with only 10 percent being above the age of 50. The average age differs from region to region. According to ILO report, the average age of crowdworkers was approximately 28 years in developing countries and 35 years in developed countries. The workers from Africa, Latin America, and the Caribbean were on average younger than those in Asia and developed countries. Overall data has shown that crowdworkers are well-educated. Only less than 18 percent of the crowdworkers had a high school diploma or a lesser education level in 2017. Approximately a quarter of the workers have technical certificates and some university education, and 37 percent have bachelor’s degrees while 20 percent of them have post-graduate degrees. The findings are consistent with the years 2015 and 2017.

The most educated crowdworkers reside in Asia, with 80 percent having a bachelor’s degree or higher, while Africa has the lowest education level among crowdworkers with 47 percent having a bachelor’s degree or higher. A significant part of the crowdworkers with a 21 percent rate was enrolled at universities to obtain a bachelor's degree in 2017. Most prevalently, university students who do crowdwork lived in Africa with 40 percent of the respondents enrolled in undergraduate programs. Degree holders specialized in the following areas: natural sciences and medicine, engineering, information technology, economics, finance, and accounting.

Although quitting crowdwork is somehow prevalent, 56 percent of the crowdworkers who went through the surveys had been crowdworker for more than a year and 29 percent of them had been crowdworkers for more than three years. In 2015, the percentage of crowdworkers who had been working for more than three years was 4 points less than in 2017 findings. This difference was attributed to the inclusion of more microtask platforms with more diverse workers around the globe making the 2017 survey more representative of developing countries.

The answers for the main reasons to perform crowdwork were varied with the most common one being "to complement pay from other jobs" which 32 percent of the respondents answered as the essential factor. The second most prevalent answer was "preferring to work from home" with 22 percent of the workers reporting as the main reason. In 2015, "to complement pay from other jobs" was the main reason for 20 percent of the workers, and "preferring to work from home" was the main reason for 36 percent of the workers. Yet, "preferring to work from home" and "to complement pay from other jobs" were the two most popular reasons among all regions. The other responses in the survey were as follows (in no particular order): not being able to find other jobs, only being able to work from home, pay being better than other available jobs, earning money while going to school, a form of leisure and enjoyment. In terms of crowdworkers who could "only work from home", there were apparent gender differences, with 13 percent of women workers stating this reason as opposed to 5 percent of men workers. These differences were attributed to the care responsibilities that are traditionally burdened on women. This was supported by the responses given by workers in qualitative surveys:

> I take care of my mom so that she doesn't have to go to the nursing home. As she gets older, her needs become more time intensive. We would not be able to afford to pay someone to stay. - Respondent on Prolific, United States (Berg et al. 2018, 38)

> I have a sick child (autism and cancer) and he needs all day care."- Respondent on Crowdflower, Serbia (ibid, 38)

Approximately 19 percent of the workers who partake in the survey have reported that they had physical or mental health issues that were expected to last at least one year. 54 percent of these workers stated that their health problems could affect the type of labor that they could perform and approximately 18 percent of the workers who had health problems were heavily affected by their health issues so digital work

offered the substitute opportunity to earn income at all. In the qualitative answers, health problems were also regularly mentioned:

> I have Autism Spectrum Disorder which limits my social skills and ability to interact with others. By working from home these problems do not affect my ability to complete tasks successfully. - Respondent on Clickworker, United Kingdom (Berg et al. 2018, 39)

> I am disabled due to spinal cord injury and have limited mobility. - Respondent on AMT, India (Berg et al. 2018, 39)

Significantly, 22 percent of Latin American crowdworkers with intense representations from Venezuela and Brazil and 9 percent of Indian AMT workers have expressed their main reason as "pay is better than other jobs available". This answer was not shared among respondents from other regions (38). In the 2015 dated survey, one Venezuelan crowdworker explained: "Working as a crowd worker has given me the opportunity to obtain an extra income in USD that actually in my country is very profitable. I have been able to quit my day job and make my main income from this work." (Berg et al. 2018,57)

It is evident that the overall economic situation in the countries has played a significant role in the contentedness of the workers about payments, and it is also plausible that economic downturns in countries may have pushed people into the crowdwork industry. In his study, A.Florian Schmidt (2019) found that at the time when new platforms were established to provide training data to the self-driving car business around 2018, Venezuelan workers amounted to 75 percent of the workforce in Spare5 which is the worker-facing platform of Mighty AI. The percentage of Venezuelan workers in the Hive Work platform rose from 55 to 75 throughout 2018 (17). The year 2018 was the year that Venezuela experienced extraordinary hyperinflation making the well-educated middle class suddenly fall into poverty. This coincidence Schmidt (2019) argues, has made hundreds of thousands of Venezuelans gravitate toward these platforms providing them a lifeline in the midst of a severe economic crisis. He calls them "online migrant workers" pursuing profitable digital job opportunities throughout the internet without having to find ways to leave their country. Some qualitative responses from the ILO survey have also supported the claim that well-educated people from Venezuela turn to

crowdwork to make a living and this situation was also observable before the 2018 hyperinflation:

> I only use crowd work because in my country it is impossible to make a living out of a regular job, for example my dad is a trained engineer working for an oil company and my mom is a teacher, combined they make around 85 a month."- Microwerkers worker, Venezuela (Berg et al. 2018, 57)

Schmidt (2019) has also conducted interviews with five workers from Spare5: "a 58-year-old female nursery school teacher from Brazil, a 55-year-old female fashion retailer from Italy, a 34-year-old female prospective dentist from Venezuela, a 22-year-old male electrical-engineering student from Venezuela, and a 20-year-old male mechanical engineering student from Venezuela." (Schmidt 2019, 19)

All workers have been chosen because of their well and steady contribution to the platform. Although the sample was too narrow to be representative, it provided valuable insight into the workers' experiences. All of the workers had a decent educational background and they had some experience with crowdwork on other platforms. Women from Brazil and Italy who were more experienced with the platform have expressed that the influx of large groups of Venezuelan workers to the platform had lowered their payments significantly. Not only the payment for a task has declined to 2 cents from 5 cents but the number of available tasks has also dropped. However, they were not heavily troubled by this since they did not entirely depend upon the payments from this job. As for the Venezuelan workers, this job was their main source of income and they were wholly dependent on it. The average income they made was between 20 and 50 USD per week, and they were recognized as relatively prosperous by their family and acquaintances, whom they introduced the job later to help them get through the crisis.

The findings on the synchronicity of the economic crisis and the arrival of many Venezuelan workers to the new crowdwork platforms and results of the ILO surveys on why crowdworkers perform this labor suggest that crowdworkers are mostly interested in the economic prospects of this job and many of them are actually dependent on this digital labor even though they may have other jobs. According to the 2018 dated ILO report, 32 percent of the surveyed workers indicated that crowdwork was their main source of income. However, in consideration of the data that has been obtained from other questions in the survey, it has been estimated that

dependence on crowdwork might be more than respondents admit. The survey asked if the crowdworkers had any other paid jobs and it turned out that

> 48 percent of the crowdworkers were not engaged in any other type of employment. An additional 8 percent had another job but earned more from crowdwork than in the other job, implying that for 56 percent of the respondents, the main (personal) income source was crowdwork. (Berg, et al. 2018, 41)

Although crowdworkers have clearly engaged with this type of work primarily for monetary reasons, there is a convenient discourse that claims crowdworkers are basically people who perform this labor "on the side" to raise some extra mone y while having fun (Berg 2016). Jeff Howe (2008) has also asserted in his book about crowdsourcing that crowds are not necessarily motivated by money but they are after some creative fulfillment. This rhetoric has fed the perception that crowdworkers and other workers in on-demand economy (an economy enabled by digital platforms to provide for consumers' and employer's needs with instantaneous access) are not actually performing "real work", that they are just pursuing secondary income by choosing enjoyable side quests via online means. According to the ILO (2018) report, only ten percent of the crowdworkers in the study stated that their reason for performing crowdwork was because they "enjoyed it" and 56 percent of the crowdworkers was actually dependent on their income from crowdwork. In the study of the Turker Nation forum for Amazon Mechanical Turk workers, workers' understanding of the platform has also been observed as "a marketplace where they sell their labor" (Martin et al. 2014, 226). The workers in the forum have discussed this issue in a thread where the topic was "HITs for fun". The summative quotes from workers are as follows:

> danturker:
>
> This attitude would be requesters dream come true. The workers come here to have fun and play and the lousy pay for work is not an issue. This attitude helps create low pay for the AMT work force that does care about fair pay
>
> larak56:
> I agree with most everyone here. While I do find some of the HITS fun and actually learn an incredible amount by doing HITS, I do it for the cash. (Martin et al. 2014, 227)

The researchers that studied the Turkernation forum have also observed that even for those workers who perform crowdwork because their main job started to pay off less and they needed extra money, they did not choose this type of work but felt

compelled. One worker that got into crowdwork when her main job sector was in market depression has written that: “I would much rather have my salary back and drop turking.”(Martin et al. 2014, 227)

The ILO (2018) report shows that crowdworkers who were engaged in other types of employment constituted 52 percent of the workers of which 32 percent were in a steady job with salaries and ten percent of them owned a business while the remaining had informal jobs (casual work or part-time jobs). Among those who had other jobs, almost 45 percent of them performed crowdwork while they were in business hours. Those who performed crowdwork during business hours were more frequent in some regions: in Africa, Latin America, and the Caribbean, nearly 60 percent of the crowdworkers who worked in another job performed crowdwork while working (ibid, 59)

The ILO study has found that many crowdworkers’ financial situation was precarious: In about 20 percent of the crowdworkers’ households, monthly income was not sufficient for fundamental needs. This percentage was higher in Africa with 42 points followed by Asia and Pacific with 24 and Latin America with 23 percent. In Northern America, Europe, and Central Asia, 17 percent of the crowdworkers lived in households with insufficient monthly income for basic needs. Additionally, 42 percent of the workers’ households did not afford to “cover an emergency equal to one month's income.” (Berg et al. 2018, 59) The absence of social protection was also observed in the findings: about 60 percent of the workers had health insurance, 35 percent of them had a pension or retirement plan and 29 percent of them benefited from government assistance. For those who were covered by health insurance and had a pension, most of them got their social protections from their main jobs. The study revealed an inverse relationship between dependence on crowdwork and social protection.

Crowdworkers who do not engage in other employments - whose main source of income came from crowdwork- have limited protection. Workers whose main source of income was crowdwork were more likely to receive government assistance, especially for food which was an implication of prior poverty before the workers had become crowdworkers (ibid, 60). The findings were consistent with the 2015 survey results. Similarly, only 8 percent of AMT US workers had retirement equity, and 9

percent had some kind of social security while only 14 percent of Indian AMT workers had contributed to a provident fund.

In both ILO surveys conducted in 2015 and 2017, workers were asked how much money they make from crowdworking in a week and how many hours they spent doing the job. As for the number of hours spent by the crowdworkers, there was a distinction between the time they spent doing paid work, and time spent doing unpaid work such as looking for tasks and researching the requesters via online forums. According to the obtained information from these questions, when only paid work was considered, the average earnings in 2017 per hour were US$4.43, and when paid and unpaid total hours were considered, average earnings per hour dropped to US$3.31. (Berg et al., 2018, 49) Unpaid hours were a recurring significant problem in the textual answers provided by the respondents:

> The toughest part of turking for a living is actually finding the jobs, for every hour I spend working I most likely spend 2 hours monitoring the various scripts I have running to see what jobs show up. – AMT worker.
>
> It's an extremely unstable existence….I cannot say to myself I'm going to log in from 9 to 5 today and do enough work to make X amount of dollars. Sometimes there is work you can do, sometimes there isn't….So it becomes right time, right place, and fighting other workers for the better paying tasks/work if/when they are available. If you want to be successful, you can't stop. You can't log out…. – AMT worker. (Berg 2016, 15)

In the textual answers of the workers, low payment has also been brought up by crowdworkers:

> Fairer pay – a bare minimum of 10 cents a minute is barely acceptable, but anything under that is just greed. I put in a lot of thought and work into each HIT and deserve to be compensated fairly.”-AMT worker, United States.
>
> I think pay should be more humane, just because someone is desperate enough to do these jobs doesn’t mean that you will literally pay them peanuts as it is rampant on Mturk.”-Prolific worker, India (Berg et al. 2018, 56)

When Irani and Silberman (2013) tried to design a web plug-in for Amazon Mechanical Turk crowdworkers for a platform to rate requesters, they offered a task in AMT that requested workers to imagine a “Workers Bill of Rights” in which workers answered open-ended questions about the way they think of platform’s working conditions. They later published the workers’ answers with their permission to generate a public debate with the intention of making visible crowdworkers’ issues

and ideas about their work processes. From the workers' responses, some of the most recurring issues were as follows in order: the regular rejection of their work and hence payment unfairly, slow payment, payments being below minimum wage, general unfair compensation, Amazon's and requesters' unresponsiveness to their concerns (615).

In Amazon Mechanical Turk, requesters have full intellectual property rights when the workers submit the tasks, even if the work is ultimately rejected. Therefore the requesters had the right to keep the rejected work (Irani 2015b). Workers' reputations on how competent they are in terms of tasks are reflected in their approval ratings and the number and type of tasks that they could access are based on those approval ratings. Therefore, unfair rejection of work- often requesters did not give explicit reasons for rejection- has emerged as a prevalent problem for the workers. One of the workers explained her frustration with AMT:

> I don't care about the penny I didn't earn for knowing the difference between an apple and a giraffe, but I'm angry that MT will take requester's money but not manage, oversee, or mediate the problems and injustices on their site. (Irani, Silberman 2013, 615)

Other platforms that were included in ILO research also provided employers with the right to reject the work and deny the payments without making them accountable for explaining the grounds for rejection. Similarly, in these platforms workers' acceptance rates also affect the prospects of their future work. In CrowdFlower, for example, there was a system called "gamification" in which workers gain badges to level up when their work is accepted. More badges mean higher levels and a higher chance of getting well-payed tasks. Some of the CrowdFlower workers who participated in the ILO research also stated their issues regarding rejections:

> The major problem all testers on CrowdFlower have is the power that Customers have. If one customer doesn't like your work, he has the power to give you a Flag (punishment) that remove all your badges (you can reach up to level 3 badge) and you won't work in any jobs that requires badges (level 1, 2 or 3 badges) anymore.- CrowdFlower worker, IGM Survey

> Task authors should treat members fair e.g. correct the accuracy in case of wrong corrections, give sufficient instructions, should not give flags without telling the reason.- CrowdFlower Worker, Germany (Berg et al. 2018, 77)

Likewise, respondents on AMT in ILO research have voiced their problems about rejections and the opaqueness of the process: “Workers should get the right to question about their rejected hits. Currently, it is at the sole discretion of the requester”. (Quoted in ibid, 76). The lack of responsiveness of the employers who use the platform or of the people in charge of communication in the platform is a common problem observed in ILO research as well. In the platforms included in the research, in theory, it is possible to contact the platform management however it is observed that practically it is not so easy. Contact information was not always well-put, and communication was slow and interrupted. Communication with the requesters might be even more problematic. While it was possible to communicate with the requesters in AMT and Prolific, it was not the case with Clickworker, CrowdFlower, or Microworkers (ibid, 79).

In one of the personal conversations between Lily Irani and one big Amazon requester Dahn Tamir, he stated that: “You cannot spend time exchanging e-mail. The time you spent looking at the e-mail costs more than what you paid them. This has to function on autopilot as an algorithmic system . . . and integrated with your business processes” (Irani 2015b, 228-229). Algorithmic management has further inconvenienced the communication between workers and employers. One of the most conspicuous qualities of crowdwork is that it is mostly algorithmically managed and controlled. The algorithms that approve or reject the tasks are also developed by humans however when it comes to mediating conflicts; workers generally find it hard to communicate with actual humans. When the supervision of a task is trusted with the algorithm, the algorithm chooses the most given answer as correct by default; therefore, a worker may perform the task accurately but if the other workers mostly submit the same incorrect results with a task, the accurate submission would get rejected.

According to Irani (2015b), the requester's attitude of finding communication with the worker as a waste of time is not exceptional. Therefore it is not surprising that many of the crowdworkers have expressed this as an issue in the ILO research: “I would make requesters to communicate with workers better. I think we are all humans and are allowed a few mistakes. Requesters who refuse to communicate need to be given a bad review.” (Berg et al. 2018, 79) It is noteworthy that the problems

workers face have so much commonality in the studies that were conducted years from each other. Silberman and Irani had conducted their informal surveys on AMT workers around 2008, yet the results obtained from ILO research that was based on the surveys conducted in 2015 and 2017 were very similar to that study. In both of the studies, workers mainly objected to the unfair rejections, the opaqueness of the rejection process, insufficient payment, and the lack of responsiveness and communication.

Overall extensive examination of several different types of research conducted in different periods of time suggests these points about crowdworkers: crowdwork is an urban phenomenon, crowdworkers are well-educated and mostly young, and crowdworkers from developed countries are on average younger than their counterparts. Workers' main reason for crowdworking is based on financial difficulties and workers recognize these platforms as a marketplace to sell their labor. The workers from countries in economic crises are more inclined to perform crowdwork because of the currency rates and unavailability of well-paid jobs. Workers with mental or physical health conditions and workers with care and domestic duties -with more representation of women- find crowdwork as an alternative way to earn an income. Overall financial situations of the crowdworkers are unstable in consideration of their monthly household incomes and their access to social protections. Although workers appreciate the ability to work from home and to choose the time they work, the supposed flexibility is spoiled by the uncertainty of the availability of the jobs, which compels workers to spend a significant amount of time searching and waiting for tasks on their computers. Workers from all platforms have common problems: insufficiency of work, unfair rejection of their work, the uncertainty of the reasons why their work is rejected, the inability to communicate with employers and platform managers, and low payment. These problems have stayed relatively the same between the years 2008 and 2017.

### 2.4.1. The Legal Condition of the Crowdworkers

Crowdworkers and workers in the on-demand/ gig economy, in general, were easily defined with some catchphrases such as "turkers", "taskers" and sometimes "rabbits"

(after the crowdwork company TaskRabbit). The terms like “labor” and “worker” were not generally used for this type of digital labor resulting in the denigration of the work itself while contributing to a perception that the legal and social regulation of this labor is redundant. (De Stefano 2016) .In this section, the legal framework will be United States Law since almost all major crowdwork platforms are based in the US. Almost all workers operating in on-demand economy are classified as “independent contractors” by the platform’s terms and conditions agreements. In terms of crowdwork which is wholly completed through online means, crowdwork platforms are very careful with their classification of the relationship between the individuals who perform the job and the digital platform. The reason for this diligence comes from the liabilities of employment relationships.

By classifying the crowdworkers as “independent contractors” platforms manage to avoid legal responsibilities such as minimum wage, sick leave, protection from discrimination, worker’s compensation, and unemployment insurance (Cherry 2016). The clauses that establish self-employment relationships with crowdworkers are only legitimate “when the classification of the relationship between the parties corresponds to the reality of the transaction, i.e. when the person hired fully preserves her autonomy in the actual execution of the task.” (De Stefano 2016, 12) In the US, the differentiation between an employee and an independent contractor is determined through the execution of some complicated and multi-faceted tests relating to the reality of the relationship between the service provider and the requester. These factors are various, and in the case of digital work, there may be no clear-cut distinctions regarding the autonomy of the hired person. If a job giver is directly involved in the management and the control of the process of work as in providing instructions to the laborer and determining the working hours; this relationship is classified as an employment relationship. The factors that define independent contractor status are generally related to high-skilled work where the workers choose the time period to work, provide their own equipment, and get paid per project instead of an hour. Alternatively, some tests analyze the nature of economic dependency in the relationship and try to establish if the worker is in an entrepreneurial endeavor. (Cherry 2016) These tests are executed in the instances where the agreement between parties is claimed to be legally inaccurate.

According to De Stefano (2016), some crowdwork companies have conflicting provisions in their agreements that are outside the scope of regular independent contractor clauses. For example, in the Amazon Mechanical Turk Participation Agreement, there is a clause:

> We are not responsible for the actions of any Requester or Worker, or performing any screening of Requesters or Workers. Because we are not a party to the transactions between Workers and Requesters, we are not responsible for resolving any disputes between Workers and Requesters related to any Tasks or any transaction.[3] (Amazon Mechanical Turk, n.d)

With this clause, Amazon Mechanical Turk clearly states that they are not a party to the transactions between requesters and workers however, in another clause, it is stated that: "Workers perform Tasks for Requesters in their personal capacity as an independent contractor and not as an employee of a Requester or Amazon Mechanical Turk or our affiliates." (Amazon Mechanical Turk, n.d)

In the first quote, the AMT participation agreement establishes that the platform is not involved in the transactions between the requesters and the worker. However in the second quote, the agreement establishes that the workers are not employees of the requesters. The agreement does not only eliminate the possibility of an employment relationship between the platform and the worker but also eliminates the possibility of an employment relationship between the requester (customer in the platform) and the worker. Because of this, De Stefano (2016,13) claims that these clauses could be regarded as "enhanced independent contractor clauses" which could mean that in the instance of litigation, it might be possible to conclude that the platform acts as a "joint employer" for the worker in a transaction under US law. Regardless of the possibility of "joint-employment status", these clauses clearly intervene with the relationship between customers and workers which is at odds with the platform's alleged neutrality in those relationships. Moreover, in the agreement of AMT, customers are prohibited from accepting work through other means than the platform and acting in a way that may risk the status of the worker as an independent contractor:

[3] Amazon Mechanical Turk Terms and Conditions, accessed June 21, 2023, https://www.mturk.com/mturk/conditionsofuse

> you may not have Workers perform Tasks through venues other than the Site (unless expressly permitted by us in a policy posted on the Site).
>
> As a Requester, you will not engage a Worker in any way that may jeopardize that Worker's status as an independent contractor performing Tasks for you (Amazon Mechanical Turk, n.d)

Although the activities of the requesters that may risk the status of the worker as an independent contractor are not detailed in the agreement, the existence of the clause shows that AMT is aware of the possibilities that legally binding employment relationships could arise and the clauses in the participation agreement are not definitive. Formerly, the AMT participation agreement specified possible terms of instances that could jeopardize the independent contractor status as a warning to the requesters which they later changed to the version above:

> While Providers are agreeing to perform Services for you as independent contractors and not employees, repeated and frequent performance of Services by the same Provider on your behalf could result in reclassification of that employment status (De Stefano 2016, 13)

Additionally, the fact that AMT gives all ownership rights, including the intellectual property rights, to the requesters at the possibility of rejection without making the requester accountable in any way could also be regarded as an interference with the relationship of the worker and requester. Also it may be counted as interference to the process of the execution of the work since the rejection of the tasks causes a decline of the rating of the workers which severely affects the future prospect of working conditions. Granting intellectual property rights to the requester also may result in conscious unfair rejection of the tasks by the requester, making possible direct wage theft. The rating system and the dependence on high ratings to be able to work is a concrete influence on the work process and the relationship between requester and worker.

Amazon Mechanical Turk is the most prototypical and also the oldest of the crowdwork platforms. Although the platform is involved in some ways in the operation of the work, as discussed above, it mainly exerts itself as a third party that does not have responsibility for the quality of the end product or the conditions of the work process. It is up to customers- requesters- to select workers, describe the tasks, and give direction and some training to the workers.

A. Florian Schmidt (2019) defines these kinds of microwork platforms as "generalist platforms where the provider serves as an intermediary that allows its clients to directly access a distributed crowd." (10) The crowdwork industry, however, is growing as the need for training data for artificial intelligence grows. As indicated earlier, crowdwork platforms increasingly promise their clients "ground truth data" which means "the reality you want to model with your supervised machine learning algorithm." (dominodatalab, n.d) [4] Ground truth data relies on human annotators to label data sets to train and confirm the machine's classification model. These specialist platforms train, test, and select their human annotators. Workers in these platforms go through a training phase before they can get any tasks at all. After being qualified, they could level up to get access to better jobs as they get more competent in certain types of tasks. Workers are individually monitored and given detailed feedback on their performances. Platform managers even channel specific new tasks to certain subgroups to train them more efficiently. In these platforms, workers could not choose tasks freely. Platform managers are involved in the work process and execute direct control and management over the workers except for working hours. Specialist crowdwork platforms try to signal their clients that the data labeling is not trusted upon a mass of incompetent crowds but rather given to "handpicked groups of experts that are trained and monitored constantly." (Schmidt 2019, 14)

However, this might be troublesome for the platforms that still classify the workers as "independent contractors". These platforms might face misclassification lawsuits given that hired people have scant autonomy over their work processes. Misclassification of employment status cases related to platform work is rising especially in the Northern District of California. According to Cheery (2016), there are two reasons for this. Bay area's proximity to Silicon Valley makes it a convenient place for startups to test and establish the platform work models so the area in general is experiencing digitally enabled work intensely. Secondly, California's labor law is more inclined to judge in favor of the employees. There are noteworthy litigations regarding employment status in the on-demand economy, particularly the cases regarding car-hailing services such as Uber and Lyft. Although Uber and Lyft organize different kinds of work than crowdwork companies, the results of those

4 What is Ground Truth , accessed June 25, 2023, https://www.dominodatalab.com/data-science-dictionary/ground-truth

cases include relevant features for all kinds of platform work. Uber and Lyft are both car-hailing services that rely on applications. Customers use GPS-authorized application to make a call and the app matches the nearby available drivers who own their private cars. In 2022, Uber reached a settlement to pay 8.4 million in a class-action lawsuit to the workers who claimed they were misclassified as independent contractors (Shepherd 2022).

In past litigations, Uber and Lyft both tried to avoid claims of misclassification by arguing that they are just "tech companies" that supply a platform to pair up demand and supply for car rides. The District Court has dismissed those arguments. In the Uber case court stated that: "it is clear that Uber is most certainly a transportation company, albeit a technologically sophisticated one" and Uber "does not simply sell software; it sells rides" [5] Also, significantly court stated that: "Uber would not be a viable business entity without its drivers.[6] In the Lyft case, court's rebuttal of the argument of "being a mere intermediary tech company" included these statements: "(Lyft) markets itself to customers as an on-demand ride service, and it actively seeks out those customers" and court also acknowledged that Lyft equips the drivers with "detailed instruction on how to conduct themselves".[7] The District Court has recognized that these companies are not simply selling technological products but rely on a labor force without which companies would not be profitable. Moreover, they go further to facilitate demand and supply but manage and control workers in some ways. Lyft, for example, instructs drivers that they should be the only non-passenger in the car, help passengers with luggage or welcome them with a big smile.[8] As for Uber, drivers are checked for their background and pass an exam about their knowledge of the city roads before they could be hired.[9] However, in these cases, the court only permitted the issue to be further trialed before the jury, not decide in favor of the workers being classified as employees. In the end, the parties settled on some amount of financial compensation. (De Stefano 2016) Nevertheless, it is very plausible that crowdwork platforms that train, test, and evaluate workers

[5] O'Connor v. Uber, 82 F. Supp. 3d 1133 (N.D. Cal. 2015), 10.
[6] ibid, 10-11.
[7] Cotter et al. v. Lyft Inc.3:13-cv-04065-VC (N.D. Cal. Jun. 16, 2015), 14.
[8] ibid.
[9] O'Connor v. Uber, 82 F. Supp. 3d 1133 (N.D. Cal. 2015)

and manage the tasks given to them are open to misclassification of employment litigations.

Even the “old” crowdwork platforms like Amazon Mechanical Turk that use rating systems that directly affect workers' future possibilities of accessing tasks are exerting control on the work process. In fact, CrowdFlower went through a misclassification of employment trial in 2012 before the company started to switch its branding to become more like an AI-related platform. Workers sued the company because they did not get minimum wage under Fair Labor Standards Act. Predictably, CrowdFlower argued that the workers were independent contractors hence the company did not have to pay them minimum wages. The case ended with a settlement in a similar fashion to Uber and Lyft in 2015. The company agreed to pay $585,507 to the plaintiffs including attorney fees. It might be argued that while Uber and Lyft execute control on the workers CrowdFlower acts more like an intermediary platform, not managing the workers other than designing the platform in a way that lets customers rate the workers and make this rating system determine the work conditions. The argument might have worked more in court than in the cases of Uber and Lyft. However, plaintiffs have included in their complaints a Youtube video of the CEO of CrowdFlower stating that he did not have to pay workers minimum wage. The video has been withdrawn from the site, but in an interview with BBC, which is still available online CEO of CrowdFlower expressed the “opportunities” that this digital labor form has given them: “We almost trick the game players into doing something useful for the world while playing these games. Just do ten minutes of real work that a real company can use, and we’ll give you a virtual tractor. That way, everyone wins.” (Cherry, 2016, 17) These remarks could be interpreted as a calculated violation of minimum wage laws which the CEO unwittingly admitted while going overboard to advertise the business. Cynically, CrowdFlower has attracted a big venture capital investment recently after the trial. (Cherry 2016)

In the next chapter, cognitive capitalism theories involving post-Operaismo will be explained in detail. These theories place significance on the new technologies of computerization and digitalization and resulting “immaterial labor” to indicate a mutation in the capital-labor relations that marks the inauguration of a different stage in capitalism. Clarification of the theoretical concepts such as “subsumption” and

“autonomy” will be provided to be later used in the analysis of crowdwork which will shown to have important implications regarding the relationship between livin knowledge and Machine Learning.

# CHAPTER 3

# COGNITIVE CAPITALISM THEORY AND IMMATERIAL LABOR

## 3.1 Marx's Machines and Contemporary Interpretations

Marx's most comprehensive account of machines was mainly laid out in Capital Volume I and Grundrisse, which resulted in contemporary somehow differing conceptions of the relationship between machines and living labor. Although in Grundrisse, Marx's conception of machines did not contradict the main line laid out in Capital Volume I, Grundrisse's part called "Fragment on Machines" grabbed the attention of theorists when it was translated in the 1970s to the English, Italian, and French.

In this part, Marx (1973) imagines the ultimate development of the rationality of machinery under capitalism, in which machinery absorbs the entire general intellect that society produces, scientific and abstract social knowledge altogether. Grundrisse's discovery in Europe coincided with the beginning of the expansion of computerization in advanced capitalist countries (Dyer-Witheford et al., 2019). It is seen as a forethought of high-technology capitalism and created a theoretical ground in which the obsolescence of the law of value proposed by some post-Marxist thinkers such as Negri, Hardt, Vercollene, and Boutang could be developed, along with the idea of the immaterial/cognitive labor as the productive labor. In the Italian New Left, "Fragment on Machines" contributed to the idea that individual labor could no longer be quantified and be the measure of value (Bowring 2004). Negri (1992) even wrote a book called "Marx Beyond Marx. Lesson on The Gruindrisse and came to a conclusion:

> The Law of Value dies. The force and the efficiency with which it appears, at the level of the socialization of capital, such as we have seen in the Grundrisse, are demystified. The Law of Value passes over from appearance to misery: both are efficient, but the first form is rational, the second only constraining. There is no longer any relationship with the (average) time of (abstract) labor, there is no longer any determinant proportionality between necessary labor and surplus labor (Negri 1992, 172)

The concept of “General Intellect” laid out in Grundrisse is appropriated and reinterpreted by these theorists as well. Rather than general intellect being thought of as objectified in the fixed capital as a direct force of production, it was seen as being invested in the minds of the living labor connected through networks as living knowledge to render machines and humans inseparable. Machines are not thought of as something that the laborer confronts as an alien entity that commands the process of labor as in the industrial stage. In this line of thinking, the old dichotomy between fixed capital and “variable capital,” of which the name signals that living labor is animated by capital and made coherent by it, does not translate into the high technology capitalism in a digitally networked age.

Fragments on machines are also linked to bringing about some approaches to the machinery that see them as potentially emancipatory if they are to be developed to the point of making human labor unrequired. The possibilities of luxury communism, universal basic income, and concepts such as post-capitalism have also increasingly developed over the last years. (Bastani 2014-2019; Srnicek 2015; Mason 2015) Nevertheless, the alternating notions are logically derived from the central line in Marx’s thoughts on machines, but they have a point of departure.

In Chapter 15 of Capital Volume I, Machinery and Large Scale Industry, Marx (1976) explains the capitalist rationality of development and the introduction of machinery into the production process.Every means to increase the productivity of labor results in shortening the part of the working day that workers work for themselves and lengthening the other parts that workers give for free. (492). Thus, the social function of machines is to produce (relative) surplus value. He draws attention to the differences between the role of labor in relation to tools and machinery in manufacturing and large-scale industry. In the large-scale industry, instruments are the “starting point” as opposed to manufacturing, where labor has primacy over tools. He then formulates the definition of the machine as they mark a distinction in the economic sense: “All fully developed machinery consists of three essentially different parts, the motor mechanism, the transmitting mechanism and finally the tool or working machine.” (Marx 1976, 494) The motor produces the driving power of the machinery, and the transmitting part regulates and addresses the motion with wheels, pulleys, or straps. It is the third part of the machinery, working machine, or tool that set off the Industrial Revolution in the 18th century. (Although

the proper "revolutionary" production mode was achieved after the steam power engine was started to be used in a truly "capitalist" sense until the 1860s).

For Marx (1976), the existence of the working tool leaves the worker with the only act of "watching the machine with his eyes and correcting its mistakes with his hands." (1976, 496) Other than "watching and correcting," the only thing that is left to the laborer is the quality of the "mechanical role of motive power" (turning the crank of a mill). He asserts that at the moment, the man stops working the object with the tool but instead performs the motive power of the machine: "It is purely accidental that the motive power happens to be clothed in the form of human muscles" (1976, 497). The motive power also has to change to dispose of the limits of human strength. In the cooperation of numerous machines, one motive power is able to drive many machines, which is also the difference between manufacturing and large-scale industrial production. Watt's double-acting steam engine is considered the first primary 'self-acting prime mover' (Marx 1976, 499).

Additionally, in manufacturing, although the workers are adapted to the process of division of labor by the manual implements as tools, the process had been designed for workers. Yet, in large-scale machine production, the subjective principle of division of labor evaporates:

> Here the total process is examined objectively, viewed in and for itself, and analysed into its constitutive phases. The problem of how to execute each particular process, and bind the different partial processes together into a whole is solved by the aid of machines, chemistry, etc. (Marx 1976, 502)

Therefore, in large-scale industrial production, the division of labor relies on a more objective and scientific installation in which the machines are the starting point. Machine systems become the objective organization of production, which workers encounter as "a pre-existing material condition of production" (ibid, 508). However, without the cooperative character of associated labor, the machine system would not work. Instruments of labor- machinery systems- require a cooperative character as a technical necessity. The increased productivity goes hand in hand with the increasing expenditure of labor power. Machines are loaded with value, but just like any other constant capital; they do not create value, only transfer it to the product. As labor that had already been objectified, machines perform a gratuitous service in the large-scale

industry yet "never adds value more than it loses, on an average; by depreciation" (ibid, 509). By asserting that machines do not create value, Marx means "exchange value" which is regulated by the socially necessary labor time expended for producing a commodity.

> It is easy to form the notion that machinery as such posits value, because it acts as a productive power of labour. But if machinery required no labour, then it would be able to increase the use value; but the exchange value which it would create would never be greater than its own costs of production, its own value, the value objectified in it. It creates value not because it replaces labour; rather, only in so far as it is a means to increase surplus labour, and only the latter itself is both the measure and the substance of the surplus value posited with the aid of the machine; hence of labour in general. (Marx 1973, 767-768)

While machinery is a means to diminish socially necessary abstract labor time to produce goods, this would result in the appropriation of less surplus labor in the production process; hence, the exchange value decreases with each product the machine transfers value to. It makes a single one of those commodities cheaper and less profitable. This is called the Law of the Tendency of the Falling Rate of Profit. It is informed by and essentially related to the "organic composition of capital" and its tendency to rise. The organic composition of capital roughly means the proportion of constant capital to variable capital: (C/V). Because capital has a tendency to eliminate human labor in the production process to suppress wages, machinic production is expected to increase. Class conflict and capitalist competition further prompt the tendency to replace human labor with machines. However, other things being equal, a rise in the organic composition of capital decreases wages while increasing production. So, there would emerge an imbalance between purchasing power and overproduced commodities. Thus, the tendency of the organic composition to rise would eventually create a crisis of overproduction and stagnation. The Falling Rate of Profits and the tendency of Organic Composition to Rise are the two ways Marx describes the machinic production-induced crisis in capitalism.

In the Grundrisse, Marx imagines the possibility of direct labor time becoming superfluous in the creation of wealth as a consequence of the development of machinery system and other productive forces to the point of absorbing general intelligence of society:

> But to the degree that large industry develops, the creation of real wealth comes to depend less on labour time and on the amount of labour employed than on the power of the agencies set in motion during labour time, whose ' powerful effectiveness' is itself in tum out of all proportion to the direct labour time spent ) on their production, but depends rather on the general state of science and on the progress of technology, or the application of this science to production. (Marx 1973, 704- 705)

If the machines as fixed capital could absorb the general intelligence of society with all its technological and scientific elements, this degree of automation could render workers not entirely redundant but reduce the role of the worker to a mere observer and controller of the machinic production process. Yet the system is based on labor power as a measurement and substance of the surplus value. Therefore, capital works towards its own dissolution. Automation unintendedly undermines value, which is the basis of capitalism. That is why Marx defines capital as a "moving contradiction [in] that it presses to reduce labour time to a minimum, while it posits labour time on the other side, as sole measure and source of wealth." (Marx 1973, 706) Some left accelerationist approaches were inspired by this line of thought and posited that full automation could grant the conditions in which capital prepares its own end.

Cognitive capitalism theory and post-operaismo were also inspired by the Gruindrisse, yet they interpreted the text in their own way. They have been less interested in automation's ultimate possibilities for a workless future. Still, they were more interested in the technological novelties creating communicative and linguistic networks that prioritize living knowledge over dead knowledge (variable capital over fixed capital) or posit them as no longer antagonistic with each other in the new phase of capitalism. Those transformations have also changed the formation of class and led those theorists to formulate "the socialized worker": "The social worker is the subject of "technoscientific labor," and s/he steps out of the pages of theGrundrisse as a late twentieth-century cyborg." (Caffentzis 2013, 118)

The cyborg social worker is deemed the "vanguard of the communist revolution" since he is no longer bound to the machinations of capital. (ibid, 119) The subjectivity and the cooperation of labor are independent of the command of the capital, which now only operates parasitically as a means for capture. Although Grundrisse-inspired lines of leftist thought come out as "optimistic" interpretations

of technological development and automation, Grundrisse also has some grim descriptions of automation:

> …set in motion by an automaton, a moving power that moves itself; this automaton consisting of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages. (Marx 1973, 692)

> The workers activity, reduced to a mere abstraction of activity is determined and regulated on all sides by the movement of the machinery, and not the opposite. The science which compels the inanimate limbs of the machinery, by their construction, to act purposefully, as an automaton, does not exist in the worker's consciousness, but rather acts upon him through the machine as an alien power…Labour appears, rather, merely as a conscious organ, scattered among the individual living workers at numerous points of the mechanical system; subsumed under the total process of the machinery itself. (ibid, 693)

### 3.1.2 Formal and Real Subsumption

The question regarding subsumption functions to describe conditions and the form of exploitation regarding the immediate production process. The concepts are inherently related to the transformation to the large-scale industrial machinery system and the corresponding movement from the absolute surplus value to the relative surplus value. In the "Results of The Immediate Process of Production" in the appendix to Volume I of Capital (1976), Marx explains formal and real subsumption. Formal subsumption is "the general form of every capitalist process of production" (Marx 1976, 1019). Here, the labor process becomes the instrument of the self-valorization of capital. In the case of formal subsumption, the relationship between the journeyman and the master disappears with the system of hierarchy of the guild. The relation between them is defined by the valorization process of the capital, and the two are confronted as commodity dealers, one being the owner of capital, the other as the seller of labor. Here the aim of production is not anymore the production of use-values but the exchange value: "' Production for production's sake ' - production as an end in itself- does indeed come on the scene with the formal subsumption of labour under capital." (Marx 1976, 1037)

Capital organized the mode of labor that existed before capitalist relations as wage labor and formally subsumed it. However, Marx (1976) highlights that this change does not necessarily bring about a "fundamental modification in the real nature of the labour process, the actual process of production."(1021). Rather, in the case of

formal subsumption, capital "takes over an existing labour process, developed by different and more archaic modes of production." (ibid, 1021) In contrast, in large-scale industry, the nature of the labor process is transformed, and the actual mode of labor is "revolutionized." In this contradiction, the formal subsumption of labor under capital is defined. Concerning formal subsumption, capital's role regarding labor could be defined as "merely changing its social form while leaving the content of labour." (Dyer Witheford et al. 2019, 20)

According to Marx, formal subsumption even existed before manufacturing. Capital, in its unrefined form, appeared in the parasitic form of "usurer and merchant," then taking over inherited forms of labor and extending their duration to produce absolute surplus value. Formal subsumption of labor only suffices the production of absolute surplus value by extending the duration of the working day, whereas the production of relative surplus value necessitated more technical and radical transformations: "The production of absolute surplus-value turns exclusively on the length of the working day, whereas the production of relative surplus-value completely revolutionizes the technical processes of labour and the groupings into which society is divided." (Marx 1976, 645)

Before the complete development of the production of the relative surplus value with the machinery system, there emerged some hybrid forms in which multifaced works were divided into menial tasks with modern manufacturing and domestic industry. Here, the process of work is not actually "revolutionalized" as in the case of real subsumption, but capital begins to extract relative surplus value by shortening the time that workers work for their existence and extending the time they produce surplus value. Here, the capital adopts the industrial technology partially, only to operationalize it to employ a less skilled and physically weak labor force: women and children. The transition to large-scale industrial production generates the condition for real subsumption of labor under capital. This complete transition happened with the advent of the Industrial Revolution, which was accelerated by the application of factory acts in the industry (Marx 1976). The laws and the natural obstacles to the long working days have called for the application of machinery in production, transforming the dispersed domestic industry and manufacturing into the

factory paradigm. In the 1860s, capital fully embraced technology for producing relative surplus value to remake the labor in accord with the machinery structure.

Real subsumption of labor under capital is related to the complete introduction of machinery in the production system to produce relative surplus value. Formal subsumption has no relation to the technological state of capital's development, whereas real subsumption is understood in relation to the application of technology in the production process. Marx (1976) stressed that large-scale industrial production is "a technologically and otherwise specific mode of production - capitalist production - which transforms the nature of the labour process and its conditions. Only when that happens do we witness the real subsumption of labour under capital." (1034-1035) Science and technology are directly applied to the production process to enhance the productivity of the workers. When capital could not capture more time, it found that it could congest labor in the available time by transforming its content and process. With the advent of real subsumption and hence the emergence of a specific mode of capitalist production, the inherent tendency of capital to "produce surplus value as much as possible" is finally realized. Relative surplus value production is related to the "rationalization" of the conditions of labor and cooperation.

### 3.2 Operaismo and Post-Operaismo

The first seeds of cognitive capitalism theory, sometimes also called post-operaismo, were planted in the Italian left "operaismo" which means workerism. Post-operaismo and cognitive capitalism theory mostly overlap, and the theory of cognitive capitalism is heavily influenced by the prominent thinkers of post-Operaismo, such as Antonio Negri, Paulo Virno, Maurizio Lazzarato, and Michael Hardt. There is a very close affinity between these schools of thought regarding their understanding of class struggle, Marx's theory of value, the contemporary relationship between capital and labor, and the centrality of "immaterial labor." (Akçoraoğlu 2019, 532; Steinhoff 2021, 78) For this reason, besides the cognitive capitalism theorists such as Carlo Vercollene, Yann Moulier Boutang, Andrea Fumagalli, and Stefano Lucarelli's works, some of the works of the authors mentioned above will also be the subject of

this thesis. Especially, Hardt and Negri's latest collaborations will be of particular importance for the purposes of this thesis. Therefore, before starting to outline the main assumptions of cognitive capitalism theories, the formation of "operaismo" and its transformation into post-operaismo should be briefly mentioned.

In 1950s Italy, a group of thinkers started to diverge from the orthodox Marxist readings, putting precedence on labor as opposed to the capital and " treated capital as the dependent variable in the class struggle"(Bowring 2004,101). The name operaismo (workerism) comes from this theoretical orientation. According to this line of thinking, the deciding factor was the working class's struggle, and capitalist development was subordinated to it. This overturning of the primacy of capital and labor also meant that contradictions of capitalist society did not exist at the merely structural level of forces and relations of production; they were instead the consequences of the class struggles. Automation and the development of the forces of production were formulated as capital's reactions to the mass workers' struggle. Therefore, this approach rejected technological development as a purely neutral scientific matter and instead defined its inevitably political character. They strengthened this analysis with Marx's (1976) remarks: "It would be possible to write a whole history of the inventions made since 1830 for the sole purpose of providing capital with weapons against working-class revolt." (563) From this, they concluded that there would be no necessary or destined overturning of relations of production linked to the ever-increasing tendency of the expansion of the productive forces resulting in structural conflicts.

They rejected the linear trajectory towards socialism in which the political activity of the working class organized in the Party is seen as the complementary final blow to the economic crisis to achieve revolution; they claimed that the crises are the consequences of the resistance of the working class. Operaismo's understanding of history was that of "cycle of struggles" in which capital and labor alter, mutate, and reassemble in line with the strategies of their enemies:

> For in the war between capital and anti-capital, the combatants are each constantly transforming themselves inorder to answer or pre-empt the strategies of their opponent, spiraling in a `bad infinity' of reciprocal reshaping that can only be broken if one finally extinguishes the other. (Dyer-Witheford 1999, 9)

Workerists saw the potential in the "class composition," which is a concept they formulated as opposed to the "organic composition of capital." As the organic composition of capital increases, the class composition of capital changes and adapts, and the unforeseen, novel ways of struggling could be achieved by the working class.

The focus on class composition has led some operaismo thinkers to examine the capitalist relations outside the factory. They drew attention to the fact that capitalist organization was increasingly spreading beyond the industrial workplace. Education, health, transportation, advertising, communication, and media, which had been held as unproductive instances in the circulation of capital by Marx, were being regulated as wage labor. Thus, operaismo rejected a fixed and confined notion of productive labor and the working class. For Negri (1992), in the new phase of class struggle, which is based on the high level of computerization and automation, "immediately productive labor loses its centrality in the process of production." (77) The Operaismo movement embraced the notion of the "social factory" to stress that society as a whole was reconstructed according to production requirements. Tronti (1971) asserted: "At the highest level of capitalist development, this social relation becomes a moment of the relation of production, the whole of society becomes an articulation of production, the whole society lives in function of the factory and the factory extends its exclusive dominion over the whole society." (60-61). With the deployment of the term "social factory," operaismo's focus on mass workers at the beginning was shifted to the "socialized worker" (Dyer-Witheford 1999).

Moreover, the factory and the society has merged to the degree that Negri (1989) uses the term "factory without walls" to emphasize this (89). This led to debate around the concept of "revolutionary class" while some thinkers from the operaismo were still bound up with the necessity of the communist party representing the workers, the others dismissed the revolutionary primacy of any group in society. This approach in the operaismo has opened the ground for post-operaismo. Technological changes, their effects on the socialized worker, and the development of the concept of "immaterial labor" have further prepared the ground in which the post-operaismo has developed.

### 3.2.1 Immaterial Labor and the Law of Value

Among the proponents of cognitive capitalism, the primary point of agreement is that there is a qualitative change in the capital-labor relations as in the nature and form of exploitation. They claim that "After the post-Fordist period, started in the mid-1990s, a new paradigm has emerged in a sufficiently hegemonic and pervasive way in a large part of the globe." (Vercollene, Gulliani 2019, 1) Cognitive capitalism theorists have asserted that as a tendency in the capitalist paradigm, in the transition from industrial capitalism to cognitive capitalism, the form of exploitation in the capital-labor relation is changing, and it is not based on the real subsumption of the industrial paradigm. The sharp separation between machines and humans; between productive waged labor and unproductive immaterial/cognitive labor evaporated, and the cognitive aspect of labor tends to become hegemonic with respect to capitalist valorization.

Immaterial/cognitive labor is central to the main arguments of the Post-Operaismo and cognitive capitalism paradigm. Immaterial labor is defined rather vaguely by some of the post-Operaismo thinkers, such as the one by Hardt (1999): "labour'—'labour that produces an immaterial good, such as a service, knowledge, or communication" (94) or by Lazzarato (1996) as the "labor that produces the cultural and informational content" (78). Carlo Vercollone (2007) insisted that the use of the term "immaterial labor" alone is insufficient, vague and must be supplanted with the adjective "cognitive" because: "The essential trait of the present transformation in labour is not limited to its many immaterial dimensions or, more precisely, those of its products. It can above all be found in the reappropriation of the cognitive dimensions of work by living labour, with respect to all material and immaterial activity." (16). This definition by Vercellone is more satisfying than the others since it clarifies that while the product might be in a material form, a decorative object, or a fashion item, for example, in its production process, the cognitive character of the living labor was essential.

The concept is seen as directly related to the development of new communication technologies and computerization even though producing affects, communication, or knowledge includes a wide range of labor types, from domestic labor to the service sector to computer science. Technological developments and the rise of computers

were seen in a positive light, possibly empowering the working class in the post-industrial, post-Fordist economy, which is based on "immaterial labor": 'Today productivity, wealth, and the creation of social surpluses take the form of co-operative interactivity through linguistic, communicational, and affective networks.' (Hardt, Negri 2000, 294)

The notion of immaterial labor and the obsolescence of the law of value led Hardt and Negri (2000) to develop the concept of the "multitude," which they started to develop in *Empire* before writing *Multitude* in 2004:

> The immediately social dimension of the exploitation of living immaterial labor immerses labor in all the relational elements that define the social but also at the same time activate the critical elements that develop the potential of insubordination and revolt through the entire set of laboring practices. After a new theory of value, then, a new theory of subjectivity must be formulated that operates primarily through knowledge, communication, and language (Hardt, Negri 2000, 29).

In the "Empire" (2000), Hardt and Negri asserted that productive labor's tendential becoming of immaterial labor should be advanced with a more comprehensive articulation that takes immaterial labor not only as producing language and communication. They tried to formulate a concept of immaterial labor that also produces affects, the corporeal, the somatic, the relationships, and the social life. They differentiate between three types of immaterial labor. The first one is incorporated into the industrial production process with computerization and communication technologies and transformed the production process itself in which material and immaterial labor mix; the second kind of immaterial labor is "analytical and symbolic tasks" which are made of " creative and intelligent manipulation on the one hand and routine symbolic tasks on the other"; and the third kind of immaterial labor is the manipulation of affects and it is a labor that necessitates "human contact and labor in the bodily mode"( Hardt, Negri 2000, 293). They stress that all the immaterial labor "immediately involves social interaction and cooperation." (ibid, 293) The fact that they have added affective labor to the list offers a ground in which almost every activity involving reproduction and social interaction could now be regarded as productive under the banner of immaterial labor. The production of life itself has become inseparable from the capital. Thus, instead of a central revolutionary "working class," they began to talk about "multitude" which is the subject who performs the immaterial labor and has the

potential and common reason for resistance to domination. According to Hardt and Negri (2000), since the relations of production could not be distinguished from social relations, there is no "externality" from economic production.

The relationship between forces of production and exploitation "no longer has a determinate place," and immaterial labor entails a "real homogenization of labor process" (ibid, 209-292). However, it must be noted that for Hardt and Negri, what entails the "real homogenization of labor process" is the "informatization of production" (ibid, 292). They claim that in 19th-century production, the Marxian term "abstract labor" refers to when the work activities were abstracted from their concrete situations and homogenized as the expenditure of human labor power. Still, the labor processes of different activities had actually different qualities, like tailoring and weaving. However, they claim that the heterogeneity of work conditions is radically reduced in the contemporary informatization and computerization age of production. It is difficult to notice that in those claims, domestic or affective labor is not included as instances of immaterial labor (How an activity of caring could be computerized?), which they so heartily emphasized when they formulated the multitude.

Indeed, they recognized this and added that the affective face of immaterial labor goes beyond the communication and information created by the paradigm of computers, but they asserted that since affective labor produces "social networks, forms of community, biopower," one could still see that economic production and communicative human relations are merged (ibid, 293). Nonetheless, the term they use, "affective labor," is ambiguous. It is supposed to include domestic work and healthcare, and both of them have a "determinate place," and neither of them could be reduced to "communicative human relations." (ibid, 293).Those criticisms aside, it is significant that immaterial labor in Hardt and Negri's account, sometimes explicitly and other times implicitly, corresponds to the labor that is performed in the technological sphere or digital communication: "The computer and communication revolution of production has transformed laboring practices in such a way that they all tend toward the model of information and communication technologies…The anthropology of cyberspace is really a recognition of the new human condition" (ibid, 291). In this new human condition, Hardt and Negri argue that the qualities of

labor power as in measure or difference could not be grasped and "exploitation can no longer be localized and quantified."(ibid, 209) Exploitation no longer levels a specific working activity but occurs on a much more comprehensive level, on the level of universal capacity to produce. It is no longer the working class being exploited but the multitude who collectively perform the immaterial labor. The fact that these theorists place "immaterial/cognitive labor" at the heart of their claim of mutation in capitalist relations already suggests that what they mean by immaterial labor involves computerization and digitalization at its core because what they call "affective labor" seems to be already have existed for centuries.

The communicative and intellectual labor that relies on "analytical and symbolic tasks" has also existed; however, information and communication technologies have impacted the production and distribution of the products vastly therefore, that kind of immaterial labor is also related to the novel technologies. In a critique of the cognitive capitalism paradigm, George Caffentzis and socialist feminist Slyvia Federici wrote:

> Does replacing the notion of 'reproductive work,' as used by the feminist movement, with that of 'affective labor' truly serve to assimilate, under the "cognitive" label, the work of a domestic worker (whether immigrant or not, whether a wife/sister/mother or paid laborer) or the work of a sex worker to that of a computer programmer or computer artist? ( Caffentzis, Federici 2006, 130).

To claim that domestic or care work has transformed in the age of cognitive capitalism because living labor has adopted or incorporated the cognitive aspects of those labor processes does not really fit in the way it does with intellectual, informational, or artistic work .It is not clear the point of categorizing housework or care work in the new realm of cognitive/immaterial labor although this kind of labor like all types including manual labor has cognitive aspects as well.

Including the affective labor in the immaterial labor category also gives one more argumentative level to these theorists to suggest that today's social form of labor is not only dependent upon physical exploitation (in a determinate place and time) but increasingly based on emotional, mental, creative, etc. exploitation: "Labour and value have become bio-political in the sense that living and producing tend to be indistinguishable" (Hardt, Negri 2004, 148)

In a more recent article, Hardt and Negri (2018) once again emphasize the centrality of computerization and digitalization in their analysis:

> Digitalisation and computerisation articulated in society a transformation of the compositionof labour-power, adequate to the new forms of technological command, renouncing definitively the worker composition that had been constructed in and by the industrial factory. (Hardt, Negri 2018a, 417).

Although they strongly reject "techno-determinism" from the beginning of operaismo movement and saw technology as essentially a capitalist response to working-class struggle, they somehow end up attributing liberatory potentials to the technology.

The main reason may be that they see contemporary technology as not relating to automation. They see that in the current technological milieu, technology is less relevant to "automation" and presents a more complex structure in which social labor becomes interweavingly connected. Therefore, technology is seen as not confronting the workers as alien powers in the production process in the current technological stage:

> Now, while the automated industrial processes continued increasingly to produce material goods, outside of the roboticised factories grew ever more complex integrated, productive services that connected in social labour complex technologies and fundamental sciences, industrial services and welfare.Through the development of this tendency, digitalisation and computerisation became decisive (in a second phase) in the social structuring of capital – more important, so to speak, than automation. (Hardt, Negri 2018a, 417)

For these theorists, digitalization and computerization have inherently "social" attributes producing "communicative, linguistic, affective networks" that connect the multitude in potentially autonomous cooperation. They assume in those communicative networks, the multitude who perform the immaterial labor does not hold an intrinsically antagonistic relationship with the "fixed capital." The multitude does not confront the fixed capital as the industrial worker used to do because: "we should also recognize, perhaps now beyond Marx, as production is increasingly socialized, how fixed capital tends to be implanted into life itself, creating a machinic humanity." (Hardt, Negri 2017, 114)

The focus on the new technological dimension, the social factory, and the centrality of immaterial labor in the (re)productional schema led Hardt and Negri (1994) to dismiss the classical labor theory in which the surplus value is extracted by the appropriation of the labor time of workers. According to them, the law of value "is completely bankrupt." (10) For Negri (1991), in the late 20th century, capitalism, which is defined by its relation to emergent high-technology, the value is collectively produced by the whole society thus; Marx's law of value is grounded in the work of individual and "heavily reductive" (29). Some cognitive capitalism theorists have somehow a more elaborated conception on the matter, although they also stressed that the direct exploitation of labor time in the industrial paradigm is obscene. Vercellone and Fumagelli (2019) asserted that there are two different conceptions of the labor theory of value in the Marxist tradition: the law of value/labor time and the theory of surplus value.

What they call the law of value/labor time merely interests itself with the quantitative issue of measuring the magnitude of value in which labor time is understood as the measure of the value of commodities. It is based on the notion of "abstract labor" as the substance that creates the value of commodities. Abstract labor is "labor in general" in which all the characteristics with which labor forms are differentiated are ignored. Vercellone and Fumagelli (2019) claim that in this view of the law of value /labor time; abstract labor is seen as a "non-historical law of measure and equilibrium".(34) This renders abstract labor a "quasi-natural category" while it is a specific attribute of capitalism of a distinct historical stage in which "estrangement inherent in the nature of labor" dominates. (Marx 1988, 73 quoted in Vercollone, Fumagelli 2019, 34) This estrangement involves the separation of the workers from the products of their labor as well as the workers' disengagement from the knowledge of their labor process and conditions that shape and forge the production process.

Fumagelli and Vercellone (2019) have stressed that rather than conceiving abstract labor as a historical and concrete phenomenon, this view of the law of value/ labor time sees it as a non-historical theoretical product of economic science which is enforced on the society as an abstract market necessity. Like Negri, they also see the approach of the law of value/ labor time as inherently a "micro-economic

explanation of relative prices rather than considering it (the law of value) as a macro and monetary theory of exploitation."(ibid, 35) They claim that in Marx, the labor theory of value is understood as a function of the theory of surplus value and there is no essentialism regarding the law of value/labor time in Marx's thought. The nature of exploitation determines the law of value. Value/ labor time and the theory of surplus value are inherently related and were the same thing in Marx's time, but the reality is value/labor time is a "historically determined dependent variable" while the extraction of surplus value is the kernel of capitalism (33).

The law of surplus value is the essential economic core of capitalism and is independent from its historical form namely the the law of value/ labor time. The law of surplus value merely interests itself with the boundless accumulation of capital. In the formula M-C-M', it could be seen that the valorization of capital is the end goal, not the consumption nor the production of use-values. "Accumulation of abstract wealth represented by money" is the main ambition of the capital with which it can command over society and labor. (ibid, 36) In this line of thought, money bestows to the capital the command power by allowing it to extract indirectly or directly surplus value. Therefore, the extraction of surplus value is still the end game of the capitalists in that the extraction constitutes the conditions of domination and exploitation. In this respect, following Negri, their understanding of the law of surplus value is actually a "law of exploitation and antagonism" that could transform according to the "qualitative" relationship between capital and labor. (ibid, 36)

In contemporary capitalism, extraction of surplus value is not directly leveled at the labor time of workers, but it is aimed at the commons, cooperation, and mobilized living knowledge that is essentially not bound to the capitalist organization. Therefore, cognitive capitalism opponents see a clear link between the obsolescence of the law of value/ labor time and "becoming rent of profit."For cognitive capitalism opponents, "becoming rent of profit" is a symptom of the contemporary crisis of capitalism since it is related to capital being "parasitic," as in not organizing and controlling the employment of labor and dictating the process and content of labor in the age of immaterial/cognitive labor:

> In our view, rent represents not only the starting point but also the becoming of contemporary capitalism. Why becoming? Because as the law of value-labour time is in crisis and the cooperation of labour appears to become increasingly autonomous from the

> managerial functions of capital, the very frontiers between rent and profit begin to disintegrate (Vercellone 2008, 3).

Moreover, capital does not play a role in fostering the development of productive forces as in the stage of industrial production. In the realm of industrial capitalism, the command of material capital over living labor constituted the logic of real subsumption in which labor is intricately and objectively organized according to the scientific arrangements for maximum efficiency. Vercellone and Fumagelli (2019) propose a historical consistency of value/labor time, and industrial capitalism, which is defined by the logic of real subsumption where material capital dominates over living labor and profit prevails over rent.

It is during the stage of the Industrial Revolution that capital no longer controls production from the "outside" but begins to establish managerial practices in accordance with its economic rationality. This economic rationality was based on mass material consumption and the production of standardized commodities. Capital's direct control of production process and labor and its injection of managerial practices have "abstracted labour from its very content and turned the clock's time (and then the chronometer's one) into the favorite means employed for quantifying the economic value of labour, prescribing its modes of operation as to increase its productivity" (ibid, 37). Thus, abstract labor actually emerges under the paradigm of "real subsumption" where the labor is fragmented into multiple basic tasks for the sake of productivity (according to the machinery system) and homogenized to become the universal measure of exchange value. The homogenization of industrial labor and the estrangement inherent in it also serve the purpose of control of labor by the capital. This process, cognitive capitalism theorists suggest, is rooted in the "knowledge/power relationship" that eventually led to the conditions for formal subsumption to transform into real subsumption.

As for the transition stage from industrial capitalism to cognitive capitalism, Vercellone (2008) asserted: "We are now witnessing the return of a mercantilist and financial logic that is reminiscent of pre-industrial capitalism and of the formal subsumption of labour under capital."(3). This is the symptom of the crisis of "real subsumption" because the cooperation of labor is no longer dependent upon capital in terms of its autonomy from fixed capital and the managerial functions of capital in the "knowledge-based economy." The changing dynamics of capital-labor relations,

which are the base argument of post-Marxist traditions of Cognitive capitalism theory and Post-operaismo are inherently related to "the metamorphoses of the law of value" triggered by the crisis of real subsumption of labor under capital after it reached an epitomic phase in Fordism. However, the aforementioned theoretical approaches vary in defining the form of subsumption in the transition stage of industrial capitalism to contemporary capitalism.

### 3.3 The Question of Subsumption in Contemporary Capitalism

The rise of the cognitive dimension of labor has served the emergence of the new role of knowledge in capitalism, which radically has influenced the transformation in the capital/labor relationship in this new emergent stage. Cognitive capitalism opponents emphasize the importance of knowledge/power relations regarding the form of division of labor. They claim that this line of thought could be detected in Marx himself, especially since the concept of "general intellect" is crucial for this understanding. According to Vercellone, the general intellect hypothesis could be read as a "sublation of real subsumption" (13). The line represented by Hardt and Negri also asserts that the real subsumption of industrial capitalism is no longer the hegemonic form in contemporary capitalism, but they suggest its ultimate extension to society as a whole (yet this version already suggests a form of mutation of the original concept of real subsumption). Some cognitive capitalism theorists mention the co-presence of formal and real subsumption as complementary, as an original form belonging to cognitive capitalism rather than taking the co-presence as a consequence of the "tendential" dynamics and the contradictions of capitalism that make old and new forms simultaneously exist. Fumagelli (2019) calls this form "life subsumption" in bio-cognitive capitalism yet still identifies its basis as "the crisis of the real subsumption based on material production" (77).

The cognitive capitalism paradigm, as mentioned before, asserts that the crisis of the Fordist economy is also the crisis of real subsumption. According to this, the crisis of material production of Fordism did not only generate the conditions for post-Fordism, where capital starts to rely on flexible accumulation and flee to places where cheap and unprotected labor is abundant. Although capital undoubtedly

ventures into foreign lands in search of cheap labor, this account is still in the paradigm of the factory and real subsumption, thus failing to capture the radically new character of antagonism that gives way to the transition to cognitive capitalism. (Vercellone 2007, 14) The "general intellect hypothesis" of Marx is taken as the "a tendential overcoming of the Smithian logic of the division of labour proper to industrial capitalism." (ibid, 15) Since they qualify and distinguish the division of labor on the basis of the knowledge/power relationship, their periodization of capitalism is directly related to the role of knowledge concerning production and the mechanisms of accumulation that conform with the role of knowledge. Therefore, the formal subsumption stage is characterized by the "hegemony of the knowledge of craftsmen and workers with a trade, and by the pre-eminence of the mechanisms of accumulation of a mercantile and financial type." (ibid, 15) In this stage, the cooperation in the labor process and relations is technically autonomous. The capital controls the labor from the outside; there is no fixed capital that commands over the workers in the production process. The appropriation of surplus value is achieved through external mechanisms from the direct productive process, as in the putting-out system. The relation between the worker and the mercantile capital is merely defined by the monetary dependence of the workers. Workers' technical autonomy in the production process and their monetary dependence on capital present the critical contradiction of formal subsumption of labor under capital.

In the real subsumption, "the division of labor is characterized by a process of polarisation of knowledge which is expressed in the parceling out and disqualification of the labour of execution" (ibid, 16). Subsumption becomes real when it is effective inside the production process as opposed to the formal subsumption in which capital commands over the labor from outside. Since the real subsumption relies on shortening the labor time according to the logic of the law of value/labor time, in this stage, for the sake of efficiency, the complex labor is reduced by the decomposition of the labor process into menial tasks and by the incorporation of knowledge in the fixed capital and in the structural management of the firm. Intellectual labor power has attained an overqualified state, and the sharp dichotomy between execution and conception has emerged. By parceling out complex labor into small processes in coordination with machinery, workers have been robbed of a holistic understanding of their labor process, "in such a way, labour

becomes ever more abstract, not only under the form of exchange-value, but also in its content, emptied of any intellectual and creative quality" (ibid,24). Abstract labor was used for the production of standardized goods. Capital accumulation relies on large factories that produce standardized goods for mass consumption.

Vercellone (2007) claims that the "general intellect" of Marx marks a radical transformation of subsumption and an indication of a third stage of the division of labor after the formal and real subsumption. Moreover, the general intellect hypothesis is seen by Vercellone as a criticism of the Smithian division of labor, which recognizes as natural the polarization of knowledges and the division between intellectual and material labor. In the Smithian division of labor, the separation between conception and execution is seen as the inevitable consequence of the development of productive forces. Marx, on the other hand, explained this separation as a historical product:

> To the degree that labour time - the mere quantity of labour is posited by capital as the sole determinant element, to that degree does direct labour and its quantity disappear, as the determinant · principle of production - of the creation of use values - and is reduced both quantitatively, to a smaller proportion, and qualitatively, as an, of course, indispensable but subordinate moment, compared to general scientific labour, technological application of natural sciences, on one side and to the general productive, force arising from social combination in total production on the other side - a combination which appears as a natural fruit of social labour (although it is a historic product). ( Marx 1973, 700)

It is the way capital chooses to use machinery and technology that causes the dichotomy of material and intellectual and renders the worker's labor menial in comparison to general scientific labor. While fixed capital is operationalized to create relative surplus value, it seeks to reduce the time the worker in which he works for himself and lengthen the time he works for the production of surplus value to be appropriated by capital. Therefore, it reduces the labor process into simple tasks, creating the polarization of knowledge and ultimately generating the conditions of real subsumption of labor under capital.Therefore, the cognitive capitalism paradigm asserts that the division of labor is directly related to the qualitative state of the knowledge/power relationship and could be changed in accordance with the application and appropriation of technology. In the Fragments, Marx (1973) wrote: "While machinery is the most appropriate form of the use value of fixed capital, it does not at all follow that therefore subsumption under the social

relation of capital is the most appropriate and ultimate social relation of production for the application of machinery (699-700). Moreover, there is an inherent contradiction in capitalist production between value as a measure and the development of machines. Where capital develops machinery to reduce the socially necessary labor time, it involuntarily creates social disposable time. Nevertheless, the tendency to create socially disposable time always goes hand in hand with its conversion to surplus labor. If the labor time is diminished too much, the surplus production causes surplus labor that could not be realized by capital. Hence, Marx (1973) argues: "The more this contradiction develops, the more does it become evident that the growth of the forces of production can no longer be bound up with appropriation of alien labor."(708) The extraction of abstract labor time would lose its centrality as machines improve and incorporate more and more science. The laborer, who is a part of the "social body" with his knowledge and comprehension, becomes the central source of wealth.

> Labour no longer appears so much to be included within the production process; rather, the human being comes to relate more as watchman and regulator to the production process itself….In this transformation, it is neither the direct human labour he himself performs nor the time during which he works, but rather the appropriation of his own general productive power, his understanding of nature and his mastery over it by virtue of his presence as a social body - it is, in a word, the development of the social individual which appears as the great foundation-stone of production and of wealth. (Marx 1973, 705)

Vercellone (2007) claims that as long as technical progress results in the appropriation of the knowledge of the workers, there would be a conflictual situation in which new types of knowledge try to establish themselves regarding the technical and social division of labor. The dynamics of the conflictual relationship between power and knowledge are undoubtedly related to the organic composition of capital not only in the sense that it is structured by it but also because these dynamics directly affect the development of the technical composition of capital. Workers' labor is turned into mechanical tasks so that machines can replace them. The labor power and its resistance to the regulation of the working day hastened the application of the machinery system in production.

Vercellone (2007) establishes that there is a qualitative difference in the power/knowledge relationship in contemporary capitalism that "overturns the relation of subordination of the living knowledge incorporated in labour-power to the

dead knowledge incorporated in fixed capital." (18). As living knowledge starts to command over dead knowledge in the machines contrary to the industrial paradigm, there emerges a "tendential fall of the capital's control of the division of labour.' (ibid, 18) In this stage, the productive value of cognitive and intellectual labor becomes the primary source of wealth. With the decreasing importance of the appropriation of "abstract labor" in the production process, real subsumption also starts to fade away.

The gradual cancellation of real subsumption happens in an economic paradigm in which "the relation of capital to labor is marked by the hegemony of knowledges, by a diffuse intellectuality, and by the driving role of the production of knowledges by means of knowledges connected to the increasingly immaterial and cognitive character of labor." (ibid, 15) While living knowledge becomes the driving role of the production process, living labor becomes more autonomous from the fixed capital, and its cooperation and organization become less dependent on the capital. "The force that regulates the labour process, both in terms of the control of working methods and the intensity of labour, remains incorporated in the living knowledge of the collective worker"(ibid, 20).

In this stage, formal subsumption of labor under capital returns with the very accumulation type of its stage. As the organization of production becomes independent of capital, capital will tend to embrace more indirect forms of exploitation. Surplus appropriation, in this case, would be achieved by financial and monetary circulation. The need to sell labor power to the capitalist does not arise from a technical necessity as in the division of labor associated with the real subsumption because the collective worker has appropriated the cognitive character of the labor thanks to the diffuse intellectuality. The only reason to sell labor power comes from the workers' need for money, and in this way, too, the subsumption of labor has turned back into the formal.

Hardt and Negri's analysis of the form of subsumption in contemporary capitalism ground itself with the same theoretical observations as Vercellone's-driving role of knowledge, immaterial labor's cooperation capacity, obsolescence of the law of value/ labor time, and the general intellect hypothesis—the capital command over labor from the outside. Valorization is redefined by the cooperative and social nature

of labor, which capital extracts indirectly. Exploitation in contemporary capitalism is defined by its distance from the organization of production from its internal process and components. (Hardt, Negri 2018a) Capital no longer adheres to the industrial disciplinary logic in which the substance of labor is organized according to the fixed capital. The hegemony of finance must be understood in relation to the transformation of capital into an extractive force that does not organize the labor inside of the production process. "Finance functions as an apparatus of capture of natural and social values, as a power of the extraction of the common" (ibid, 419)

However, rather than the "sublation of real subsumption," Hardt and Negri emphasize the real subsumption of society under capital. Their insistence on the "bioproduction" in which living and producing is no longer distinguishable led them to extend the concept of real subsumption to the whole society. The concept of the social factory already hints at the extension of real subsumption. The capital turns to the outside of traditional labor and encapsulates all the social and reproductive relations, which is expressed by the category of immaterial labor. Here, the real subsumption is used in a way that breaks with its relation to the fixed capital and the production of the relative surplus value. Rather it is the fact that capital, as a strategic move, has found ways to transform formerly unproductive realms into the object of extraction of surplus value that is crucial for their reformulation of the concept. However, the real subsumption of society under capital does not mean "only of the totalitarian extension of consumption and its eventual alienating effects (as followers of the Frankfurt School maintained), but also the incarnation of capitalist production in society, that is, in the languages of the market as in the vital connections of society." (Hardt, Negri 2018a, 416) Real subsumption of society under capital does not indicate a social homogenization. On the contrary, real subsumption of society implies a capitalist society that is composed of multiplicities,"a framework in which social differences interact" (Hardt, Negri 2018b, 442) Their reinterpretation of the real subsumption could also be seen as linked to their understanding of social struggle. They emphasized that the traditional syndicalist movements were no longer adequate for anticapitalist struggle since the capitalist rule managed to establish itself in other social terrains. They also acknowledged that formal subsumption could still be observed. Capital still tries to incorporate not just labor practices but also diverse social forms that are "outside" of it. They establish a "continuing dynamic between

the process of formal and real subsumption" (ibid, 442). In this continuous dynamic, formal subsumption presents an anchor with the past forms of capitalism and demonstrates the relationship of capital to its outsides, whereas real subsumption demonstrates how capital produces and reproduces differences within its properly capitalist domain.

Andrea Fumagelli (2019) elaborates on the notion of exploitation in contemporary capitalism as beyond the real and formal subsumption: "We are entering a new phase of subsumption of labor to capital, where at the same time formal subsumption and real subsumption tend to merge and feed off one each other" (77). While Fumagelli's account regarding "subsumption" is actually in line with Hardt and Negri's "bioproduction" paradigm since all of them are influenced by Foucault's analysis of the historical transformation from disciplinary society to the society of control and Deleuze' "immanence." However, in his analysis, Fumagelli (2019) does not exactly reinvent the inherent meaning of the concepts but reformulates their novel situation in relation to each other and asserts their co-presence as a form of subsumption specific to biocognitive capitalism.

According to Fumagelli (2019), formal subsumption could be observed in labor relations involving activities previously regarded as unproductive in the Fordist paradigm, such as linguistic skills, learning, affective capabilities, etc. These intellectual and affective qualities are gained by individuals in the course of their social and everyday lives. These capabilities initially appear as use-values, and then as soon as they enter the realm of production, they are salaried, meaning they are "formally subsumed in the production of exchange value." (ibid, 75) Therefore, the cancellation of the dichotomy of material labor as productive and immaterial labor as unproductive results in contemporary forms of formal subsumption. He regards the formal subsumption in biocognitive capitalism as a form of primitive accumulation in which formally unproductive activities in the Fordist-Taylorist paradigm are included in the valorization process of capital. Reproduction and the multiple social forms are captured for broadening the frame of accumulation.

Real subsumption has been modified in this age but still operates. While today's formal subsumption is related to the becoming productive of the social in its entirety, real subsumption in this age is related to the " dead to living labour ratio, as

consequence of the transition from repetitive mechanical technologies to linguistic relational ones" (ibid, 79). It is directly related to the new form of technology and its application. Former static technologies have been abandoned. Today, what he calls "dynamic technologies" that are able to "exploit learning and network economies by simultaneously combining manual tasks and brain-relational activities" are adopted (ibid, 79) Fumagelli (2019) claims that dead labor in fixed capital becomes dependent on living labor as a consequence of this shift to the transition fromrepetitive mechanical technologies to linguistic relational ones. In the course of this transition, machines need to absorb learning and other human skills.

As opposed to the real subsumption of the industrial stage, in biocognitive real subsumption, humans and machines feed off one another rather than workers being only the conscious limbs of the machinery system. Fumagelli gives the example of "computer-aided design" or "computer-aided manufacture" to illustrate that manual activities and mental activities are no longer easily differentiated from each other in the course of production because the usage of these technologies requires skill and knowledge on the part of the workers. The complementary collaboration of machines and humans in the production process makes them inseparable from each other. In this linguistic-relational technological production, machines and humans compulsively feed off one another. This symbiotic relationship is also valid in terms of formal and real subsumption since the production of services, education, care, and alike, and the technologically driven production of goods are in direct relationship with one another. Fumagelli calls the combination of real and formal subsumption "life subsumption." (ibid, 79) Fumagelli agrees with Vercellone on the crisis of the domination of dead labor over living labor connected to the fact that diffused knowledge has become the principal productive force. Yet, he prefers the term "life subsumption" as opposed to the "subsumption of general intellect" that manifests itself as the returning of formal subsumption because: "we do not refer only to the sphere of knowledge and education but even to the sphere of human relations" (ibid,79). He emphasized that changing the relation between dead and living labor also translates into a redefinition of the terms. When the human brain becomes a part of the machine in the immediate production, humans become "fixed capital and variable capital at the same time," in this regard, the intensification of labor is efficiently organized, and this provides the conditions of the extraction of relative

surplus value hence real subsumption.(ibid, 80). On the other hand, since life becomes the source of labor, the entire day could be regarded as working time, hence the extraction of absolute surplus value and formal subsumption.

The next chapter intends to thoroughly discuss those related claims concerning crowdwork. How the notion of crowdwork exposes data dependency of the ML and the underlying epistemological understanding of intelligence will be discussed to give a rational and historical framework to the AI question. How crowdworkers engage with ML in the production process will be analyzed in consideration of "inseperability of machines and humans" and the forms of subsumpiton in contemporary capitalism. From these considerations the nature of ML as fixed capital will be discussed. How industrial machines and ML differ in terms of its relationship with living labor will be analyzed. The possibility of appropriation of fixed capital in the situation of machine and human entanglement will be questioned through the consideration of crowdwork.

# CHAPTER 4

# MACHINIC AUTONOMY OF CAPITAL VS. AUTONOMY OF LABOR

## 4.1 Artificial Intelligence and Living Knowledge

The development of AI has owed much to various disciplines, such as engineering (cybernetics that introduce feedback and control), biology (neural networks), mathematics, statistics, communication theory, game theory, linguistics, philosophy, and experimental psychology. (Buchanan, 2006, 56) .Undoubtedly, the development of AI requires monumental improvements in science and technology, yet an understanding of how intelligence works has been one of the most crucial parts of AI. The mechanisms of information processing, symbol manipulation, perception, decision-making, reasoning, and learning need to be understood to create an intelligent machine. It is significant that what is called "Artificial Intelligence problems" by Law and Ahn (2011): "perceptual tasks (e.g., object recognition, music classification, and protein folding), natural language analysis (e.g., sentiment analysis, language translation), and complex cognitive tasks (e.g., planning and reasoning)" are the main questions that cognitive psychology still tries to unravel (2). Zhao et al. (2022) assert that:

> As the existing AI is not perfect, the AI system combined with cognitive psychology is the research direction of AI: Promote the development of artificial intelligence, endow the computer with the ability to simulate the advanced cognition of human beings and carry out learning and thinking (2).

However, neither cognitive psychology, neuroscience nor other social sciences have come up with a univocal and universal definition of the mechanism behind human reasoning and sentience. Since the definitions of AI have to do with the elaboration of intelligence, there is no consensus regarding the definition of AI, and something called the AI effect is intensifying those problems. AI effect could be described as the tendency to not see some activity as relating to intelligence as soon as AI achieves to perform it (Dyer Witheford et al. 2019, 10). Related to this, there is a discourse that considers the term AI as a mere successful marketing strategy because

“no software is truly intelligent” since no software could perform the thinking associated with humans, meaning learning from disparate and unrelated sets of data to solve a problem (Steinhoff 2021).

If only artificial intelligence could draw conclusions from unrelated, limited data sets, ask questions, and seek the correct data to solve a problem, the term “artificial intelligence” would be justified. (Dawson 2020). This is why Steinhoff (2021) and Dyer-Witheford et al. (2019) claim that the satisfactory definitions of intelligence related to AI generally involve the concepts of “temporal finitude, generality, and applicability.” (10; 10) That kind of approach would also be relevant to differentiate between “actually existing AI” and Artificial General Intelligence. Dyer-Witheford et al. (2019) favor the definition by Kaplan (2016):

> The essence of AI – indeed, the essence of intelligence – is the ability to make appropriate generalizations in a timely fashion based on limited data. The broader the domain of application, the quicker conclusions are drawn with minimal information, the more intelligent the behaviour. (5–6)

The definition that stresses generability indicates the difference between Artificial General Intelligence and “narrow AI,” which is based on ML and used prevalently across various sectors. Currently, no“Artificial general intelligence” exists in reality. However, it also represents an aspect of reality far from being just a science fiction trope; the development of AGI manifests as an assertive scientific project in which powerful technology corporations are financially and academically invested. There is no clear-cut definition of Artificial General Intelligence, but there are common attributes associated, such as

> (1) matching or exceeding human performance across a broad class of cognitive tasks (e.g., perception, reading comprehension, and reasoning) in a variety of contexts and environments; (2) possessing the ability to handle problems quite different from those anticipated by its creators; and (3) being able to generalize/transfer the learned knowledge from one context to others (Fei et al. 2022, 1)

On the contrary, existing AI could perform specific functions according to its programming and economic-political purpose, such as AI that specializes in facial recognition, word processing, or automotive driving. AI designed to make predictions about the stock market would not help translate sentences or write automated e-mails.

All the AI systems incorporated into our daily lives are thus called “narrow AI” since they have been designed for exclusive purposes and have a limited operational scope.

Nevertheless, it must be noted that some scientists regard the recently developed ChatGPT-4 by OpenAI, which is a Large Language Model (LLM), as containing "sparks of artificial general intelligence." However, they suggest that it merely represents an early version that is far from complete (Bubeck et al.2023). Considering the possibility of the advent of AGI is exciting and frightening at the same time since it would transform labor, human activity, and social relations in a ground-breaking fashion.

After the successful launch of ChatGPT-4, more than 1000 experts and researchers in the AI industry signed an open letter named "Pause Giant AI experiments," demanding a 6-month interlude in AI research and development on March 22, 2023. The signatories were leading names involved in some of the biggest AI initiatives, including Elon Musk, the co-founder of OpenAI until he quit; Steve Wozniak, the co-founder of Apple; and Emad Mostaque, founder of StabilityAI. (Hern 2023) In the letter, there was a warning regarding the possible damage that AI might yield if its development is left unregulated, and the signatories insisted on shared safety protocols: "Should we automate away all the jobs, including the fulfilling ones? Should we develop nonhuman minds that might eventually outnumber, outsmart, obsolete, and replace us? Should we risk loss of control of our civilization?" (Browne 2023)

This open letter endorses the view that intelligent machines that can replace and "outsmart" humans are expected in the current technological milieu to the point that even the automation of fulfilling jobs might be possible. The fulfilling jobs in question are the ones involving creativity and mental skills. The alarming tone of the open letter depicts a world in which, if the safety protocols are not established, there is a possibility that humans can lose control of civilization. The letter contributes to the apocalyptic visions of AI that go hand in hand with the optimistic vision that emphasizes the possibility that all waged labor could be dispensed with. "Human-competent intelligence in machines" might be a real-life "threat" or "blessing" that could automate all wage labor creating the conditions of luxury socialism or create capitalism without humans, making " homo sapiens a superfluous species" (Dyer-Witheford et al., 2019,111). Nevertheless, Elon Musk gathered an AI team and announced "xAI" in July 2023 before the 6-month period ended. Its announcement

came with a declaration of a stirring aim for “understanding the universe” through the development of AGI. Steven Levy (2023), a journalist who is specialized in technology, stated:

> The pause was never going to happen.You weren't going to get Google and OpenAI and other companies and competition with each other to say, we're going to stop for six months. To the contrary, once ChatGPT came out, it was super popular and then Microsoft started integrating OpenAI into its search engine and now other products; the other companies felt they had to go full bore to compete with them. And Elon is very frank in saying that xAI is a competitor to these companies. It's not a research operation. (Calore, Goode 2023)

Therefore, some of the signatories of this letter, especially the leaders of technology giants, might be more concerned about finding themselves irrelevant in the race for developing AI than they are concerned about the future of human civilization or widespread unemployment. The competition factor is clear concerning the financial investment of the companies. Apple is investing around 22.6 billion dollars in AI research and development, including generative AI (Mauran 2023). Microsoft is one of the biggest funders of Open AI initiatives, which produced ChatGPT-4, and recently, it has invested another 10 billion dollars in 2023 (Bass 2023). Amazon is described as the company that made ML its “flywheel” (Dyer-Witheford et al. 2019, 84). Alphabet Inc.( GOOGL) famously acquired startup DeepMind, and DeepMind produced cutting-edge Machine Learning research like Go playing AlphaZero ( Steinhoff 2021,141). On their site, Deepmind explained their long-term goals as “to solve intelligence, developing more general and capable problem-solving systems, known as artificial general intelligence.”(Deepmind, n.d) However, regardless of the possibility of AGI, existing narrow AI has already replaced or transformed some of the labor types and processes that must be discussed thoroughly.

Before going into detail about the deployments of narrow AI, also called weak AI, the historical process should be outlined briefly. In the post-war US, 1957’s Dartmouth Summer Research Project, the term AI was first coined. The project was funded by the Rockefeller Foundation and the US Office of Naval Research (Steinhoff 2021). Steinhoff (2021) notes that historical conjecture in which the interest in the production of thinking machines developed was related to “the antagonism between capital and labour taking on a new, technologically mediated intensity.” (100). Industrial productivity had significantly increased, and the

technological developments achieved in wartime were intended to extend to the realm of production.

Cybernetics was also seen as playing a significant role in AI's intellectual and technical understanding. Cybernetics could be defined as “the science that studies the communication and interactions between autonomous complex systems (machines and living organisms) through the use of information and control of their processes.) (Fajordo-Ortiz et al.2022, 1). This field has been highly interested in the notion of “feedback, or the process by which a system could form a loop, based on the use of its output as input, to respond to its environment.” (Steinhoff 2021, 100) The field has also reinforced the understanding that humans and computers have fundamentally similar mechanisms in processing information, further obscuring the separation between humans and machines.

Scientists involved in the Dartmouth Summer Research project aimed to simulate human intelligence in machines, making them use language, make abstractions, and solve problems. The aspirations were high, and the researchers believed that in the visible future, thinking machines would solve the problem that had been reserved for humans. Although these expectations fell short, these efforts raised interest in symbolic AI, now called “good old-fashioned artificial intelligence” (Haugeland 1989, quoted in Steinhoff 2021, 104). Pasquinelli (2023), in an attempt to write a “sociotechnical history of AI,” categorizes two competing scientific tendencies in developing intelligence machines dating back to the 1960s: symbolic AI and connectionist AI. These two distinct epistemological logics approach the question of intelligence differently. The symbolic representation is taken as a core dynamic in the symbolic approach. Specific and unambiguous rules needed to be provided to represent knowledge for the achievement of tasks by machines. The symbolic AI approach relies on the assumption that “intelligence is a representation of the world (knowing that) which can be formalised into propositions and, therefore, mechanised following deductive logic.” (Pasquinelli 2023, 22) However, connectionist AI posits an empirical understanding of intelligence that is more focused on pattern recognition rather than unveiling and coding the underlying logical components of intelligence. According to connectionist AI “intelligence is experience of the world (knowing-how) which can be implemented into approximate models constructed according to inductive logic.” (ibid, 22) In the 1980s, the Symbolic AI approach

transformed into “expert systems, “marking the first era of the AI industry. (Dyer-Witheford et al., 2019, 32) However, this approach has learning and scalability problems and fell in importance around the late 1980s: “That was the start of the so-called “AI winter,” when researchers instead turned to making smarter software without the appeal to human intelligence.” (Katz 2017, 2)

Currently, symbolic AI has become outmoded, whereas connectionist AI culminated in ML and deep neural networks (a form of machine learning technique that aims to mimic the information processing of the brain’s neural networks). Although neither of the AI paradigms has yet to imitate human intelligence successfully, ML has proven to be effective in various ways for “pattern recognition,” which resulted in some forms of automation of mental and manual labor and the technological prophecies around singularity and AGI.

The second era in the AI industry, initiated by the developments in “machine learning,” has been much more influential in the commercial and scientific sense. The contemporary “AI boom” is directly triggered by the increasing interest in machine learning around the 2010s. The interest was not merely academic; ML techniques were seen as promising regarding their commercial applications, such as online targeted advertisement and consumer data analysis. Machine learning is fundamentally about pattern recognition. The increasing rate of online connectivity has made it possible to store and process different forms of data - text, video, and image- to the extent that we may say we are experiencing a “dataquake” which is behind the acceleration of data analysis and machine learning. (Alpaydın, 2016, x) The accumulation of colossal amounts of data has raised the question of how it could be used, resulting in contemporary advanced machine learning.

> With this question, the whole direction of computing is reversed. Before, data was what the programs processed and spit out—data was passive. With this question, data starts to drive the operation; it is not the programmers anymore but the data itself that defines what to do next (Alpaydın, 2016, 11)

The critical requirement for AI is that software must be able to “learn.” With the abundance of data, programmers finally found a way to design software that could recognize patterns and draw conclusions by themselves. Machine learning made it possible to “extract information” from the data by software. Rather than programmers defining the way computers perform a task with strict instructions, they

have found a way to make software infer how to perform a particular task with related "training data." With the advent of machine learning, system designers were freed from the obligation to consider all possible situations and specify solutions for them.

> Where engineers are unable to program a machine to "simulate" a nonroutine task by following a scripted procedure, they may nevertheless be able to program a machine to master the task autonomously by studying successful examples of the task being carried out by others. (Autor 2015, 25)

Therefore, Alpaydın (2016) asserts that machine learning is "a quiet revolution" in computer science that has been taking place for 20 years. It has shifted the focus in programming to data collection and eradicated the imperativeness of defining and identifying the strict procedural structure that takes too much time and triggers chains of problems with minor errors. Now, the data accommodates the instances of performing a task. However, this "pattern recognition and knowledge extraction" regime necessitated more and more data to accommodate the chief purpose of modeling reality with the most accurate approximation possible. Today, nearly all narrow AI that is incorporated into the economic system and social life is developed through machine learning. Only after the storage and processing of massive amounts of data, thanks to pervasive online connectivity and the penetration of digital technology into daily life, did machine learning become the driving technique behind AI.

Machine learning has proven to be successful commercially, yet its extreme reliance on data could be problematic. The software basically performs statistical reference without underlying theoretical understanding or commonsense. In a way, machine learning is a crude but effective method that lacks a deeper scientific understanding of its learning operations:

> AI is now at the same stage as when the steam engine was invented, before the laws of thermodynamics necessary to explain and control its inner workings, had been discovered.Similarly, today, there are efficient neural networks for image recognition, but there is no theory of learning to explain why they work so well and how they fail so badly (Pasquinelli, Joner 2020, 3)

That could trigger problems and inaccurate solutions, especially if the data is inconsistent and unclear. In some instances, the data consists of the behavioral patterns of online users who are potentially prone to random and erratic decisions. Autor (2015) gives the example of search engines: "If the majority of users who

recently searched for the terms ‘degrees bacon’ clicked on links for Kevin Bacon rather than links for best bacon cooking temperatures, the search engine would tend to place the Kevin Bacon links higher in the list of results” (25). This kind of error in the search engines is well-known. It might yield problems for add revenues. The companies like Google “crowdsource” these “add rating” tasks to the human workers for correction and the betterment of their algorithms with the human-in the loop technique.

Heavy reliance on data necessitated the quality and comprehensiveness of data for training. The need for “Ground-truth data” has emerged from the dependence of ML on quality training data. Ground truth means the reality that the machine learning algorithm is intended to model. Ground-truth data needs to include enormous sets of labeled objects in order to more accurately model the reality that data represents. It is especially used for computer vision, geospatial intelligence, autonomous driving, medical imagining, and natural language processing. The growing need for ground-truth data, as it could be seen in the emergence of specialist crwodwork companies, further evinces the significance of data sets regarding the operation and production of AI:

> Data is the first source of value and intelligence. Algorithms are second; they are the machines that compute such value and intelligence into a model. However, training data are never raw, independent and unbiased (they are already themselves ‘algorithmic’) The carving, formatting and editing of training datasets is a laborious and delicate undertaking, which is probably more significant for the final results than the technical parameters that control the learning algorithm. (Pasquinelli, Joner 2020, 5)

As discussed earlier, data labeling is done by digital manual laborers called crowdworkers or ghost workers. It must be noted that supervised machine learning, which is the dominant technique, relies and depends on ground truth data that are curated by digital manual labor. Nevertheless, machine learning is abruptly developing, and new techniques are being established, such as unsupervised machine learning or reinforcement techniques that do not require data labeling and human annotators. (Alpaydin, 2016)

The use of narrow AI based on machine learning is pervasive. It includes the fields of manufacturing, customer service, healthcare, finance, insurance, self-driving cars, translation, attack drones, surveillance systems, and marketing. Dyer-Witheford et al. (2019) assert that the deployment of AI changes according to the role of countries in

the global economy. In the global North, which is mostly fueled by financialization, services, and retail, AI's application is realized chiefly in circulation, although its use is also flourishing in industrial production. In the manufacturing areas -China and Southeast Asia- that depend on exports, AI is primarily applied in automation and management for industrial production. In underdeveloped countries, AI's particular functions seem to involve the military use of drones and surveillance systems. Of course, these observations do not exclude the possibility of various functional deployments of AI in all regions.

Regarding circulation, AI's most important function is the "acceleration of the realization of value" by shortening the circulation time with improved coordination and logistics, linking factories, retail stores, and distribution centers. The targeted online advertisement also serves to increase the speed of sales. Autonomous driving has started to be deployed commercially and is already used in industries such as mining. (Dyer-Witheford et al., 2019) Although self-driving trucks are expected to be on the road working in the delivery system, they are also expected to be supervised by "watch drivers" (Adler 2018). Customer services are one of the most automated sectors. The famous recorded line 'Your call may be recorded for training and quality purposes' currently involves training purposes for ML. (Dyer-Witheford et al., 2019, 82).

Warehouses are also in the process of automation by the application of AI. Amazon fulfillment centers are infamous for their "dystopian" adoption of technology, such as their patented wristband to track the hands of employees in real-time (Salame 2018). However, the company's use of robots in the warehouses to pick up the ordered goods and deliver them for packaging proved to be more troublesome than expected. Picking items was hard for the AI-powered bots because goods were too varied in shape and size (Agrawal, Gans, and Goldfarb 2018). Amazon tries to outsource this challenge via major robotics companies yet failed to find a purely automatic solution, "one recent line of research uses a mix of automated software and a human controller', with the robot automatically navigating to a shelf where the human – wearing a virtual reality helmet, possibly in a remote location – guides its arm to grip and move the item" (Dyer-Witheford et al. 2019, 82). Interestingly, another instance of automation necessitated guidance and instruction from a human worker controlling and supervising the robot's moves. However, according to a

recent article, Amazon partially solves this problem. A “pinch-grasping robot system” is shown in a video on the company’s science blog, presumably handling 1,000 items an hour without the need for human involvement. The robot relied on machine learning to choose the best way to pick up an item. The prototypical robot could deal with various shapes and sizes; however, the only catch was that it could only move items less than two pounds. (Del Rey 2022).

AI for the financial market quickens the conversion of money into more money. It assesses investments, detects fraud, and manages transactions and client interaction. It is noted that the most noticeable examples of AI automation are observed at the top of the sector, especially after the Wall Street meltdown:

> Stock exchanges in Tokyo, Singapore, London and Hong Kong have eliminated their trading floors. By 2018 only some 10 per cent of stock market trades were actively conducted by humans; 40 per cent are ‘passive’ trades scheduled by mutual funds; the remaining 50 per cent are executed by algorithms that are increasingly informed by ML (Dyer-Witheford et al. 2019, 86).

Some processes are designed to keep humans in the loop regarding the application of AI in the finance sector. Human-AI partnership is essential for eliminating discrimination against certain parts of the population, which might be the case when algorithms merely make the decisions (MckKendrick 2023).

In the realm of material production, AI systems are mostly used for automation, quality control, prediction of revenues, and the planning of production. The use of AI in manufacturing goes beyond the automation of manual labor. Robotic mechanisms have already been deployed in factories since the 1960s. Some established robotics companies such as General Electronics and Siemens and technology companies Microsft and Intel alike produce AI products for manufacturing. Various AI products for the manufacturing sector serve the purposes of automation, continuous monitoring, and recording the state of the types of equipment for the precision and organization of their maintenance, duration, and quality. Especially for the extensive operations that deal with gigantic amounts and various raw and auxiliary materials, the details of the state and resilience of the raw and auxiliary materials matter significantly. Reducing cost and risks depend on gathering comprehensive data for more accurate calculations. Halts in production, storage problems, and transportation delays are avoided with the help of AI systems. Devices embedded with sensory

observational skills are employed to monitor and record relevant information. These devices could also transmit and share those bits of information in the network; hence, those operations are also called the Internet of Things (IoT): “operating systems that connect products, systems, and machines. (Steinhoff 2021, 142) These objects could sense and transmit information about the environment, making it possible to adjust and control environmental complexities. (Chui et al. 2010) Current AI systems are multifaceted and effective in the whole production process, “smart, connected manufacturing plants where humans and machines work together, and data and analytics enable better predictions and decision-making at every stage of the process.” (Marr 2023)

There are also “cobots” working alongside human workers. Cobots are not like traditional industrial robots. They are produced to augment human workers, not replace them. “They can pick components, carry out manufacturing operations like screwing, sanding, and polishing, and operate conventional manufacturing machinery like injection molding and stamping presses. They can also carry out quality control inspections using computer vision-enabled cameras.” (Marr 2023)

Whether AI is used directly in material production as a comprehensive operating system that manages and organizes the production process, as a means of automating manual labor through robotics, or is used to speed up the circulation with transportation, warehouses, and automatization of customer services,it might be argued that it functions as “fixed capital” with material and immaterial- labor objectified in it. Its social function is reducing the necessary labor time and increasing surplus extraction. Although it does not precisely “replace” jobs, it changes the process of its execution and the definition of labor. Whether in manufacturing, warehouses, or self-driving cars, human workers must collaborate with AI systems or supervise them during the execution of tasks. There is a dependence on AI systems in the immediate production process and at the level of management and organization. The labor is not substituted but transformed to become a supplementary factor. However, do these technological deployments indicate a different form of fixed capital than industrial machines regarding its relation to living labor? Narrow AI is highly different from industrial machines in terms of its scientific and theoretical infrastructure and external capabilities.

The main question remains whether these technologies are any different from industrial machines in terms of their immediate effects on living labor. According to some post-Marxist lines of thought discussed in this thesis, contemporary technology does not create the conditions associated with industrial machines. However, it must be noted that they emphasize “digitalization and computerization” and seldom consider the rise of machine learning based on big data. The lack of AI in their paradigm is interesting since they claim that the historic battle between capital and living labor transformed into one that is not inherently antagonistic but also promising in terms of emancipation. Their primacy of “living knowledge” that could not be fixed in the capital seems doubtful, considering the uses of narrow AI in the economy.

It is true that full automation or the development of AGI does not seem to be going to be realized in the near future; nevertheless, the deployment of narrow AI already demonstrates a significant modification of labor in the production process and dependence on AI systems. For example, the use of narrow AI in manufacturing deals with comprehensive data on materials, storage, and transportation to predict maintenance and make managerial plans regarding the future of business. These managerial jobs that require education and proficiency were formerly reserved for humans. These professionals have not been replaced entirely, but their job description has changed in accordance with the capabilities of narrow AI. However, the question still remains: when all the efforts regarding technology almost always involve the reduction of living labor, why are there still so many jobs? Does this fact validate the idea that living knowledge in the connected brains could not be objectified in the fixed capital? Therefore, does the deployment of narrow AI across different sectors always displace and modify living labor instead of replacing it?

It is true that some cognitive capabilities, such as perception and decision-making, could not yet be objectified in contemporary AI. The limited scope of narrow AI and the crowdworkers' existence as supplementary human cognition for training manifests the need for living knowledge for ML. However, the living knowledge in question is data.

While cognitive capitalism opponents place so much importance on knowledge and the cognitive character of labor, they have simply chosen to neglect the already existing AI and significantly increasing efforts to establish “AGI.”.Although the

operaist line proposes the paradigm of the "cycle of struggles" between capital and living labor and identifies the newly developed technologies as capital's "response" to the struggles of the working class, in their successive post-operaismo paradigm, they withdraw from identifying AI as the capital's response to the rising importance of living knowledge. Their antagonism of living knowledge vs. dead knowledge actually would fit the current situation in which AI is eagerly invested and used. Nevertheless, AI in that paradigm would be "fixed capital," with which capital tries to self-valorize itself rather than means to self-valorize living labor, as cognitive capitalism theorists would have suggested in the case of computerization and digitalization.

Moreover, as discussed earlier, machine learning made it possible to train machines with an abundance of data without the need to endow machines with explicitly human cognitive capabilities. For instance, in computer vision, what computers do is not "seeing" per se. However, the computers could be trained to identify particular objects through labeled "ground truth data" set. Therefore, it is not a question of making computers see in such a way that humans do but of developing software that could learn to identify objects (basically, recognize patterns) through computing "pixels, numerical values of brightness and proximity" (Pasquenelli, Joler 2020). In that situation, the living knowledge that could not ever be fixed in machines might lose its validity with the advent of machine learning. In techniques like "human in the loop," it could also be observed that cognitive functions actually could be "objectified" in machines, albeit not in a fixed way as in the case of industrial machines. Human cognitive functions like language and vision could be ascribed to the machines through training data that includes "feedback loops." Humans are placed in the loop as data labelers and as micro-supervisors of the training process. Although the human-in-the-loop process is being specialized, managed, and organized more with increasing use of narrow AI in various sectors, the process aims to rule out the need for manual data laborers eventually, as machines could actually perform the tasks better, meaning machines are able to absorb the labor of data labelers to carry out relevant tasks.

### 4.2. Crowdworkers: Autonomy and Subsumption

Crowdworkers' labor, as discussed before, is very significant to the operation of ML. Only after machine learning became the dominant technique behind AI did human digital data laborers start to be used in the human-in-the-loop process. At first, concepts like "crowdsourcing" became popular as business strategies after the online masses began to generate enormous amounts of data thanks to the pervasive use of smartphones and personal computers. Extraction of free labor from the online masses became popular and used for human computation, such as reCAPTCHA. However, free voluntary labor of online masses was also creating big chunks of data that were about to be used commercially based on ML techniques.

The first crowdwork platform, Amazon Mechanical Turk, was born out of the difficulties of algorithmic failure to process some data. These tasks were then parceled and distributed to the crowds for tiny financial compensation. " Like 'cloud computing' services more generally, AMT offered immediate, on-demand provisioning of computational power accessible through computer code. In this case, however, the computational power was human." (Irani 2015a, 4)

Actually, the development of crowdwork companies, from its first manifestation as Amazon Mechanical Turk to the latest versions of specialized companies such as Mighty AI, demonstrates the market tendencies of AI applications. Specialized crowdwork companies started to promise their customers "ground truth data" with nearly 100 percent accuracy, related to the increasing deployment of AI technology in sensitive sectors like autonomous driving and medical diagnosis. (Schmidt 2019). Of course, ground truth data is not only needed in those sectors; ground truth has somehow become the standard for all kinds of AI operations as the application of narrow AI is flourishing in manufacturing systems, customer relations, and translation.

AMT and other "generalist" establishments that do not train and actively organize the work of human annotators have started to be called "legacy platforms." (Schmidt 2019, 4) New specialist platforms train their workers, make assessments of their performances, and give feedback, unlike platforms such as AMT, which define their role as merely intermediate platforms that connect workers and customers. In those specialist platforms, workers are also directly paid by platforms and do not have to

deal with various “requesters” who are given the right not to pay the workers by platforms like AMT. However, they are still categorized as “independent contractors” like any other digital platform workers. Legally, independent contractors are not counted as employees and are exempt from labor rights such as minimum wage and sick leave. The categorization of independent contractors depends on various factors, such as whether “the person hired fully preserves her autonomy in the actual execution of the task.” (De Stefano 2016, 12)

Although the question of autonomy is different than in the accounts of post-Marxist theorists like Hardt and Negri, legally binding “independent contractor” relationships between parties require conditions that significantly resemble the conditions that are attributed to the autonomous multitude by some autonomist Marxists. If a job giver is directly involved in the management and the control of the process of work, as in providing instructions to the laborer and determining the working hours, this relationship is classified as an employment relationship. Direct management and the dictation of working hours violate the conditions of independent contractor status. In the case of crowdwork, whether in the form of old generalist platforms or new specialist platforms, the process of work and conditions are managed by algorithms and the platforms’ terms and conditions. An employment relationship is clearly observed, especially for new specialist platforms that select and train their workers. One thing that could not be associated with traditional employment relationships is that workers could choose the time of the day to work.

It is observed that, generally, all digital platforms wish to be perceived as just intermediary technological infrastructures that do not manage and control the workforce since they want to avoid the responsibilities of minimum wage and labor protection. Interestingly, cognitive capitalism theorists seem to be on the same page regarding the companies’ status. Becoming rent of profit, the crisis of real subsumption, and the obsolescence of the law of value are directly related to the arguments that capital in its parasitic stage does not really manage and control workers in the production process. Of course, they emphasize capital’s irrelevance and its tactics to extract rent on the basis of intellectual property rights. However, it could be seen that those arguments could work to downplay actual exploitative conditions involving technologically mediated labor types. Those arguments also

serve to overlook how capital is still relevant in facilitating and organizing cooperation and production with the help of technological means. Only "the managers" in this question are increasingly becoming the algorithms.

Moreover, when we look closely at the transformation of crowdwork, from the extraction of free labor of the random online masses to specialized crowdwork platforms that supply ground truth data for the training purposes of ML, it could be observed that scientific management increasingly plays a more prominent role in the organization of this labor process. This is also related to the increasing application of narrow AI in the economy, suggesting that the labor process of developing AI transforms as the deployment of AI in economic production gains a more significant role. As AI increasingly valorizes capital, its hidden labor-intensive production becomes more disciplinary-based and controlled.

In crowdwork, laborers both work "in the algorithm" as a supplement and are managed by algorithms. The fact that the labor process is subjugated to only algorithmic management that is partially automated does not mean that the labor process is not controlled by capital. On the contrary, since the control of digital labor is based on algorithms, the labor process is intricately observed and designed to be efficient according to the parameters of ML. After all, the labor process itself is designed to complement the algorithms, which immediately creates the conditions for real subsumption of labor under capital. There are other strong indications of the real subsumption that could be observed in the process of crowdwork. The massive amount of data is parcelled into "microtasks" that could be performed by on-demand crowds. The most crucial goals of this fragmentation are saving time and reducing costs for the production of training data sets. Crowdwork platforms are used for the maximum extraction of surplus labor, with microtasks technically designed to do so. After the completion of microtasks, the outputs are incorporated into algorithmic systems, which could be interpreted as the objectification of living knowledge in the algorithmic system. However, this objectification occurs dynamically through repeated instances, feedback loops, and human-computer collaboration that facilitate "learning" in the machine.

As Vercellone (2007) expressed, in the real subsumption, “the division of labor is characterized by a process of polarisation of knowledge which is expressed in the parceling out and disqualification of the labour of execution” (16). In crowdwork, there is an extreme parceling of data processing into microtasks, and in the AI industry, the work of crowdworkers and software developers represents the polarization of knowledge. A worker who performs microtasks generally has no idea of his labor’s overall role in the Machine Learning models. The polarization of knowledge between engineers and crowdworkers is not just observed in the technological/ scientific infrastructure of ML. It could also be observed in the projects that crowdwork is used for. A striking example of this is when crowdworkers registered in CrowdFlower -later named Figure Eight- are included in “Project Maven” which is a Pentagon AI warfare project that necessitated identifying humans and objects in drone-captured visual images. The Pentagon collaborated with Google on that project, and Google decided to crowdsource the work of labeling massive amounts of satellite images to CrowdFlower in 2017. Google engineers subsequently opposed the collaboration with the Pentagon. However, crowdworkers could not possibly revolt against or even boycott it because they had no way of knowing that their work contributed to a military offensive project. (Altrendid 2020)

Crowdwork is sometimes defined as “menial, dull, mindless clickwork,” which actually reminds the effects of real subsumption on the workers’ labor process, also defined by Vercellone (2007): “ labour becomes ever more abstract, not only under the form of exchange-value but also in its content, emptied of any intellectual and creative quality” (24). However, there are different types of crowdwork since crowdwork is established to complement the Machine Learning process in which algorithms could not perform a task. Human in-the-loop jobs could be roughly separated into two categories. The first category involves assessing and correcting search engine results, moderation of content, and weeding out hazardous content. In this crowdwork, laborers use their cultural orientations and everyday knowledge to complete tasks. In the tasks involving search engine results, crowdworkers look at the query, which means what the internet user types in the engine; later, they evaluate the appropriateness of the results, suggested websites, and ads. For instance, when evaluating the result's appropriateness concerning a query, crowdworkers also check the internet user's location. If the user typed “Paris road conditions” into the

search and the search was made from Dallas, Texas, the appropriate suggested result would have to be about Paris in Texas State, not Paris in France. However, because France's Paris is more popular, the results might be more inclined to show the situation of the roads in Paris. It is also possible that the results may show architectural information about Paris' roads in French history when the internet user is possibly looking for if the roads are safe to travel from Dallas to Paris. Sometimes, queries have misspelled words that the machine could not quite understand. In those instances, crowdworkers could understand the context and make meaningful arrangements to match the results and the query.

Content moderation is probably the most mentally challenging form of crowdwork. In this type, workers are exposed to the horrors of the internet, from child and animal pornography to graphic violence. They also detect inappropriate content regarding hate speech. They become, in a sense, "data janitors," keeping the inappropriate content out and ensuring a safe internet experience (Resnikoff, 2015). Recently, OpenAI used an outsourcing company to "make ChatGPT-4 less toxic," employing thousands of workers from Kenya, Uganda, and India who earned less than $2 per hour. The TIME interviewed some of the workers and found that the psychological toll was heavy:

> One Sama worker tasked with reading and labeling text for OpenAI told TIME he suffered from recurring visions after reading a graphic description of a man having sex with a dog in the presence of a young child. "That was torture," he said. "You will read a number of statements like that all through the week. By the time it gets to Friday, you are disturbed from thinking through that picture." The work's traumatic nature eventually led Sama to cancel all its work for OpenAI in February 2022, eight months earlier than planned. (Perrigo 2023)

The second type of crowdwork involves a more direct performance regarding sensory data, such as some forms of labeling visual data for computer vision, for instance, rounding the objects like bicycles on the road for automotive driving. This type also involves auditory data. With auditory data, workers generate training data sets for speech recognition and sometimes create the data sets just by speaking in their native language. Currently, the most developed AI models are trained on the data on the internet, which are mostly in English. Some local dialects in India, such as Kannada, are spoken by millions of people. Nevertheless, there is little data on the internet to develop AI systems that could efficiently run in those dialects. So, the

demand for text and audio for these local dialects is rising. Recently, workers in India have been employed just to read some texts in their native language to create training data sets for these local dialects. (Perrigo 2023)

The two categories of crowdwork are somehow separated by the execution of common sense in the process of work. When working through search engine results and content moderation, workers have to mobilize some kinds of everyday knowledge and interpret the context, such as distinguishing between hate speech and a joke. However, when reading texts in a native language and drawing boxes around the bicycles, workers simply perform simple cognitive functions to be absorbed by AI. However, this does not suggest that in one category, jobs are menial, and the others are more sophisticated. In computer vision, there are several methods for data labeling for different sectors and machine learning needs, and the ground truth parameters make the data labeling process complicated and labor-intensive. Moreover, in some forms of labeling data for computer vision, the labor of classification and description represents vital importance. The human labelers provide cultural or historical context that is imperative for machines to "recognize patterns" and interpret the digital bits to capture the coherent story of the image that involves linguistic, historical, and cultural complexity.

The critical role of situated knowledge is also demonstrated by Katz (2017), emphasizing the fact that the technological quest for AI has always been blind to the social context of human life. He investigated the Google deep-learning powered image caption system called "Show and Tell." which was supposed to analyze images and photographs based on its "training" with the visual data. Katz chose photographs capturing specific political and historical events and components, like a photograph of Palestinians in the Israeli checkpoint, and found that descriptions are senseless:

> Consider a photograph of Palestinians arriving at a checkpoint controlled by Israeli soldiers Palestinian lifts his shirt to show the soldier, who is motioning to him from the top of a small hill, that he is unarmed. Google's deep network gave the image the caption "a group of people standing on top of a snow-covered slope." For a statistical pattern recognizer, the outline of the hill and the light dirt might look like a snow-covered slope—but the sun, the clothing, and the relationship among those photographed make that an absurd description (Katz 2017, 10)

The same system also interpreted a photograph of Ruby Bridges, the first African-American child to attend a formerly whites-only school in 1960. The photograph captures her and the accompanying US marshalls at the school entrance. Since Google deep learning was not able to understand the historical context of desegregation, it has produced a barren description: “a group of men standing next to each other” (Katz 2017, 10). This demonstrates the relevance of the specific cultural and historical understanding necessary for labeling images since the labeling of data emerges as the first step in the classification of data needed for the proper “framing” of reality. Google used AMT workers to label and validate the classification of the results. As emphasized by Lily Irani (2015a), AMT workers are mostly chosen among Americans of cultural relevance for the linguistic tasks that involve classification. However, this resulted in the poor performance of the “Show and Tell” image captioning system since American data labelers lack the relevant historical knowledge.

This diversity of the form of crowdwork tasks demonstrates that “AI problems” are multifaceted. Since these needs are born out of mimicking human cognition, crowdworkers’ tasks range from simple vision to content moderation. However, in both categories, crowdworkers refine, work on, and sometimes create “raw materials,” which in the AI industry corresponds to the data. In both categories, software systems “learn” to mimic some human cognitive functions by absorbing the labor of the crowdworkers.

Moreover, in both forms of crowdwork, we could observe that the conditions of formal subsumption exist, as well as the conditions for real subsumption. Real subsumption is detected since the technology is heavily penetrated into the immediate production process, and the tasks are created and parceled according to the working principle of the machine learning algorithms. The conditions of formal subsumptions occur clearly when the basic cognitive functions of the human crowdworkers, such as seeing a bicycle and speaking in a native language, are adopted for the production of ML training data sets. When the cultural know-how of the crowdworkers is used in labeling data sets for computer vision, sentiment recognition, or eliminating hazardous content, their formerly unproductive properties, such as having knowledge relating to social norms, everyday life, and commonsensical tacit knowledge, become salaried. These activities may vary; the

way crowdworkers engage with data is diversified. Nevertheless, real and formal subsumption conditions exist side by side, whether a worker engages in content moderation or labels objects in visual data for computer vision. Fumagelli's (2019) concept of "life subsumption" may effectively define the form of the subjugation of the crowdworkers in the immediate production process.

According to Fumagelli (2019), bio-cognitive capitalism is based on the "anthropogenetic model of production and accumulation," in which the formal and real subsumption complements and feed one another (77). The anthropogenic model of production is defined by its dependence on expansion based on human activity that is relational, communicational, and innovative. Formal subsumption exists because every aspect of human life is entering the realm of economic production. In the case of crowdwork that feeds machine learning needs, even the basic cognitive and sensory capabilities are formally subsumed for the training of the machine to make machines perform better and better through feedback loops. In the process, the data work is parcelled into "microtasks" that could be performed instantly by an educated or random online crowd. Therefore, in the same instance, the conditions of real subsumption could also be observed. The complementary nature of real and formal subsumption in the immediate production process of training data signals a parallel with the formulation of contemporary subsumption by Fumagelli.

Nevertheless, Fumagelli (2019) also claims that this complementary form stems from "the transition from static technologies to dynamic, relational ones" in which dynamic technologies are able "to exploit learning and network economies by simultaneously combining manual tasks and brain relational activities" (79). Therefore, he claims machines are as dependent on humans as machines are dependent on them. He gives examples of computer-aided manufacture and design in which a competent team of workers works side by side with the machinic component in the production process, either supervising or controlling it. He claims that manual and mental labor are undifferentiated in those instances, just like humans and machines could not be easily separated from each other in these "relational, dynamic" technologies. However, in the case of human-in-the-loop, the immediate labor conditions in relation to machines require more elaboration regarding the human-machine relationship. This process could actually result in the formation of

fixed capital because “dynamic relational” machines could learn and exploit the human cognitive abilities towards objectification and culmination in its format. Even though objectification in this case is “perpetual” and “dynamic”, because it feeds on the collective knowledge that is reproduced on a daily basis, it is still objectification. The fact that machines need dynamic update to absorb collective intelligence does not mean that the knowledge is not accumulated or objectified in machine learning.

ML techniques are being developed as computing power meets more data and sophisticated techniques are continually advanced by academics receiving significant funding from technological corporations. (Katz 2017, 4) The knowledge is “accumulated” in ML systems through institutional scientific knowledge produced in the academy that is fused with the market. The very scientific logic of ML necessitates the abundance of data and its classification for training to achieve a successful extraction of knowledge from data and metadata, which are the recordings of real-life events. The inquiry into the social and economic role of ML also suggests “the reproduction of the social division of labor,” fueled by its pursuit of interpreting big data through complex architectures embedded in the models that seek to approximate reality and project reliable future scenarios. (Pasquinelli 2023)

This “fixed capital” format is undoubtedly different from the machines of the industrial age. They are more “relational and dynamic” and could exploit learning, as Fumagelli (2019) suggested. However, that does not create a situation in which machines and humans feed one another in the immediate production process. The human-in-the-loop process functions as a vital part of machines to capture properties of human intelligence. Still, for the crowdworkers, it is, at best, a way to get through unemployment and poverty, as discussed in Chapter 2.

The workers’ labor could be absorbed by machine-learning systems; with enough training data, machines could “learn.” It is true that contemporary machines should increasingly keep learning human skills. However, does this entail a situation in which living knowledge prevails over dead knowledge congealed in the machines? In the case of crowdwork, which is invented to complement machines in the course of their development of human-like intelligence, living knowledge does not command

over dead knowledge, even when this living knowledge is what exactly is missing in the machines. Moreover, in the case of crowdwork we could see there is an intensification of real subumption because the labor of the crowdworkers is defined by the lack of the algorithms.

Objectification of living labor and knowledge in AI systems feed on the labor of software engineers, data scientists, model designers, and humans in the loopers. However, humans in the loop are rarely given credit in the production of AI, and this fact opens up an interesting discussion regarding the "obsolescence of law of value" proposed by cognitive capitalism theorists and Post-Opeaismo. As laid out earlier, cognitive capitalism theorists claim that, in cognitive capitalism, the law of value/ labor time dies because of the centrality of immaterial labor. "There is no longer any relationship with the (average) time of (abstract) labor, there is no longer any determinant proportionality between necessary labor and surplus labor" (Negri 1992,72). In the old factory, mass workers' labor time was correlated to productivity, but in cognitive capitalism, there is no necessary relation between workers' labor time and productivity. The workers in the latter are the ones who performed the immaterial labor. Negri also called them social cyborgs after Donna Haraway (Caffentzis 2013, 118).

In his criticism of Negri's claim that labor time is irrelevant to capital's self-valorization process, Caffentzis (2013) points out that if the labor time is irrelevant, there will arise a question of why capital is so eager to create "new enclosures" fleeing to the cheap and unprotected labor. His answer to this question lies in the Marxian notion of "Conversion of Profit into Average Profit":

> In order for there to be an average rate of profit throughout the capitalist system, branches of industry that employ very little labor but a lot of machinery must be able to have the right to call on the pool of value that high-labor, low-tech branches create. If there were no such branches or no such right, then the average rate of profit would be so low in the high-tech, low-labor industries that all investment would stop and the system would terminate. (Caffentzis 2013,121-122)

In his criticism, he fundamentally suggests that the line represented by Negri merely considers the advanced capitalist territories and most developed technological sectors, overlooking the labor-intensive branches that actually power the high-tech

sector. The global economy is unevenly divided into “capital-intensive branches” (high organic composition) and labor-intensive branches (low organic composition) so that the capital-intensive branches can extract surplus value in proportion to the magnitude of their fixed capital even though those branches employ and manage less labor power. Therefore, he writes, “The computer requires the sweatshop, and the cyborg’s existence is premised on the slave.” (Caffentzis 2013, 122) This study suggests that a similar process is at play in the AI industry, although effective within the same branch of production. However, in this case, the complementary nature of “qualified and unqualified labor” is unrelated to the relationship between high and low organic composition since both the software engineers and the crowdworkers are somehow “cyborgs” since technology primarily defines their labor and both complete and work in the algorithms. However, the crowdworkers are said to perform “digital manual labor,” making them more of “slave cyborgs” as opposed to qualified and well-compensated software engineers. The development of AI requires expensive research and development projects, the employment of skilled and educated software engineers who are few in number, and the employment of crowds who are paid less than minimum wage. Although the labor-intensive part of AI development is intentionally made invisible by capital and rarely discussed, the need for cheap and unprotected labor of crowdworkers is undeniable.

The research into the conditions of the crowdworkers demonstrates that the uneven global economic development plays a significant role in the motivations of the crowdworkers even though people are performing as crowdworkers in “developed” countries of the global North as well. In ILO research covered in this thesis, almost all regions of the globe were represented; however, some significant worker representations were from India, Indonesia, and Brazil (Berg et al. 2018, 31). It has also been noted that when people from countries that go through economic crises discover crowdwork platforms, they “flow” into the platforms, significantly decreasing the payment for former workers and the available tasks, creating a competitive condition between workers (Schmidt 2019). The research found that the workers in crowdwork platforms experience financial instability in consideration of their monthly household incomes and their access to social protections. Although the

crowdworkers who have mental and health issues or have domestic and care duties appreciate the opportunities to work at home, overall, they have trouble with insufficiency of work, unfair rejection of their work, the uncertainty of the reasons why their work is rejected, the inability to communicate with employers and platform managers, and low payment.

Considering the conditions of crowdworkers and the function of their work to complement machine learning algorithms, it is observable that crowdworkers do not enjoy the autonomy that is attributed to immaterial labor or "human-machine hybridization" in which their living knowledge commands over the dead knowledge in the machines. Immaterial or cognitive labor is developed as an antithesis to "abstract labor" of the industrial stage. The essential component of the immaterial labor arguments generally derives from the new technological advancements in which machines do not command human workers in the immediate production process. Therefore, Vercellone (2007) argued that the power/knowledge relationship in the stage of cognitive capitalism entails a situation in which an overturning of the "relation of subordination of the living knowledge incorporated in labour-power to the dead knowledge incorporated in fixed capital." (18). Moreover, there is an argument that the regulation of the labor process - the control of the working methods and intensity of the labor- "remains incorporated in the living knowledge of the collective worker." (Vercellone 2007, 11)

However, the elaboration of the work that crowdworkers engage in suggests otherwise. Crowdworking is undoubtedly "immaterial/cognitive labor" since the results of the labor process are immaterial, and the "cognitive aspect of the labor" is important in the execution of the labor. Crowdwork is sometimes defined as "manual digital labor" because it replaces the algorithms and requires a "hands-on" involvement in the digital sphere. However, the labor is executed wholly through digital means, and the results of the labor are incorporated into the algorithms; therefore, it indeed should be regarded as an instance of immaterial labor

Nevertheless, the attributes of autonomy regarding immaterial labor, such as "immediately involving social interaction and cooperation," are nowhere to be found.

Moreover, crowdworkers experience a lack of communication even if there are problems that require communication with the managers or administrators of the platform. The cooperation is imposed externally, more accurately algorithmically. Crowdworkers have no means of communication other than voluntarily developed blogs or sites. Crowdworkers' relationship with productive technology is reminiscentof the industrial paradigm. Machine systems -in this case, ML- come off as objective organizations of production that workers confront as "a pre-existing material condition of production" as in the conditions of real subsumption of labor under capital. The labor process is subsumed under the Machine Learning process itself.

### 4.3 Human-Machine Hybridization and Crowdwork

The human-in-the-loop process is strictly developed as part of a machine-learning technique called "supervised machine learning." In this form, colossal amounts of data are prepared before they can be fed to the machines for them to infer results, achieve specific tasks, and predict future outcomes. This preparation of data, whether it is moderation, labeling, or annotating, is done by humans. On-demand cognitive labor of crowds is deployed to the service of machine learning algorithms that are about to -but not quite yet- be in the position to acquire humanlike "mental and cognitive" functions. In this deployment of cognitive labor of the crowd, human labor is placed as a part of an algorithm where the algorithms cannot function to come up with human-like results. Therefore, this labor is sometimes called "human API" (Irani 2015b, 230). Application Programming Interface functions as a communication setting in which distinct software can share information with each other. APIs facilitate cooperation with external services that are other software systems.

In the case of human APIs, the external service is human. The human-in-the-loop technique also involves correction of the results when the software is unsure of its human cognition requiring tasks. Humans function first as replacements for algorithms and then as microtask supervisors. Machine-learning algorithms have also been developed for the exclusive purpose of aiding the process of human annotation of data. These algorithms are developed as humans and machines meet in the loop;

later, the results of those meetings are used as data and included in the factors that transform the design of the labor process. Machines aid the process in which humans label the training data and later evaluate results. Therefore, a feedback loop emerges between machines and humans by combining supervised machine learning and active learning. Then, this loop is augmented when the machine-learning algorithms are used to increase the efficiency of the data labeling process. This demonstrates an instance of human-machine collaboration and a specific example of "human computation." However, this instance of human-machine hybridization does not grant the potentialities that cognitive capitalism theorists have laid out.

According to Fumagelli (2019), the transformation of the static technologies of the industrial stage to the contemporary dynamic relational technologies helps to overturn the hierarchical relationship between humans and machines in the production process. Relational, dynamic technologies that could exploit learning need human skill and knowledge to be functional. In the process, Fumagelli (2019) establishes that humans become "fixed capital and variable capital at the same time"; therefore, efficiency is maximized, and the conditions of real subsumption are observed (80). However, according to this line of thought, there is no clear separation between humans and machines in the contemporary stage of capitalism. Moreover, this lack of separation becomes an essential trait of "bio-cognitive capitalism" and is defined as the "dematerialization of fixed capital and the transfer of its productive and organizational functions to the living body of labor power." (Fumagelli 2019, 67) However, what happens in the human-in-the-loop technique is the exact opposite. The humans' productive and organizational functions transfer to the fixed capital, that is, AI, not the other way around.

Hardt and Negri (2017) also emphasized the lack of a clear distinction between machines and humans and saw that as potentially liberating since it paves the way for the "reappropriation of fixed capital by living labor" to be integrated into machinic assemblages, a constituent of subjectivity (122). Hardt and Negri contemplated the inseparability of humans and machines under the "human-machine hybridization" category. They claimed that "new subjectivities of production and reproduction" require the re-evaluation of the relationship between humans and machines. They still agree that science and technology are not neutral. They maintain that it should

not be overlooked that modern science and technology have been instrumental in ecological and social destruction. However, they claimed that seeing technology only in this fashion creates "bitter resignation rather than an active project." (Hardt, Negri 2017, 108)

Additionally, they highlight that technology in the large-scale industrial economy and contemporary technologies of cognitive capitalism are fundamentally different. They stress that technological pessimism, dominant in times of large-scale industrial production, presupposes "an ontological division and even opposition between human life and machines" (ibid, 109) Hardt and Negri take this ontological opposition as a mistake and maintain that today; "human machines" are at work and constantly changing the technological reality.

According to Hardt and Negri (2017), technology has been mostly realized in fixed capitals for automation through the course of capitalist production against the rising power of the working classes. The capital saw that to re-establish profits, it needed to rely on more automation in the factory, expand beyond the factory walls, and reorganize the social terrain as a production site. However, they claim that the digitalization that serves for "bioproduction," or mode of production being interwoven to life itself, has been more important than the technologies of automation:

> While the automated industrial processes produced more material goods, outside of the robotized factories grew productive and ever more complex and integrated "services," bringing together complex technologies and fundamental science, industrial services and human services. In this second phase, digitization became more important than automation: this, in fact, spreads throughout society a transformation of the technical composition of labor-power that has already taken place in the factory. (Hardt, Negri 2018a, 417)

The fact that they take "automation" and " digitalization and computerization" as distinct technologies makes sense on a superficial level, but they take this distinction too far to assert that contemporary technologies are not ontologically opposed to living labor because they enable communication and cooperation between workers external to the capitalist control. It is clear that they place so much significance on "communication, cooperation, networks" that they see it essential that a new subjectivity "that operates primarily through knowledge, communication, and language" be formulated (Hardt, Negri 2000, 29). They first developed the concept

of “multitude” that perform immaterial labor and have an immanent potential for resistance. However, in their last published book, “Assembly,” they talk about “machinic assemblages” without transforming their core arguments about immaterial labor and the role of technology in contemporary capitalism. On the one hand, they see computerization as linking the factory's automation and society's digitalization. Computers triggered the merging of modes of production and forms of life. On the other hand, they see that the connected living brains through networks are offering immediate cooperative and social labor, free from capital’s control. However, the concentration on communication, cooperation, or diffused intellectuality has led these post-Marxist thinkers to regard “the social individual” as replacing the notion of fixed capital.

> Fixed capital, that is, the memory and storehouse of past physical and intellectual labor, is increasingly embedded in “the social individual,” a fascinating concept in its own right. To the same degree that capital, as this process proceeds, loses the capacity for self-realization, the social individual gains autonomy (Hardt, Negri 2017, 114)

The productive tools and knowledges have been incorporated into the minds of the living labor, making them the most essential part of the organization of production rather than the dead knowledge incorporated in the machines. This poses a challenge to the capital, making it parasitic and external to the production. What makes the “social individual” and the living knowledge of labor power essential is the “appropriation of the fixed capital,” unlike the antagonistic relationship in the industrial stage of production. When Marx (1973) wrote about the free time enabled by the development of productive forces also stimulated the development of the individual, it reflects back as a productive power then it could be read as “the production of fixed capital, this fixed capital being man himself” (712). This was taken as anticipation by the post-operaismo and cognitive capitalism theorists. Fixed capital has been objectified living labor and incorporation of scientific knowledge and appropriated by capital for free as a weapon against living labor. However, they claim, at a certain point of capitalist development, living labor gains a capacity to revert this relationship: “Living labor begins to demonstrate its priority with respect to capital and the capitalist management of social production, even though it cannot necessarily take hold of the process” (Hardt, Negri 2017,116)

The idea that living labor could “reabsorb” fixed capital “within themselves” derives from a non-antagonistic or possibly liberating understanding of the relationship between machines and humans. In this stage of capitalist development, especially concerning machines, living labor increasingly adopts the capacity to organize production autonomously. However, living labor “still remains subordinated to mechanisms of the extraction of value by capital” (Hardt, Negri 2017, 117) Hardt and Negri establish that this autonomy is not just the autonomy in relation to the process of production but acquires an ontological sense of the concept: “Labour gains an ontological consistency, even when still completely subordinated to capitalist command.”(ibid, 117)

Hardt and Negri (2017) also delve into the question of algorithms in this book and maintain that the power of living labor is also at the base of algorithms. They claim that the difference between the algorithms and industrial machines is that “whereas industrial machines crystallize intelligence in a relatively fixed, static form, algorithms continually add social intelligence to the results of the past to create an open, expansive dynamic” (Hardt, Negri 2017,118). These machines might appear intelligent, but in reality, they are continuously modified by social intelligence. Following this, they assert that the reappropriation of fixed capital by the workers and reappropriation of the fixed capital for autonomous social control is now more possible than ever. They see that it is possible to make lgorithms in service of the self-valorization of cooperative social production. In reality, as also conceded by Hardt and Negri (2017), algorithms and machine learning techniques to develop AI are used as fixed capital as a means to maximize the extraction of surplus value.

Nevertheless, they do not consider the algorithms as an alien power that confronts the workers in the production process, whether it is used in manufacturing, content creation, predictive analysis, financial speculation, or in the process of producing ML training data sets by digital manual laborers. What is called “dynamic technologies that are able to “exploit learning and network economies by simultaneously combining manual tasks and brain-relational activities” by Fumagelli is an accurate description of the nature of the technology that is used and produced during crowdwork. (Fumagelli 2019, 79) However, he also suggests that as a consequence of the shift towards relational, dynamic technologies, dead labor in fixed capital

becomes dependent on living labor. Even if the machine learning algorithms depend on the cognitive labor of crowdworkers, that does not overturn the antagonistic relationship between ded labor to living labor. Their inseparability, or "the merging with the machine, being a supplement to the algorithm," does not eradicate the antagonism by making the two depend on one another in an equal fashion. It is true that the machines need labeled data sets as an initial and fundamental condition to optimize their pattern recognition, yet the "fungibility" of the crowdworkers due to parcelled digital microtask design makes their relation to the machines antagonistic. The design of cognitive labor is based on the algorithmic starvation for the qualified data, making the labor involving "cleaning" and labeling of enormous amounts of data for machines an indispensable part of developing machine learning.

Purposefully designed as piecemeal digital labor to be distributed among the crowds of the world who are willing to be commodity dealers of their essential cognitive functions, crowdwork demonstrates another dimension of relational and dynamic technologies which contemporarily has found its expression as machine learning that is branded as AI. Additionally, the "dynamic" technologies that could absorb human intelligence actually contradict the emancipatory notion of human-machine hybridization in which the dead labor-living labor hierarchy is overturned. Machines transforming with dynamic and relational technology are a legitimate threat to so-called living knowledge embedded in the workers' brains. If machines could absorb human intelligence in a perpetual augmenting feed, that means the priority of living knowledges is jeopardized even if the machines will need more and more living knowledge to absorb. The fact that absorbed living knowledge could be "updated" and integrated into the models means that Machine Learning could advance and improve at performing tasks.

It is not that the critical investigation of AI based on ML supports a vision of current AI hype in technological discourse- the implications of AGI, a generative intelligence that can perform every intellectual task, do not represent the truth - but the deployment of narrow AI in the economy, and as military and surveillance tool evinces the comprehensive role of "AI" in the organization of the social labor and the statistical modeling of reality. So, the perpetual advancement of Machine Learning becomes possible as extensive data computation develops. The abundance of data

stems from internet users' activities, mainly including the daily practices of the social factory, such as shopping, traveling, engaging in conversations, creating visual or written content, studying, or researching. Therefore, ML is dependent on the continuing recordings of any kind of social activity to make sense of the world, extract knowledge, and model the world. It is a dynamic technology that needs to be reinvigorated and is defined by its capacity to "learn." In those respects, Machine Learning (narrow AI) differs severely from industrial machines. However, this technical difference is overinterpreted by Negri and Fumagelli concerning their understanding of human-machine hybridization. The cognitive capitalism paradigm interprets the relationality of the new machines as representing a historical turning point from the paradigm of industrialist production that reinforced the real subsumption of labor under capital. They emphasize the emancipatory framework based on the "reappropriation of fixed capital" made possible by the changing nature of machines. Their argument demonstrates a tendency for techno-determinism that loses sight of capitalist command over the use of machines in the production process.

It is observed that the variety and number of crowdsourced data jobs are expanding as AI starts to be used in various sectors. However, these jobs and their conditions are also transforming, as seen in the generalist and specialist platforms. Crowdworkers perform tasks that machines "for the moment" could not. However, as machines learn to perform specific tasks by being in the loop with the workers, the jobs also transform. The automated tasks are replaced with the tasks that could still not be automated. This means that in the human-in-the-loop process, machines are able to absorb the cognitive skills of the crowdworkers as they create "training data" that can actually train machines.

In contrast, crowdworkers certainly do not acquire any of the qualities of the machines other than being treated as lifeless algorithms. It still remains a fact that crowdworkers are essential to the process of developing AI since machines are not able to perform some tasks that require human intelligence as Hardt and Negri (2017) also observed: **"**Sometimes seems as though computer systems, artificial intelligence, and algorithms are making human labor obsolete … in fact, there are innumerable digital tasks that machines cannot complete" (131). The existence of human-in-the-loop supports that. However, that does not establish leverage on the part of the

crowdworkers; on the contrary, their employment situation is precarious and unprotected. Moreover, this instance of machine-human hybridization complicates and aggravates the exploitative conditions of the crowdworkers instead of empowering them in the process of production, contrary to what post-operaismo and cognitive capitalism theorists would suggest.

The strategic position of the crowdworkers' living knowledge does not translate back to them as autonomy or the potential for reappropriation of fixed capital. In fact, in 2014, there was a campaign to write e-mails to the founder and CEO of Amazon, Jeff Bezos, in which the crowdworkers on Amazon's platform AMT voiced their discontent with the unrecognition of their humanity through an equation with the algorithm. One of the employees stated: "I am a human being, not an algorithm, and yet [employers] seem to think I am there just to serve their bidding" (Harris 2014). The hybridization reinforces the crowdworkers' invisibility and conceals time-consuming, labor-intensive data work behind AI. Additionally, crowdwork companies intentionally enforce this invisibility to represent their operations as more related to technology through the recurring verbal emphasis on producing AI solutions or supplying the tools for AI professionals. The data sector has recently renewed itself to reflect more on its technological side. The emergence of specialist platforms has been discussed, but how some platforms renew their branding or adopt a "two-faced" policy should also be considered. Crowdwork platforms are essentially labor-managing companies for the production of labeled training data sets as a part of supervised Machine Learning. However, more and more, they start to label themselves as "AI companies." The term crowd is also avoided for its implication of cheap labor and unreliable results. Platforms started to develop a policy in which they have two distinct platforms for workers and prospective customers:

> They have a client-facing company name, website and appearance focused on "AI" – and an entirely different crowd-facing name, platform and appearance, promising prospective workers how easy it is to make money through microtasks. Mighty AI's crowd-platform, as mentioned above, is Spare5, Hive's platform is Hive Work (https://hivemicro.com/), and Scale's platform is Remotasks. (Schmidt 2019, 11)

Another crowdwork platform explains the decision to change branding in this way:

> DefinedCrowd has built a reputation as one of the world's leading AI training data providers however, as the market shifts to meet the ever-growing demand for AI, we're evolving too. Now, more than ever before, AI professionals need access to ready-to-use AI training data, tools, and models, and they need it fast. That's why DefinedCrowd is evolving into Defined.ai. /Our new name and logo reflect our new product positioning. (defined. ai,n.d)

These "AI companies" almost make one think they are producing ML research with technology developers when, in reality, they employ an on-demand workforce and train them to label data sets. Of course, with the human-in-the-loop system, there is also software at work to ease the data labeling process in which humans and algorithms train each other. New models are being developed to make data labeling more efficient. However, these models rarely satisfy the requirements to categorize a company as an "AI company." These efforts are directly related to the investment opportunities that are reinforced by the new AI branding and hype in the market. This hype is intentionally "ambiguous" in explaining what AI really is and how it is produced. The branding of AI circulates around mystical endowment to its capacities and emphasizes its artificiality while it is a technique primarily for massive data management and analysis. Yarden Kartz (2017) analyzed recent market interest and hype in AI: "The label "AI" has, in fact, recently undergone a rebranding. Corporations have helped manufacture an "AI revolution" in which AI stands for a confused mix of terms—such as "big data," "machine learning"or"deep learning"—whose common denominator is the use of expensive computing power to analyze massive centralized data." (2). Crowdwork is the consequence of this quest to statistically model the world with the ground truth data. The purpose of rebranding "DefinedCrowd" as "Defined.ai" is to appeal to the investor's grandiose ideal of "technology" that manifests in the quest to "unlock the secrets of human intellect and automate it." However, the crowdwork, its execution, technical role and the experience of the workers evinces a reality in which data is the central drive behind machine-learning because ML is essentially a statistical data analysis method that feeds on big data that is the real-life recordings of everyday life. That necessitates the time-consuming curation, labeling, and "categorizing" for the machines to recognize patterns better and make future predictions.

Preparation of data is so critical to the process of developing Machine Learning that IBM senior Avid Krishna stated, “About 80% of the work with an AI project is collecting and preparing data. Some companies aren’t prepared for the cost and work associated with that going in.” (Council 2019) The increasing deployment of narrow AI in the economy and for the purposes of knowledge extraction further facilitated the need for crowdwork due to the need for well-curated data. Crowdwork companies enjoy ambiguity and mystification around AI and the role of data in developing ML. Since the labor-intensive collection and preparation of the raw data sets is usually unknown and outsourced or crowdsourced through intermediary platforms, crowdworking platforms easily built their branding around the “AI” label, indicating that they are providing “AI solutions” to the professionals being explicitly vague about their management of digital labor of the crowds. Crowdworkers certainly do not enjoy a spotlight in the recent AI hype. Crowdwork companies have a better chance of attracting investment if they emphasize their “technological” side and give little weight to the labor-intensive side of their operations. Lily Irani (2015a) has written an experience regarding this in a panel:

> At one industry panel, a crowdsourcing startup CEO discussed thequestion, “Am I a labor business or a SaaS [software-as-a-service] business?” In response, a venture capital (VC) investor responded, “SaaS has a higher multiplier inthe market. I was hoping it was a technology company and not a labor company when I invested! (11)

The companies’ reluctance to establish themselves as workforce managers are related to their tendency to avoid legal responsibilities of minimum wage and labor protections and their wish to be perceived as AI-related technology firms to attract more investments. However, this invisibility is reinforced by a specific form of “human-machine hybridization.” The inseparability of humans and the algorithm supplements a perception that crowdwork is not really labor and that the crowdworkers are not workers, just like the other “gig-economy” platform workers. Concerning other platform works, the management of the workforce is still complicated through the optimizing algorithms built to maximize surplus extraction. This also contributes to an understanding that legal and social regulation of crowdwork and other forms of platform labor is not really needed (De Stefano 2016). This “absence of traditional forms of management “manifested in the lack of physical managers and legal regulations does not create a situation in which workers become autonomous with respect to productive processes. They are still subjugated

to the rules of algorithmic management. As shown in the research that has been covered in the thesis, the workers in the gig economy suffer from a lack of communication with the "human managers." They are in the dark regarding the mechanism of the decision of the algorithms managing their work, including assigning tasks, rejecting the work, and canceling payment.

Crowdworkers engage with labor that is later objectified through feedback loops in the Machine Learning models and experience an instance of human-machine hybridization that is characteristic of "relational technologies that are able to learn." However, they are far from being in control of the production process as in having the "knowledge" of the reality concerning the productive process, even its ultimate result, and they are not also able to command the technology that is involved in labor. Crowdworkers do not have comprehensive information on the technical nature of Machine Learning production or the economic and social purposes of the AI projects that ultimately overlap with capitalist production. Therefore, even if the "separation of human beings and machines is lacking" at the immediate site of production, as in the case of human APIs that are crowdworkers, that does not result in a situation where crowdworkers can potentially reappropriate fixed capital.

Moreover, it should be noted that data labeling is also under the efforts of automation. As noted, data labeling or human-in-the-loop processes are established as a part of supervised machine learning. However, there are three main categories of machine learning: supervised, unsupervised, and reinforcement learning. (Dyer-Witheford 2019, 14) Supervised machine learning is the most common and effective technique. Yet, labeling has required a lot of human labor, and some new techniques have been developed to diminish the necessary digital manual labor. "Unsupervised learning is an important research area because unlabeled data is a lot easier and cheaper to find" (Alpaydın 2016, 117). In unsupervised machine learning, there is no predefined output, only the input data. Since there is no predefined output, there is no need for supervision, but the aim is to find regularities in the data to see what happens (Alpaydın 2016, 112). It has been noted that for some experts in deep learning, which is a subcategory of machine learning that relies on neural networks, the future of ML resides in unsupervised machine learning because it mimics the learning paths of animals and humans who do not need to be told what everything is

called to learn but requires observing. (Dyer-Witheford 2019, 14) There are some other techniques that aim to reduce or completely erase the need for data labeling. Some of them are semi-supervised and self-supervised machine learning that makes use of both labeled and unlabeled data sets.

Automatic labeling, synthetic data generation, and feature learning are also being developed to diminish the need for human data labelers. An investor of MightyAI, which is a specialist AI data company, S. "Soma" Somasegar, says: “Humans will be in the loop for a long, long, long time to come.” (Nakashima 2018) A machine learning expert, Trevor Darrel, estimates that it could take ten years before algorithms could perform without the need for ground truth data. Particular venture capitalists are also investing in crowdwork platforms that make data labeling faster and more efficient, even if they are not completely automated. (Nakashima 2018) Although these techniques are not entirely effective and are only in the development stage, these processes prove that data labeling is trying to be automated. The question of whether data labeling will become obsolete in the future still remains. Labeled ground truth data may still be needed for some areas even if techniques become advanced. Currently, supervised machine learning is still the dominant approach in ML, and as long as it stays that way, human data labelers will still be critical to the process of Machine Learning.

The automation of data labeling is, even currently at the stage of development, further evinces that human-machine hybridization is not the way to “reappropriation of fixed capital” rather it is just a step towards more automation. Especially if the technique called “synthetic data generation” and automatic data labeling” is achieved, these techniques could indicate a whole new technological dimension in which the AI data sector could eliminate its reliance on living labor.

Even if data labeling could not be automated in the near future or could not be automated at all, the human-in-the-loop process demonstrates that living knowledge does not need to be strictly codified to be absorbed by machines. Machines could just resort to humans acting like algorithms for the completion and learning of some tasks that could not be performed by them. Human-in-the-loop demonstrates an instance of human-machine hybridization in which the machines dynamically objectify living knowledge through feedback loops. In this process, living labor is actually

commanded by dead labor in the machines, and this hybridization does not grant the possibility of appropriation of fixed capital by living labor but the other way around.

# CHAPTER 5

# CONCLUSION

In this thesis, the purpose was to question and problematize the assertions of autonomist Marxists that claim a particular mutation in the capital and labor relationship based on the centrality of cognitive labor. Detailed analysis of the autonomist Marxist paradigm demonstrates that the centrality of cognitive labor is heavily related to understanding new technologies as relational and dynamic. Computerization and digitalization are interpreted as linguistic networks that enable the anthropogenic mode of the economy that primarily relies on human activities and social life. Therefore, they assert that in the age of cognitive capitalism, real subsumption of labor under capital loses its centrality along with abstract labor. The knowledge-power relationship is transformed to the degree that the industrial division of labor that is manifested in real subsumption becomes obsolete in the cognitive stage of capitalism.

In the old industrial paradigm of the division of labor, the polarization of knowledge resulted in the dichotomy of dead labor in machines and living labor in the workforce. In the stage of cognitive labor, the hierarchy between dead labor and living labor is overturned; now, relational machines depend on human knowledge to be functional. This presents a mutation of real subsumption and marks the primacy of living knowledge as opposed to dead knowledge in the machines.

Following this analysis, they propose the dematerialization of fixed capital understood in the industrial paradigm and claim that its productive powers are transferred to the living knowledge of the workers. This created a situation in which fixed and variable capital can not be differentiated and defined as human-machine hybridization. This kind of hybridization is considered potentially emancipatory for workers and paving the way for the reappropriation of fixed capital.

As a counter-example of the emancipatory possibilities related to human-machine hybridization, a particular form of digital labor called crowdwork was analyzed. The

elaboration of crowdwork as an instance of human-machine hybridization further exposes the nature of Machine Learning that depends on big data, which has become the central technique behind AI. The analysis of crowdwork is convenient for demystifying AI since it brings light to the labor-intensive, invisible side of producing Machine Learning algorithms.The obvious traces of real subsumption in the parcellation of the crowdwork suggest that ML may not be radically different than industrial machines in their role in the production process and their overall role regarding the division of labor.

The second chapter engages with the reality of crowdwork as a technical component of data refinement and the demographics and experiences of the crowdworkers. The discussion on the technical relevance of crowdwork as human computation and its historical progress manifested in the emergence and transformation of crowdwork platforms demonstrates the way that the internet has become a sphere of extraction of digital labor of online masses. Digital labor of online masses, which is the creation of content in the digital sphere, culminated in the concentration of big data and machine learning. The crowdwork, which involves data labeling for training the MLalgorithms, is the consequence of the nature of big data analysis, which is imperative to contemporary capitalism.

Furtherly, the conditions and demographics of the crowdworkers, their financial situations, motivations for the work, and the challenges they face illustrate the tendency of data-related precarious digital work extending to the underdeveloped parts of the world and to the people who are not able to formally join the workforce because of various health problems and care duties. Examining the crowdworkers' experiences illuminates the troubles of algorithmic management, another form of human-machine hybridization where the managers are the algorithms. Algorithmic management is leveraged by digital platforms to bypass legal obligations to employees with the implication that they only provide technological infrastructure as intermediaries and do not manage a workforce. This fact shows that the inclusion of technology in the work eradicates traditional labor relations, albeit not in the emancipatory way claimed by post-Operaismo.

In the third chapter, a comprehensive discussion of post-Operaismo was provided. The initial paradigm of operaismo and its transformation into the post- Operaismo was explained. Since the post-Operaismo paradigm is influenced by Marx's Grundrisse, the significance of Grundrisse and its impact that created a divergence in the understanding of the role of machines was explained. In the Grundrisse, Marx contemplates the rationality of the capitalist deployment of machines and posits a situation in which the general intellect of the society is objectified in the machines, making direct extraction of abstract labor meaningless while simultaneously positing labor time as a measure of wealth. Therefore, capitalist production works toward its own end. This line of thinking inspired the accelerationists and the post-Operaismo, emphasizing autonomy and immaterial labor. Post-Operaismo regards the new technologies as different than industrial machines and posits that, as opposed to abstract labor, immaterial labor is considered inherently cooperative. Post-operaismo's fixation on immaterial labor, cooperation, linguistic networks, living knowledge, and the sublation of real subsumption derives from their notion of relational technology that depends on living knowledge.

However, the next chapter aims to demonstrate that, although ML depends on living knowledge, that does not mean that objectification of living knowledge in ML does not occur. The fact that living knowledge can rejuvenate the objectified knowledge in ML, in fact, does not preclude an antagonistic relationship between living labor and machines. In order to demonstrate that, various deployments of narrow AI in the economy are explained to show how narrow AI is already effective in the automation of some forms of jobs and the displacement and modification of others apart from crowdworking. The various labor processes are transformed and re-arranged according to the capabilities of narrow AI, suggesting a continuation and intensification of real subsumption. In this chapter, the nature of ML is thoroughly discussed against the arguments of cognitive capitalism theory. Initially, the history of AI and its culmination in ML that feeds on data is explained. The historical development of AI demonstrates the different epistemological logics behind human intelligence. Crowdwork, where people act like algorithms to train machines, is directly related to the epistemological logic that depends on big data.

Further, the questions regarding subsumption and autonomy are analyzed in the case of crowdworkers to illustrate the nature of exploitation concerning crowdwork. Crowdworkers engage in diverse forms of tasks involving the functioning of different cognitive and cultural capabilities. Formally unproductive activities such as speaking in a native language and being able to differentiate hate speech or pornography are salaried, exhibiting the conditions of formal subsumption. However, parcelled microtasks designed for efficiency and arranged for the mechanisms of algorithms evince the conditions for real subsumption. This co-presence of formal and real subsumption is called "life subsumption" by Fumagelli (2019). However, his assertions that tie life subsumption with the overturning of the hierarchical relationship between living knowledge and dead knowledge in the machines are not valid in terms of crowdwork in which the living knowledge of the worker is shown to be commanded by dead knowledge in the machines. Moreover, crowdworkers perform labor entirely on the basis of the requirements for developing machine learning algorithms. They act like algorithms, managed by them provide training data for them. In the production process their living knowledge is commanded by algorithms to serve for the needs of machines. This could be interpreted as the intensification of real subsumption because not only do crowdworkers perform menial parceled work designed for efficiency and extraction of relative surplus value but their labor exists in concordance with the needs of machines.

Lastly, the assumptions of cognitive capitalism theorists on human-machine hybridization and crowdwork are considered. In this part, human-machine hybridization is shown to be a direct factor that enables the conception of crowdworkers as algorithms. This contributes to the dehumanization of the crowdworkers while making it possible for crowdwork platforms that actually manage the workforce that labels training data to present themselves as AI companies. This presentation is reinforced by the new AI branding that attracts new investment. Overall, the human-machine hybridization that promises the reappropriation of fixed capital by workers is not detected in the case of crowdwork. On the contrary, the inseparability of machines and humans created dehumanization of the workers and deprivation of their legal rights while the platforms intentionally obscure their labor-intensive operations to attract more investment with the allure of technology.

This thesis aims to provide an account of ML as fixed capital in the current capitalist paradigm by examining the theoretical tools of cognitive capitalism theory in the specific case of crowdwork. Crowdwork exposes critical points regarding ML, such as how living knowledge is codified in ML and how the classification of big data is essential for its successful operation. It demonstrates that human-machine hybridization regarding ML is deployed for more automation of social intelligence, and knowledge polarization is inherent in the AI industry.

The technical explanations regarding computer science and machine learning were provided on the basis of the writings by experts. These technical explanations are later operationalized to analyze the human-machine relationship in the production process. From a sociological perspective, it is clear that machine learning is deployed to accelerate circulation and maximize surplus extraction. In its production process, an intensified real subsumption can be observed in the stage of preparing data. Knowledge polarization in the artificial intelligence industry manifests in the work of software developers and crowdworkers who experience "human-machine hybridization" as invisibility.

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## A. TURKISH SUMMARY / TÜRKÇE ÖZET

Bu tez, otonomist Marksizmin güncel kapitalizmde insan -makine ilişkisine dair eleştirel bir bakış sunmaktadır. Tez, bu eleştirisini dijital bir emek biçimi olan ve makine öğrenmesi için eğitme verileri sağlayan kitle bazlı çalışmanın incelenmesi aracılığıyla yapmaktadır. Kitle bazlı çalışanların makine öğrenmesi algoritmalarıyla olan ilişkilerinin detaylı analizi aracılığıyla, tez, kitle bazlı çalışmanın reel bağımlılığın yoğunlaşması olduğunu savunmaktadır. Bu tezde eleştirel okuması yapılan otonomist Marksizim aynı zamanda "bilişsel kapitalizm teorisi" ve İtalyan "Operaismo" geleneğinin farklılaşmış hali olduğu için "post-Operaismo" akımlarıyla birlikte anılmaktadır. Bu üç akım birbirlerini besleyen ve sermaye- emek ilişkisi, maddi olmayan/bilişsel emeğin merkezi konumu, toplumsal iş bölümünün dönüşümü, yeni kapitalist aşamada sermayenin üretim süreçlerine olan etkisi ,sabit kapitalin kollektif işçinin bilgisel birikimine dönüşmesi ve Marks'ın değer teorisi gibi konularda, nüans farklılıklarıyla benzer pozisyonlar almışlardır. Bu tezde, söz edilen nüans farklılıkları da göz önünde bulundurularak, bu teoriler bütününün , özellikle, üretim sürecinde çağdaş makineler ve işçiler arasındaki ilişkileri ele alması eleştirilmiştir.

Otonomist Marksizm "maddi olmayan emek" kavramı üzerinden sermaye ve emek arasındaki sömürgeci ilişkinin bir çeşit mutasyona uğramakta olduğunu ve bu mutasyonun kapitalizmde yeni bir dönemin eğilimsel başlangıcını vurguladığını iddia etmektedir. Bu çerçeveye göre maddi olmayan /bilişsel emeğin hegemonikleşmesiyle, insanlar ve makineler arasındaki, üretici ve üretici olmayan emek arasındaki keskin ayrımlar bilişsel kapitalizm döneminde geçerliliğini kaybetmeye başlamıştır. 1970' lerin sonundan başlayarak Fordist kalkınma rejiminin ileri kapitalist ülkelerde girdiği krizi bir milat olarak alan otonomist Marksistler, bu krizden sonra kapitalist stratejinin değiştiğini ve üretim ilişkilerinin fabrikanın duvarlarını aşarak tüm topluma ve sosyal ilişkilere genişletildiğini iddia etmektedir. Ücretli emeğin yaygınlaşmasıyla değişen baskın işçi sınıfı öznelliğine dikkat çeken bu teorisyenler aynı zamanda üretim ilişkilerinin fabrikayı aşmasıyla, endüstriyel kapitalizm bağlamında ele alınan değişmeyen sermayenin üretim sürecindeki birincil

rolü ve buna bağlı olarak gelişen reel bağımlılık tipi sermayesel boyunduruğun merkezi önemini yitirdiğini savunmaktadır. Otonomist Marksist yaklaşımın, Marksist temel kavramlar üzerinden yaptığı yeniden okumaları ortaya koyabilmek için Marks'ın değişmeyen sermaye, sabit sermaye, biçimsel ve reel bağımlılık ve makineler üzerine yazdıklarını değerlendirmek gerekiyor.

1970'lerde Marks'ın daha önce Avrupa dillerine çevirlmeyen "Grundrisse" adlı eseri, İtalyanca, Almanca ve İngilizceye çevrilmiştir. İleri kapitalist ülkelerde bilgisayarlaşmanın yaygınlaştığı dönemlere denk Grundrisse okumaları ,özellikle Makina Üzerine Fragmanlar bölümü, otonomist Marksistlerin bu eseri bir çeşit "ileri teknoloji kapitalizmin öngörüsü" olarak değerlendirmesiyle sonuçlanmıştır (Dyer-Witheford et al., 2019). Otonomist Marksistler, Makina Üzerine Fragmanlardan etkilenen tek post-Marksist grup değildir, sol akselarasyonist akımlar ve "tam otomatik lüks köminizm" gibi kavramların ortaya çıkmasında da Marks'ın bu eserinin yorumlanması etkilidir. Fakat sol akselarasyonist akımlarda görülen tam otomasyonun insan emeğine olan ihtiyacı elimine edeceği ve komünist bir topluma doğru kopuşu başlatabileceği fikri Otonomist Marksizmin sermaye- emek ilişkilerinde, canlı emeğe biçtiği belirleyici rol ile bağdaşmayan niteliktedir. Makine Üzerine Fragmanlardan etkilenen ve çağdaş teknolojilerin özgürleştirici potansiyellerine vurgu yapan iki grup olmalarına rağmen, Otonomist Marksizmin çağdaş kapitalizmde tarif ettiği sermaye-emek ilişkisi ve Grundrisse okuması sol akselarasyonist akımlardan farklıdır.

Otonomist Marksizme göre de, doğrudan soyut emeğin ve emek zamanın sömürülmesi, bugünün kapitalist aşamasında merkezi değildir fakat bu iddia, teknojilerin otomosyon potansiyellerinin daha belirleyici olduğu kabülünden doğan bir çıkarım değildir. Bu tezde teorik çerçeveleri konu eline Otonomist Marksistler, iş birliği potansiyelini kendinde barındıran canlı bilginin, kolektif sosyal işçinin, maddi olmayan emeğin üreticisinin üretim sürecindeki artan kontrol ve otonomisine vurgu yapar. Bununla bağlantılı olarak sabit sermayenin maddeselliğini kaybederek canlı bilginin ağlarında kendini var ettiğini ve sabit sermayenin maddesel ve statik olmayan bir nitelik kazandığını ifade eden bu teorisyenler, endüstriyel kapitalizmin sabit sermayesinin üretici güçlerinin " emek gücünün yaşayan vücuduna" aktarıldığını iddia eder (Fumagelli 2019,76).

Otonomist Marksistlerin, “değişmeyen sermaye” yerine “sabit sermaye” terimini kullanmaları ve bazen birbirlerinin yerine geçecek şekilde aynı anlamda kullanmaları, bu teorisyenlerin Marks’ın çağdaş kapitalizmin kavranması için en etkili araçları ürettiğini düşündükleri Grundrisse’nin dilinden etkilenmeleri ile ilişkilendirelebilinir. Marks (1976) Grundrisse’de “değişmeyen sermaye” (constant capital) yerine, “sabit sermaye” (fixed capital) ifadesini kullanmıştır.

Marksist paradigmaya göre, değişmeyen sermaye- değişen sermaye ve sabit sermaye- akışkan sermaye ayrı ikiliklerdir ve farklı çelişkelerin sonucunda anlamlarını bulurlar. Değişmeyen sermaye, tüm üretim araçlarıdır. Canlı emek gücü olmayan her üretim aracı değişmeyen sermayenin( c) bir parçasıdır. Bu araçlar somutlaşmış ölü emektir. Emek gücü için ayrılan ücretler ise değişken sermayedir. Bu ayrım, değer üretimindeki rol ile ilişkilir. Degiğşmeyen sermaye, artı değer üretimine bir katkı sunmaz ve kendi halihazırda içerdiği değeri giderek zayıflayan bir ölçüde emtia’lara aktarır. Değişmeyen sermaye, örneğin makineler, yeni bir değer yaratmazlar, ancak değişken sermaye ile ilişkiye girdiklerinde artı değer yaratımı gerçekleşir. Değişken sermaye ise daha önce var olmayan artı değer yarattığı için bu ismi almıştır. Burada kast edilen kullanım değeri değil, değişim değeridir.

Sabit sermaye- akışkan sermaye ilikiği ise, sermayenin dolaşım formu ile ilgilidir. Sabit sermaye, üretim sürecinin sonunda kendi bağımsız kullanım formunu koruyan sermaye biçimidir, akışka sermaye ise bir üretim süreci boyunca tamamen kullanlıp tükenen ve yenilenmesi gereken sermaye biçimidir (Marx 1992). Marks (1992) değişmeyen sermaye ve sabit sermaye arasındaki farkı ham ve yardımcı maddeler üzerinden anlatmaktadır. Bu çeşit sermaye, artı değer üretiminde etkin olmadığı için değişmeyen sermayedir fakat bir üretim sürecinde kullanım formunu korumadığı ve yenilenmek durumunda olduğu için akışkan sermaye kategorisine aittir.

Otonomist Marksistlerin değişmeyen sermaye yerine sabit sermaye kullanmalarının sebebinin Marks’ın değer kuramına getirdikleri güncel itirazlarla alakalı olup olmadığı kesin değildir. Fakat yüksek teknoloji kapitalizminin bir öngörüsü olarak kabul ettikleri ve Marks’ın klasik değer kuramına Marks’ın kendi mantığı içerisinden bir yanlışlama olarak değerlendirdikleri Grundrisse’deki “sabit kapital” kullanımını makineleri ifade etmek için kullanmışlardır. Tezde sıkça konu alan Negri, Hardt, Vercellone ve Boutang gibi otonomist Marksizm ve bilişsel kapitalizm teorisinin sembolik isimlerinin Marks’ın klasik değer teorisinin geçerliliğini kaybettiği iddiası

doğrudan “Makina Üzerine Fragmanlar” bölümüyle ilgilidir. Daha anlaşılır bir bağlam kurabilmek için Marks’ın Kapital’deki makineler üzerine olan teorik yaklaşımıyla, Makine Üzerine Fragmanlar’daki yaklaşımlarını karşılaştırmak gerekiyor.

Marks’ın (1976) makineler üzerine düşüncelerini kapsamlı olarak Kapital’in 1. cildinde, 15. bölümde bulmak mümkündür. Emeğin üretkenliğini arttırmaya yönelik rasyonalite ile geliştirilen endüstriyel makineler sistemi, işçinin kendisi için çalıştığı zamanı azaltıp, işçinin artı değer ürettiği zamanı arttırmaya yöneliktir. Bu sebeple makinelerin toplumsal fonksiyonu, “göreli artı değer” üretimidir. Buna göre “mutlak artı değer”, endüstriyel dönem öncesi, sermayenin işçilerin üretkenliğini arttırmak için salt çalışma gününü uzatmasıyla elde edilen artık değerdir. Sermayenin üretkenliği arttırmak için, üretim sürecinin doğasında dönüştürücü eylemlerde bulunması ve bilimsel olarak üretkenliği arttıran makineler sistemini üreticim sürecinde başat role getirmesi ise çalışma gününü uzatmadan elde edilen “göreli artı değeri” mümkün kılmıştır.

Mutlak artı değer ve göreli artı değer kavramları aynı zamanda biçimsel bağımlılık ve reel bağımlılık kavramlarıyla da ilgilidir. Buna göre biçimsel bağımlılık söz konusu olduğunda, sermaye kendinden önce var olan, daha arkaik formlar tarafından geliştirilmiş emek türlerini ücretlendirir ve biçimsel olarak kendine bağımlı kılar. Burada, üretimin süreçlerine hakim olan işçilerin merkantalist ve finansal sermayeye bağımlılığı ücrete duyulan ihtiyacın ötesine geçmez.Üretim süreçleri bu biçimde içeriksel ve teknik olarak dönüşüme uğramamıştır. Reel bağımlılık söz konusu olduğunda ise, üretim srecinin doğası dönüşmüştür. İşçilerin emek süreçleri tamamen makineler sistemine bağımlı kılınmıştır. Tam endüstriyelleşme öncesi imalat döneminde, iş bölümünün başlangıç noktası işçilerin kabileti ve etkinliğiydi ve manuel araçlar da onlara göre ayarlanırdı. Fakat makineler sisteminin etkin olduğu dönemde işçiler değil makineler başlangıç noktasıdır. İş bölümü ve araçların işlevselleştirilmesi makinelerin kabiliyet ve kapasitesine göre ayarlanmıştır. Reel bağımlılıkta usta işçi figürü, kitlesel işçi figürüne doğru dönüşmeye başlamıştır. İşçilerin üretime dair özgün bilgileri ve üretim sürecindeki göreli bağımsızlıkları, makinelerin üretim sürecine dahliyle arka planda kalmıştır. Bu sebeple reel bağımlılıkta söz konusu olan sadece işçilerin yaşamını devem ettirmek için ücrete

ihtiyaç duyması değil aynı zamanda işçinin üretebilmek için büyük ölçekli makineler sistemine bağımlı kılınmasıdır. Bu dönemde üretim süreci parçalara ayrılmış, her parça kendi içerisinde verimlilik amacıyla bilimsel olarak incelenmiştir. Bu yüzden bu dönemde Marks (1976), iş bölümün subjektif niteliğini kaybederek objektf bir niteliğe büründüğünü vurgulamaktadır (502).
Bununla birlikte büyük ölçekli makineler sisteminin işleyebilmesi için, teknik bir gereklilik olarak toplumsal bir iş bölümü gerekmekteydi. Yükselen verimlilik aynı zamanda daha fazla emek gücünün harcanmasını gerektirdi. Çünkü makineler değerle donanmış olsalar da diğer bütün değişmeyen sermaye gibi yeni değer üretemezler sadece bulundurdukları değeri emtia'lara aktarırlar. Bu durumda makineler toplumsal olarak gerekli emek zamanını azaltmak fonksiyonu ile üretilmiş olsalar bile, artı değer üretiminin artması için makinelerin insan emeği ile etkileşime geçmesi gerekir.

Bu durum, kapitalizmin yapısal çelişkilerini kaçınılmaz kılan bir unsurdur. Makineler toplumsal olarak gerekli emek zamanını düşürmek için üretime entegre edilir fakat bu, daha az emek gücüne el konulmasına yol açar. Daha ez emek gücüne el konulması, üretilen ürün için değişim değerinn azalması anlamına gelmektedir. Makinenin her ürüne aktardığı değişim değerinde bir azalma görülmesiyle, ürünlerin her biri daha ucuz dolayısıyla daha az kar getiren bir niceliğe bürünür. Bu durum "Kar oranlarının düşme eğilimi" olarak adlandırılır. Kar oranlarının düşme eğilimi "sermayenin organik bileşimi" kavramıyla ilintilidir. Sermayenin organik bileşimi, temel olarak, değişmeyen sermayenin, değişken sermayeye oranıdır (C/V). Sermaye, insan emeğine olan ihtiyacı azaltıp, ücretleri düşürmek isterken rekabetçi doğasının da etkisiyle makine üretimini, dolayısıyla organik bileşimini arttırır. Fakat bu durum, kalan her şey sabit kabul edildiğinde, üretimi arttırıken ücretleri düşürür. Dolayısıyla alım gücü ve fazla üretilen emtia'lar arasında bir dengesizlik oluşturur. Düşen kar oranları ve sermayenin organik bileşimi Marks'ın sermayenin makineleşme sonucu yaşayacağı çelişkilerini tarifleyen kavramlardır.

Makinelere yaklaşımı açısından, Marks'ın Kapital'deki makine anlatımıyla, Makine Üzerine Fragmanlar'daki değerlendirmeleri, günümüzde farklı yorumlamalara sebep olmuştur. Makineler Üzerine Fragmanlar'da Marks, kapitalizmin makineleşme mantığını sonuna götüren ileriye dönük bir tahayyül ortaya koyar. Bu metinde, büyük

ölçekli makine sisteminin geleceği gelişmişlik seviyesini göz önünde bulunduran Marks(1973), üretimin makineler sistemi geliştikçe gittikçe daha az doğrudan emek-zamanın sömürüsüne dayanacağını ve bunun yerine artan bir şekilde " bilimselliğin genel durumuna, teknolojik ilerlemeye ve bilimin üretime uygulanmasına" bağlı olacağını ifade eder (705). Eğer sabit sermaye, kolektif toplumsal bilginin ve genel akılın topyekün somutlaşması formuna dönüşürse, Marks'a göre bu durum, işçilerin soyut emeğine olan ihtiyacı ve bu emeğin merkeziliğini aşındıracaktır. Fakat kapitalist sistem servetin ölçüsünü emek zamana dayandırmaya devam ettikçe ortaya çelişkili bir durum çıkar. Bu nedenle Marks'a göre sermaye kendi var oluş koşullarınının altını oyan bir rasyonalite ile ilerlemektedir. Buna ek olarak, Marks bu metinde üretken güçlerin gelişmesinin kaçınılmaz olarak boş zaman yaratacağını ve bu boş zamanın bireyin gelişmesinde etkili olacağını söyler. Entelektüel kapasitesiyle birlikte, üretim ve yaratım kapasitesi de güçlenen bireyler daha sonra kendileri "üretken güçlere" dönüşecektir. Bu durumu Marks (1973) "sabt sermayenin insanlaşması" olarak tanımlar (712). Grundrisse'den etkilenen otonomist Marksistler de doğrudan emek zamanının sömürüsüne dayanmayan maddesel olmayan emeğin merkezi olduğu, sabit sermayenin kolektif işçilerin yaşayan bilgisine dönüşmekte olduğu post-endüstriyel kapitalizm kuramını bu metine dayandırmaktadır.

Otonomist Marksist yaklaşıma göre, sınıf savaşınının doğrultusunu belirleyen unsur semayenin yapısal çelişkileri değil, işçi sınıfının direnme pratikleridir. Bu yaklaşım, 1950'lerde İtalya'da bir grup entelektüelin ortodoks Marksizm eleştirisinden doğmuştur. İtalyada "Operaismo" yani işçilik olarak bilinen bu akıma göre, üretici güçlerinin gelişmesi ve otomasyon teknolojileri, işçilerin kazandığı toplumsal güçlere, grev ve sabotaj gibi kolektif siyasal faaliyetlere karşı sermaye tarafından geliştirilen silahlardır. Bu yaklaşım, teknolojik gelişimin nötr ve sadece bilimsel olarak algılanmasına karşı çıkarak, teknolojinin sermayenin silahı olduğu nosyonunun Marks'ın (1976) yazılarında var olduğunu vurgular: " 1830'dan beri gerçekleştirilen bütün buluşların tarihini, sadece işçi sınıfının ayaklanmalarına karşı sermayeyi silahlandırma amacıyla gerçekleştiğini gözeterek yazmak mümkündür."(563) Bu fikirden yola çıkarak, sınıf savaşımında işçilerin kolektif gücünün ve eylemlerinin, sermayenin politikalarını belirlediğini iddia eden otonomist Marksistler, üretken güçlein ilerlemesinde belirleyici olanın işçiler ve sermaye arasındaki çelişki, mücadele olduğunu ileri sürer. İşçilik akımının tarihsel kavrayışı, "mücadeler döngüsü" kavramıyla ifade edilebilinir. Mücadeler döngüsüne göre,

sermaye ve işçi sınıfı birbirlerinin stratejilerine cevap vererek dağılır, toplanır, dönüşüme uğrar ve gelişir. (Dyer-Witheford 1999). Bununla bağlantılı olarak işçilerin gerçekliklerinin ve sermaye ile girdikleri ilişkilerin ve stratejilerin daha fazla incelenmesi gerektiğini düşünen bu teorisyenler, klasik Marksist bir konsept olan "sermayenin organik bileşimi" ne karşı "sınıf bileşimi" terimini formüle ettiler. Sınıf bileşimi kavramıyla vurgulanmak istenen şey, sermayen dönüşüme uğradıkça, sınıfın da dönüşüme uğradığı ve sınıfın beklenmedik, yeni özellikler kazanarak direniş potansiyellerinin de arttığıdır. Bu nedenle bu akım sabit ve statik bir üretken emek biçiyle birlikte, sabit ve değişmez bir işçi sınıfı tanımını da reddeder. Daha sonra işçilik akımı post-işçilik akımına doğru evrilmiş ve bu akımın en sembolik isimleri olan Hardt ve Negri (1994) yeni bir işçi sınıfı öznelliği tanımlayarak buna "çokluk" (multitude) adını vermiştirler. Çokluk maddesel olmayan emeğin üreticisi olan evrensel bir sınıftır.

Maddesel olmayan emek, Hardt (1999) tarafından "hizmet, bilgi ya da iletişim gibi maddesel olmayanı üreten emek" olarak tanımlanmıştır (94). Vercellone (2007) ise " işin bilişsel boyutlarının emek gücü tarafından yeniden temellük edilmesi" olarak daha ayrıştırıcı bir tanım ortaya koymuştur. Bu kavram afektif emek biçimlerinden (bakım, duygusal emek), entülektüel üretime kadar birçok iş biçimini tanımlasa da, bilgisayarlaşma ve dijitalleşmenin yaygınlaşmasının ve bu teknolojilerin sağladığı iletişim ve iş birliği olanaklarının, bu teorisyenleri yoğun olarak etkilediği açıktır: "Günümüzde; üretkenlik, servet ve toplumsal artık değer üretimi, linguistik, iletişimsel ve afektif ağlar aracılığıyla iş birlikçi etkileşim biçimini almıştır." (Hardt, Negri 2000, 294). Maddesel olmayan emeğin doğrudan iş birliğini ve iletişimi içerdiğini iddia eden bu teorisyenlere göre, üretim sürecinde işçilerin sermayeden özerk olduğunu fakat yaşamak için emeklerini satmak zorunda olduklarını vurgular. Buna göre, reel bağımlılık biçimsel bağımlılığa dönüşmüştür.

Yeni, ilişkisel ve dinamik teknolojilerin üretim sürecinde işçilerle olan ilişkisinin endüstriyel kapitalizm döneminden farklı olduğunu ortaya koyan otonomist Marksist yaklaşıma göre, bu teknolojiler ilişkisel "lingusitik ağlar" olması sebebiyle "canlı" kolektif toplumsal bilgiye bağımlıdır ve onun tarafından devamlı bir dönüştürülme ve değişim halindedir. Böylece sabit sermayenin genel aklıla dönüşerek maddeselliğini yitirdiğini ortaya koyan otonomist Marksist çizgi, bununla bağlantılı olarak "reel bağımlılığın", endüstriyel kapitalist aşamada olduğu gibi var olmadığını

da savunur. Bu teorisyenlere göre, reel bağımlılık eski merkeziliğini yitirmiştir ya da artık sadece üretim sürecinde var olan bir iktisadi boyunduruk değil, tüm toplumsal ilişkilere yayılmış ve ayırıcı niteliğini kaybetmiştir (Vercellone 2006; Negri, Hardt 2018a). Buna göre, yüksek teknolojili çağdaş kapitalizmde işçiler, endüstriyel dönemde olduğu gibi sadece makinelerin birer aparatı olarak etkinleşen bir değişken sermaye olarak ele alınamaz. İşçilerin canlı bilgisi, üretim sürecinde esas olan unsur haline geldiği için artık makinelerdeki ölü emeğin, canlı emeğe kurduğu dominasyon tersine çevrilmiştir. İlişkisel ve dinamik teknolojiler canlı bilgi birikimine sürekli bir ihtiyaç duyduğundan canlı emekle kurdukları düşmanca ilişki artık geçerli değildir. Fumagelli'ye (2019) göre de işçiler artık aynı anda " hem sabit hem değişken sermaye" haline gelmiştir (80). Bu çerçevede Fumagelli çağdaş kapitalizmde hem reel hem de biçimsel bağımlılık tipinin birbirini tamamlayıcı ve yeni bir biçimde var olduğunu ortaya koyar. Buna göre daha önceden ücretli emek alanında olmayan kültürel ve afektif üretimlerin ücretlendirilmesi biçimsel bağımlılığa uyumludur. Reel bağımlılık ise özgün endüstriyel verisyonundan farklı bir şekilde hala yürürlüktedir. Mekanik teknolojilerden dinamik teknolojilere geçilmesi sonucu manuel işlerle, bilişsel aktivitelerin birleştirilmesi sonucu verimliliğin arttırılması bir çeşit reel bağımlılıktır. Fakat bu çeşit reel bağımlılıkta da makineler işçilerin canlı bilgisine bağımlıdır.

Bilgisayar destekli imalat gibi örneklerde, bu teknoljilerin etkin kullanımı için yetkin işçilerin var olması gerektiğini vurgulayan Fumagelli (2019), bu teknolojilerin canlı bilgiye olan bağımlılığının klasik işçi-makine ilişkisini tersine çevirdiğini vurgular. Bu teorik kavrayışa göre, canlı bilginin sabit sermayede maddeleşemez ve somutlaşamaz, kolektif bilgiye ihtiyaç uyar ve bu sebeple endüstriyel kapitalist dönemin "statik" makinelerinden farklı olarak işçiler üzerinde mutlak bir hakimiyet kurmaktan uzaktır. Hardt ve Negri (2017) bu teorik çizgiyi pekiştirerek, çağdaş teknolojilerin yapısının ve merkezileşen maddesel olmayan emeğin bir çeşit "insan-makine hibridizasyonu" yarattığını ve bu hibridizasyonun işçilere potansiyel olarak özgürleştirici imkanlar sunduğunu iddia eder. Bu hibridizasyonun işçiler tarafından "sabit kapitalin yeniden temellük edilmesinin" mümkün kıldığını belirtir (Hardt, Negri 2017, 122).

Otonomist Marksist argümanların değerlendrilmesi için dijital kitle bazlı çalışmanın incelenmesinin önemli sebeblerinden biri , algoritmaların insan gibi davranamadıkları koşullarda, kitle bazlı çalışan veri işçilerinin algoritmalar yerine bu görevleri yerine getirmesi, daha sonra bu çıktıların algoritmik tertibata eklenmesi yoluyla, makine öğrenmesi için eğitme verilerinin üretilmesidir. Bu süreçte kitle bazlı çalışan işçilerin canlı bilgisi doğrudan algoritmik eğitim için değerlendirilir ve bu, canlı bilginin makinelerde somutlaşmasına sebep olur.

Kitle bazlı çalışma dijital platformlar yoluyla, veri toplama, kategorizasyon, düzeltme ve etiketleme gibi işlerin çevrimiçi kitlelere belirli finansal bir karşılıkla atanması olarak tanımlanabilir. Veriler çok kapsamlı ve niceliksel olarak büyük olduğu için, verilerin sınıflandırılması işi yoğun olarak parsellenmiş ve bir görev kitleden herhangi bir insanın yapabileceği şekilde basitleştirilerek sadeleştilmiştir. Bu nedenle bu görevlere aynı zamanda "mikro görev" adı verilir.
Kitle bazlı çalışma, makine öğrenmesi algoritmalarının insani bilişsel görevleri yerine getiremediğinde kullanılan bir yöntemdir. Bu görevler, Law and Ahn (2011) tarafından " algısal görevler ( nesne tanıma, müzik sınıflandırması), doğal dil analizi (duygu analizi, çeviri) ve karmaşık bilişsel görevler (planlama ve akıl yürütme) " olarak tanımlanmıştır (2). Bu görevlerin çeşitliliği, kitle bazlı çalışanların yaptığı çeşitli işlerde kendini gösterir.

Kitle bazlı çalışanlar, sosyal medya sitelerinin zararlı içerikleri ayıklamasında başat bir role sahiptir. Zararlı içerikleri tanımaya programlanmış algoritmaların bir penisi bir baş parmağından ayırt etmesi veya nefret söylemini algılayabilmesi problemli olacağından, kitle bazlı çalışanlar verileri kategorize ederek ve etiketleyerek, ineternet deneyiminin güvenli olmasını ve makine öğrenmesi algoritmalarına "eğitim verisi" sağlarlar (Gray, Suri 2019). Arama motorlarındaki kullanıcı aramalarına verilen reklamların uyumluluğunu da denetleyen kitle bazlı çalışanlar, sonuçlarda sakıncalı çıktıların gözükmemesi (şiddet veya pornografik içerikler) için de kullanılırlar. Bu anlamıyla tüm bir internetin işleyişine verdikleri "görünmez" ve çoğu zaman zikredilmeyen bir emek biçimi olduğu için kitle bazlı çalışmaya "hayalet iş", "yapay zekanın arkasındaki saklı emek" gibi tanımlamalar yakıştırılmıştır. (Gray, Suri 2019; Altenried 2020)

Makine öğrenmesinin tıbbi tanı, sürücüsüz arabalar, çeviri gibi farklı sektörlerde artan kullanımlarıyla, kitle bazlı çalışmanın da yaygınlaştığını ve daha organize bir hale geldiğini görmekteyiz. Gözetimli makine öğrenmesinin bir parçası olan "döngüde insan" tekniği kitle bazlı çalışmanın özünü yansıtan bir terimdir. Bu süreçte kitle bazlı çalışanlar öncelikle veriyi etikitleyip, sınıflandırırarak makine öğrenmesi sistemleri için temsil birimleri oluşturur. Bu temsili birimler makinelerin veriyi anlamlandırması için gerekli olan ilk aşamadır. Bu temsili birimlere "öğrenme verileri" adı verilir. Öğrenme verileri makinelerin örüntü tanımlama işlemini gerçekleştirmesini sağlar. Daha sonra, döngüdeki insanlar algoritmaların ürettiği sonuç verilerinin doğruluğunu denetler. Doğrulukların denetlenmesi mekinelerin öğrenmesini pekiştirir ve ileride bu görevlerin insan yardımı olmadan, otomatik olarak gerçekleştirilmesini amaçlar. Karşılıklı olarak devam eden ve pekiştirilen bu süreç yine algoritmalar tarafından daha etkin ve hızlı olacak şekillerde yapılandırılır ve bu sürece "geri bildirim döngüsü" adı verilir.

Günümüzde "yapay zeka" olarak pazarlanan ve gittikçe yaygınlaşan makine öğrenmesi, internet kullanımının ve dijitalleşmenin getirdiği büyük veri patlaması sonucu mümkün olmuştur (Alpaydın 2016). Bu duruma bağlı olarak, kitle bazlı çalışanların veri sınıflandırması emeğine duyulan ihtiyaç artmıştır. Özellikle, tıbbi tanı ve sürücüsüz arabalar gibi sektörlerde verilerin işlenmesi hayati önem arz ettiğinden, veri işlerinde özelleşen platformlar müşterilerine "kesin referans" (ground truth data) vaat etmektedirler. Kesin referans olarak kabul edilebilecek verilerin hazırlanması oldukça emek isteyen ve uzun bir iştir. Yapılan bir araştırmaya göre, yapay zeka projelerinin en büyük sorunu "veri kalitesi" olarak belirlenmiştir (FRI 2020).Verilerin kalitesi, verilerin uygun bir şekilde kategorize edilip ayıklanmasına yani kitle bazlı çalışanların emeğine bağlıdır. Bu sebeple kitle bazlı çalışmanın yapay zekanın arkasındaki görünmez emek olduğu iddia edilebilir.

Kitle bazlı çalışmanın koşulları ve çalışanların demografisinin incelenmesi için tezde, farklı zamanlarda yapılan niceliksel ve niteliksel çalışmalar baz alınmıştır. Bu çalışmaların sonuçlarına göre, kitle bazlı çalışma küresel birçok bölgede görülse de, çalışanların en yüksek temsiliyete sahip oldukları bölgeler "Hindistan, Endonezya, Brezilya, ABD, batı ve doğu Avrupa" olarak belirlenmiştir (Berg et al. 2018, 31). A. Florian Schmidt'in (2019) yaptığı bir çalışmaya göre de, 2018'de sürücüsüz araba üretimi için makine öğrenmesine eğitim verisi sağlayan bir kitle çalışması

platformunun işçi gücünün yüzde yetmiş beşini, o sene hiper enflasyon yaşayan Venezuellalı işçiler oluşturmuştur (17). Bu çalışmada orta sınıf eğitimli insanların ikamet ettikleri ülkedeki ekonomik kriz ve ulusal kurun değer kaybetmesi gibi sebeplerle, dolar birimi üzerinden para kazanabilecekleri bu dijital iş biçimine yöneldiği görülmektedir.

Bu bulgulara uygun olarak, kitle bazlı çalışanlarla yapılan mülakatlar ve anketlerde de kitle bazlı çalışanların finansal durumunun düzensiz olduğu, sosyal güvenceden yoksun oldukları ve kitle bazlı çalışmaya yönelmelerinin temel sebebinin maddi kazanç olduğu ortaya çıkmıştır. Kitle bazlı çalışanlar içerisinde fiziksel ve mental sağlık sorunlarından muzdarip ya da bakım emeği vermek zorunda olduğu için evini terk edemeyen insanların kayda değer bir temsili olduğunu saptanmıştır (Berg et al. 2018).

Kitle bazlı çalışmanın makine öğrenmesine katkısı, bu süreçteki teknik rolünün ve kitle bazlı çalışanların ekonomik ve sosyal gerçeklikleri incelendiğinde, otonomist Marksistlerin maddesel olmayan emek biçimlerine atfettikleri doğrudan otonomi, iletişim ve iş birliği gibi kavramların bu emek biçimi için geçerli olmadığı görülecektir. Ne var ki daha da önemlisi, kitle bazlı çalışmanın doğası, otonomist Marksistlerin ilişkisel ve canlı bilgiye ihtiyaç duyan makineler üzerine kurdukları argümanları boşa çıkartmaktadır. Otonomist Marksistlerin iddia ettikleri gibi, çağdaş teknojiler endüstriyel makinelerden oldukça farklıdır. Bu farklılık sadece teknik alt yapı ve bilimsel arka plandan kaynaklanmaz. Makine öğrenmesi teknolojisi gerçekten de kollektif bilgiyle sürekli güncellenmesi gereken ve bir anlamda o bilgiye ihtiyaç duyan bir yapıya sahiptir. Kitle bazlı çalışmanın varlığı da bu ihtiyacın bir yansımasıdır. Fakat bu durum kollektif canlı bilginin makinelerde "somutlaşmadığına" ve sabit sermayenin maddesel olmayan bir nitelik kazanarak üretim sürecinde işçilere hakimiyet kurmadığına işaret etmez. Tam tersine, döngüde insan gibi tekniklere makine öğrenmesine sağlanan eğitim verileri işe yaramaktadır. Makine öğrenmesinin yaygınlaşmasıyla kitle bazlı çalışanlara daha fazla ihtiyaç duyulsa da bu işlerin makineler görevleri yerine getirmeyi öğrendikçe, henüz otomatikleştirilemeyen alanlara kaydığı görülmektedir (Irani 2015a). Canlı bilgi hem yazılım geliştiricilerin hem de kitle bazlı çalışanların emek süreçleri sonucunda makinelerde somutlaşmıştır. Bu bilgiler kollektif akılda genişleyip dönüşüme uğradıkça makinelerin güncellenmesi gerekir fakat bu durum canlı bilginin üretim

sürecinde dominasyon kurduğu bir tablo oluşturmamaktadır. Tam aksine, kitle bazlı çalışanların emek süreçleri düşünüldüğünde parsellenmiş mikro görevlerde işin bütününe dair hiçbir bilgiye sahip olmayan çalışanlar ilişkisel, dinamik makinelerdeki somutlanmış bilginin boyunduruğu altındadır. Kitle bazlı çalışmada işin bütün varlığı ve işleyişinin makine öğrenmesi algoritmalarının ihtiyaçlarına göre ayarlanması, dahası işçilerin temelde makinelerin ihtiyaçlarını karşılamak adına çalışmaları, bu dijital emek biçiminin reel bağımlılığın yoğunlaşması olarak tanımlanmasını mümkün kılmaktadır.

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