

3D PRINTERS, THE THIRD INDUSTRIAL REVOLUTION AND THE DEMISE OF CAPITALISM

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ABSTRACT: Recently some authors have discussed the idea that capitalism is nearing its end and will be replaced by a post-capitalist society through the forces created by new technologies. This paper will specifically address 3D printers, which have the potential to change the way manufacturing occurs. This paper will argue that such deterministic arguments, which mirror ideas present at the beginning of the twentieth century, are incorrect in their predictions that they will overthrow capitalism, and are corrosive to radical political action because of the fatalism they engender. It will argue that these notions do not hold up to scrutiny in purely economic focused terms (in an economic analysis based primarily on the economics of Karl Marx's *Capital*), but also are faulty when one acknowledges and analyses the problem from a more complex view of society as argued in Arran Gare's formulation of Hegel's three dialectics within society, and Gramsci's formulation of Ideological Hegemony and the dialectic of consent and domination.

KEYWORDS: 3D Printers, Capitalism, Determinism, Industrial Revolution, Hegel, Marx, Marxism, Gramsci, Gare, Dialectics.

The idea behind the contention that new technologies, particularly the 3D printer, have the potential to change society radically is an extrapolation from the societal changes that accompanied the Industrial Revolution, and the theorised ability for new technologies to change the way goods are manufactured. 3D printers, which function by printing layers of various materials into finished, 3 dimensional shapes, have the potential to be a form of production that could exist on small scales or in people's homes. Just as automation in Manchester began the first Industrial Revolution in the 18th Century, and Henry Ford's production line began the second Industrial

Revolution, the idea goes that 3D printers will bring about the third Industrial Revolution.¹ Some people on the revolutionary left who have raised the idea that 3D printers will undermine the capitalist relation, ushering in socialism, communism, or some other post-capitalist society.² Some non-radical thinkers also see, within the confines of capitalism, a change towards a more just system of distributed manufacture, particularly for those in the 'Global South'.³

In this paper it will be argued that while 3D printers might cause parts of the means of production to congeal in a new form, they will neither fundamentally sever the power relations exercised *within* the dialectic of labour (the economic sphere of society) nor *without* (through the other spheres of society – culture, language, ideology etc.). It will be further argued that any political strategy devoid of consideration for the other aspects of society that are irreducible to the dialectic of labour will simply fall into the same trap that vulgar Marxism historically fell into; a sense of deterministic fatalism. Further, the existence of 3D printers will not overcome the myriad of relations that tie society to the capitalist model and thus will not create a fundamentally new ordering of society.

In regards to the views of those on the left, the idea behind some inevitable change to a post-capitalist society due to 3D printers, while seductive, is Vulgar Marxism reborn. In his book, *A Revolution in the Making*,⁴ Guy Rundle details and flirts with,⁵ but does not embrace fully,⁶ some of these deterministic ideas being put forward by some members of the left involved in or watching the development of the 3D Printer. Specifically, those involved in the so called 'Makerspaces', a movement that in some respects can be seen as attempting to construct economies partially outside of capitalism; some of whom see the new technology as creating forces capitalism will inevitably succumb to.⁷

Another, perhaps more subtle example (though not focused on 3D printers specifically) of this deterministic thought can be seen in the recent article in *The*

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¹ Chris Anderson, *Makers: The New Industrial Revolution* (New York: Crown Business 2012), pp. 33-42.

² Guy Rundle, 'All Power to the Makerspaces: 3-D printing in its current form could be a return to "small is beautiful" drudgery, but it has the potential to do much more', *Jacobin*, Issue 17, <https://www.jacobinmag.com/2015/04/3d-printing-industrial-revolution-rundle/> (Accessed 30/05/2015).

³ Thomas Birtchnell and William Hoyle, *3D Printing for Development in the Global South The 3D4D Challenge* (Basingstoke: Palgrave Macmillan 2014), p. 52.

⁴ Guy Rundle, *A Revolution in the Making: 3D Printing, Robots and the Future*, (South Melbourne: Affirm Press 2014).

⁵ *Ibid.*, p. 48.

⁶ *Ibid.*, pp. 77, 195-196.

⁷ *Ibid.*, pp. 47-80

Guardian, “The end of capitalism has begun” by Paul Mason. Mason predicts that “... [Capitalism] will be abolished by creating something more dynamic that exists, at first almost unseen within the old system, but which will break through, reshaping the economy around new values and behaviours.”⁸ The reason that parts of this can be interpreted as being in a similar vein to vulgar Marxism (though it is even more removed from Marxist thought than earlier examples) is because of the fatalism that Mason’s approach engenders by his assertion that no revolutionary activity is needed to overthrow capitalism, and that such counter-capitalist historical changes will simply emerge naturally and overcome capitalism. The victory over capitalism is something presented as *a priori*, as happening regardless of human agency.

Similar deterministic ideas as those outlined above had some popularity in the late 19th and early 20th centuries on the radical left. Proponents of these believed that the forces of industrialisation *inevitably* lead to a breakdown of capitalism due to the crises it generates as part of its normal functioning, and this in turn will *inevitably* lead to socialism and then communism. It would be foolish to disregard the potential of technology to change societies, since the first Industrial Revolution was one of the largest changes to society in human history. However, the trap to avoid is not to descend, in Hegelian terms, into the absolute primacy of the dialectic of labour above recognition and representation. As Arran Gare argues in *Nihilism Inc.*, human society is more complicated than simply being driven solely by the dialectic of labour.⁹ Additionally, this paper will argue that any claim that the third Industrial Revolution will break capitalism does not make sense even when viewed solely through a Marxist analysis rooted firmly in the dialectic of labour.

In his Jena lectures and in parts of later works, Hegel outlined how the three dialectics of recognition, labour and representation are central in understanding the development of humans in society.¹⁰ Recognition describes how the development of self-consciousness takes place through an interactive process in which one sees oneself in the recognition of the other.¹¹ In the Hegelian scheme of development it is not merely the dialectic of labour that is part of the development of the ‘self’ and the world, but also cultural interactions, which shape and give boundaries to the ‘I’ and guide its moral development and outlook (recognition). Representation refers to how

⁸ Paul Mason, “The end of capitalism has begun” in *The Guardian*, 17/7/2015. <http://www.theguardian.com/books/2015/jul/17/postcapitalism-end-of-capitalism-begun> (Accessed 30/05/2015).

⁹ Arran Gare, ‘Humanity as an Emergent Phenomenon within Nature’, in *Nihilism Inc.*, (Ecological Press 1996), p. 336.

¹⁰ Arran Gare, ‘Humanity as an Emergent Phenomenon within Nature’, p. 351.

¹¹ *Ibid.*, pp. 351-365.

language both structures and is structured by our thought. Both are phenomena and processes irreducible to the dialectic of labour, even though they necessarily interact as forces within the same world.¹² The third dialectic process, which for Marx was the most important, is the dialectic of labour. It refers to the sphere of human development shaped by economic relations and technologies that are necessary for human society to continue and renew itself. It was considered the most important for Marx because human all beings required base of material goods in order to perpetuate their existence, and because Marx analysed how the power of the revolutionary bourgeoisie which allowed for the transition from feudalism to capitalism was based in the social power that they obtained through a change in social relations of production;¹³ or in other words, a development in the dialectic of labour.¹⁴ Although Marx's thought was not entirely consistent on the subject of determinism; sometimes appearing in favour, sometimes not.¹⁵ I would agree, however, with Gare that the core of Marx's thought must be interpreted as non-deterministic, since at base it is about overcoming the economic relations which serve to cripple human potential.

If one wishes to claim that 3D printers or other types of automation would disrupt capitalism completely within a 'technical' sphere (the dialectic of labour), then one must look at the basic mechanism of a capitalist mode of production and determine whether or not it would be disturbed. In *Das Capital* Karl Marx identified the basic capitalist relation as "M → C → ΔM"; **M**oney is thrown into circulation by purchasing means of production, raw material and labour power, this is then 'used' by the capitalist to create a **C**ommodity deemed socially necessary (whether that be shoes or shoe-shining; a physical commodity or service), this commodity is then sold for more (Δ) **M**oney than the capitalist paid to purchase the original 'ingredients'.¹⁶ The cycle then repeats itself when the capitalist reinvests this increased sum of capital. The key part of this magical operation, of simply 'creating' more money from less money lies in the oft ignored valorisation property that is unique to labour power. The 'profit' of the capitalist is the surplus value produced by the worker once their subsistence needs have been met (their wages paid) and the cost of constant capital (the machinery, rent etc.) have been recouped. This form of production is distinguished from the "M → ΔM" relation of the usurer or merchant,¹⁷ who gains their profit through an 'unequal exchange', and is 'redistributing' wealth generated by workers

¹² Ibid., pp. 365-369.

¹³ Karl Marx, *Das Capital Vol. 1* (London: Penguin Classics 1976), p. 229.

¹⁴ Ibid., pp. 914-916.

¹⁵ Arran Gare, 'Humanity as an Emergent Phenomenon within Nature', p. 336.

¹⁶ Karl Marx, *Das Capital Vol. 1*, pp. 247-257.

¹⁷ Ibid., pp. 247, 267, 914.

producing commodities (regardless of whether in a capitalist or non-capitalist exchange). Of course, a capitalist may well engage in both relations (and in today's late capitalism *do*), but what makes them a capitalist is the "M → C → ΔM" relation, which is different from previous (and concurrent in the case of the worker) consumptive modes of social production based on a "C → M → C" relation.

Then, before considering how cooperatives armed with 3D printers might undermine capitalism one must examine whether or not they break down the fundamental "M → C → ΔM" relation. When examined closely one finds that this is not the case. Though perhaps the capitalist will be thrown out of parts or all of the manufacturing sector, the harvesting of resources, the development of new technologies, or the selling of services like hairdressing all remain, will remain untouched by 3D printers. Capital will still be used to purchase the commodities (including labour power) that are needed in order for capital to be valorised; the miner creates value by extracting the wealth from the ground, the waged-tech-developer in designing the newest almost identical iteration of the *iPhone*, the hairdresser in performing a service that is socially necessary because of cultural standards, etc. This is true whether it is communities (coops etc.) or individuals that link to capitalism's monopoly over physical goods, supply chains and spaces/land. These would still function within the "M → C → ΔM", which means that by themselves 3D printers do not undermine capitalism as a whole. While they could make certain spaces non-profitable, these would not be insulated, due to the aforementioned need for resources and space with which to operate. Communal ownership by workers of the means of production is the definitive quality that would distinguish socialism or communism from capitalism, mercantilism, feudalism or some other less egalitarian form of social production. However, the means of production is not just the point of manufacture, it also encompasses the gathering of resources, transport etc. The proletariat often already control part of the means of production for food; stoves and other implements for cooking. However, since they do not control the *entire* process involved in creating sustenance, this does not sever them from a capitalist relation with agribusiness, electricity and gas companies (where privatised), etc.

So what would technology capable of undermining the capitalist relation look like? What would break "M → C → ΔM" relation? The answer is a removal of the component in the capitalist relation that transforms M into ΔM; the valorising component of labour. Capitalism would only end in a technological-deterministic fashion if *all* labour were removed from the production of goods; not only in production, or even harvesting – but also in development and services and any other part of human life in which people do labour that is deemed socially necessary and is

unable to be automated. A critical threshold *only* intervenes to undermine the mechanic of capitalism in a ‘deterministic sense’ at a point of *full* automation in *every* sphere of socially necessary labour. Something that is either a far, far distant concept, or impossible due to the likely asymptomatic nature of automation. Therefore, even in an analysis centred solely within the dialectic of labour, the claims that 3D printers will dissolve capitalism is at best, something that would require far more technology and automation than perhaps even the most committed ‘Technocopian’¹⁸ is predicting – *full* automation.

There is also no guarantee that such a post-capitalist society would not be *even* worse for the majority of the world’s people than present conditions. Not in the bourgeois-conservative Panglossian sense that the present is the ‘best of all possible worlds’¹⁹, but rather that if the ideological constellation (property, legal system, bourgeois sentiments of entitlement, etc.) of today persisted into that new ‘social’²⁰ productive relation, those who had been capitalists would still own everything but then be under no compulsion to see to the regeneration of the, now *ex*, proletariat – since the latter would be superfluous to their production. The situation here changes in relation to money. Whereas Marx in *Capital* said:

Whenever there is a general disturbance of the mechanism [the flow of capital, i.e. payments], no matter what its cause, money suddenly and immediately changes over from its merely nominal shape, money of account, into hard cash. Profane commodities can no longer replace it. The use-value of commodities becomes valueless, and their value vanishes in the face of their own form of value. The bourgeois, drunk with prosperity and arrogantly certain of himself, has just declared that money is a purely imaginary creation. ‘Commodities alone are money,’ he said. But now the opposite cry resounds over the markets of the world: only money is a commodity. As the hart pants after fresh water, so pants his soul after money, the only wealth.²¹

Instead, there occurs a negation of this concept under full automation, as the ability to produce commodities becomes something transcending the purchasing power of money. No longer is money the “great leveller”.²² Social power flows in this scenario from ownership of the fully automated means of production, the commodities produced mere finitudes compared to its infinite. The social power of money is eroded

¹⁸ Guy Rundle, *Revolution in the Making: 3D Printing, Robots and the Future*, pp. 47-58.

¹⁹ Voltaire, *Candide* (Harmondsworth, Penguin Books: 1947).

²⁰ Though perhaps social is no longer the right word here, since it would be a relation of purely robotic production.

²¹ Karl Marx, *Das Capital Vol. 1*, p. 235.

²² *Ibid.*, p. 229.

by the very dynamics of capitalism is pushed towards full automation. Whether or not there would be forces in society capable of negating this negativity (i.e. breaking the concept of ownership) is unclear and doubtful. Since the revolutionary potential of the proletariat no longer exists in this rapidly-becoming dystopia. In this nightmarish world of the late-bourgeoisie, then ‘neo aristocracy’, the only hope of the landless and asset-less ex-proletariat might be in relying on the charity and ‘good nature’ of the late-capitalist. And since they would have inherited the hegemonic ideological constellation from the capitalist epoch, perhaps the best that the majority could hope for is that Peter Singer’s *The Most Good You Can Do*²³ becomes a best seller among these neo-aristocrats.

Returning from this possible future dystopia to the prospect of 3D printers, there is another reason within the dialectic of labour why the demise of factory style manufacturing will not be the death knell of capitalism. Manufacturing does not spin cotton or cobble shoes out of the conjunction of dead and living labour power²⁴ alone (i.e the manufacturing machines and the worker’s labour). It also requires raw-materials that have been harvested, by machine or human hands. This is no different with 3D printers, regardless of where the manufacture occurs. Additionally, commodity chains, for resources only available in a few parts of the world, would still be necessary in order for commodities to be ‘printed’. On an individual level, a capitalist invested in the current technologies of manufacturing might find their factories and machines radically devalued, and no longer able to continue advancing their capital in that particular process. On a more widespread level, the shift to dispersed manufacturing could be disastrous for the stability of the market – as huge amounts of capital (embodied in the then-obsolete factory process) would suddenly devalue and remove a large chunk of the ‘total goods’ comprising the world economy, while simultaneously millions of people would be put out of work and be unable to ‘participate’ to the same extent in the flow of commodities.

But other capitalists – the mining magnate, the landowner invested in agribusiness, the transnationals who ‘rent’ access to precious resources from the Congolese warlord by paying with weapons²⁵ - i.e. those engaged in extracting profit from workers and wealth from nature in a non-manufacturing capacity – would be as successful (they are simply selling to a larger number of people), or even more successful. Since now they are not dealing with another large capitalist eager to keep their own costs down, but

²³ Peter Singer, *The Most Good You Can Do* (Text Publishing Company, 2015).

²⁴ Karl Marx, *Das Capital Vol. 1*, p. 322.

²⁵ Slavoj Žižek, *Trouble in Paradise: From the End of History to the End of Capitalism* (London, Allen Lane: 2014), p. 22.

instead with individuals or communities with less ability to resist in an economic arena due to their fragmentation.

Just as previous automation did not lead irrevocably to higher wages, or ‘free people’ to perform other, less automatable jobs,²⁶ the idea that the ability to reduce scarcity necessarily leads to a reduction in scarcity for the masses and a more equal distribution of wealth is naïve and contrary to the historical evidence. Indeed automation has had either the opposite effect or was bypassed due to cheap labour available in poor countries.²⁷ Humans already have the capacity to eradicate scarcity of basic goods; a recent report by the Food and Agriculture Organisation of the United Nations showed that enough food is wasted to feed two billion people, more than enough to feed the estimated 800 million hungry human beings on the planet.²⁸ However, it must be stressed that 3D printers, like other forms of automation, do contain a certain emancipatory potential. The potential for human beings to live at high material standards in egalitarian relations. However, as the abovementioned UN report details, this potentiality has certainly not been realised under capitalist relations.

We see similar technological optimism again in regards to the development of technology itself. However, technology does not exist and develop as separate from the interacting economic and cultural institutions within society. This idea is in contrast to the simplistic way Henryk Skolimowski attempts to define technology in *The Structure of Thinking in Technology*,²⁹ in which Skolimowski asserts that technology is the progression of refinement and increased efficiency. Take the example of a child dying due to artificially expensive medicine. Because it was developed within the rubric of capitalist relations, the medicine was developed to be sold first, and consumed second. The ‘technical’ problem of the disease, in light of cheaply manufacturable modern medicine, is not the reason that the child dies. The problem is the economic logic that holds profit as the highest good - the primacy of the dialectic of labour over recognition. That is, the imperatives of a system of research, production and marketing of medicine as a commodity by international pharmaceutical companies overrides any moral or ethical considerations we might have impelling us to value a child’s life above that of international profit.

²⁶ Chris Anderson, *Makers: The New Industrial Revolution*.

²⁷ Thomas Birtchnell and William Hoyle, *3D Printing for Development in the Global South The 3D4D Challenge*, p. 55.

²⁸ Food and Agriculture Organisation of the United Nations, ‘New online platform fosters efforts to curb food losses through information sharing’, 24/10/2014, <http://www.fao.org/news/story/en/item/262504/icode/%20/> (Accessed 30/05/2015).

²⁹ Henryk Skolimowski, ‘The Structure of Thinking in Technology’, in Carl Mitchum and Robert Mackey *Philosophy of Technology: Readings in the Philosophical problems of technology* (New York: Free press 1983).

This is not to say that the parts of society that fall inside the process of the dialectic of labour are somehow *inherently* bad for society. Human existence is dependent on consumption, a need which can only be met through labouring in some form to continue existing.³⁰ The problem of the contemporary dialectic of labour is that it has become ascendant in such a way that it destroys that which gets in the way of its maxim. A maxim which is not concerned with meeting required levels of consumption of use-values or reproducing and enhancing human life, but rather with creating profit. This maxim is ascendant because of the social power contained in money, which is unique as a commodity in that it is theoretically infinite.³¹ Under capitalism it has become intensely concentrated and driven by an immanent capitalist logic to seek maximum valorisation (the ΔM).³² While technology, which emerges primarily in the dialectic of labour, may provide the *potential* for a more egalitarian society (and certainly one in which children do not die from preventable diseases), which is the central thesis of Karl Marx's work, it is presently subordinated to capitalist social relations.

Property (both means of production and land) as a cultural institution would not disappear with the advent of 3D printers. That ownership of land today cannot be satisfactorily philosophically justified as a 'natural right' is inconsequential to ideology; what matters in that it is a widely accepted and internalised norm which dictates how the world and possible societies are perceived. Neither John Locke's explanation that people somehow gain ownership of land through the mixing of their labour with it,³³ (which was as ahistorically problematic when written as it is today), nor the more honest, barefaced self-interested explanation given by Adam Smith in the *Wealth of Nations*, that "[c]ivil government, so far as it is instituted for the security of property, is, in reality, instituted for the defence of the rich against the poor, or of those who have property against those who have none at all,"³⁴ constitute good philosophical grounds on which to defend private property. Rather than through a robust framework, the perpetuation of the institution of property instead relies on unquestioned inherited ideological hegemony which makes it appear natural, and is perpetuated by a ruling class which, at least for the moment, seem to have more or less a continuing 'mandate of heaven.'

Gramsci's formulation of ideological hegemony built from both Marx and Hegel in that it asserts the importance of the dialectic of labour, but also creates space for the

³⁰ Karl Marx, *Das Capital Vol. 1*, p. 133.

³¹ *Ibid.*, pp. 231, 253.

³² *Ibid.*, pp. 253-254.

³³ John Locke, 'Second Treatise on Civil Government' in *Two Treatises of Government : And a Letter Concerning Toleration* (New Haven: Yale University Press 2003 {Originally 1689}), Chapter V, pp. 111-112.

³⁴ Adam Smith, *Wealth of Nations* (Hackett Publishing: 1993 {Originally 1776}), p. 181.

irreducible forces of recognition and representation in the concept of ideological hegemony.³⁵ Ideological hegemony serves to set up boundaries of thought through ‘common sense’, which Gramsci described as the ‘folklore of philosophy’.³⁶ This means that the modes and norms of thought today are influenced powerfully and invisibly by the dominant ideas and hegemonic cultural structures inherited from the past (both physical structures or organisations and language itself, or recognition and representation respectively). The structuring nature of language upon thought can perhaps be seen more clearly in another language. For example, in Spanish a prevailing ingrained nature of patriarchal misogyny can be seen in that *Las esposas* signifies both ‘wives’ and ‘handcuffs’. It is pronounced identically and the meaning can only be identified through context. It is not difficult to see how such a misogynistic facet of language symbiotically corrupts the structure of thought and attitudes towards female spouses, and women more generally, in Spanish speaking cultures.

In the *The Modern Prince* and *Americanism and Fordism* (as edited by Quintin Hoare and Geoffrey Nowell Smith) Gramsci discusses how institutions inherited from previous epochs always play an integral part in forming the terrain of any political struggle.³⁷ He focused mainly on Italy, where the presence of the Catholic Church altered the development of capitalism, as compared to America, which Gramsci considered more typical of how capitalism would develop in a more ‘neutral’ environment.³⁸ The historical-distorting role that the Catholic Church played to Fordism, Fordism and other current institutions and norms will be to the ‘3rd Industrial revolution’. This distorting ideology means that what counts as ‘common sense’ (the ‘automatic’ response) will continue to influence thinking beyond the era of its emergence and into subsequent ones (or inhibit the transition to a subsequent era). In regards to 3D printers, this means that ideology is an obstacle that has the potential to re-encapsulate the revolutionary potential of the technology, since the world that 3D printers are emerging into has already deeply entrenched modes of thinking (e.g. private property) and power structures eager to perpetuate themselves (i.e. the global capitalist class).

³⁵ Carl Boggs, ‘The theory of Ideology Hegemony’, in *The Two Revolutions: Gramsci and the Dilemmas of Western Marxism* (Boston: South End Press 1984), p. 155.

³⁶ Antonio Gramsci in Carl Boggs, ‘The Theory of Ideology Hegemony’, p. 161.

³⁷ Antonio Gramsci, ‘The Modern Prince’ and ‘Americanism and Fordism’ in *Selections from the Prison Notebooks*, trans. By Quintin Hoare and Geoffrey Nowell Smith (New York: International Publishers 1973).

³⁸ Though it should be pointed out that the Puritan culture was far from some kind of ‘neutral’ bed from which capitalism could grow, since the protestant ethic, inherited through the puritans, was itself baggage from the epoch of the reformation and contributed significantly to the enthusiasm with which capitalism was adopted. (Alasdair MacIntyre, *A Short History of Ethics* (Padstow: Routledge Classics 1998), p. 145).

The norms which form these ideological boundaries can perhaps be thought of as a two layered sphere of ideology, through which we must break if we are to be able to envisage the transition to, and the sustaining of, a new societal ordering. The first layer is the *denkverbort*³⁹ [forbidden thought]; in this case, ideas conducive to counter-ideological or revolutionary action which, because they are premised on the destruction of the dominant regime are considered ugly, anti-social or subversive. The second layer is what could be described as the *undenkbar* [the unthinkable]; by which I mean the delimiting nature of our inherited language and cultural-philosophical assumptions towards *what* we are and could be. (An example of a challenge to the latter would be what Heidegger did in *Being and Time*, when he identified our Western attitudes towards ontology as flowing from metaphysical assumptions made by the Greek thinkers and their interpretations by Christianity.)⁴⁰

Action that does not attempt to transcend these limitations and simultaneously attempts to construct a new order can perhaps be best exemplified in social democracy's 20th Century capitulation into what is described as the 'third way' – the acceptance of the premises of economic rationalism. This political programme rejected that which was *denkverbort*, staying firmly within the sphere of the dominant ideology (which allowed it to assume 'power' by winning elections, but eliminate the potential to challenge 'the essential'). Because of this ideological adherence within an ideological system of the primacy of the dialectic of labour, the result of the 'third way' project was an inability to break free from the dominant economic juggernaut of neoliberalism and eventuated in their fall towards today's 'status quo'. (See the Australian Labour Party's rightward trend, Tony Blair's 'New Labour' in Britain, the PSOE in Spain, or any other of the large 'social democratic' parties whose policies have become closer and closer to those of the ruling class parties [the Liberals in Australia, the Tories in Britain, the PP in Spain] since the triumph of the 'neo-liberal revolution').

If the dialectics of representation and recognition thusly are ignored, and the dialectic of labour comes to assume absolute primacy, then it is easy to see how the fatalistic attitude (economic determinism) towards the possibility for change surfaces, and with it, the corrosive effects this has upon the ability of any group to wage political struggle (whether they are still formally committed to radical change or not).⁴¹ Without an understanding of the dialectics of recognition or representation, of a more complex understanding of human development, then the idea that a new stage of industrial

³⁹ Žižek discusses this concept in the afterword of: Slavoj Žižek, *Revolution at the Gates: Selected Writings of Lenin from 1917* (London: Verso 2002), pp. 167-168.

⁴⁰ Martin Heidegger, *Being and Time* trans. By John Macquarrie and Edward Robinson (New York: HarperCollins Publishers 2008 {Original German in 1927}), pp. 70-71.

⁴¹ Carl Boggs, 'The theory of Ideology Hegemony', pp. 153-157.

development characterised by 3D printers will radically reshape our economic relations becomes convincing because if there is nothing but the economy, then a change to the economy changes everything. Or, in terms Marx used at his most vulgar and deterministic: “The hand-mill gives you the society with the feudal lord; the steam-mill, society with the industrial capitalist”;⁴² the 3D printer; a post-capitalist society.

Perhaps capitalism may be challenged by the terrain created by 3D printers. Certainly situations that can be imagined in which it might provide possibilities to more successfully oppose the power of global capital. But as Gramsci points out, when hegemony is threatened and the ruling class ‘lose their mandate of heaven’, they still retain legions of police, the army, the courts and law-making apparatus to enforce compliance; that in the dialectic of consent and domination, when consent (our self-censorship and our self-regulation) breaks down, domination steps in.⁴³ This means that even if 3D printers create conditions favourable towards the spread of radical, revolutionary thought, a political struggle will still be necessary. A new societal order will need to be further theorised and developed from exploration of what is currently the *undenkbar* (especially given humanities position on the brink of environmental catastrophe). Arguments will still need to be made and won to break the *denkverbort*. Economic struggle and political struggle will be needed to challenge the ideological hegemony. And at some point there would need to be a revolutionary break with capitalism; whether it is through armed insurrection, a power vacuum, a peaceful transition, a combination thereof, or something hitherto undreamed of. Society, and all its associated ills and oppressive structures, is far more complex than something that can be solved with a single ‘magic bullet’ (such as 3D printers), and the basic premise of Gramsci’s theory of ideological hegemony still holds. There must be an ideological revolution, a complete reordering of the way humans relate to themselves, each other and the world (which necessarily goes beyond a one dimensional understanding of culture and its change), to accompany any economic revolution. That is, a ‘step forward’ in the dialectic of labour requires steps to be also taken in the domain of recognition and representation. 3D printers, as technology with the potential to ease the burden of human labour, might assist with this, but are not emancipatory in-and-of themselves. As such, 3D printers are not the horsemen of the capitalist’s apocalypse; they will not inevitably lead to its dissolution. Such thinking serves only to hamper any movement’s attempt to break today’s hegemonic systems of oppression.

⁴² Arran Gare, ‘Humanity as an Emergent Phenomenon within Nature’, p. 366.

⁴³ Carl Boggs, ‘The theory of Ideology Hegemony’, pp. 157-166.

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