UCL Institute of Education

Organic Thinking for the 4IR/AI Era: Specialisation, the General Intellect and 45-Degree Knowledge Production

Discussion Paper 2

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Abstract

This second module paper is a neo-Gramscian analysis that develops the concept of the Organic Intellect to be applied to the world of the Fourth Industrial Revolution and artificial intelligence/machine learning. While Antonio Gramsci, an early 20th Century Italian Marxist, developed the concept of progressive organic intellectuals that have a key role in building the hegemonic capacities of the working class, the types of thinking required by these key 'organisers' to transform society remained implicit in his work. In this paper I attempt to bring together concepts of specialist and general thinking and 45-degree knowledge production to form the concept of the Organic Intellect. This unified yet diverse form of thinking (there is not a single Organic Intellect) is then applied to the era of 4IR/AI to pose questions regarding the historic task of reshaping and re-socialising rapidly emerging technologies.

Part 1. Introducing the re-shaping/re-socialisation perspective and the concept of the Organic Intellect

What kind of thinking is required to understand and to participate in a rapid technological revolution? As explained in Paper No 1, the answer from leading transnational organisations is the need for human adaptive and resilient thinking and practice, marked by qualities such as entrepreneurship and 21st Century competences (Bidshari, 2018, Schwab, 2018). By developing these broad and flexible abilities people are more likely to become 'robot-proof', in relation to a rapidly changing labour market and having sufficient digital skills to be able to use new technologies both at work and in everyday life (Golstein, 2018). This 'adaptive' interpretation has become part of long-standing debates about the reform of formal education; away from mechanistic learning and towards more social learning and problem-solving (e.g. Sahlberg, 2007; 2011).

In Paper No 1 it was argued, however, that the main issue regarding the trajectory of 4IR/AI, is not human adaption to an inevitable technological future, even though adaptiveness is important, but to develop human knowledge and activity to re-socialise and re-shape artificial intelligence (AI) and the different dimensions of the Fourth Industrial Revolution (4IR). The process of re-socialising and reshaping and has been referred to earlier as

'Futures 4'. Creating this particular future will not involve technological change acting in a vacuum, but processes closely related to wider economic, social and political contexts. This contextualised approach is termed a 'socio-technical future'; that seeks to mould technological advancements to meet not only the demands of everyday life but, crucially, to address the greatest challenges facing humanity.

Central to technological resocialisation/reshaping is the relationship between two different types of knowledge in the techno-economic sphere – the expert knowledge of specialists and a more general knowledge and understanding of the wider population. This second paper develops this dualism by elaborating 'advanced' concepts of specialist and general thinking - 'Connective Specialisation' involving experts not only in the technological sphere, but also in wider economic, political and social activity and the development of general awareness in the wider population that in its most advanced forms can be understood as the 'General Intellect'.

The next section of the paper explores the inter-relationship and multiple combinations of specialist/vertical and general/horizontal forms of knowledge to create a holistic concept of the 'Organic Intellect'. This approach to human knowledge and skill is also viewed as '45-degree knowledge production' on account of combinations of vertical and horizontal dimensions. The concept of the Organic Intellect is closely allied to the Gramscian concept of 'organic intellectuals' who have a key role in 'mediating' specialist and general knowledge and activity. In terms of 21st Century Organic Intellectuals a distinction can be made between the connective roles of specialist intellectuals (with specialist scientific or technical knowledge) and the more general mediating role of public or political intellectuals with ethico-political knowledge.

The concept of the Organic Intellect has the potential to be applied to a wide range of human thinking and activity. What characterises thinking as organic is its potential to transform human societies – a fusion of progressive general thinking capable of envisaging a new stage of human civilisation and the specialist knowledge and skill capable of building the necessary elements of the new society. In Gramsci's theoretical work, the dialectic between general and specialist thinking is seen as fundamental to constructing a

'progressive historical bloc' – an alliance of different social and political forces capable of forging a post-capitalist future (Gramsci, 1971 translation).

In this paper, however, the concept of the Organic Intellect takes on a more specific meaning as it is applied to the field of the fourth industrial revolution and artificial intelligence. Here, three related challenges are identified from the re-socialisation/reshaping perspective. The first concerns the role of specialist intellectuals who are intimately involved in the world of AI/ML because the reshaping of technologies cannot take place without experts who are willing and able to undertake this kind of work. This is a major challenge given the strangle hold of tech giants on the digital productive processes and their workforces. The second is related to the level of consciousness of the wider population. From the societal dimension, the re-socialisation/reshaping of new technologies will depend not only on committed and progressive specialist intellectuals, but also on a broader societal awareness that will reflect the ways that people will use (or not use) emergent technologies and the view they take on the wider economic, social and political contexts in which the technology plays its role. Of particular importance is the ability of the wider population to understand the regressive roles of new technologies (e.g. digital media and fake news; surveillance and attacks on democracy) and to develop new civic capacities in the AI era. The third challenge concerns conceptualising the inter-relationship between the dimensions of the Organic Intellect and AI through the generation of fusions of human intelligence (HI) and artificial intelligence (AI). The paper concludes with key questions regarding these dimensions of technological reshaping and res-socialisation.

Part 2. Forms of Specialisation and the General Intellect

Introduction

There has been a tendency for the discussion of different forms of knowledge and their relevance to education to produce sharp and sometimes mutually exclusive arguments, for example, between disciplinary knowledge and international discourses around broad skills and their effects on social change (Reiss, 2018). However, the polarised nature of these debates appears less relevant in the context of the 21st Century development of scientific,

technological and social understanding that stress inter-disciplinary approaches to address increased global threats of pandemics and the climate emergency. To address complex and 'wicked' problems requires both specialist knowledge and wider societal forms of thinking and skill. The key issue is their relationship. Here I will argue that we have to move beyond binaries to embrace the idea of 'combinational' knowledge production. Accordingly, the knowledge debate in this paper is reconceptualised in terms of multiple relationships between 'advanced' forms of vertical and horizontal knowledge referred to as 'Connective Specialisation' and a socialised version of the 'General Intellect'. The combination of both these advanced types of knowledge leads later in the paper to a unified concept of the Organic Intellect.

Specialisation – insular and connective versions

Increased specialisation can be seen as an integral aspect of human progress. The last 200 years has seen an acceleration of specialist activity due to economic, scientific and social advancements including, over the last 100 years, the role of mass learning in society and increased specialisation of study as the duration of education lengthens beyond that of universal primary education. Increased specialisation has also arisen from economic life due to new forms of technology, notably the development of divisions of labour and mass production in the early 20th Century and new forms of hybridised phased production of the 21st Century (UNIDO, 2013).

While the development of specialisation can and should be viewed historically, in this paper I confine the analysis to an observation that specialisation has evolved into two related forms – insular and connective (Young, 1993). Insular or divisive specialization can be associated with, for example, rigid divisions of labour (e.g. Taylorism and Fordism) that massified production, but which now finds it difficult to respond to economic flexibility; the 'siloization' of communication between different specialist groups that can impair performance; and the separation of services with different governance regimes that may inhibit collaborative working and the development of different and separated form of knowledge (disciplines) in which one form of knowledge is divided from another. The common threads underpinning insular specialisation are paradigms of production (technical); forms of privilege (socio-economic); the preservation of power and

bureaucratisation (political); together with the relative absence of common forms of understanding and practice that connect different specialisms (ideological).

At the same time, another process has been taking place in the world of production, science and education – connectiveness. Economic, scientific and technological innovation over the past 30 years in particular has resulted in increasing amounts of hybridized (Post-Fordist) forms of production that appears to be accelerating with the Fourth Industrial Revolution – the merging of physical, digital and biological worlds (Schwab, 2018). This has been accompanied by a greater emphasis on 'teamworking' in productive processes in an attempt to address more complex problems. The hybridization of production has also seen a parallel process in the knowledge world; a growing emphasis on cross-disciplinary knowledge production within and across the fields of natural sciences and social sciences (Dogan, 1996). It is possible, therefore, to fuse these two developments – specialisation and connectiveness - to create the concept of 'connective specialisation' rooted in complexity and hybridisation.

Specialisation can be viewed as a 'verticality' reflected by, for example, a hierarchy of knowledge marked by levels of abstraction and complexity and by 'boundaries' that delineate one knowledge discipline from another (Young and Muller, 2018). Similarly, specialisation in productive life is also underpinned by a hierarchy of organisation. Connective specialisation, however, comprises not only verticalities, but a range of different 'horizontalities'. The main features of connective specialisation are associated with various forms of lateral connections emanating from specialist knowledge. If a knowledge verticality is viewed as both its specialist knowledge historically associated with the area and its underlying philosophical, scientific and ethical method, the latter may hold particular connective potential because of the possibility of developing critical conceptions capable of moving beyond the existing 'frontiers' (Errejon and Mouffe, 2015) of specialist knowledge. Additionally, a specialism may also have its own particular mode of engagement with more general social and political consciousness (e.g. medicine and the role of an ethical code). And, critically, different disciplines are having to collaborate more in relation to the challenges of scientific and technological innovation. There would appear, therefore, to be a relentless set of forces that forge lateral forms of connectiveness in the vertical sphere.

As part of an overall educative mission, connective specialization can be seen not only to be reaching out sideways, but also downwards in order to introduce specialist thinking into everyday thinking. Climate science, for example, is both hybridized and highly specialized while, at the same time, finding forms that can be more easily understood by non-specialists. It is also the case that connective specialization cannot develop without 'connective specialists'; that is to say 'specialist intellectuals' who are dedicated to collaboration across various boundaries (see next section on 21st Century Organic Intellectuals).

Accordingly, connective specialisation has political dimensions. Srnicek and Williams maintain that in order to achieve a new and progressive 'mastery' will require 'a collectively controlled legitimate vertical authority *in addition* to distributed horizontal forms of sociality assembled through an organisational ecology' (2013: 3/4). This can be read as both a criticism of the classical Marxist determinist view of the socialization of knowledge through technological development and of 'horizontalism' and the fetishisation of popular control. Their emphasis on the deliberate building a new socio-technical hegemony suggests that the embedding of knowledge in technologies, such as modern software, only present opportunities for transformative action, not an inevitable outcome. If the modern world of finance, production and cultural life is to be progressively transformed it will not only be the result of horizontal grassroots activism but, crucially, the contribution of committed 'specific intellectuals' (Sotiris, 2013) who are prepared to develop and apply their 'vertical' knowledge in progressive ways in a variety of state and civil society settings (Fischman and McLaren, 2005).

This discussion leads to a question regarding nature of 'technological connective specialisation'. This could include a range of capabilities including those particular 'specialist technical intellectuals' directly involved directly in the digital world (e.g. those programming algorithms) and the connectivities with wider society that could be provided by an ethical code that questions the function of the algorithm and its effects. There are, however, many other specialists involved in different fields such as medicine, engineering, construction and the creative arts that become expert in the applications of new technologies and AI in their particular fields. Here the connectivities may not only be

ethico-political in a broader sense (the infusion of a relevant element of the General Intellect), but also understanding how particular application of the new technologies is reshaping the nature of work and workplaces, including their social implications. This brings us to the more horizontal and social dimension of knowledge and awareness.

The General Intellect – technological and social consciousness versions

In this section the concept of the General Intellect (GI) is viewed as an 'advanced horizontality' insofar as it comprises types of thinking that raise it above that of everyday thinking (Vygotsky 2012 edition) or what has been termed 'common sense' (Gramsci 1971 edition). However, the General Intellect as a concept is not well understood nor easily utilised in current political and educational discourse. This is principally due to its association with a Marxist technological determinist interpretation based on the historical development of economic modes of production that renders it as a relatively passive concept. Here the paper briefly reviews and critiques the technological approach to the GI and then proceeds to explore a broader and arguably more active approach of 'shared societal consciousness'.

The technological determinist version

The term General Intellect originates with Marx's thought piece 'The Fragment on Machines' in which he speculated about the relationship between the worker and the 'self-acting' machine in a future world in which the main human input would be the organization and knowledge invested in the machine (Marx, 1973 translation). In a world in which production is led by technologies that are created and maintained by human knowledge, the nature of the knowledge locked inside the machine is increasingly social since it comes from the head of the worker and can be shared (Mason, 2015). Moreover, in such a system of production, where employers are compelled to develop the intellectual capacities of the worker, all this information will be stored and shared in the 'general intellect' in which the activity of the workforce is 'the activity of production of knowledge by the means of production' (Drucker cited in Mason, 2015).

Marx's 'thought experiment' written in 1858 and hidden away in the Grundrisse resurfaced because of the implications of a new phase of capitalism – referred to as 'cognitive

capitalism' (Moulier Boutang, 2007) - and the emergence of digital and knowledge-based technologies that Marx could not have envisaged 150 years ago. The growing interest in this particular interpretation of the GI has given rise to two strands of debate – historical optimism and pessimism. The optimism arises from visions of a world in which machines produce everything, providing humans with the freedom from the drudgery of work and the freedom to think and imagine (Srnicek and Williams, 2015; Bastani, 2019). Conversely, pessimism is rooted in the expectation of the homogenizing, alienating and immiseration effects of neoliberal Post-Fordism to automatically produce the 'mass intellectuality' and ultimately insurrection by the post-modern mass proletariat known as the 'Multitude' (e.g. Lazzarato, 1996; Hardt and Negri, 2004).

However, there are several problems with the technological determinist binaries of the GI. First, this form of theoretical speculation concerning the consequences of 'embedded' or 'dead labour' in the machine has yet to be proved historically. In fact, evidence from the last three decades suggests a struggle between socialised and privatised digital technologies in which the social remains subordinate to the private. A second, and more specific observation is that the assertion that knowledge embedded in machinery must by definition be social ignores recent developments in AI and the role of 'technical intellectuals' in the pay of corporate giants who create algorithms and design modern software to harvest personal data for private gain. There is, therefore, nothing inherently progressive about embedding human thinking in technologies. The issue is the nature and purpose of the human thinking that leads to technological design and use. Issues of its regressive use have led, for example, to analyses of Surveillance Capitalism (Zuboff, 2019).

Third, the pessimistic expectation of the homogenizing, alienating and immiseration effects of neoliberal Post-Fordism to automatically produce 'mass intellectuality', while rightly pointing to the dark effects of rapid technological change (Brindle 2018), ignores the complexities of an expanded modern state and civil society that requires an explicit political articulation of injustice and oppression in the context of political and ideological contestation (Errejon and Mouffe, 2015). It may be the case, therefore, that emergent properties of advanced technologies (e.g. potential social, sharing and collaborative design features) present not 'technological inevitabilities', but 'techno-social possibilities'.

Whether these are realised will depend on wider economic, social and political power relations and contestations and, crucially, imaginings of different future directions of technological change.

A key issue, therefore, of a passive technological determinist perspective on the GI is that it acts as an impediment to developing a more active ways of conceptualising new intellectual social and political relationship between human thinking and technologies in, in particular, the development of emergent forms of HI/AI fusion knowledge.

The General Intellect (GI) as advanced individual and social consciousness

A more productive approach is to consider the concept of GI as forms of general understanding and consciousness associated with 'living labour' rather than technological phenomenon of embedded or 'dead labour'. Here the paper attempts to draw out a multi-level conceptualisation of the GI as a 'horizontal' form of general consciousness – individual and collective and in its less and more advanced versions.

The GI as a form of horizontal thinking can be seen to occur in differing forms – from less to more advanced. What might be termed 'base horizontalities' are manifested in ideological form as common sense; popular belief or everyday thinking. At this level there are differences of interpretation according to national and cultural contexts. In the UK, for example, the concept of 'common sense' contains elements of rational thought through the notion of sound practical judgement or 'plain wisdom', whereas the Gramscian concept of 'common sense' sees everyday thinking more as 'folk-lore' in more multiple and fractured forms – *senso commune* – in which each social group has its own 'common sense'. Importantly, what the two interpretations share in common, however, is being a 'given' or 'natural' and, in this way, both form part of existing ideological hegemonic relations (Krehan, 2016).

On the other hand, horizontal thinking can develop in more 'structured' or 'advanced' forms. An example, Gramsci's concept of 'good sense' is conceived as a 'healthy nucleus' that exists within common sense (Coben, 2002). The character of this concept of good sense would contain, for example, elements of questioning due to the impact of mass

education or an understanding of 'everyday injustices' through participation in everyday struggles, both of which can lead to more systematic or reflective thinking. A key point to understand here is that good sense does not just arise from universal formal schooling, despite its importance, but is rooted in wider social relations.

In its most ambitious forms, horizontal thinking can be characterized as shared 'ethico-political awareness', driven by various forms of social and political activity, progressive technological developments and engagement with strands of vertical knowledge. In terms of the relationship between vertical and horizontal forms of knowledge, 'advanced horizontalities' could also be equated with a socialised version of the 'General Intellect'.

The GI as advanced horizontal thinking can be seen to exist at both the individual and social levels. In terms of the individual, the GI can be viewed as 'personal cognitive capacity' – the notion of a general critical faculty, the ability to reflect and question that arises as a result of education and social discourse (Virno, 2007). However, going beyond these boundaries can include 'formal and informal knowledge, imagination, ethical tendencies, mentalities and 'language games' that have to be separated from the post-fordist capitalist production (Virno 2001).

At a wider and societal level, the GI has also been conceptualised as 'shared social knowledge and collective intelligence at any historical period '(Dyer-Witheford, 1999); the cognitive powers of society and the accumulation of concepts, scientific knowledge, tools and the universal wealth of humanity (Pavlidis, 2012). This complex collective consciousness version of the GI is best understood as cumulative and thus historical, requiring conditions for its emergence through wider economic, political and societal struggle and a strong ethico-political dimension, including key elements of justice, equality, democracy and sustainability. This particular concept of the GI is yet to be realized historically.

At the same time, the formation of collective consciousness is also politically and culturally contested. It is possible to speculate about the 'fragmentation' of the GI amidst the crisis of neoliberalism. In the present era we experience a number of long-standing divisions -

between common sense and specialist thinking; the commodification of knowledge rather than its social sharing; and the challenges to the role of the public intellectual through neoliberal managerialism (Oslender, 2007). But there are also new forms of fragmentation, notably the deliberate propagation of false information or 'fake news' in social media which serves to reduce the critical capacities of the population. Attempts to manipulate popular thinking is reinforced by the tendency of neoliberals to underestimate human capacity for cognition and to overemphasise the hidden hand of the market (Mirowski, 2020).

The socially-oriented GI will, therefore, be formed in a climate of political and ideological contestation and has to be created through the role of education, political life with a key role for 'progressive public intellectuals' who are able to generate new analyses and connect this form of thinking with more general popular thinking in what is essentially an educative mission. McKenzie Wark (2017) suggests that the role of public intellectuals may be to promote a range of 'general intellects' as they discuss the complexities of the 21st-century from differing perspectives, albeit with the possibility a common public purpose. The task then becomes connective – linking and relating the different 'General Intellects' into a more common discourse to take us nearer to the idea of a shared and universal consciousness.

This part of the paper has introduced two important distinctions in both the concepts of the general intellect and specialisation and their variants. Part 3 relates the 'advanced versions' both to create the concept of the Organic Intellect in which 21st Century Organic Intellectuals play a fundamental role in its elaboration and spread in society.

Part 3. The Organic Intellect and the role of 21st Century Organic Intellectuals

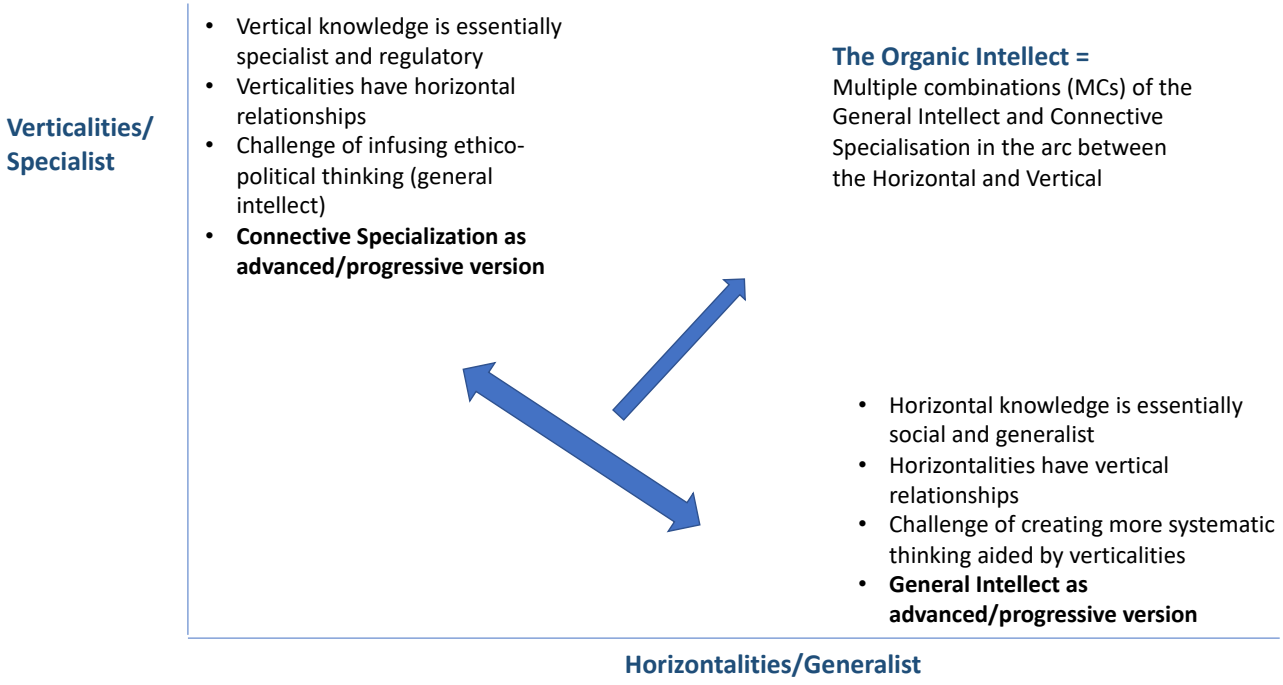
Transforming the world will require new knowledge from both the horizontal and vertical knowledge-worlds. The popular production of knowledge from innovative horizontal practices will be assisted by new forms of lateral digital communication and exchange, whereby citizens can find things out for themselves and exchange experiences, thereby becoming more specialist. But the knowledge world cannot simply be transformed from below; it also requires progressive forms of specialisation from technical experts who are

prepared to serve a universal and progressive cause because their vertical knowledge is informed by a horizontal dimension (Lawson, 2019).

The vertical and horizontal dimensions of the Organic Intellect

Having analysed variants of specialization and the general intellect, this section functions as an abstract thought experiment to explore the dynamics between horizontal and vertical forms of knowledge production in 21st Century conditions to form what is termed the Organic Intellect. The multiple relationships between the vertical and horizontal can be understood as 45-degree analysis (see Figure 1).

Figure 1. The 45-Degree Organic Intellect



In Figure 1, the horizontal is associated with general and non-specialist forms of thinking and activity that occur broadly in civil society and shared in everyday life. As we have seen in the previous section, the horizontal can exist in more or less advanced and progressive forms; the most advanced version being what has been termed the General Intellect, viewed as shared and collective consciousness. The vertical, on the other hand, concerns specialist forms of in-depth thinking that tend to be structured by hierarchic institutions (e.g. universities) and regulated directly or indirectly by the state.

In reality, however, all forms of thinking and activity are hybridized and combinational in which the two dimensions of knowledge are involved in a dynamic relationship to produce multiple combinations (MCs) in which each particular 45-degree intersection produces a unique and reciprocal combination of the horizontal and the vertical. According to 45-degree conceptualization these MCs can have differing balances and relationships of general and specialist thinking, thus occurring differing locations on the arc between the two fundamental axes in Figure 1.

Of particular interest in relation to producing new knowledge and undertaking socialized reshaping is the way in which the MCs can become 'progressive' combinations of general and specialist thinking and activity. Creating progressive combinations of connective specialization will necessarily involve, for example the fusion of various 'horizontalities', whether these be multi-disciplinary collaborative working or the application of a strong ethical code in the specialism. However, for a specialism to truly become as aspect of the Organic Intellect will require an ability to bend downward through the 45-degree trajectory to critically inform wider public understanding through forms of education and the mediating roles of different types of 'organic intellectuals'. Conversely, the General Intellect dimension could represent an advanced and progressive version of the horizontal if its lateral and social dimensions also reach 'upwards' to become infused with connective vertical thinking coming from the worlds of formal education, politics, economics and science that educates the citizen to participate in specialisms (e.g. skilled work) and to develop particular interests and orientations that can be applied to societal need.

45-degree intersections and unity in the middle range

45-degree intersections should not be considered a fixed point between the horizontal and vertical, but symbolic of the dialectical interaction of apparent opposites and acting as 'The Bridge' that spans not only the specialist and general, but also heterogeneity and homogeneity; parts and the whole; the present and the future (Elbaek and Lawson, 2015).
In combinational 45-degree thinking it may be useful to think about the 'zones' that constitute the 'middle range', lying between the horizontal and vertical. Earlier in the paper there was a discussion of the advanced horizontality in the form of the general intellect – a form of general

consciousness capable of informing specialist thinking and activity and providing it with an ethico-political direction. Conversely, there was also discussion of an advanced form of specialist thinking understood as connective specialization. A question here is whether there is a middle range form of thinking at the 45-degree borders of the specialist sphere? Put another way, is there a form of thinking and that can be commonly adopted by all intellectuals in a particular specialist sphere of human activity (e.g. science and technology) and that also potentially forms a bridge to advance general thinking? In medicine, for example, this might be understood as 'clinical reasoning' – evidence-based thinking that can be appreciated by specialist non-specialists alike and that comprises part of a common educative process. In this sense, zones in the middle range might be regarded as arenas in which more unified thinking can form. It may also be possible to think about blends of specialist and general knowledge formed in the middle range as 'Integral Knowledge' and it is the multiplicities of the integral that spurs on knowledge production.

Boundaries and frontiers

Through 45-degree analysis it is possible to make a distinction between knowledge 'boundaries' and 'knowledge frontiers'. Boundaries can be seen as the means of defining and differentiating areas of knowledge (university disciplines and school subjects) and thus contributing to the identity of the specialists in those defined fields. The dominant function of boundaries is to differentiate areas of knowledge and its negative side can be the creation of knowledge silos and a lack of intellectual collaboration.

The concept of the 'Organic Intellects', however, has the potential to propel and intellectual life through the expansion of 'knowledge frontiers'. While the term 'knowledge frontiers' has been used in relation to the potential of inter-disciplinary research (e.g. The British Academy, 2019), here the concept of frontiers refers not only to connective specialisations in the vertical sphere, but also their relationship with advanced general thinking in the horizontal sphere.

In terms of the dynamics illustrated by Figure 1, the expansion process would see Organic Intellects moving knowledge frontiers outwards on a 45-degree trajectory. In this, the concept of frontiers prioritise connection over differentiation and, crucially, a productive relationship

between specialist and general societal thinking through the deepening and broadening of multiple combinations, particularly those involving natural science and the social sciences. To this dynamic we can now add the new dimension of AI/ML as extensions to these dimensions of the human intellect.

As part of the concept of 45-degree knowledge expansion, in contrast to the classical and relatively passive concept of the General Intellect in which social thought is embedded in the design and function of the machine, the concept of the Organic Intellect suggests a two-way dynamic relationship with AI/ML - the combined specialist and general dimensions of the Organic Intellect seeks to shape and re-socialise AI/ML and, at the same time, to develop the social thinking and collective relationships in order to interpret and to respond to what the machine is feeding back. This dynamic relationship could also be seen to be pushing outwards the frontiers of knowledge production in which different facets of human intelligence are extended by AI/ML to serve the progressive interests of humanity (for a detailed discussion of the Extended Mind, see Lecture 4 by Prof. David Guile).

The mediating role Organic Intellectuals

Writing in the 1930s Gramsci stated 'all men are intellectuals, but not all men have in society the function of intellectuals' (1971 translation). By this Gramsci was making the point that while not everyone was a specialist intellectual everyone is capable of thinking and exercising a general intellectual function, what he referred to as Good Sense. However, the exercise of Good Sense (rational thinking) can be regarded as simply a step towards the Organic Intellect that comprises the fusions of advanced versions of specialist and general thinking. This section of the paper explores the role of 21st Century Organic Intellectuals who mediate the dimensions of the Organic Intellect. Originally understood by Gramsci as political actors who cohere the progressive historical bloc, 21st Century organic intellectuals who operate at different intersections of the vertical and horizontal; in fact any productive or educative function that helps to develop progressive state and civil society. In terms of 45-degree combinations organic intellectuals could include specialists who can communicate with other public intellectuals or the public more directly and more general political organisers who utilize and promote specialist knowledge.

For Gramsci the term 'intellectual' did not simply mean a person of letters, but an 'organiser' that combined both specialist knowledge/skill and an a general ethico-political consciousness. This latter type of knowledge comprises not only a shared social knowledge, but also contains within it the kernel of a vision of a future order. A progressive 'organic intellectual' would, therefore, be a person with these capacities who also forms a concrete relationship to different layers of the 'historical bloc' and particularly its economic base, and thus a political relationship with the subordinate classes. Progressive Organic Intellectuals are also intended to represent the progressive bloc in its most advanced condition, hence the importance of developing activists who are the most conscious professionals, skilled workers, technicians and academics in society. In various parts of the technological world there are different challenges in developing the 'conscious technician' amidst the constraints of working in private companies or even universities. However, there comes periods of change in which new types of thinking can flow and a new stratum of organic intellectuals begin to emerge. A case in point is the current challenge Zuckerberg is facing from his own staff, the political economic community and academic communities, over his stewardship of Facebook amidst the pandemic, the Black Lives Matter protests and the actions of the President of the US. This is the latest manifestation of a growing movement of a revolt of tech workers in Silicon Valley that in recent years have called out racism, sexism and the relationships between tech companies and lucrative contracts that have been deemed ethically dubious (Tiku, 2018).

Srnicek and Williams (2015) go further and demand the deliberate development of a whole new cadre of technical/political intellectuals capable of steering the financial and digital developments in a progressive direction that currently constitute the frontier of neoliberal innovation. Allied to this, Gramsci was also insistent that the working class and its allies, that today we could refer to as 'The People' (Errejon and Mouffe, 2015), had to develop their own 'organic intellectuals' in order to articulate a coherent philosophy and an awareness of its social interests. This was in addition to process of winning over 'traditional intellectuals' - people of letters and also other groups such as technicians - who might regard themselves as 'neutral' but who were, nevertheless, under the ideological sway of the of the dominant bloc. In other literatures the concept of the organic intellectual is also referred to as a 'public intellectual' (Small, 2002).

45-degree knowledge production based on MCs of the vertical and horizontal suggests that there is not a single Organic Intellect. A related point was made by McKenzie Walk (2017) when referring to a pluralism of general intellects. There also not a single type of organic intellectual. When Gramsci was developing the concept of organic intellectuals in the 1930's he very much had in mind the role of members of the communist party and trade unions who would provide the working class with its own sense of historical mission. However, in the conditions of the 21st Century the number and variety of potential organic intellectuals has diversified due to the growing complexity of the modern extended state (governmental state + civil society), that includes ever-expanding activities in economic, social, political, technological and cultural life.

There are at least two related implications of these pluralisms. The first concerns the building of relationships between these different mediating groups, raising an interesting issue about the function of 21st Century political parties and social movements as 'alliance-builders' of different groups of organic intellectuals (Spours, 2017). This pluralism and its potential inter-relationships could be seen as a 'social ecosystem' in which particular types of 'public intellectuals' play a particularly important role as they combine general and specialist knowledge to communicate with society more broadly in the digital age. Particularly influential may be feature writing, investigative journalists, bloggers and members of specialist communities that utilise popular platforms. Interestingly, leading members of political parties do not appear to have a privileged organic intellectual function even though they are potentially important (Spours, 2017).

In the technological sphere it is interesting to think about multiple organic intellects and the issue of the relationship between the diversity of technological organic intellectuals (e.g. specialist academics with a wider view of society such as Van Der Schaar); specialist technological journalists such as Morozov and Naughton who write in the Guardian; together with specialist users in areas such as medicine or engineering. A question here is whether a common thread might be created to connect the different combinations of the Organic Intellect and the intellectuals who embody them. It could be argued that common or unifying threads can be formed by hegemonic ideas and narratives that arise out of complex political, economic, social and ecological trends and contestations and that

articulated by key strata of organic intellectuals. According to the dynamics of 45-degree knowledge production, this kind of common thread is more likely to come from the advanced horizonality – the technological general intellect - that reaches out to the different connective specialisms.

Part 4. The Organic Intellect and reshaping technological change – some issues for exploration in Session 8

This final section returns to Futures 4 and the resocialisation/reshaping perspective by asking three related questions concerning dimensions of the 'Technological Organic Intellect' – Technological Connective Specialisation, the Technological General Intellect; the Organic Intellect as unified forms of thinking and the implications of fusions of Human Intelligence and Artificial Intelligence.

1. Technological Connective Specialisation (TCS)

If connective specialisation involves advanced forms of horizontal and well as vertical knowledge, can you think of an example of a technological expert exhibiting behaviours of TCS? In what ways might these capacities be used to reshape aspects of 4IR/AI?

2. Technological General Intellect (TGI)

What capacities might be exhibited by members of a population demonstrating capacities of the TGI? Can you think of examples of TGI in relation to pressing issues in 4IR/AI?

3. Extending the Organic Intellects – the role of the social and AI/ML

It can be argued that unified forms of thinking (fusions of specialist and general knowledge and awareness) and 45-degree knowledge production already represent an extension of human intelligence by social means. However, how might the different dimensions of the Organic Intellect be further extended by AI/ML?

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