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Visions of Swarming Robots: Artificial Intelligence and Stupidity in the Military-Industrial Projection of the Future of Warfare

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Introduction

My subject in this paper is the analysis, speculation and recommendations for the future development and deployment of lethal autonomous robotic systems such as they appear in reports, studies and presentations emanating from what is still aptly called the military-industrial complex. This term is still apt inasmuch as it continues to characterize a more or less explicit set of relations between networks of thinktanks, lobbying organizations, defense and government agencies, politicians, academics and funded university research projects and their spinoffs into private sector industry and venture capital, as well as the military "clients" who are both end users and beta-testers of new technological initiatives.[1] I want to look in particular at the promotion of artificial swarming intelligence in the research and strategic scoping work that is supporting the development of this robotic future of warfare – if that is what it should still be called if military operations become automated under the control of artificially intelligent systems. This is a question that Gregoire Chamayou has posed in *Drone Theory* in relation to the current uses of robotic systems in conflict, including and especially the remotely piloted unmanned aerial vehicles known ubiquitously as "drones":

> Contrary to Carl von Clausewitz's classical definition, the fundamental structure of this type of warfare is no longer that of a duel, of two fighters facing each other. The paradigm is quite different: a hunter advancing on a prey that flees or hides from him. The rules of the game are not the same. (Chamayou 2015, 53)

Chamayou is discussing the rapid growth over the last decades in the development and use of robotic systems by the militaries of advanced industrial powers in conflict zones such as Afghanistan, Iraq and the occupied Palestinian territories, and covertly in other countries like Yemen, Somalia and Pakistan. The deployment of these systems for surveillance and strike operations represents for him a blurring of accepted understandings of the nature of armed conflict that disturbs the ontological, ethical, geo-political, legal and strategic coordinates in which war is contemplated, conducted and evaluated by society and its members. Chamayou has shown how a vision of the deployment of fully automatic weapons drives developments in drone technology (Chamayou 2015, 205-221). My essay seeks to shine a critical light on an instance of this dreaming of a future of smart robot soldiers from a critical and philosophical perspective.

As Chamayou points out, the research and development of robotic weapons includes the deployment of systems in actual operations. Systems developed by technologists of the military industrial complex are trialled and tested on the ground by forces and this feeds back into the next cycle of system development. This means that the thinking about future swarms of drones does not end with the work of the think-tank boffins and Pentagon report writers, but continues right through all of the processes of funding, design, testing, accreditation, implementation and so on, right the way down to the idiosyncratic adoptions, workarounds and alternative uses that those forces using new weapons will develop in acquiring a "working knowledge" of them. My focus in this text is on the theorising, recommending and legitimating work at its closest to the sphere of political, collective debate and review. This work engages with the public's political representatives through various fora, reporting and lobbying acitivities. Often these reports are also available to the public, and various talks and presentations and demonstrations related to these activities can be found online. My aim is to develop a critical reflection on the vision of the

future of war in this well-funded and strategically well-placed work dedicated to influencing political decision-making regarding military spending and strategy in the U.S.A.

To develop this critical reflection I will mobilize a critical perspective on the future of military technology informed by the work of French philosopher of technology Bernard Stiegler. Stiegler's propositions concerning the inescapably technical character of human being have implications for the consideration of all the important questions about human being and its technologically-driven transformation today. This includes consideration of the dynamics of military developments which Stiegler has characterized as part of the concretization of a prevailing tendency toward a highly dangerous and destructive deployment of the possibilities of digital technology.[2] For my part, I want to consider from this perspective the human intelligence that is marshalled and directed toward the future plans for a new kind of "war in the age of intelligent machines" – as Manuel De Landa, writing at the opening of the digital age, named the vision animating this military-industrial thinking (De Landa 1991). More specifically, I hope to show the pertinence of Stiegler's comments on the human exercise of its potential for rational, reflective intelligence in order to critically evaluate the promotion in these plans of a strategy advocating the delegation of killing to a synthesized swarming intelligence.

Mind the Gap

The work supporting the material development and implementation of automated robotic systems in actual military and security operations is an instance of what Stiegler calls "noetic" labour. Noetic refers to the ancient Greek *noesis* – understanding or intellect, from which the English word "nous" derives. There are two related claims that underpin Stiegler's work on the nature of the work of human intellect that I need to introduce briefly. Firstly, noetic labour is the

realisation of the potential of the individual intellect that is only possible and always takes place in relation to the intelligence of the collective. The noetic individual thinks, imagines, articulates and reflects on her experience and her perceptions, reasons and speculates, and so forth, drawing on established knowledge in (more or less explicit) dialogue with others. These others differentially comprise various groupings which define and condition her identity understood as process rather than as innate or essential element. Intelligence develops in this process of a mutual, ongoing "individuation" of individual and collective(s).[3] As part of this individuation of the I and the we, the "psychic" and "collective" individual, intelligence is never without a social dimension, that is, it is never without an historical, cultural and political dimension. For Stiegler, human intelligence is something that is formed in the relation between the individual and the social group(s) as individuals multifariously act on, confirm, question, modify and reestablish the "we's" collective knowledge of the world.[4] This is especially pertinent to and only too clear in considering this military-industrial effort to rethink the nature, value and conduct of military operations against other "we's" through a discourse on the potential applicability to these questions of the latest intelligence about artificial intelligence.

Secondly, as what distinguishes ours from the intelligence of other beings, human intelligence amounts to a process that emerges from a reflecting on and sharing of experience that is equally dependent on the accumulated knowledge of the shared experience of the collective's history. The material substrate of this accumulated knowledge is artifactual, that is technical. We inherit past insights and understandings from what is left behind from those who lived before. The social, cultural knowledge-banks of the collective are mediated by the material residues of the experiences and discoveries and plans of the past. For Stiegler this puts the specificities and the contingencies of the production and retention of technical forms at the very

heart of individual and collective human becoming. What we make and what we preserve depends on these residues and also impacts future access and orientation to them for those thinkers to come. In what follows I hope to explain the relevance of these perspectives on human intelligence in my examination of the strange fruits of this noetic labour expended on advancing military robotics toward a model of a swarming intelligence that is promoted as both more and less than human intelligence.

Stiegler's thinking about human thinking is influenced by many writers but his adoption and reformulation of Aristotle's doctrine of the souls, taken together with the insight he draws from André Leroi-Gourhan about the technical character of the evolution of the human, offer the most pertinent frame for my topic. In *The Decadence of Industrial Democracies* Stiegler returns to Aristotle's *On the Soul* to re-read his influential account of the different character of vegetable, animal and human life:

> The noetic soul cannot therefore be simply opposed to the sensitive soul, from which it must on the other hand nevertheless be distinguished, as Aristotle did in fact do. The sensitive and the noetic compose as potential and act. The sensitive soul, according to Hegel, is the *dunamis* [potential] of the noetic soul that is only ever in action (*energeia*, *entelecheia*) intermittently. (2011b, 134)

Aristotle's doctrine of the different "souls" animating different forms of life, that is, beings whose principle of movement is contained within themselves – from the vegetative to the "sensitive" (or perceiving) to the "noetic" or mental/intellectual soul – delineates three categories of beings that also represent a layered hierarchy where the lowest is subsumed within the higher (Aristotle 1986). The vegetative soul can nourish and reproduce itself, but does not perceive or move in response to the world around it. It takes care of the basics of life, drawing nourishment from the environment and propagating its reproduction. The sensitive (or perceptive) soul belongs to those life forms that perceive and act in the world, the animals who hide, run, migrate,

lay in wait for prey or seek out their reproductive partner. The noetic (intelligent, thinking) soul belongs only for Aristotle to those beings who can think, reflect, use language, who have access to *logos*, to logic and reason.

Aristotle's noetic labour of categorizing can be read as delineating clear oppositions between these three kinds of soul. The progression from the vegetative to the sensitive involves the incorporation of the lower soul as a kind of base layer of the higher soul. Similarly, the noetic soul is built on sensitive and vegetative layers that it transcends. Stiegler, a thinker of the becoming of human (and indeed all life) beyond fixed categories, pushes Aristotle's categories toward a more processual reading of the interplay between modes of life animating living beings. For Stiegler, Aristotle can be read (after Hegel and others) by posing the relations between the three kinds of soul in terms of potential and act (*dunamis* and *energeia*).[5] The sensitive soul of the animal life forms associated with it would be from this point of view active only part of the time while otherwise it would remain in the vegetative "mode." Likewise, the potential of noetic life would be that of a being which remained at the "sensitive" animal level for part of the time. The noetic would be in action only intermittently, as the highest realization of the potential of mortal beings who cannot remain permanently as the expression of their *dunamis*.

Daniel Ross explains this by saying that Stiegler understands the interrelation of these different kinds of life in a compositional rather than oppositional way:

> Thus, thinking compositionally, Stiegler says that the sensitive soul "inherits" the vegetation of the vegetative soul, and that the noetic soul "inherits" the sensitivity of the sensitive soul. But the point here is that this inheritance cannot be grasped in terms of layers of the soul: it is a matter of potential and act. Vegetativity is the sensitive soul's way of being in potential, and sensitivity is its way of being active; similarly, sensitivity is the noetic soul's way of being in potential, and noeticity is its way of taking action. (Ross 2009, 3-4)

In this compositional view, the human is composed of noetic and sensitive kinds of soul (and even, within the inheritance of the sensitive, of a vegetative kind), which could be thought of as three *modes* of existing. The noetic mode is in action some of the time, as the realization of its potential for reflective, reasoned, abstract, speculative (and so on) kinds of response to what is perceived, remembered and anticipated.

In a later work Stiegler will articulate this dynamic, processual character of human being in terms of a composition of autonomy and automaticity, where reflection, theorization and conceptualization are composed with habitual, routine and reflex behaviours in response to perceptions (Stiegler 2016, 72-74). The two are irreducibly related in human ways of life and its development. Culture is most often lived, for instance, as a kind of automatic, "sensitive" program for acting in relation to certain perceptions in certain situations and contexts. Its vitality and potential to remain current, compelling and valuable to individuals depends, however, on the possibility of individuals to reflect on its appropriateness at times, to challenge, modify or re-affirm it in and for the collective. This is not possible, however, at every moment of one's lived existence. The routine observance of cultural norms holds in potential their review, criticism, suspension and reformulation.

The balance of these composed tendencies of the human life form is an ongoing question for the noetic mode's intermittent actualisation. To look ahead briefly to my argument's conclusion, this is one way to express the stakes of the current promotion of a mode of warfighting that would relegate killing to an artificially intelligent, "sensitive" mode of thought in its actual conduct and execution. Is this balancing of the automatic and the noetic tendencies of human action in the terrain of military and security operations appropriate to a form of life that lives up to the idea of the human such as it is conceived today in the concepts (and

documents) of humanity associated with the "advanced" Western democracies prosecuting these operations?

For Stiegler, the progress of the noetic being toward actualising and extending its potential is dependent on its elaboration of a technical mode of existence.[6] Stiegler is influenced by paleo-anthropologist André Leroi-Gourhan's notion of the exteriorization of biological functions through technical development. In *Gesture and Speech* Leroi-Gourhan (1993) developed a thesis concerning the crucial role of technical development in "hominization." For him it is, paradoxically, our genetic non-adaptation that characterizes our evolution:

> Our significant genetic trait is precisely physical (and mental) *non*adaptation: a tortoise when we retire beneath a roof, a crab when we hold out a pair of pliers, a horse when we bestride a mount. We are again and again available for new forms of actions, our memory transferred to books, our strength multiplied in the ox, our fist improved in the hammer. (Leroi-Gourhan 1993, 246)

Human evolution must be understood has having passed beyond an essentially genetic process to one which proceeds more technically, through the "evolution" of ethnic and cultural groupings on the basis of technical differentiation.[7] The early hominid's capacity to invent and then develop technical forms that replaced and improved functions such as biting and scratching – for example the knapped flint tool, touchstone of evolutionary anthropology – initiated a pathway of human differentiation based on this process of exteriorization (and differentiation) of functions.

Drawing on this approach, Stiegler sees the human as an inherently technical form of life whose evolution is "nongenetically programmed: since ethnic memory is external to the individual, it can evolve independently of genetic drift and is thus found in this sense to be temporal" (Stiegler 1998, 155). This ethnic memory evolves historically, conditioned by the material character of human artifactual production and subject to the contingencies of existence in time. The human animal develops and becomes different within the framework of the ethnic

group. Her individual becoming leaves its mark on ethnic memory and contributes to evolving the identity of the ethnic. As discussed above, Stiegler thinks of the human as the combined "individuation" of psychic and collective individuals.

For Stiegler the human must be understood as a composition of biological and technical elements that cannot be neatly opposed but must be thought of as composed. Stiegler will call these elements "organs" to insist on the irreducible composition of biological and artificial components in human life and what it has produced in the course of human history. The word "organ" comes from the ancient Greek *organon*, which means organ in the biological sense but also tool or instrument. The irreducible character of the composite of the human organic and social, collective body with "inorganic organized matter" is Stiegler's core proposition leading off from Leroi-Gourhan's daring claim (at the time, and perhaps even now) of the decisive differentiation of evolution that the human animal enacted and represents (Stiegler 1998, 82).[8]

A philosopher influenced by Derridean deconstruction but also by Gilbert Simondon's process philosophy of individuation, Stiegler tries to formulate in these engagements with Leroi-Gourhan and Aristotle an explanation of how we are like and also unlike other biological life forms. It is necessary to make distinctions that avoid simplistic oppositions in Steigler's compositional thought. This point is one which I argue we cannot ignore as we humans of the globalized world pursue today the development of quasi-biological forms of intelligent technologies to prosecute our cultural and political disagreements about how to live. Our challenges as well as our potential are bound up with our technological development, and so a rigorous critical scrutiny is demanded when it is proposed to secure our future becoming through the development of cutting-edge technological systems simulating the automatic, swarming operations of species within the animal kingdom.

If we are to understand ourselves as intelligent and ethical beings animated by a noetic soul, exercising our *nous*, it is important for Stiegler that we understand that we are that being only *intermittently*, as our most specific potential, one which we realise sometimes, while often resting in or "falling back" towards the sensitive "animal" and even "vegetative" states. This does not mean for Stiegler that the essential ground or "true nature" of human being is animalistic or instinctual, as evolutionary psychologists or figures like Richard Dawkins might claim. If we often regress toward the mode of being represented by Aristotle's "sensitive soul" that is part of our biological and genetic history, this "animality" has always and forever been altered by our passage beyond it to access the noetic soul. There is no pure going back.[9]

All of the ethical, moral and political stakes of our "regression" to brutal, cruel, or insensitive and stupid acts reside in this which is our key difference to the life forms that we have so much in common with but are also so different from. The bloodlust of violent slaughter in armed combat or in the shocking acts of groups like Daesh or Boko Haram should not be considered more authentically human (or indeed inhuman in a symmetrical fashion) in their supposedly "animalistic" savagery than the long distance executions by hi-tech drone strikes, the starvation of populations by strategic trade blockade or the cynical indifference of economic imperialism. All of these kinds of violence and killing amount to various forms of regression from the higher possibilities of the being we conventionally call "human." All of them are technically conditioned. They each require a rigorous analysis of the context and conditions in which they occur or have become acceptable to those who prosecute them. None of them can be excused or explained, however, as more or less "essentially" human by recourse to some biological bedrock of humanity. Such a gesture must be taken for what it is: a (technically

conditioned and enabled) attempt by the noetic soul to avoid responsibility for its regressive realisation.

Swarming as Natural Inspiration for Military Futures

This "no going back" informs my approach to the projected application of the techniques of "natural" swarming phenomena to advanced military operations involving autonomous robots. I have in view the work of U.S. think-tank lobby groups like the Washington-based Center for a New American Security (CNAS) and the Rand Corporation, and of the contributions to planning and policy by the United States Defense forces disseminated through the numerous reports and scoping documents they produce. Reports like the *United States Air Force RPA [Remotely Piloted Aircraft] Vector: Vision and Enabling Concepts 2013-2048* from 2014 and its 2009 predecessor, the *USAF Unmanned Aircraft Systems Flight Plan 2009-2047* contain detailed projections of future development and use of autonomous vehicles along with economic and strategic rationales for their adoption as a central plank of future military doctrine (United States 2009, 2014; also Department of Defense 2013). *The RPA Vector* report's Executive Summary states that the extent of the deployment of autonomous systems in the USAF's various "core functions" will be the decision of the personnel responsible for integrating the human and remotely or automatically piloted elements, but that it will be necessary to build "increased capability development and synchronization [for autonomous vehicles] within the Air Force's various budgeting, development and requirements processes" (United States 2014, iv).

The various reports and papers from CNAS' "Future of Warfare" research program – including the two volume *Robotics on the Battlefield* – amount to a much more strident advocacy for the role of autonomous systems in the future of U.S. military operations (Scharre 2014b, 2014c). The second volume, *The Coming Swarm* is of particular interest here because of its

consolidation of the theoretical and logistical arguments for the adoption of swarming robotic elements in the application of military force. In *The Coming Swarm* Scharre recommends embracing the "disruptive" paradigm shift from "direct human control" to one where "human controllers supervise the mission at command level and uninhabited systems maneuver and perform tasks on their own" (Scharre 2014c, 6). In the future, Scharre predicts, developments in AI will exceed the bounds of current doctrine regarding "networked" forces and achieve "true swarming – cooperative behaviour among distributed elements that gives rise to a coherent, intelligent whole" (10). The report promotes the potential of autonomous systems to provide a decisive (and cost effective) means for the U.S. armed forces to maintain their superiority and global reach in a changing world (18-22).[10] The coming military swarm of autonomous machines will move, communicate with each other and "think" faster, much faster, than human warfighters (33).

In a section discussing the origins of the applicable concepts for a military mobilization of swarming robots, Scharre refers to the "groundbreaking monograph" by RAND Corporation intellectuals John Arquilla and David Ronfeldt (2000) entitled *Swarming and the Future of Conflict*. *The Coming Swarm* adopts the RAND study's rather circuitous, duplicitous and contradictory incorporation of the biological concept of swarming into the development of military doctrine. At the beginning of their discussion of "Swarming in nature" Arquilla and Ronfeldt state that "Military swarming cannot be modeled closely after swarming in the animal kingdom. But some useful lessons and insights can be drawn from it" (Arquilla and Ronfeldt 2000, 25). No reasons are given for why military swarming cannot be closely modeled on the natural variety. Moreover, full advantage is taken of this "but" in the ensuing comparisons between examples of biological swarming phenomena in ants, bees, wolves and mosquitos and

human instances of organized conflict from mass war, to U Boat "wolfpack" tactics, Vietnamese National Liberation Front (Viêt Công) operations to guerilla warfare and the political deployment of mobs of "soccer hooligans" in Milosevic's Serbia (25-27). Ant activities against other ant nests "have an operational complexity that mirrors human wars in striking ways" – indeed, the authors claim that ants have been "making war" long before humans came along (26). The World War Two German submarine tactics known as the "wolfpack" are interpreted as a metaphor with more than a kernel of biological truth. According to the authors, like the predatory animal wolfpack the U-Boat tactics employed small groups of mobile units who targeted isolated members of a larger group (the shipping convoy). Another "powerful metaphor" identifies countermeasures against cyber-attack with the "mobbing" tactics of the biological immune system (27).

Arquilla and Rondfeldt's envisioning in 2000 of a future "BattleSwarm" doctrine identified advances in "information operations" and the networking of forces as a crucial reason and opportunity for moving beyond maneuver-based Air-Land Battle doctrine (Arquilla and Ronfeldt 2000, 78). Scharre's *The Coming Swarm* imagines artificially intelligent swarming forces whose capacities for action based on their realtime communications linkages far exceed the goals of networked human warfighters. This vision of swarming robotic military force seeks to realise the potential of what Kevin Kelly called the "neobiological" shift in work on intelligent systems design from the 1980s (Kelly 1994). It sets out to project applications more or less modeled on the "striking" similarities and "powerful metaphors" offered by swarming intelligence in the animal kingdom to the extremes of violent conflict between humans. These metaphors imply an essential, biological equivalence between human and animal existence.

The swarming phenomenon has been hugely significant in the development of what became "the New AI" which took a different tack from the "classic AI" approach of modeling human thinking. According to John Johnston's overview of the history of artificial intelligence, the classic AI works toward software implementations of models of the functioning of human intelligence conceived as a top-level, hierarchical decision-making logic.[11] That is, it sets out to build a programme that emulates thinking understood as a complex process of logical symbol manipulation that works with models representing external reality. Instead of modeling cognition as a top-down, abstract logical scheme, the new AI adopted a bottom-up approach of experimenting with smaller parts of less symbolic and more immediate, responsive functioning to see how their combination and coordination might open onto higher, more conceptual levels of processing inputs and organising behaviour.

The key concept here is "emergence." Intelligence is theorized as an emergent phenomenon that appears in evolution as an unexpected result of the combinations of lower level operations of the organism's perception-response physiology. The symbolic, conceptual and logical thinking of the human mind has emerged in the course of the evolution of biological nervous systems conducting and arranging these relatively simpler processings of data: fight or flight, sense prey – attack, detect potential mate – begin the reproduction process, and so on.[12] Emergence is unexpected, surprising, messy, and dramatic. It brings forth a whole that exceeds the individual parts, a whole which is not discernible as an implication in them, or is only visible after the fact.

The emergent intelligence exhibited in the coordination of actions by the collective insect species like the ant, the termite and the bee, the flocking of birds and the schooling of fish, became phenomena of interest and inspiration for the new AI and robotics researchers from

around the 1980s. The foraging ant has a simple signalling and response system, the famous pheromone secretions that leave a mark other ants can detect and so can contribute to a temporary trail. The individual ant's simple functioning – follow the trail, secrete or not (thereby intensifying the trail's collective signalling to subsequently arriving ants) is the basis of the collective, emergent "superorganism" of the ant nest's food scouting and acquisition, threat response, and other "higher level" capabilities.[13] Drawing on the success of the new AI in modeling and simulating such emergence in artificial systems, it is the potential emergence of a collective warfighting intelligence among a "swarm" of military bots that is being imagined – and indeed confidently predicted – in reports like *The Coming Swarm*.

Emergent Stupidity

In a conference presentation on the same theme of the potential of swarming AI for the future of war, *The Coming Swarm* author Paul Scharre uses a series of computer graphics images and simple diagrammatic animations to illustrate the report's imagining of future uses of autonomous swarms of robots (Scharre 2014a). These images depict land and sea terrain from an overhead view reminiscent of the perspective provided the player in strategy simulation games. The simplified, schematic representation of military units such as ships, missiles, aircraft and tanks resembles the graphics in these games and in even older traditions of the depiction of battles for military gaming, simulation and historical representation.[14] Ships, planes or missiles are recognizable but the aesthetic is one of depicting symbolic tokens on a simplified map of the territory rather than an illusionistic, photorealistically rendered world.[15]

This visual strategy is both institutionally conventional and absolutely symptomatic of the willful blindness – a kind of voluntary stupidity – that characterizes this projection of the immediate future of the warfare envisaged for the armed forces of the United States. Like all

fiction, this imaging (which is also an imagining) operates a strategic selection (and exclusion) of the elements to be included in this vision of the scenario. In one sequence of images conventional naval ships are surrounded by a defensive screen of robotic vessels which respond to the appearance of enemy vessels with a swarming attack. Whether the unfriendly vessels have humans on board or are also autonomous is not specified. In another sequence a swarm of land-based robots advances inland as an avant-garde, eliminating enemy units in advance of icons representing conventional armoured personnel carriers.

The kernel of the controversies and debates that have accompanied the U.S. military and security deployments of semi-autonomous and remotely piloted systems over the past decade or so is conspicuous by its absence in these visualizations of future war: no non-combatants, no villages, no temples, no town square meetings, no farmers, fishers, no bus trips to weddings or football matches, no "others" except the implied presence of enemy combatants (and even this is a weak and unnecessary implication). The absence of the occupants of the contested territory in these images is reflected in *The Coming Swarm* which contains no substantial discussion of the challenge of discriminating between combatants and non-combatants. As such it sidesteps the subject of much of the civil protest and activism in recent years challenging the policies of U.S. military and covert CIA use of drones in surveillance and targeted killings over the skies of Afghanistan, Pakistan, Yemen and Somalia. Human rights groups have criticized the deployment of drones over inhabited territories not recognized as conflict zones. In Waziristan in northern Pakistan, for instance, the resident population have been subjected to a perpetual threat of attack by everpresent overflying drones. Legal researchers attacked the failure of the Obama U.S. administration to establish the legal grounds for these operations in either the laws of war or of policing.[16]

The Obama administration's controversial "signature strike" attacks on unnamed and unidentified Pakistani, Yemeni and Somali inhabitants highlighted for some the risks of conducting war via remote controlled systems in the kind of "asymmetrical conflicts" of the perpetual "war on terror" (Becker and Shane 2012). These operations targeted individuals on the basis of the "signature" of the data trail collected from drone and electronic communications surveillance. The Obama administration's direction of travel in dealing with the problem of identifying combatants among the civilian population was revealed by investigative journalists who discovered that the White House had adopted a George W. Bush administration-era definition of combatant as any military-aged male in the zone of operations (Becker and Shane 2012).[17]

Moreover – and this is one reason why I called this a kind of voluntary stupidity – it ignores the significant debates in military strategic circles about the value of drone deployments in counterinsurgency operations such as those undertaken in these countries. As Chamayou has shown, the burgeoning use of drones and surveillance and strike operations was not universally welcomed among military leaders and strategists because it was seen as inimical to the doctrine of counterinsurgency which is based on winning the support of local civilian populations.[18] The most substantial critique along these lines is made by former advisor to General David Petraeus in Iraq, David Kilcullen (Chamayou 2015, 65). For Kilcullen and other supporters of counterinsurgency over "antiterrorism," the key aim of occupation campaigns such as in Iraq and Afghanistan is to "mobilize the population in its cause" against competing efforts by the enemy (Kilcullen cited in Chamayou 2015, 67). The avoidance of any engagement in these debates, in the context of the projection of future strategic doctrine and the configuration of military forces,

seems calculated to ignore, that is, to remain ignorant of, these significant questions concerning the use of remotely controlled and semi-automated forces.

There is a second reason why I called this report's projection of the future of swarming forces stupid, one which relates specifically to the conception of human intelligence as a dynamic and intermittent phenomenon. This stupidity reveals itself most clearly here, not as an error in reasoning or gathering of relevant information but as an approach that accepts a diminution of existing warfighting nous and with it, the noetic potential of humans conducting war. For what is being advocated here is effectively a development of an emergent, artificial intelligence that would replace and render obsolete existing traditions and doctrines of "military intelligence" about fighting the enemy. The actual execution of military operations involving lethal force would be directed by a radically transformed combination of human and artificially intelligent decision-making. CNAS calls for a shifting of the "existing paradigms" of command and control to enable "human supervision of large swarms" (Scharre 2014c, 6).

In the overturning of the paradigms of fighting war the specific skills and knowledges of many warfighting activities would be delegated to autonomously functioning systems, envisaged to be able to react with an emergent tactic to different challenges, posed for instance by either human or non-human (AI-based) opponents. This would inevitably entail a de-skilling and re-skilling process for the armed forces as a whole, and what is only tacitly acknowledged in this report is that a significant diminution in the scope and depth of existing skills and experience of actually killing the enemy is a consequence of the promoted paradigm shift. Skills develop through the analysis and formalization of the "lessons of experience." When the robots are left to conduct many engagements with the enemy, there will be less need for those skills and a consequent withering of the competencies and the "higher learning" of those lessons. It is among

this “higher” strata that resides the subtlety of decisions about who is the enemy and who is the non-combatant caught in the middle, about what is the appropriate action in response to both the situation and the rules of engagement governing action in that particular situation, who to believe and who to discount, and so on. This subtlety involves the ethical-political, the legal, the moral as much as the tactical and operational dimensions of the conduct of war.

From my perspective informed by Stiegler’s work, it is important not to characterize this simplistically as a disabling of human intelligence in favour of machine intelligence. As I argued above there is no purely human intelligence that is independent of its technical supports. The human is always conditioned by its technicity – as ethnically and historically “evolving,” the human is composed with a technical becoming that it animates but which, as exterior and material process, is not entirely reducible to human being nor is it merely its instrumental supplement.

In this regard, USAF fighter pilot M. Shane Riza has examined the highly complex and semi-automated condition of his advanced technological weapon system in his book *Killing Without Heart* which nonetheless argues for a substantial reconsideration of the trend towards the increased automation of warfare (Riza 2013, 3-6). As Riza shows, automation already plays a central role in the advanced weapons systems of the industrial powers, in tracking and targeting from missile guidance to missile defence, in vehicle navigation and systems monitoring, in the functioning of communications and logistics, in training and simulation, and so on. This blurring of the opposition between automation and human agency does not mean that there is no difference between the existing and the proposed future state of warfare, or that the difference is one of degree and does not really matter. On the contrary, because of the composed, dynamic and therefore contingent nature of the becoming of human activity in general, and here in the

"extreme" zone of human conflict especially, it is all the more important to distinguish rigorously between different compositions and to argue their merits in shaping what we will become. For this is what is at stake.[19]

What *The Coming Swarm* is advocating is a shift in the combination of autonomy – machinic and human – prevailing in military operations. In N. Katherine Hayles' terms this would be a reconfigured "cognitive assemblage" of human and artificial, computer-generated cognition:

> Because humans and technical systems in a cognitive assemblage are interconnected, the cognitive decisions of each affect the others, with interactions occurring across the full range of human cognition…. As a whole, a cognitive assemblage performs the functions identified with cognition – flexibly attending to new situations, incorporating this knowledge into adaptive strategies, and evolving through experience to create new strategies and kinds of responses. (Hayles 2016, 33)

Hayles has in mind complex systems of human and computing and mechanical elements such as Los Angeles's Automated Traffic Surveillance and Control system.[20] Her key insight is that it is important to pay attention to the "thinking of the system" as a whole, and to think of this in terms of a co-evolving complex rather than as a sophisticated tool in the hands of the human designers and operators. The implication of this wholistic characterization of a cognitive assemblage is that as these become more widespread and more technologically sophisticated, human cognition will become increasingly incorporated within and conditioned in its possibilities by the emergent evolution of the assemblage's "adaptive strategies."

For Stiegler, human thinking has always to be understood as the product of a composition of biological and artificial elements. Today with ongoing advances in artificial intelligence, data processing algorithms and so on, more and more tasks traditionally reserved for the people in the "cognitive assemblage" are being delegated to these artificial elements. The character, rhythm

and quality of the thinking of the assemblage will change. The nature of and the passage to the highest levels of our noetic potential are consequently subject to alteration, put into question.

One could say that the highest task of thinking is precisely to think this circumstance, to understand the alterations to the very conditions of cognition brought about by technical innovations, and to think about how and what to make of these innovations in order to best shape the becoming of the technical beings that we are. For Stiegler, this is to adopt technical change rather than to adapt ourselves to it as if we are still an essentially biological being, susceptible to environmental changes but not able to selectively inflect their affects on us. The refusal to do so is to choose to remain in a stupid mode of thought. The critical challenge today in the era of the explosion of artificial intelligence is to come to terms noetically with the potential and the challenge posed by the capacity of "cognitive assemblages" to flexibly attend to the new and to adapt its operations iteratively and automatically at a speed which threatens to outpace their human elements. The human noetic potential remains for now the distinguishing element within the assemblage, the element which brings intermittently the highest potentials of the "noetic soul" to its evolution.

In the cognitive assemblage of the future of war envisaged by *The Coming Swarm* the role of the human is cast in very general terms in relation to an increasingly "sensitive" mode of operational, artificial cognition focussed exclusively on perceive and act processes of targeting and attack. The report opens by saying that AI will "fall short of human intelligence in many respects" and that experimentation has to be pursued in an "aggressive campaign of experimentation and technology development" in order to discover which combinations of human and autonomous robots is optimal (Scharre 2014c, 7). The role of the human is then broadly conceived as one of exercising "common sense" oversight and a restrictive response to

any undesired behaviours from the inherently unpredictable emergent swarm (26). No sense of the inherently compositional dynamic of the changing "military intelligence" of the conduct of war as a whole is explored in this prospective vision of the future of war. The shocking inadequacy of *The Coming Swarm's* idea of "common sense" management of swarming AI elements appears as a fissure in the report's own consideration of the dangers of emergent behaviours that could outstrip the capacities of humans to respond to them in time:

> While increased automation may have tactical benefits in allowing faster reaction times to enemy actions, it could also have strategic consequences if the speed of action on the battlefield eclipses the speed of decision-making for policy makers. Increased autonomy in the use of force raises the dangerous spectre of "flash wars" initiated by autonomous systems interacting on the battlefield in ways that may be unpredicable. While militaries will need to embrace automation for some purposes, humans must also be kept in the loop on the most critical decisions, particularly those that involve the use of force or movements and actions that could potentially be escalatory in a crisis. (Scharre 2014c, 7)

A simple question: how will the supervising human controllers know what is happening in these crisis circumstances – developing at a speed beyond their ability to comprehend them – in order to make these critical decisions *before* it is too late?

The "noetic soul" of CNAS projections of the future of war amount to a wilful limiting of the intermittent potential of human interiority (in warfighting), and an ignoring of existing debates about the strategic and political merits of remotely conducted warfare. I have characterised this as advocating a pathway toward an increasingly stupid global, geopolitical, military engagement in the world by the "advanced industrial powers." It is a responsibility of those of us who are members of the societies of these democratic states to actualize our noetic potential to intervene in these debates, to respond to these propositions for the conduct of war made in our name by organizations and institutions that think about these complex issues on our behalf.

Conclusion

In this chapter I have taken a philosophically informed approach to this disturbing shifting of the goalposts (of military operations and of the human-weapon relations that are being reimagined). This is in part to take seriously Stiegler's claim that changes in the technical possibilities of the human have to be taken as potentially reframing the human being inasmuch as it is a prosthetic, technical form of life. As cultural, historical and artifactual form of existence, the human is a being susceptible to the dynamics of technological development. Questioning the relevance or legitimacy of an existing or projected state of cultural or political affairs – and this means today global, geopolitical affairs – can appeal to the way things were as most appropriate to the conduct of human life and society, such as those challenges to drone strikes based on existing human rights and international law. It might also confront, however, the sense of the human as, precisely, an historical, political and technologically contingent one. This is what I have tried to do here.

What is being advocated in reports like *The Coming Swarm* is the necessity (both economic and strategic) to adopt a future deployment of autonomous systems that amounts to a less restrained, less deliberative, less controllable and less understood mobilisation of lethal force than what exists today in accepted military doctrine (if not always in practice). This is "regressive" in the sense of a falling back from the highest level of thinking, a perhaps lazy, but perhaps calculated and strategic falling away from, or cynical avoidance of a rigorous consideration of the projections of a near future for lethal swarming robotics.

What is regressive in these projections, what is being ignored, overlooked, unthought? Above all, or perhaps before all, that war is a human activity that destroys all the others, that states cooperate in international agreements and subscribe to regulations designed to severely limit its occurrence, circumscribe its destructive affects and contain the threat of its escalation. In

other words, that war is not biological, we are not exactly like other animals, and that the passage to the act of war – which is a catastrophic falling back into forms of thinking and acting much "lower" than political negotiation and conflict resolution – that *especially* the act of war must never be projected, imagined or programmed as something where the killing and destruction might be left to a "cognitive assemblage" more automatic and unpredictable than thoughtful, and less self-doubtful for all its potential gains in speed, effectiveness and emergent inventiveness.

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[1] The term "military-industrial complex" was (in)famously coined by Dwight D. Eisenhower in his presidential farewell speech in 1961, having presided over its expansion across his two terms in the midst of the Cold War (Eisenhower 1961). For accounts of the central role played by the mobilisation and transformation of university research and knowledge production in the intensification of the military-industrial complex, see Edwards 1996 (52-55), and Pickering 1995.

[2] See Stiegler 2016, 47. Stiegler refers to Chamayou's critique of the performative undermining of the laws and conventions of war by the U.S. (and other state) military's drone operations.

[3] See Stiegler 2011a, 93-98.

[4] "The individual psyche is originarily psychosocial, and the social is not an 'intersubjective' aggregate of already-constituted individuals. The individuation of the I is that of the We, and vice versa, even though I and We differ…." (Stiegler 2011a*,* 94).

[5] Dan Ross will add Heidegger and Derrida to this list of proponents of a more processual reading of Aristotle. See Ross 2009.

[6] Stiegler points out in *Technics and Time 1* (1998) that this is a thought Aristotle could not entertain, because for him technical objects were not animate and did not contain the principle of their own movement. They were merely tools in the hands of the living being, relegated by Aristotle to the margins of questions concerning human being and life in general, initiating a long history of the marginalisation of technics from philosophy in the Western tradition.

[7] In Leroi-Gourhan's thesis the genetic evolutionary drift that altered the relative functionality of what became the hands and the feet of the earliest homonid predecessors also altered the potential of cranial and facial development and opened up the possibility of the expansion of the brain pan. At some stage the potentialities of the advance and accumulation of technical invention and symbolization were realised and this transformed the evolution of these life forms.

[8] Indeed, Stiegler proposes in *For a New Critique of Political Economy* (2010) that today we urgently need a shift in scientific thought toward an "organological" paradigm – organology

would be dedicated to the analysis of the relations between the biological and the artificial organs in the formation and refinement of knowledge in all fields of endeavour.

[9] Dan Ross puts it this way: "For the noetic soul, the noeticity of that soul is something which pervades it, and thus which characterises even its sensitivity: the sensitivity of the noetic soul is transformed by its *being*-noetic, and exists as a *power* of the noetic. In other words, for the noetic soul, *aesthesis* is always inscribed in *noesis*, and *noesis*, thinking, is always inscribed in *aesthesis*" (Ross 2009, 4).

[10] The cost effectiveness of swarming systems is argued by Scharre by resort to the notion of the "cost-exchange ratio" employed in the theory of nuclear war. This refers to the relative cost efficiency (versus developing conventional weapons) of deploying massive numbers of units against your enemy and so draining their resources and capacity to defend themselves or launch a counter-attack. The rationale here is that massive numbers of cheaper (and overall lower quality) military units allowed by their swarming coordination enables "a disaggregation of that combat capability into larger numbers of less exquisite systems which, individually, may be less capable but in aggregate are superior to the enemy's forces" (Scharre 2014c, 20-21).

[11] My overview of the new AI is indebted to John Johnston's account of the history of AI and robotics in *The Allure of Machinic Life* (2008). See in particular pp. 277-336.

[12] Of course, these are already quite sophisticated levels of the sensory-motor schema built on layers of emergent organisation arising from patternings of the simplist levels of sensory stimulus and response (see Johnston 2008, 302-303).

[13] See Kelly's accessible overview of the influential entomological and ethological work on swarming in *Out of Control* (Kelly 1994, 5-29).

[14] In Crogan (2017), I provide an overview of the aesthetic logics found in different genres and historical developments of digital wargaming.

[15] The only exception in the presentation to this aesthetic is an image representing the potential use of autonomous medical evacuation helicopters for injured U.S. soldiers. This image is richly rendered in naturalistic detail, showing a rescue from the perspective sharing the soldiers' situation on the ground in the midst of the battle terrain.

[16] See Human Rights Watch 2010; Stanford Law School 2012.

[17] The assertion that this redefinition of "combatant" derived from the Bush administration is made in Woods 2012.

[18] See Chamayou 2015, 60-72.

[19] This point is made most tellingly by Chamayou when he insists on the ethical, critical and political potentiality of human soldiers as something which the deployment of drones is able to sidestep. He discusses something of a set piece in the philosophical debates about the morality of war: the often recounted refusal to kill a defenceless enemy when presented with the opportunity (the archetypal instance of which is catching an enemy in the course of having a wash or going to the toilet). Chamayou resumes commentaries by philosophers Michael Walzer and Cora Diamond before arguing that the refusal to kill in this situation is because "if he does it he knows he will have to live with that action. And that is what he rejects in advance. It is a

matter not of *duty* but of *becoming*. The crucial, decisive question is not 'What should I do?' but 'What will I become?'" (Chamayou 2015, 199). Stiegler will characterise this as the capacity of the soldiery to "dis-automatize" their actions, a potential which emerges in the composition of highly drilled and routinized behaviours and intermittent noetic agency, of psychic interiority with collective identity formation, and prosecuted in the technical milieu of human conflict (Stiegler 2016, 55ff). This potential is something that Riza's concern with the ethics of the "warrior" is aiming at as well, from "within" the intellectual traditions of the armed forces. Like all human life, warfighting involves a composition (that is also an ongoing compromise) of the automatic and the autonomous, the habit-formed, reflex response and the thoughtul, reflective or modifying one. When Scharre makes a comparison between the coordinated action of a pack of wolves and the heavily drilled skill execution and tactical manoeuvres of a combat squad, his conception of the soldiers as "sensitive," perceive-and-act beings is a privative one that strips them of this intermittent potential (Scharre 2014c, 44).

[20] Hayles does discuss the deployment of remotely piloted vehicles by the U.S. but in a way that does not in my view develop productively the implications of her theorisation of "cognitive assemblage".

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