

**Actor-Network Theory analysis of Unmanned and Autonomous Military Technology and  
the Effect on Society's Definition of War**

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On my honor as a University Student, I have neither given nor received  
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## **Abstract**

The strength of a nation's military has always been proportional to the technical innovations of warfare the country possesses. Currently, unmanned and autonomous assets of war are being utilized, funded, and developed for this very reason. But, the application of such technologies leads to new ethical concerns and considerations surrounding warfare.

Actor-Network Theory (ANT) is used to analyze how the increased use of unmanned technologies and the addition of autonomous assets affect the current state of warfare. By utilizing ANT, this thesis shows that by the nature of translations within an actor-network by one actant onto another, how society views and defines war changes as more of these assets are used. This thesis does not aim to define the makeup of the Actor-Network of warfare with the addition of unmanned and autonomous assets, but rather to show that a change will occur.

# **Actor-Network Theory analysis of Unmanned and Autonomous Military Technology and the Effect on Society's Definition of War**

## **Introduction**

To be a powerful military force, it is important that countries innovate military weapons, practices, and hold a large enough standing army to defer any threats that may come to your country or your allies. One category of new military technologies is unmanned and autonomous assets of war that do not require direct control from an operator. Gary Merchant of the Center for Law, Science & Innovation at Arizona State University writes “...many experts believe that autonomous, and in particular lethal autonomous, robots are an inevitable and relatively imminent development” (Merchant et al., 2008). As new autonomous and artificial technologies are invented throughout the world, new military technologies can act as a way to increase the standing army without putting lives in danger. But, by doing so does war itself, and how society defines war change? This research question will be explored first by analyzing autonomous military technologies over time. Second exploring the ethical and societal implications of using such technologies. And lastly, determine to what extent the use of autonomous technologies reshapes the current Actor-Network of military warfare.

In the United States, the increase of focus on autonomous technologies can be seen by the 2017 defense budget allocated to drone-related spending, 4.61 billion dollars. Particularly, this money was budgeted to be used for research innovation purposes as much of the procurement of drones had been done in years prior (Gettinger, 2016). Based on the nature of world politics it can be assumed that other world superpowers are investing in drones and other autonomous technologies for military purposes as well. The use of unmanned and autonomous assets of war does not just affect governing bodies who approve the spending and application of new

technological use. Utilizing unmanned military technologies has a large impact on the individual soldiers who are asked to use them. Another key stakeholder in the utilization of new military technologies is the public and how they perceive the technology, especially in an age where any individual can have access to news and information through social media and other fast new sources.

Militaries across the globe are increasingly using unmanned and autonomous technologies, but the impact of such technologies on the war itself has not been widely studied. This impact will be analyzed by studying the history of unmanned technologies of war, understanding the ethical implications of such technologies, and conducting an Actor-Network Theory analysis. The purpose of this analysis is to show how the increased usage of such assets changes the actor-network surrounding military warfare but does not aim to prove the exact makeup of this new network. Ultimately, the increased usage of unmanned and autonomous technologies will reshape the current actor-network and change how society defines war.

### **Definitions and Limitations**

In this thesis, unmanned technologies refer to technologies that once deployed are operated remotely or not within the technology itself. Autonomous refers to technologies that once deployed make decisions on their own based on artificial intelligence. The operator oversees the actions but does not directly control them. The words drone or UAV (unmanned aerial vehicle) are used as a blanket term to describe a flying vehicle that can be either unmanned or autonomous.

One main limitation of this thesis is that military technological advancements are not public information. It cannot be determined exactly what technologies are currently in development and the exact capabilities of these technologies. This information is not needed to

conduct the analysis but would provide for a stronger argument as to exactly how war is changing, and thus address how society would view war differently.

### **Introduction of the Actor-Network Theory Framework**

Actor-Network Theory (ANT) is used as a research method to show that humans themselves are not the ones solely in control of technology. It aims to map how shifting networks driven by the combination of human and non-human entities change society. Actor networks are not specific social groups, but rather include a combination of various social norms interacting with technology (Munro, 2013). Actor-Networks are framed around a group and when studied from the inside out, each entity has its group associated with it. Each entity is referred to as an actant that accomplishes an action. Actants can be human or non-human. Another key aspect of ANT is translations. Translations are ways in which individual actants are changed from their original state because they are a part of the actor-network (Dankert, 2011). Overall, ANT identifies ways in which actants are related and how they are altered based on interactions with other actants within the network. This makes ANT the appropriate framework for this thesis because it allows for the analysis of how human stakeholders and military technologies interact with one another. This is important when determining how autonomous military technologies shape societies' view of war.

Lastly, a key concept of ANT is that humans and technology are intertwined and cannot be studied by themselves (Bilodeau, 2018). Thus, the main point of study in ANT is the intervention of humans and technology and how that affects the rest of the network. How humans, including government officials, individual soldiers, and the public, respond to autonomous technologies is the main concept of this thesis. Because of this, the aforementioned

concept of ANT makes it possible to consider how the use of autonomous military technologies changes society because they exist in a manner that cannot be analyzed separately.

### **Unmanned and Autonomous Military Technologies**

Rudimental unmanned assets began to be used for military purposes during World War II. The United States Army and Navy developed torpedoes and flying vehicles equipped with explosives that were flown through communications via radio waves. More sophisticated unmanned vehicles were used for reconnaissance purposes during the cold war (Udeanu, 2016). These technologies were used on a small scale and since they were not at the forefront of military strategy, their usage went relatively unnoticed and unquestioned by individuals. The turning point for unmanned vehicles and their use for military purposes came after the terrorist attacks on the United States on September 11, 2001. The use of Unmanned Aerial Vehicles (UAVs) became a key strategy of the United States efforts in the middle east.

When the public thinks about a military UAV they are most likely imagining the MQ-1 Predator. The Predator brought UAVs into everyone's eyes when it was used in 2002 to fire a missile that destroyed a van carrying senior members of Al-Qaeda (Schwing, 2007). This not only proved to governments and militaries around the world that unmanned aircraft could perform dangerous tasks but also began the public's opinions on UAVs, both good or bad.

Currently, unmanned military assets are beginning to become more and more autonomous. That is, instead of having an operator controlling the weapon from a remote location, the weapon itself is making decisions on its own based on what it observes. One advantage of utilizing unmanned assets is that as technology gets more advanced humans become the slowest part in initiating military action (Braun et al., 2018). For example, if an operator is remotely controlling an attack drone and is utilizing its surveillance capabilities to

identify adversaries, the operator must then decide to attack or not. In the scenario of war, this time delay could be enough to make the mission unsuccessful. By taking out the human operator, you potentially reduce this time delay as the UAV acts on its own. But, by taking the human out of the equation new ethical concerns of war can be identified.

While current military uses and development of unmanned and autonomous weapons are not publicly announced, one can look at commercial products to get an idea of the technology that currently exists. Currently, drone swarming technology is being developed and innovated. Drone swarming refers to multiple drones communicating to each other through internal networking that work together to collectively complete a task (Chen et al., 2020). Once they are deployed by the operator, the drones communicate with themselves to determine flying patterns and no other intervention is needed. A type of this technology is being used by the technology company Intel for use in their “Drone Light Shows”. At these shows, hundreds of small drones are equipped with LEDs and a light show is displayed in the air above the crowd (“Illuminate Your Story”, 2021). Intel’s use of drones in this manner shows the potential for future applications of drones working as a collective to accomplish a task. In the military, this technology could be combined with artificial intelligence technology where one drone searches an area and then relays its finding to another drone to aid in deciding its actions.

### **Ethical and Social Implications**

The public acceptance of military operation is essential to a democratic state. This is especially true in the modern-day where the public has access to 24/7 media coverage of governmental operations. The widespread media coverage of the use of unmanned aircraft for drone strikes overseas sparked the debate of the ethical concerns of such military operations from the public. The center of this debate is whether or not drone strikes follow international rules of

engagement and whether they lead to a larger number of civilian casualties than normal practices of war. One particular international rule of law is the shared understanding that two countries must be at war with each other to garner military intervention or a country can act out of defense to another country. Because of this, the United States has been questioned on whether or not drone strikes in places such as Pakistan, Yemen, and Somalia fall under this category (Kreps & Wallace, 2016). This is because the United States is actively defending itself against the threat of al Qaeda but not the countries as a whole. Additionally, in 1977 additional protocol was added to the Geneva Conventions one of which being Article 57 “Precautions in Attack”. This article states a country is obligated to “take all feasible precautions in the choice of means and methods of attack to avoid, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects” (“Protocol Additional to the Geneva Conventions”, 1977). But, even targeted drone strikes on individuals do not guarantee that just the targeted individual will be killed or that no civilians will be harmed. Leading to the question of if drone strikes follow this addition to the Geneva Convention. Lastly, in 2012 a member of the United Nations special reporter on extrajudicial killings spoke at a conference in Geneva about how the uses of unmanned airstrikes by the United States would encourage other countries to begin to forgo established human rights and international rules of engagement standards (Bowcott, 2012). The idea behind this claim was that if a superpower such as the United States believes that utilizing drones and UAVs follows international laws, then other countries will begin to do the same. The concern for the international communities is that more hostile countries will use the United States’ interpretation of the laws as a stepping stone to begin to stray away from international rules of engagement altogether.



There is another side to the ethical debate of the use of unmanned and autonomous technologies in warfare. Bradley Jay Strawser, University of Connecticut, argues that in some cases using UAVs is “ethically obligatory”. He argues that if a technology has been invented that can prevent unnecessary deaths, in this case using a UAV, it should be used over placing human soldiers in danger (Strawser, 2010). Choosing to potentially lose human lives when an alternative is available can be described as not being the ethical solution.

An additional ethical argument can be made by comparing the ethics of a human soldier to an autonomous or programmed military weapon. This ethical principle driving the human soldier can be seen in the United States Army Values of loyalty, duty, respect, selfless service, honor, integrity, and personal courage (Kusch, 2011). All American soldiers are taught to fight with integrity or to have strong moral principles which fit the idea of basing decisions on virtue ethics. Autonomous technologies cannot make decisions based on their morals. The technology is given specific tasks to perform and can only operate within those tasks. Because of this, autonomous assets more closely resemble that of the ethical principle of deontology, or the most ethical choice is one that comes from a list of possible tasks one can perform. No scenario in warfare has a black or white answer, but autonomous technologies will treat warfare as such.

By considering the various ethical debates surrounding unmanned or autonomous technologies of war it cannot be concluded ethical debate is stronger. But, the ethics behind the decisions that a human soldier and an autonomous technology make are different. Based on these it can be concluded that unmanned assets will change the ethics surrounding warfare and in turn, will not be widely accepted by society and will change the ethics surrounding warfare.

## **ANT Analysis**

The current military Actor-Network is centered around the human decision-maker. This is highlighted by the United States adopted leadership platform which teaches the need to produce “adaptive leaders”. This leadership style platform centers around “taking a known solution and modifying it to a particular situation or responding effectively to changes in the operational environment” (Cojocar, 2012). This meaning the leader uses their expertise and knowledge and makes a decision based on this prior knowledge. Branching from the main human decision-maker in combat includes the actants of government/military officials, private military contractors, engineers inventing the technologies, and the civilian public. Adding unmanned and autonomous weapons of warfare to this network changes its makeup.

Technological innovations have always been a driving factor of a military’s success. But, who innovates those technologies has shifted over time. In the 20th century, the United States military would fund its research and development (R&D) on technological advancements meant for military use. They would then keep this R&D hidden from the public. Now, starting in the late 1990s commercial technological advancements were being rapidly created faster than any government research should fund. Because of this, commercial products are created and then often shifted to be used for military purposes (Stowsky, 2004). Government contractors are then hired to make the technological advancement into a military product. This link between commercial, government contractors, and the military shows the ANT network of military technology. The technology being used for warfare is at the center, but the engineers who invented the technology and the private contractors who produced them shape the technology into what it is. One could argue the power of warfare shifts away from those operating the weapons or actively engaging in the fight and shifts to those who produce the technologies.

Additionally, the use of unmanned systems does not take the human completely out of the war. This is evident by the fact that the U.S Air Force states that the operation of one Predator UAV requires a crew of 168 military personnel back home to operate (Braun et al., 2018). Because of this, numerous personnel can be responsible for the actions carried out by the predator.

Another key translation that occurs due to the increased use of UAVs is that society will come to accept fewer deaths in war. If one drone strike can accomplish the mission, and the most dangerous course of action is that the technology is damaged, society will begin to no longer accept any men or women dying in combat. The accepted mental model of humans giving up their lives for their country, the very nature of war is being called into question because of UAVs. As the use of UAVs progresses in the context of military operations the military actor-network will further reshape this definition of war.

Autonomous assets of war are believed to be currently in development, but information about them has not been released to the public. Based on civilian technologies it is clear that autonomous assets have someone to deploy them, but they make decisions independent of the person who did so. The asset is essentially added as another “team member” for the military operation (Giachetti et al., 2008). One key problem this potentially leads to is that humans have a natural moral compass, but that no longer matters if the asset acts independently of humans once deployed. In this case, the individual who programmed when the asset decides to act could potentially be blamed for any wrongdoing the technology does. Ultimately, by utilizing autonomous technologies, the individual soldier's place in the Actor-Network is translated from being the main decision-maker to being an overseer of the decisions the technology makes.

Another key actor in this Actor-Network is the public. Public perception plays a key role in the ethical implementations of unmanned and autonomous technologies, and this also works to shape the network. Public opinion, whether good or bad, can sway decision-makers and cause the individuals utilizing the equipment to question its validity. Both of these can be dangerous in a military setting. If an individual soldier does not trust the technology, which now is acting as a team member in their operations, an unanticipated negative outcome could occur. The public shapes the network and then by ANT how overall society views war changes as well.

By comparing the current network and the one with the addition of around autonomous and unmanned technologies, it can be determined that autonomous technologies become the new center of the network, and the human decision-maker remains but as a less important actant. In both cases, the civilian public or society acts as an actant on the network, and how society views the military and war will be translated differently based on what is at the center of the network. Or in other words, how society views war will change as more and more autonomous military technologies enter the network.

### **Counter Arguments**

An argument can also be made that because military technologies improve with the improvement of consumer technologies, the general public's reaction to military technologies will not be that much different as they are to nonmilitary technologies. For example, public acceptance of artificial technologies (AI) is generally high. The majority of the non-acceptance does not come from the use of the technology itself, but the security concerns related to AI technologies (Talley, 2020). Thus, it can be concluded that because consumer AI products have general public acceptance, the public will react the same way to military uses of AI or other autonomous technologies. But, this argument is not completely true, based on research conducted

for the “Universitat Politècnica de Catalunya, Spain”. This research found that as the complexity of the situation the drones are used in, public perception goes down (Macias et al., 2019). The decisions autonomous technologies would have to make in the context of warfare are complex. Because of this, likely, public perception of new autonomous military technologies would not be high. As the perception of military technologies shifts so will the way society views and defines war.

An additional argument is their no one global definition of war, and therefore one cannot directly argue that society's definition of war will universally change. But, what is being argued is not the exact definition of war that using unmanned assets will lead to. But rather, that these assets are a big enough distribution to the current Actor-Network that they will reshape the other actors tied to them. This will in turn lead to a change in how warfare is viewed and used. This in turn will change the definition across society.

## **Conclusion**

An increase in the usage of unmanned and autonomous technologies for military operations will continue to occur in the future. The use of such technologies will continue to be questioned through ethical debates and interpretations of international rules of engagement. This will be especially true as more and more countries adopt the usage of drones and UAVs, particularly smaller more hostile countries that will add their interpretations to international laws. Additionally, autonomous technologies will act exactly as they are programmed no matter the circumstance. This strays away from how final decisions or warfare are currently made. That is, soldiers' internal moral compasses guide what decision is made in grey situations. Lastly, putting unnecessary lives at risk will become less accepted as unmanned drones take the place of manned operations of warfare. These three points highlight how the use of unmanned and

autonomous drones changes how war was viewed and defined in the past. This altering of the definition of war is further proved under the Actor-Network theory. One of the main ideas of ANT is that all the actors in the Actor-Network are intertwined within one another. Another is that humans and technology cannot be studied separately, they both shape each other within the network. As new unmanned or autonomous military technologies are developed and utilized they reshape the actors and stakeholders within the network. Most notably, they replace the human decision-maker as the new center of the Actor-Network. In doing so, the once accepted mental model and definition of war will change and the global society will begin to view and use war differently than they have in the past.

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