

## Drone school: Tough lessons for rookie remote pilots

Visiting a US air force base showed that being the remote pilot of a warplane is no cushy number – and don't mention video games

By Sara Reardon



FOR a war zone, the silence is disconcerting. The battlefield is a dark, cold, slightly musty-smelling room, lit only by blinking LEDs on computer consoles and a pale glow from screens showing aerial views of desert expanses. A pair of jumpsuited US air force soldiers sits at each console, speaking softly into their headsets and navigating remotely operated aircraft with controllers similar to those in fighter jets. Outside, unmanned Predator or Reaper aircraft – better known as drones – patrol the pristine New Mexico skies. For now, the aircraft that these trainee drone operators are flying and the villages that they are monitoring from Holloman Air Force Base in southern New Mexico are only simulations. Soon they will fly real drones over Holloman and the military bases that adjoin it.

After four months, more than 500 pilots and sensor operators will graduate and be dispatched to bases, many in undisclosed locations. Then the voices in their headsets will become real: frantic shouts from soldiers on the ground dodging audible explosions and commanders giving combat orders. From about 6100 metres in the air, they will collect information on improvised explosive devices (IEDs) planted by enemy fighters, watch as their comrades are shot at, and launch Hellfire missiles at individuals whom commanders and politicians have designated as terrorists. At the end of the day, they will step outside into the parking lot and drive home to help their kids with their homework.

They're presented as cubicle warriors who fear carpal tunnel syndrome more than gunshots. But is being a drone operator really as cushy a military job as it appears?

On top of the stress of taking lives and witnessing battleground horrors, drone operators must monitor a barrage of digital and auditory information. And between each high-octane skirmish stretch hours or days of boredom, which can be stressful in a different way. Psychologists are now wondering whether the separation of pilots from their planes – “split ops” in military parlance – is taxing the human mind in unprecedented ways.

Drones and the soldiers who fly them will undeniably become central to many military operations (see diagram). Politicians and military alike are enthused by the idea of surveillance and precise aerial bombardment that vastly reduces the risk to their own troops. Last year, for the first time, the US air force trained more drone pilots than regular pilots for operations primarily in Iraq and Afghanistan. Some come to drone **school** straight from training; others are veteran pilots. The Central Intelligence Agency also operates drones in Yemen and Pakistan, but will not reveal how many operators it has or who trains them. And in 2012, despite cuts, President Barack Obama set aside \$5 billion of the defence budget for the controversial drone programme that has escalated under his administration.

The pilots hate the word drone. “It gives the impression of robots dropping weapons indiscriminately,” says Chad, an instructor at Holloman and former drone pilot who, like the other airmen, has covered his name badge with black tape for security reasons. Decisions to deploy weapons go through long chains of command: there can be hundreds of remote soldiers involved in a single mission, he says. “The worst thing we've ever done is call them unmanned vehicles.”

### No video game

They also hate it when people assume piloting a drone is like playing a video game. Such comparisons abound in the media, but it's a non-issue, says an instructor and drone pilot named Jay. “When you get into combat and hear the panic, you'll know it's real. You hear the gunfire and you just feel it in your bones. You definitely get the adrenalin.” Other pilots describe the surreal feeling of thinking they're in Afghanistan, and then stepping outside into, say, Nevada.

### “It's not like playing a video game. When you get into combat and hear the panic, you'll know it's for real”

That has made psychologists wonder whether these soldiers may be prone to the same problems with post-traumatic stress disorder (PTSD) that have plagued hundreds of thousands of soldiers returning from Iraq and Afghanistan. “They see through the cameras very clearly and their

bodies and minds are reacting as though on the ground,” says Elizabeth Stanley of Georgetown University in Washington DC. Gory images alone are able to induce the same flight or flight response as real war, she says.

Drone operators have an unprecedented view of war carnage as they circle scenes for hours. “In an F15 fighter jet, you’re seeing first hand what’s going on, but not hanging around for the aftermath,” says Mike Weaver, a veteran jet pilot who commands the drone training programme at Holloman. When dropping a guided missile from a jet, “you might never see the target”.

With drones, that target is often a person. The legality and ethics of killing individuals with missiles carried by remotely operated aircraft has been the most controversial aspect of the US drone programme. The military and CIA do not disclose how many targets, or indeed bystanders, their drones have killed – the total number is believed to be in the thousands. But when it comes to who is a target, “that’s for the politicians to decide”, says Weaver. For the soldiers, their orders take precedence, like in any other mission.

The difference is that rather than killing an enemy in self-defence, the operators may follow their targets for days in complete safety. Weaver sees this separation of combatants as the natural progression of warfare, along the same lines as progressing from hand-to-hand combat to a rifle.

But ironically, drone operators’ widescreen view puts them up close and personal with their targets. The operators see them living human lives, in between their insurgent actions. “If you’re watching a high-value target, if he’s planting an IED, I might feel differently about him than someone who’s sitting at a table eating,” says Weaver. “But there’s not a lot of time for emotion.”

## **“Ironically, drone operators’ widescreen view puts them up close and personal with their targets”**

What will be the psychological effects on the split ops warriors of the future? The field is still too new for us to know, says Wayne Chappelle, a military psychologist at Wright-Patterson Air Force Base in Ohio. He and colleague Kent McDonald recently completed the first clinical study of drone pilots. Although there’s significant variation between individuals, they found that nearly half the drone pilots reported high stress and burnout. This was primarily due to long, overloaded work hours and excessive stimuli and information competing for their attention.

Only 3 to 5 per cent suffered from PTSD, however, compared with up to 20 per cent of soldiers deployed to Afghanistan and Iraq. “It’s the exception, not the rule,” Chappelle says. That doesn’t mean there aren’t effects. What may emerge with future study, he suspects, is a new form of PTSD similar to “vicarious traumatisation”: a term coined to describe the symptoms experienced by mental health workers who listen to first-hand accounts of war horrors. “As therapists listen, their mind has to create an image and movie so they understand what the person experienced,” Chappelle says. This can cause the same flashbacks and sleepless nights common in people with PTSD.

### **Good communicators**

The military takes such worries seriously, says Chad. At Creech Air Force Base in Nevada, the hub for drone missions, he says, a new policy has operators contact a military psychologist each time they deploy a weapon.

And the US air force recognises the need to recruit aircraft pilots for remote operations who are stable and good communicators. “A lot of times people default to thinking that pilots are the kids who grew up on video games,” says Chappelle. “Those are the kids who were socially isolated. What we’re seeing is it really takes a person who is cognitively sharp, healthy and can relate to people.” The Holloman instructors say that with the exception of some factors, such as the ability to withstand *g* forces, the criteria for becoming a drone pilot are identical to those for a jet pilot.

Of course, drones are more than just weapons. Amidst all the political debate, it’s easy to forget that the US military has used Predators for surveillance since the 1990s. Strapping Hellfire missiles beneath the wings of the little planes is a fairly recent innovation. Their most powerful asset is the glass ball that hangs under the plane’s nose.

Here are housed multiple powerful cameras that can read a licence plate from miles away, or film scenes through smoke and operate in darkness with infrared. “Ninety nine per cent of what we do is looking at things,” says a lieutenant colonel named Jon. Drones are so good at collecting imagery information, in fact, that their footage has clogged military networks and created a massive backlog of unanalysed data.

The rapid influx of information that drone operators receive has proved to be a serious problem. A recent skirmish in Afghanistan in which 23 civilians were killed could have been avoided had an operator passed on relevant information about the crowd that was gathering, *The New York Times* claimed in 2011. The problem, military investigators concluded, was that the operators were overloaded and lost control.

“It’s not a training issue,” says James Szalma at the University of Central Florida in Orlando. “The human cognitive system simply has limits.” When on a mission, the two-person team of pilot and sensor operator will be under extreme pressure while monitoring targets, analysing images, texting and talking on the radio with people on the ground, juggling orders, and flying the plane, all while being responsible for the lives of other soldiers and civilians.

The ability to juggle many simultaneous tasks differs from person to person. “What’s interesting is it can be depleted when we’re stressed or tired,” says Stanley. “It’s like a credit bank.” When the combination of tasks and stressors becomes too much, the person fails at all the tasks.

“It’s not a graceful degradation,” says Peter Hancock, also at the University of Central Florida. “They just fall off the table top.” This phenomenon has been best studied in air-traffic controllers, who might monitor 10 or more planes on their screen at once. When a critical number of planes are present, even these highly trained professionals become overloaded and the whole mental model of the airspace they’ve built up collapses.

The instructors at Holloman are well aware of this phenomenon. In training, Jay says, they will sometimes overload students with tasks in order to stimulate the problem.

But what they cannot train them for, says an instructor named Chris, is how quickly events can unfold. That switch from dull monitoring to all-out warfare is what he says shocks students the most when they move from training to flying drones in a combat zone. “It’s the classic hours of boredom punctuated by moments of terror,” says Raja Parasuraman of George Mason University in Fairfax, Virginia, quoting a phrase often used to describe modern warfare.

The long-term effects of these repeated swings on the human psyche are not well known, Hancock says. "But in general, nature doesn't like to swerve in wide oscillations like that." The boredom end of the pendulum can be just as stressful as overload, he says. "We call extreme underload 'torture'."

Day to day, there is often little going on in the Middle Eastern deserts and villages above which remote planes operate. The Holloman airmen say they try to keep busy analysing imagery, but without stimulation it can become very difficult for soldiers to maintain their vigilance. That can hurt their performance if something happens suddenly.

Szalma hopes to help soldiers get used to coping with monotony. He's developing the most boring video game in the world: a virtual reality training program in which players sit in a rural village with nothing to do but monitor it. The average person can only pay attention for 10 to 15 minutes. "You can see the energy draining from them over time," he says.

Desperate for action, participants will initially be alert to any potential threat – every package might be an IED, every truck driven by insurgents. But as nothing continues to happen, their vigilance drops and they become less likely to consider anything a threat. "You end up being more vulnerable to missing events," Szalma says. "It's not well understood how long that effect lasts." He hopes such a training programme will at least help make soldiers aware of how quickly their minds cease to be attentive.

## Max out

The military is pursuing many such ways to help soldiers cope with split ops, whether this involves improving the data or improving the human. For instance, while pilots mostly rely on visual input, tactile or auditory input could be added to vary the way they get information. "If you max out one sensory capacity, you could transfer to another," says Hancock.

His lab has created a belt for soldiers that consists of a ring of vibrating transducers. Their pulses can direct a wearer to turn in a given direction, speed up, or alert them to a threat. The US military is testing the belt for use in extreme conditions, but it could also be used by drone operators, he says.

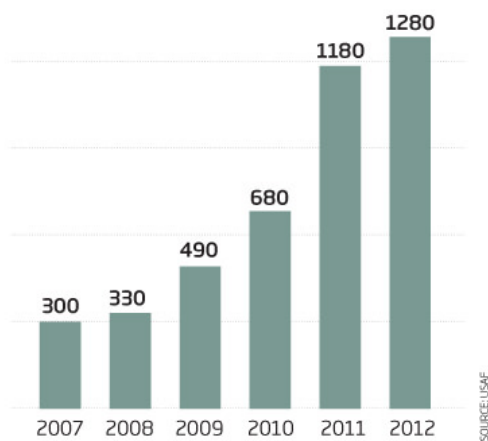
Some researchers question such solutions, however. "The whole security system optimises the technology and doesn't optimise the human," says Stanley. "It creates a vicious cycle." Far better, she believes, is to train soldiers to be aware of the various stresses of modern war through mindfulness exercises designed to make them aware of the stresses they will face before they are deployed. Preliminary studies of such techniques have shown some success in increasing soldiers' ability to juggle numerous tasks at simultaneously.

Meanwhile, the Pentagon is funding Parasuraman to study how many vehicles a person can control at once. The answer, he says, is one – unless the pilots have automated systems to help them out. That automation is on the horizon: soon, remotely operated aircraft are likely to be able to fly themselves and control their own cameras. Humans, presumably, will retain control over decisions such as dropping a bomb. The interesting question now, Parasuraman says, is how to adapt this automation to bring out the best in the human-drone collaboration.

The soldiers at Holloman are not using such next-generation systems quite yet, but despite the challenges of their job, they are excited to be working with state-of-the-art technology. "Who wouldn't want to be at the forefront?" asks Chris, standing on the tarmac in front of a Predator aircraft. Enthusiasm for the technology is one thing, but Chris stresses that it is his comrades on the ground in combat zones that are always on his mind. "They do thank you over the radio, say 'Hey man, thanks for the support.' And you feel good."

## Airmen on the ground ©NewScientist

The number of active drone pilots in the US air force is rising rapidly, and they now account for 8% of all active pilots



Sara Reardon is a reporter based in New Scientist's San Francisco office

Magazine issue 2901, published 26 January 2013

---

# NewScientist | Jobs



Principal Scientist, Translational  
Development



Principal Scientist, Cellular Imaging  
and Model Development



Principal Scientist, Research Analytics



Esprit R&D Data Leadership  
Development Programme- Data Use

[More jobs ►](#)