The horror of war: Ukraine, nuclear weapons and military strategy

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http://www.sgr.org.uk/

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(A few updates and explanatory notes have been added for this version; 7 June 2022.)

1990: ‘New Defence Strategies for the 1990’s’ (Macmillan Press)

I discussed the dangers of NATO & Russian nuclear escalation ‘theory’ suggested that alternative layered defensive (non-nuclear) strategies should take advantage of the post Cold War peace dividend.

This talk:
Part 1 - briefly cover the utter madness (and pointlessness) of considering or threatening even more destruction with nuclear weapons.

Part 2 - How Ukraine forces prove the arguments about layered ground defences against supposedly superior ground forces

Part 3 - the intense media coverage has exposed NATO audiences to the terrible civilian casualties, atrocities and destruction suffered from artillery and missile strikes and an occupying army.

For the first time after a whole series of invasions and bombing of other countries, Afghanistan, Yemen, Iraq, Libya, Syria: from the victim’s perspective.

I hope that this conflict can be used as a case study for the uselessness of nuclear weapons, the need for internationally agreed boundaries and different choices in military strategy and force deployments

- **What is a ‘tactical’ nuclear weapon?**

1. It is nuclear (but it has a ‘short’ range)
2. Typical range 300 miles – ie Europe
3. All US ‘tactical’ warheads based in Europe.
4. All Russian tactical warheads based inside Russia.
5. Similar or same single warhead as a ‘strategic’ intercontinental missile
6. 10 – 100 kT ie 1x to 10x Hiroshima-sized warhead
7. https://www.sgr.org.uk/resources/nuclear-weapons-beginner-s-guide-threats

1 kT = one kilotonne of TNT equivalent explosive power

W48_155-millimeter_nuclear_shell

Two engineers clearly showing how small a nuclear warhead can be made. This warhead was designed to fit on the nosecone of a standard NATO 155mm (6”) diameter Howitzer shell with a range of up to 40km. These are no longer in service. Withdrawn in 1992. Source: U.S. Department of Energy

- **Any nuclear detonation.**

1. Extremely destructive
2. Immediate effects: blinding flash, electro-magnetic pulse (EMP)
3. Fire, blast, radioactive dust
4. High rate of death and serious injury
5. Destruction equivalent to months of artillery shelling in a few seconds
6. Medical facilities overwhelmed. No possibility of humanitarian assistance
7. No warning possible – flight time minutes
8. https://www.sgr.org.uk/resources/nuclear-weapons-beginner-s-guide-threats
9. Huge exclusion zone if nuclear reactor hit (also see slide 8)

EMP - electro-magnetic pulse - added In response to a question from the audience – an intense burst of electronic radiation when the warhead detonates, capable of wrecking any sensitive electronic equipment. This may include car ignition circuitry (ie cars may not work). Mobile phones and mobile phone masts. All electrical networks. After a nuclear detonation and especially if several, one should assume that there will be no internet, no mobile system and that water and electrical supplies will fail. EMP from a high altitude nuclear detonation would affect all of Europe.
Even a 10kT warhead could breach a reactor core and create a huge 200-700km 100-year exclusion zone.
https://www.sgr.org.uk/resources/could-terrorists-turn-uk-nuclear-wasteland
https://inews.co.uk/news/world/ukraine-war-nuclear-risk-russia-missiles-accidental-hits-reactors-1478269

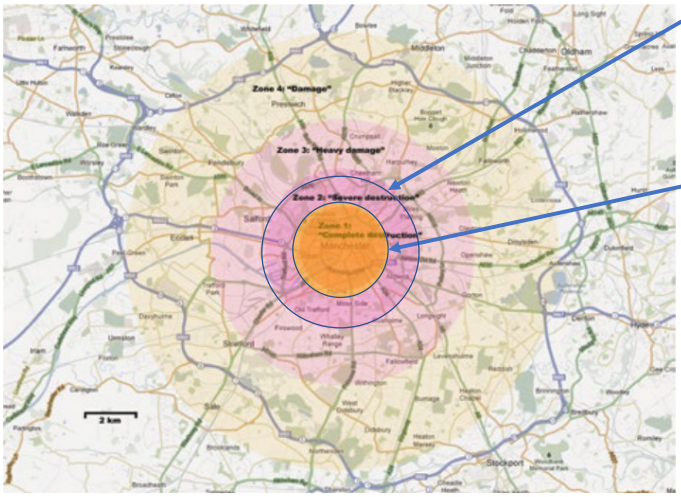
‘Tactical’ nuclear weapon detonation.

1. Was (is?) NATO strategy to fire first to avert further escalation (1980s)
2. Russian weapon role to offset NATO conventional superiority.
3. Russia has them on ground launchers, ships/ submarines
4. Threat to use if integrity of Russia threatened – ie losing war on/in Russia
5. Regarded as a deterrent – ie as US, UK, French, Chinese weapons
6. No recent testing of tactical weapons, nor greater readiness

Very, very short flight time – likely no warning at all. This creates a very high risk of firing in a panic or mistake in a highly tense confrontation.

Death and destruction zone for <u>one</u> 100kT nuclear warhead.
Overlaid over Manchester: a typical European city.
Wrecks health & life support infrastructure.

Map of the Manchester area with zones of blast and thermal impact overlaid.



Severe fire & destruction (2.3km radius)

100kT zone of complete destruction: (1.6km radius). Radioactive crater 120-200 ft deep

<u>At least</u> 80,000 dead
200,000 injured
Lethal fallout 13km downwind
Similar to Hiroshima – <u>why</u>?

A nuclear explosion is incredibly violent. The mushroom cloud following the intensely hot fireball would rise higher than Everest. The blast wave travels at supersonic speed creating large blast overpressures followed by an under-pressure phase. Whilst the Hiroshima weapon was much smaller (about 15kT), roughly the same number of casualties were caused as in this scenario. Why are they not larger? The figures quoted use the most optimistic assumptions. Reality is likely to be much worse.
In Hiroshima, the city was much more densely populated and was also hosting a large military contingent hence the higher casualty figures.
Map source https://article36.org/wp-content/uploads/2020/12/ManchesterDetonation.pdf R Moyes P Webber, G Crowther. Overlay & data: sgr.org.uk

BUT: one nuclear detonation is not realistic

1. There are about 4000 warheads ready to fire
2. 1800 ready to fire within minutes (on 600 missiles)
3. Extremely unstable situation – especially 'tactical' missiles
4. 95% deployed by the USA and Russia
5. UK Trident submarine carries 40x 100kT warheads
6. French submarine: 96x 100kT warheads
7. China: 350 warheads; India/Pakistan 150 each (national totals)
8. Detonation of 40 – 100 warheads would cause a decade long nuclear winter

It needs to be said that even if a nuclear weapon is NOT detonated that any nuclear power station or worse a nuclear reprocessing plant can cause intense and long lasting radiation over a huge area (typically an area of about 50% of the UK!) if its external electrical supply is interrupted or if its core is breached (for example by a missile or artillery hit) due to the very long lasting radio-nucleides in a reactor core. Ukraine has 15 operative nuclear reactors all of which pose a huge risk in any live conflict. This is true for all of Europe.
Even a 10kt warhead could breach a reactor core and create a huge 200-700km 100year exclusion zone.
https://www.sgr.org.uk/resources/could-terrorists-turn-uk-nuclear-wasteland
https://inews.co.uk/news/world/ukraine-war-nuclear-risk-russia-missiles-accidental-hits-reactors-1478269

Discussion of nuclear questions

1. Most countries do not posses nor want nuclear weapons
2. Hence the UN Treaty for the Prohibition of Nuclear Weapons: TPNW
3. South Africa and Sweden decided to abandon nuclear programmes
4. Nuclear weapons create risks: false warning, system or human failing.

Nuclear use – first strike?

1. Fire First? As forces mass across your border?
2. Fire First? When attackers cross your border?
3. Fire First? When your forces face certain defeat?
4. Fire second? After your country has been devastated in nuclear attack?

Moving on to discuss military strategy and force deployment choices

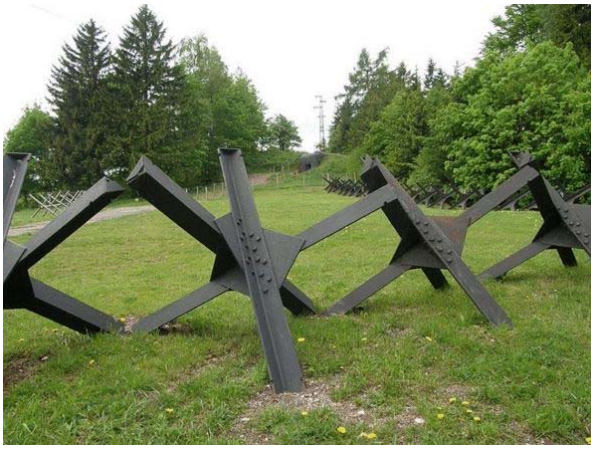
- **Modern conventional defence**

Key points

1. **Defensive weapons much cheaper than the systems they are designed to destroy – by factors of 100:1**
2. **Eg Tank vs anti-tank missile; Soldier-fired anti-aircraft missiles, anti-ship**
3. **Weapons dispersed, hidden, or highly mobile**
4. **Seek targets independently**
5. **Can hit a target very precisely – ie within a few metres or less**
6. **Targets sourced from very high levels of surveillance & 'information fusion'**
7. **In Ukraine case: NATO, USA, etc supplying real-time targeting data**

Examples of modern defensive weapons

…and their targets…



Passive ‘hedgehog’ anti-tank defences.
https://en.wikipedia.org/wiki/Czech_hedgehog

Ukraine Neptune anti-ship cruise missile – probably sunk the 'Moskva' – here at Kyiv weapons fair.

This is a reminder that Ukraine is a major arms manufacturer. In this case the Neptune anti-ship sea-skimming cruise missile with a 100km range - two of which probably sunk the heavily armed Moskva cruiser.
This highlights the vulnerability of shipping – especially large very expensive ships to anti-ship missiles costing a fraction of their value.
https://en.wikipedia.org/wiki/R-360_Neptune

FGM-148 Javelin $100,000 each ($0.1m) NLAW $40,000

By U.S. Army Missile Command, Redstone Arsenal - The Official Web-site of the United States Army, Public Domain, https://commons.wikimedia.org/w/index.php?curid=68791756

https://en.wikipedia.org/wiki/FGM-148_Javelin

Kharkiv Armored Plant upgraded over a hundred T-64 tanks (in 2017) cost $3-5m

NB: The Ukraine forces are fighting with Russian weapons and armour which in some cases they have themselves upgraded.
https://journalist.today/en/kharkovskii-bronietankovyi-zavod-proviel-modiernizatsiiu-bolieie-sotni-tankov-t-64/ (open source)

The result of an anti-tank missile impact. Entire crew dead, tank turret blown off. Ukraine military photo
https://www.ukrmilitary.com/2015/09/ilovajsk5.html

The three sub-munitions fly in a formation about 1.5 metres (4.9 ft) in radius, and have enough kinetic energy to manoeuvre to meet a target evading at 9 g at 7,000 metres (23,000 ft).[6]

UK Starstreak anti-air missile – multiple launcher

$1,000,000 each ??

7km range up to 5000m altitude

Incredible inventiveness inside a compact anti-aircraft missile. Sold all around the world: South Africa, Thailand, Indonesia, Malaysia and now Ukraine.
Deployed for 2012 London Olympic Games.
https://commons.wikimedia.org/wiki/File:Starstreak_launcher_on_Dartmoor.jpg
https://commons.wikimedia.org/wiki/Category:Starstreak_missiles#/media/File:Starstreak.JPG

UK Starstreak anti-air portable missile

https://commons.wikimedia.org/wiki/Category:Starstreak_missiles#/media/File:CJOAX_fires_150417-A-BG594-015.jpg

McDonnell Douglas F-15 Eagle $100,000,000 each ($100m)

Sukhoi Su-27SKM multirole fighter at MAKS-2005 airshow

Both of these highly expensive aircraft vulnerable to Starstreak or the Soviet (and Ukraine) S-400 anti-aircraft missile system. Because these aircraft are so costly, any air force can only afford to buy a few dozen. This is why the Russian air forces have been unable to routinely bomb targets. Instead the Russian attack has relied upon the Iskander ground launchers and cruise missiles typically fired from Russian ships.
https://commons.wikimedia.org/wiki/File:NAFB_84-1220_1984_General_Dynamics_F-16C_Fighting_Falcon_64th_Aggressor_Squadron_-_57th_Adversary_Tactics_Group_(32662783142).jpg
https://commons.wikimedia.org/wiki/File:Sukhoi_Su-27SKM_at_MAKS-2005_airshow.jpg

S-400 Anti-aircraft missile system: Ukraine, Russia etc etc

A widely deployed, highly regarded Russian anti-aircraft system. In operation by Ukrainian forces. Preventing bombing and creating something close to no-fly zones. Ministry of Defence of the Russian Federation https://commons.wikimedia.org/w/index.php?search=S+400+anti+aircraft&title=Special:MediaSearch&go=Go&type=image

US Air Force – ‘fire find’ radar.

This type of radar system tracks incoming shells and missiles and provides immediate targeting information to attack the firing area.
This is why missile systems and artillery in range of counter-attack keep moving.

http://www.au.af.mil/au/awc/systems/dvic595.htm, Public Domain,
https://commons.wikimedia.org/w/index.php?curid=6922741

Some highly destructive weapons systems

Искандер-М с ракетами 9М723К5 (9Р78-1 TEL of 9К720
Iskander-M SRBM 300m range
Mach6 missile <2mins to target

Russian Kalibr cruise missile – can be fired from launcher on LHS

Because of the huge numbers of Iskander missiles fired it appears that the Russian military are running out of the missiles.
This is probably why many attacks are made using the Kalibr cruise missile.
https://en.wikipedia.org/wiki/9K720_Iskander
https://en.wikipedia.org/wiki/3M-54_Kalibr

German M270 Multiple Launch Rocket System (M270 MLRS) 70km range;

ATACMS 'tactical missile system' 300km range

NATO have their own versions of the Iskander launcher – the multiple launch rocket system (MLRS) which can also fire a much bigger missile the ATACMS (Army Tactical Missile System).
June 2022 update: MLRS system being supplied to Ukraine forces after training. 70km range version – longer range than Russian artillery. NOT ATACMS.
https://commons.wikimedia.org/wiki/File:MARS_(MLRS)_Bundeswehr.jpg
https://commons.wikimedia.org/wiki/File:ATACMSMay2006_(cropped).jpg

A typical launch of a Russian Kalibr cruise missile – in this case against Syria.
http://blogs.plymouth.ac.uk/dcss/wp-content/uploads/sites/50/2015/10/3M14T-Kalibr.png
https://en.wikipedia.org/wiki/3M-54_Kalibr

The horror of war – anywhere – for whatever reason

The purpose of showing these terrible slides – all from Ukraine under the Russian invasion - is to remind us all that all the high tech weapons are designed to kill people (for example by designs to maximise shrapnel) and to destroy vehicles and buildings (by intense blast). Acknowledgements and with thanks:
State Emergency Service of Ukraine:
https://commons.wikimedia.org/wiki/File:Russian_plane_with_bombs_shot_down_over_Chernihiv_(8).jpg
Ministry of Defense of Ukraine:
https://commons.wikimedia.org/wiki/File:Kramatorsk_railway_bombing_2022_April_8_(3).jpg
National Police of Ukraine:
https://commons.wikimedia.org/wiki/File:Ruined_building_in_Sviatoshyn_Raion_(3).jpg
State Emergency Service of Ukraine:
https://commons.wikimedia.org/wiki/File:Borodianka_after_Russian_shelling,_08_April_2022_(11).jpg
Yan Boechat/VOA https://www.voanews.com/a/ukrainian-civilians-flee-irpin-/6475652.html (public domain Voice of America)

The horror of war – anywhere – for whatever reason

War is a general atrocity and particularly lethal for civilians. Similar scenes of devastation are the result in a long list of recent war zones. To add to this, individual atrocities are often perpetrated with an occupying army as in Ukraine.
In my live talk I showed photographs of devastation in ongoing and previous conflicts: Yemen, Libya, Syria, Sudan.

How to avoid this horror?

1. Agree & recognise international boundaries
2. Peacebuilding, diplomacy, talks
3. Deploy defensive forces; cheap and dispersed weapons systems
4. Hold offensive weapons in reserve – minimised
5. No 'prestige' weapons
    1. No huge carrier groups
    2. No grotesquely costly aircraft and tanks
6. Peace is VERY Cheap…
7. Use incredible inventiveness to reduce carbon emissions to ZERO rapidly
8. Well funded health care and welfare support, education.

In response to a question about the quantity of arms supplied to Ukraine this site summarises:
https://en.wikipedia.org/wiki/List_of_foreign_aid_to_Ukraine_during_the_Russo-Ukrainian_War
A staggering 34 countries by the end of April 2022 have sent lethal aid totalling at least **$4bn** and a further 32 non lethal aid. The total financial value of lethal military supplies promised or allocated amounts to about **$46bn**. **(USA $40bn; France $1.6bn; UK $1.6bn, EU 1.5bn, individual European, Canada $1.5bn).**
The numbers of weapons etc are huge: at least 30,000 anti-tank weapons/missiles. Several dozen 155mm howitzers with over 60,000 shells. Unspecified numbers of anti-air systems and missiles. Also tanks and armoured personnel carriers. Huge numbers of body armour, machine guns, sniper rifles & ammunition, demining, mines, small ships.