Military R&D: Is it helping or hindering our security?

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

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We will talk about...

- SGR research on sci/tech and the military
- UK military research and development
- Key justifications for military R&D
- Six key problems of military R&D
- Reconsidering security
Scientists for Global Responsibility research up to 2010

- ‘Soldiers in the Laboratory’ (2005)
  - Detailed report on military sci/tech, especially in UK (and links to US), incl. funding, lobbying, ethical & political issues
- ‘Scientists or Soldiers?’ (2006)
  - Ethical issues and potential for alternative careers
- ‘More Soldiers in the Laboratory’ (2007)
  - Assessed new UK government/ industry military programmes
- ‘Behind Closed Doors’ (2008)
  - Examined growing military involvement in UK university sector
- ‘Science and the Corporate Agenda’ (2009)
  - In-depth report including chapter on military corporate sector

Other SGR activities include education work – including presentations to academics, peace campaigners, and students; articles in specialists media etc – and advocacy work with SGR members and other campaign groups on issues related to military involvement in R&D
Reports listed in references
Latest SGR research

- ‘Offensive Insecurity’ (2013)
  - Assessment of shift in recent UK security policies
  - Detailed new programme-level data on UK military R&D
  - Detailed new programme-level data on R&D on tackling the roots of conflict

- Policy shift seen in National Security Strategy and Strategic Defence and Security Review – both in 2010
- Detailed military R&D data using freedom of information (FOI) requests
- Detailed civilian R&D data from publicly accessible databases and FOI requests
- Parkinson et al (2013)
UK military R&D – key aspects
UK is major military power

• UK military budget is world’s 4th largest
• UK is one of 5 ‘declared’ nuclear weapons states
• UK forces active in recent major conflicts
  – e.g. Afghanistan, Iraq, Libya
• UK is home to world’s 3rd largest arms company
  – BAE Systems
• UK is 6th largest arms exporter
  – Recent recipients include Algeria, Bahrain, Libya, Saudi Arabia, Tunisia, Yemen

Approach to national security

- Government military/defence strategy based on:
  - High technology, especially ‘networked’ technologies
  - Prominent role for ‘offensive’ weapons systems
    - Capability for ‘force projection’ over long-range
- Major role of military corporations
  - Often monopoly suppliers
- Involvement of scientists/engineers essential
  - Large budgets for Research and Development

Parkinson et al (2013)
Ministry of Defence (MoD)

• £15 billion per year spent on military technology/equipment
• £1.8 bn per year of this on R&D
  • Approx 1/6 of UK Gov R&D spending
  • One of the world’s largest funders of military R&D
• Main research arm is Defence Science and Technology Laboratory (DSTL)

• Spending figures from DASA (2013) & BIS (2012) – R&D figures are 2008-11 average
• Government plans to spend an average of £16 billion a year on military equipment for the next ten years (MoD, 2013)
• Other areas of interest include missile systems, communications systems, warships, cyber-security, body armour, chemical/biological/radiological/nuclear defence, emerging technologies etc
• These are minimum figures – 1/4 of MoD R&D spending not clearly documented at programme level
• In public relations, the ‘life-saving’ contribution of military R&D projects is often emphasised, e.g. soldier armour, although in practice this is a small proportion.
UK military R&D: main roles

- Offensive: 76%
- Defensive: 12%
- General: 12%

Total military R&D spending, 2008-11: £5.4 billion

Parkinson et al (2013)

- Classifications based on military/ academic literature (more discussion of this later)
New facilities installed in recent years – details:
• Supercomputers (Blue Oak, Larch etc) – simulation of nuclear explosion
• Orion Laser – small-scale simulation of nuclear detonation, e.g. fusion and boosting
• Materials testing laboratory – to study behaviour of nuclear weapons components
• New joint research centres with France – as part of 2010 Teutates agreement
• Joint radiographic/ hydrodynamics facilities – Teutates EPURE at Valduc, France, and Teutates Technological Development Centre at AWE, UK
• Claimed not to be connected to development of new nuclear warheads, but major doubts remain, especially regarding whether they undermine the Nuclear Non-proliferation Treaty and Comprehensive Test Ban Treaty.

Sources:
AWE annual reports and other related documents. http://www.awe.co.uk/
Parkinson et al (2013); Nicholls (2011)
Photo: Trident nuclear missile (Crown copyright)
Robotic aircraft/ Drones R&D

• Rapidly developing technology globally
• UK situation:
  – Armed drones first deployed in 2007
  – Collaboration with Israel to develop and deploy
  – BAE Systems: Mantis, Taranis
  – FLAVIIR: R&D involving 10 UK universities, inc. York
• Numerous concerns
  – e.g. proliferation, civilian casualties

UK situation
• Drones initially deployed for reconnaissance, but from 2007 the UK began deploying (US-made) armed ‘Predator’ drones in Afghanistan. By 31 October 2012, the RAF had carried out 349 drone strikes.
• UK collaboration with Israeli military and arms industry to deploy and develop drones
• BAE Systems developing two armed drones: Mantis and Taranis
• 10 UK universities, inc. York, involved in R&D on drones (FLAVIIR programme) – ran from 2001-06 leading to test flight in 2010
• Ethical issues – see later

Photo: BAE Mantis (Mike Young)
• Military R&D is spending by Ministry of Defence.
• In the last year, health R&D spending has risen above military R&D for the first time on record.
• Private R&D spending (by arms companies) is smaller and less certain – around a few hundred million pounds (Langley, 2005)
• Further analysis is given later
BIS (2012). Tables 2.4 & 2.2.
## International comparison of military R&D

<table>
<thead>
<tr>
<th>Country</th>
<th>Proportion of total public R&amp;D spending for military purposes</th>
<th>Public R&amp;D spending for military purposes ($bn)</th>
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<tbody>
<tr>
<td>USA</td>
<td>57%</td>
<td>76.7</td>
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<td>UK</td>
<td>17%</td>
<td>? ?</td>
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<td>South Korea</td>
<td>16%</td>
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<td>France</td>
<td>15%</td>
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<td>Japan</td>
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<td>Germany</td>
<td>5%</td>
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OECD (2012)

Public funding of military R&D in 2010: comparison of six major nations in the OECD (OECD, 2012)
Base year of 2005, purchasing power parity
Military corporations

- Majority of military R&D (including gov-funded R&D) takes place within industry
  - Represents a subsidy estimated at £500m annually
- UK home to major military corporations
  - BAE Systems
  - Rolls Royce
  - QinetiQ
  - Many others incl. subsidiaries of foreign companies

- Often, government funds military R&D within industry and then purchases the resulting technology – effectively paying twice (Langley, 2005)
- Estimate of subsidy (Jackson, 2011)
- BAE Systems – world’s largest arms company following takeover of several US contractors
- Rolls Royce – specialises in engines for ships, aircraft (2nd largest in UK)
- QinetiQ – privatised government military labs (5th in UK)
- Aggressive lobbying – sit on many influential advisory committees
Military & UK universities

- Numerous paths for military funding of R&D in universities
  - About £200 million a year, but figures very uncertain
- Government schemes
  - Through military labs, civilian Research Councils etc
- Corporate schemes
  - Large programmes run by Rolls Royce, QinetiQ
- Joint government-industry schemes in recent years
  - e.g. Defence Technology Centres (DTC)

- Government schemes run in conjunction with: Defence Science and Technology Labs (DSTL); Engineering and Physical Sciences Research Council (EPSRC)
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<th>Military-university consortia in the UK - who was involved in 2004</th>
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<td><strong>UTC</strong></td>
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<td>University College</td>
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<td>York</td>
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**Sources:** Langley (2005); Langley et al (2008)

- UTC – University Technology Centre; DTC – Defence Technology Centre; DARP – Defence and Aerospace Research Partnership; ToE – Tower of Excellence
- Research by SGR and others has yet to identify a UK university which does not receive any military funding
- Funding is focused on engineering, computer science and physics departments in top universities
Justifications for military R&D

• Technological/ operational military advantage
  – To ‘win wars’
• To protect our soldiers/ reduce casualties
• To deal with emerging/ unknown future threats
• Income from arms sales
• But...

• 20 year time horizon often considered for ‘desired’ new technologies
• These arguments can be found in, for example, MoD (2012)
Six key problems of military R&D
Theoretical ‘Lethality Index’ first proposed in 1979 by Colonel Dupuy
- It includes consideration of: rate of fire, number of targets, relative effectiveness, range effects, muzzle effects, accuracy, reliability, etc.
Graph from Lemarchand (2007).
Increase in destructive power = Increase in casualties in war

War-related deaths

War-related deaths (per 1000 people)

Webb (2005)
A range of different factors have
Total number of deaths:
• World War I – about 15 million (including indirect deaths)
• World War II – about 66 million (including indirect deaths)
• Iraq War – 162,000 (violent death only)
Sources: White (2010); IBC (2012).

2. Contributing to high civilian casualties

<table>
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<tr>
<th>Conflict</th>
<th>Percentage civilian</th>
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<tr>
<td>World War I (1914-18)</td>
<td>45%</td>
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<td>World War II (1939-45)</td>
<td>70%</td>
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<td>Iraq War (2003-11)</td>
<td>At least 79%</td>
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Key factors leading to high civilian casualties:
• destructiveness of modern weapons
• targeting of civilians and infrastructure
• low tech responses, e.g. hiding among civilians

Use of modern technology in war has not reduced proportion of civilian casualties.
3. Failure of ‘precision’ weapons

• Recent drive to create more accurate ‘precision’ weapons to reduce civilian casualties
  — Especially missiles launched from aircraft
• Academic/ military research shows casualty rate is no lower (and can be much higher)
• New problems...
Analysis of ‘precision’ weapons

• Academic study of 14,000+ violent incidents during Iraq War
  — Suicide bombs: 16 civilian deaths per incident
  — Air-strikes: 17 civilian deaths per incident
• Study by US military-linked think-tank in Afghanistan
  • Drone strikes 10 times more deadly than conventional military jets

• Kings College London study: analysis of 14,196 incidents involving 60,481 civilian deaths in Iraq 2003-08 (Hicks et al, 2009)
• Center for Naval Analyses study: analysis of air strikes in Afghanistan from mid-2010 to mid-2011, using classified military data (The Guardian, 2013)
‘Precision’ weapons: new problems

• Rapidly increasing use of armed drones by USA; UK and Israel also leading in deployment and R&D

• Many other countries now have R&D programmes

• Expansion of ‘battlespace’
  • More frequent use can increase civilian casualties
  • CIA deployment in Pakistan, outside the battlefield – ‘targeted assassinations’ – illegal?

• Anger over ‘illegal’ use is leading to increased support for Taliban/ Al-Qaeda in Pakistan and internationally

• Industry is developing the potential for them to act autonomously

• Sources: Drone Wars UK (2012); Open Briefing (2013); Amnesty International (2013)
4. Driving export/ proliferation of weapons

- To help spread R&D costs, military tech is exported to other nations
- Example: UK exports to Libya
  - Licenses granted for €119m from 2005-09
  - Exports included armoured vehicles, tear gas etc used against uprising
  - Other NATO countries exported combat aircraft, missile systems etc
- Exports of drones technology will fuel international military threat

5. Overconfidence in use of military force

- Flawed belief that military technology allows wars to be won quickly and cleanly
- Side effects of war
  - Destruction of infrastructure
  - Unsecured weapons
  - ‘Blowback’
- Military R&D fuels arms races
  - Even with allies

- Blowback is the unintended consequences of a military/ covert operation that are suffered by the civil population of the aggressor government or its allies.
6. Opportunity costs

- Financial and technical resources could be used elsewhere
- Science and technology needed to help solve other urgent problems
  - International poverty/ injustice
    - Malnutrition, clean water etc
  - Global environmental problems
    - Climate change; biodiversity loss etc
Reconsidering security
Different approaches

• New security policies
  – Less aggressive military roles
  – Tackling root causes of insecurity
• Changed roles for security-related R&D
Non-Offensive Defence

• Focus military forces on narrowly-defined defence
• Cut the ‘offensive’ arsenal, especially:
  – Nuclear weapons
  – Long-range ‘strike’ aircraft, missiles etc
  – Long-range military ships and submarines
• Minimise/ eliminate arms exports
• Shrink the military industry
• Peace-keeping activities would be retained

• Under a Non-defensive defence policy, the armed forces retain the capability to defend national territory (and contribute to peacekeeping), but not to invade or mount a major attack
• The case for Non-offensive defence (although known under a variety of titles) has been made for decades.
References: Parkinson et al (2013); Webber (1990)
Sustainable Security

• More substantial shift
• Focus on tackling the roots causes of major security threats:
  — Competition over resources
  — Global militarisation
  — Marginalisation of the majority world
    • Economic inequality/ poverty
  — Climate change

UK National Security Strategy

- Published in October 2010
- Government approach is starting to change
- Assessed wider range of security concerns than just military threats
  - Including environmental and resource problems, international development problems
- However, ‘force projection’ remains prominent

Resistance to change...

• New UK defence sci/tech strategy
  — Includes ‘defence’ and ‘security’ sectors
  — Government support:
    • To retain major ‘defence industrial base’
    • To expand and promote arms exports
    • New minimum level of research spending
    • Justified by desire to retain ‘technology advantage’ in key military fields
  — But more ‘off-the-shelf’ procurement

• Entitled ‘National security through technology’
• Research spending to be set at 1.2% of total MoD budget
Source: MoD (2012)
Comparing UK security R&D (2008-11)

Parkinson et al (2013)
A change in R&D priorities

- UK public R&D spending 2008-11
  - 2 to 7 times more spent on military than on ‘sustainable security’
- New R&D priorities should be:
  - Arms control/ disarmament
  - Tackling environmental problems
  - Economic reform
  - Energy security
  - Food/ water security etc

➢ A major spending shift towards sustainable security is urgently needed

Parkinson et al (2013)
References (p1)


Amnesty International (2013). Drones: Major new report says USA must account for Pakistan killings. 22 October.


http://dronewarsuk.wordpress.com/


http://www.guardian.co.uk/news/datablog/2011/mar/01/eu-arms-exports-libya

http://www.theguardian.com/world/2013/jul/02/us-drone-strikes-afghan-civilians


http://www.direct.gov.uk/nationalsecuritystrategy

http://www.iraqbodycount.org/analysis/numbers/2011/
References (p2)


References (p3)


