

Allied Air Power over Libya*

Christian F. Anrig¹

In a private meeting during the Libya crisis summit at the Elysée Palace in Paris, French President Nicolas Sarkozy informed US Secretary of State Hillary Clinton and British Prime Minister David Cameron that French combat aircraft were en route to the Libyan coast to enforce United Nations Security Council Resolution (SCR) 1973,² which had been adopted on 17 March 2011. With none of them objecting, the French Air Force opened the allied campaign in the afternoon of 19 March.³ In these opening strikes, Rafale and Mirage fighter– bombers destroyed several armoured vehicles at the outskirts of Benghazi, the rebel stronghold in eastern Libya.

The initial strikes highlighted specific characteristics of the air operations over Libya. In contrast to the practice found in conventional Western air power doctrine, the campaign did not begin with offensive counter-air strikes to take down the Libyan integrated air defence system (IADS) but sought to produce an immediate impact on the ground. It is also the first allied air campaign of the post-Cold War era in which selected European air forces shouldered a significant portion.

One can argue that French and British decision-makers diplomatically and militarily confronted their counterparts with a *fait accompli* before reaching consensus. From a French and British perspective, the situation on the ground dictated the pace, which required immediate action that only air power could deliver. Finally, on 31 March 2011, 12 days after the initial air strikes, the North Atlantic Treaty Organization (NATO) took over the allied air operations.

The Opening Diplomatic Moves

In the run-up to the air strikes against Colonel Muammar Gadhafi's military machine, which was violently oppressing the domestic anti-government movement, France and the United Kingdom forced the diplomatic pace. In late February 2011, Cameron unambiguously stated:

We do not in any way rule out the use of military assets, we must not tolerate this regime using military force against its own people. In that context I have asked the Ministry of Defence and the Chief of the

* Originally published as Christian F. Anrig. "Allied Air Power over Libya" in *Air Power in UN Operations: Wings for Peace* (A. Walter Dorn, Ed.), Ashgate Publishing, Farnham, UK, 2014, pp. 255-282.

Defence Staff to work with our allies on plans for a military no-fly zone.⁴

For his part, Sarkozy was the first Western leader to acknowledge the Libyan National Transitional Council on 10 March 2011, 21 days after the popular uprising began in Benghazi on 17 February 2011.

Although the United Kingdom and France displayed unusual unanimity, the European Union (EU)'s view on tackling the crisis in Libya was far from homogeneous. An EU summit in early March ended without support for military intervention. On the diplomatic front, a crucial turning point was the Arab League's endorsement of a no-fly zone (NFZ) over Libya on Saturday, 12 March 2011. Amr Moussa, Secretary-General of the Arab League, indicated after a six hour-long meeting that "the Arab League has officially requested the United Nations Security Council to impose a no-fly zone against any military action against the Libyan people".⁵ Reportedly, Algeria, Sudan, Syria, and Yemen opposed the Arab League's vote for a NFZ.

While diplomatic support for a NFZ gradually grew, the disorganized Libyan rebel forces continued to lose ground to the superior firepower of Gadhafi's forces, which, after the initial shock of the revolution, started to reorganize and seize the initiative. Besides heavy tanks and artillery, Gadhafi's forces had a decisive advantage in air- and ship-borne firepower. On 12 March, when the Arab League declared its support for a NFZ, forces loyal to Gadhafi reconquered the oil port of Ras Lanuf, in eastern Libya, at the gates to the rebel stronghold Benghazi. As a consequence, the situation for the Libyan opposition movement became drastically serious. Gadhafi's son Saif al-Islam confidently predicted that loyalist forces would soon thwart the revolution, announcing no negotiations with the rebels but a war to the end.⁶

Support for a NFZ by Arab nations and the deteriorating situation of the anti-Gadhafi forces on the ground encouraged the United Kingdom and France to step up their diplomatic efforts. Along with Lebanon, the two permanent members of the UN Security Council came up with a draft resolution, increasing the pressure for military intervention.⁷ The Obama administration, originally sceptical of a military intervention, as is examined below, suddenly changed course on 15 March. In fact, it not only changed course but also produced a new draft resolution going beyond a NFZ and providing any intervening force with sufficient leeway to decisively shape events on the ground.⁸ Finally, in the evening of 17 March 2011, the Security Council adopted Resolution 1973 by a vote of ten in favour, with five abstentions (Brazil, China, Germany, India, and Russia). SCR 1973 authorized member states, that:

acting nationally or through regional organizations or arrangements, to take all necessary measures to protect civilians under threat of attack in the country, including Benghazi, while excluding a foreign occupation force of any form on any part of Libyan territory.⁹

Hence, SCR 1973 relegated any potential military intervention to the predominant use of air power, avoiding the presence of Western militaries on the ground of yet another Arab nation. The key passage "all necessary measures", endorsed by the Obama administration and giving SCR 1973 substantial teeth, was instrumental in mounting an effective air campaign. Yet the

resolution did not explicitly include regime change and remained vague in desired strategic end-states – a prerequisite for the resolution to be passed.

Two days after the Security Council adopted Resolution 1973, Sarkozy ordered fighter-bombers to take off towards hard-pressed Benghazi. Critics of the French president argue that he primarily acted for domestic reasons. Whatever Sarkozy's motivations, the threat of a massacre in Benghazi was imminent in the second half of March 2011 and required immediate military action.

In contrast to the British and French, former US Secretary of Defense Robert M. Gates used cautious rhetoric at a press conference on 1 March 2011:

All of the options beyond humanitarian assistance and evacuations are complex. ... We also have to think about, frankly, the use of the U.S. military in another country in the Middle East.¹⁰

Gates's words unambiguously signalled scepticism within the Obama administration about military intervention in Libya. Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, and General James N. Mattis, head of US Central Command, publicly shared his concerns. Accordingly, the Secretary of Defense might primarily have had humanitarian assistance and evacuation operations in mind when he ordered the two amphibious assault ships USS *Kearsarge* and USS *Ponce* from the Red Sea into the Mediterranean. The focus on evacuation operations and humanitarian relief is underlined by the absence of a carrier strike group and by the fact that 400 additional Marines deployed from the United States to the *Kearsarge* while the 1,400 Marines assigned to the ship were fighting in Afghanistan.¹¹ In short, Gates questioned the wisdom of military intervention in yet another Muslim country.

According to Washington-based commentators, the Obama administration's passive stance in the opening diplomatic moves partly stemmed from a concern that Arab leaders would have difficulty sanctioning an American-led operation, not to mention the spectre of another protracted military involvement.¹² Yet realities unfolding in Libya seem to have brought about a drastic change within the Obama administration on 15 March 2011.

A Common European Defence Identity?

The intervention in March put into concrete action what American, British and French leaders had deliberated in the preceding months. In particular, a new entente cordiale was emerging in 2010. In November, for instance, the United Kingdom and France signed treaties foreseeing military cooperation in various areas such as common support of A400M airlifters, cross-deck operations of aircraft carriers (no longer an option after the United Kingdom's U-turn in its decision to purchase F-35B, instead of F-35C aircraft), or maintenance of nuclear warheads. This rapprochement was underlined by increased cooperation between the Royal Air Force (RAF) Eurofighter Typhoons and the French Air Force Rafales.¹³ According to Liam Fox, the UK's Secretary of State for Defence, cooperation with France was desirable because it met two key criteria: its willingness to deploy and its willingness to spend on defence.¹⁴

Unlike his predecessor Jacques Chirac, Sarkozy wished to reinforce French ties with his Anglo-Saxon counterparts. For example, under his presidency, France returned to NATO's integrated military command structure in 2009. Yet against the backdrop of the Libya campaign, he preferred a coalition of the willing framework and only reluctantly accepted NATO command. The changed French attitude was also seen on an air force level. The United States Air Force (USAF), the RAF and the French Air Force established strategic studies groups staffed by officers from each organization. According to General Norton Schwartz, the USAF Chief of Staff, this exchange of ideas concerns "how the best air forces in the world mix and match their capabilities for the best defense".¹⁵ These ties were borne out during the campaign itself. In particular, the French and British exchanged and mixed aircrews on the dual-seat Tornado GR4 and Mirage 2000D fighter-bombers. Accordingly, General Jean-Paul Palomeros, Chief of Staff of the French Air Force, argued in June, "I can tell you the level of confidence with the Royal Air Force is very, very high".¹⁶

One month after the start of operations, the troika became especially apparent again in a letter signed by US President Barack Obama, British Prime Minister Cameron, and French President Sarkozy. Leading newspapers of the three countries published the letter with the intention of demonstrating continued resolve and a united front against Colonel Gadhafi. It even went beyond SCR 1973, stating unambiguously that "it is impossible to imagine a future for Libya with Gaddafi in power".¹⁷ The letter appeared after the US military officially ceded its leading role and pulled all combat aircraft from operations in early April. Consequently, doubts emerged, particularly in the United States, about whether NATO air strikes could succeed with US aircraft such as the A-10 Warthog or the AC-130 gunships grounded.¹⁸

Although the United Kingdom and France were willing to make substantial contributions, the situation in NATO and Europe remained very heterogeneous. With regard to Libya, one finds basically three categories of NATO countries: those that conduct offensive air operations; those that relegate their actions to air policing, effectively a non-combat role; and those that fail to appear at all. As of mid-April, only six alliance countries, including France, the United Kingdom, Canada, Belgium, Denmark, and Norway, were conducting strike missions, directly influencing events on the ground.¹⁹ Canadian forces undertook a particularly swift overseas deployment when seven CF-188 (informally referred to as the CF-18 Hornet) and two CC-150T Polaris tanker aircraft departed from Canada to Trapani Air Base, Sicily, on 18 March. Canadian aircraft began combat operations on 21 March.²⁰

Interestingly, the Royal Netherlands Air Force, formerly at the vanguard during the Balkan air campaigns and a significant participant in operations over Afghanistan, was restricted to imposing the NFZ. Since early 2010, a marked shift seems to have occurred in Dutch policy, which also led to The Netherlands armed forces pulling out of Afghanistan. In contrast, Belgian aircraft operated across the spectrum of military force. Usually, the role of the two countries had been reversed, The Netherlands military taking a more proactive stance. Belgium's proactive involvement and the active lobbying for an air campaign by Guy Verhofstadt, the liberals' leader in the European Parliament, put into question remarks made by a prominent British defence scholar in 2004 – that Belgium is the most conspicuous example of a European tendency to use military force only reluctantly.²¹

Italy initially offered lukewarm support for the campaign. Though it provided seven air bases, its active military contribution to the air campaign was limited – particularly in the opening stages. Having maintained extensive economic ties with Libya, Italy felt uneasy about resorting to military force. Only from late April did the Italian Air Force become involved in offensive strike missions, but then used almost its complete inventory of precision-guided munitions (PGM). After the Italian Air Force's MQ-9 Reaper medium-altitude, long endurance unmanned aerial vehicles (MALE UAV) had achieved initial operational capability, Italy found itself in a position to provide a special capability to the campaign.²² Yet the global financial downturn had a severe effect upon Italy's budget. As a cost-saving measure, Italy removed its aircraft carrier *Giuseppe Garibaldi* from the operational theatre in July. Earlier, in late June, Italian decision makers called for a ceasefire, manifesting Italy's ambiguous position towards the allied campaign.²³ Since the Italians could not afford not to shape Libya's future, they were literally forced to participate in the operations. Doing so rather reluctantly, they attempted to mitigate military operations in addition to hosting various forces on Italian territory.

It is also interesting to look at the European non-contributors, Germany foremost among them. A dilemma between its strong emphasis upon NATO as the bedrock for German security and the country's reluctance to employ its armed forces across the spectrum of military force – a prerequisite for making credible contributions to alliance operations – will likely persist. Germany's historical legacy still exerts tremendous inertia upon a proactive defence policy. For the foreseeable future, the use of military force will remain a sensitive issue for the German constituency. Nevertheless, the German military has developed into balanced forces in the post-Cold War era, particularly in the last decade. Consequently, Germany has evolved as a key player in several air and space dimensions, including synthetic-aperture radar satellite reconnaissance/surveillance, theatre ballistic missile defence, and deep strike by acquiring an impressive number of indigenous air-launched cruise missiles. Moreover, it has retained niche capabilities such as a very sophisticated and proven suppression of enemy air defences (SEAD) capability. In 1999 a lean German Air Force SEAD component, including 10 Tornado Electronic Combat/Reconnaissance (ECR) aircraft, released approximately one-third of all High-speed Anti-Radiation Missiles (HARMTM) expended during Operation Allied Force over Yugoslavia.²⁴ By opting out of military operations against Gadhafi, Germany missed a further opportunity to translate the German Air Force's new potential into effective operational output.

Equally interesting was the absence of the new NATO countries – the former Warsaw Pact nations, in particular Poland, which operates an advanced F-16 attack force. One might speculate on three reasons for their absence: lack of operational preparedness; lack of funding for deployed fighter operations; or lack of political willingness to contribute – the latter due perhaps to Gates's (and therefore American) lukewarm support for operations against Gadhafi. Eastern European nations, particularly Poland, put a premium upon staying in line with American goals – hence their support in 2003 for Operation Iraqi Freedom. With the United States ceding its leading role in Operation Unified Protector to NATO, Poland might have felt less inclined to get involved.

Besides the NATO allies, Sweden, Qatar, the United Arab Emirates, and Jordan have taken part in the operations. For Sweden – as is examined below – participating in the Libya campaign was a first in the post-Cold War era. On 1 May, Mirage 2000-9s of the United Arab

Emirates, up to that time restricted to air policing, reportedly were carrying PGMs and targeting pods. Actual strikes, however, could not be confirmed at the time.²⁵ For its part, Qatar deployed six Mirage 2000-5s to Crete and flew that country's first air-policing sorties on 25 March alongside French Mirage 2000-5s, marking the first combat mission of an Arab League nation against the backdrop of operations over Libya.²⁶

To conclude, Europe's defence political fragmentation persisted and Libya has offered the latest examples of this political reality. Historical national experiences are too different when it comes to the use of military force. Yet as the Libya campaign aptly highlights, no carved-in-stone patterns about particular national behaviours exist. Who could have foreseen the reversed roles between Belgium and The Netherlands or, even more tellingly, the "renewal" of the entente cordiale between Britain and France, particularly after the fierce debates against the backdrop of the invasion of Iraq? In early 2003, Donald Rumsfeld, the US Secretary of Defense, divided Europe into the new and old. Establishing such fixed patterns, however, does not adequately address the problem. National historical experiences as well as the context of a particular campaign, regarding both domestic and foreign policies, will likely determine European contributions and the resulting European force mix. It is therefore also highly unlikely that Europe as a whole will ever bring to bear its full military potential for a specific political purpose.

Accordingly, the author argued in an article published in 2009 that, although one cannot expect all European alliance partners to contribute to a particular operation, it is realistic to assume that any two of the larger European air forces, combined with a number of smaller air forces, will commit themselves. Hence it is vital that the RAF, the French Air Force or the German Air Force retain a balanced core of air power capabilities that the smaller European air forces can augment.²⁷ Provision of this European core of air power capabilities by the RAF and the French Air Force could successfully sustain the air operations over Libya. Yet as this article further analyses below, a significant imbalance exists between combat air assets and force enablers such as air-to-air refuelling. This disequilibrium between the spear and the shaft will likely hamper European operations in the future. In the case of Libya, significant US support in the domain of force enablers and the geographical proximity of Libya mitigated the problem.

The Air Campaign Unfolds

On Saturday, 19 March 2011, French combat aircraft entered Libyan airspace in the early afternoon. Seeking to obtain an immediate impact, the aircraft aimed at armoured vehicles just outside Benghazi.²⁸ However limited this opening strike was, it proved crucial to stop Gadhafi's forces outside the rebel stronghold; inside the city, it would have been extremely difficult to discriminate between combatants and non-combatants or between the various parties. At night, US Navy ships launched over 100 Tomahawk Land-Attack Missiles (TLAM) against critical nodes of Libya's IADS and fixed-site surface-to-air missile systems. Royal Navy submarine

HMS *Triumph* also participated in this effort, which preceded the ensuing fixed-wing aircraft strikes.

During the initial strikes, significant confusion arose about command and control arrangements. According to French official sources, national general staffs commanded their respective assets and the sorties were coordinated among the allies.²⁹ De facto, U.S. Africa Command's Air Operations Centre located at Ramstein Air Base, Germany, directed coalition operations. Prior to NATO taking over air operations in support of SCR 1973, the United States essentially led the campaign, with the USAF bringing to bear a vast array of capabilities. Of these, units participating in Operation Odyssey Dawn included B-2 stealth bombers from the 509th Bomb Wing at Whiteman Air Force Base, Missouri; F-15Es from RAF Lakenheath, United Kingdom; F-16CJs – dedicated SEAD aircraft – from Spangdahlem Air Base, Germany; and EC-130 Commando Solo psychological operations aircraft from the 193rd Special Operations Wing, Pennsylvania Air National Guard.³⁰ Although each of these aircraft offered unique capabilities, KC-135 tanker aircraft were about to make the USAF's key contribution for the remainder of the campaign. According to the chief of staff of the French Air Force, they shouldered approximately 70 percent of NATO's air-to-air refuelling, highlighting the European gap in this important domain of air power.³¹ In light of the United Kingdom's expecting its new Airbus tankers, the RAF managed to muster just three of its 1960s-vintage VC10 air refuelling aircraft to support air operations over Libya.³²

Just prior to the United States pulling out all combat aircraft from operations over Libya in early April, the Department of Defense announced that the A-10 and AC-130 had begun operations over Libya on 26 March.³³ Both aircraft, especially suited for this particular campaign, thus made only brief appearances.

NATO's assumption of operations over Libya on 31 March 2011 coincided with the adaptation of Gadhafi regime forces to the air strikes by shifting to non-conventional tactics. Libyan government forces started to blend in with civilian road traffic and to use civilians as a shield for their advance. On many occasions, they used pick-up trucks and "technicals" (trucks armed with heavy machine guns) instead of main battle tanks and armoured personnel carriers. Moreover, weather conditions deteriorated for a few days. Against this backdrop, Gadhafi's regime forces partly seized the initiative again and recaptured territory in eastern Libya, once more posing a threat to the rebels in Benghazi.³⁴ At the time, many Western commentators blamed NATO for not dealing with the situation adequately. It can indeed be argued that the transition from Operation Odyssey Dawn (American-led) to Operation Unified Protector (NATO-led) initially had a negative impact on the planning side – in particular, NATO's combined air operations centre in Poggio Renatico, Italy, was not prepared for an operation of this scale. Regardless, the Gadhafi forces' gradual shift to nonconventional tactics at the time mitigated the effectiveness of Western air power.

As a result, allied air power had to adapt to the regime forces' non-conventional tactics – witness the efforts of the French armed forces. From 7 to 14 April, French Air Force and naval aviation flew 20 percent of the overall NATO sorties and 25 percent of the offensive sorties, neutralizing slightly more than 20 targets, of which 15 were military vehicles and five artillery pieces, including one multiple rocket launcher.³⁵ One and a half months later, from 26 May to 2

June, the French conducted 30 percent of the overall offensive sorties, enabling them to take out twice as many targets.³⁶ From 23 June to 1 July, French efforts neutralized approximately 100 targets, of which 60 were military vehicles, including tanks and armoured personnel carriers, and 10 were artillery positions.³⁷ Just prior to the pulling out of the French aircraft carrier *Charles de Gaulle*, from 3 to 11 August, targets destroyed by French aviation peaked at 150, among them 100 military vehicles and 20 artillery pieces, including multiple rocket launchers.³⁸ By the end of September, a month prior to the formal closure of Operation Unified Protector, French fighter-bombers released more than 1,140 PGMs, including air-launched cruise missiles.³⁹

On 20 October, a French Mirage fighter-bomber and a USAF MALE UAV spotted and fired on a convoy attempting an escape out of Gadhafi's home town of Sirte. After the convoy had been disrupted by the air strikes, the former Libyan leader was quickly captured by the anti-regime forces.⁴⁰ In the initial strikes, French combat aircraft operated from the French mainland and from Corsica. To save transit time, those aircraft gradually forward-deployed to Souda Bay, Crete, and later to Sigonella, Sicily.⁴¹ The composition of the French contingent changed over time. In mid-August, after pulling out the *Charles de Gaulle*, France had eight Mirage 2000D, four Mirage 2000N, and four Mirage F1 strike aircraft at Souda Bay. Five Rafale multirole aircraft were stationed at Sigonella.⁴² According to official French sources, with these aircraft in place at forward-deployed bases, French armed forces continued to conduct one-third of the offensive sorties.⁴³

The *Charles de Gaulle* supported combat operations from 22 March until 12 August, when it returned to its home port, Toulon in southern France. Counting its previous deployment to support operations in Afghanistan, it operated more than eight months at sea with a brief break at the beginning of March. The carrier's air component included Rafale and Super Etendard Modernisé strike aircraft, E-2C Hawkeyes, and a combat search and rescue component.⁴⁴

Naval gunfire complemented the air strikes, with British and French navy vessels contributing to lifting the siege of Misrata. In the night from 7 to 8 May, for instance, the French Navy frigate *Courbet* detected rocket launchers firing into the city and, after receiving authorization, effectively engaged the targets.⁴⁵ Royal Navy vessels supported air strikes by firing illumination rounds, allowing fixed-wing aircraft to engage regime targets accurately and, like their French counterparts, they engaged artillery positions along the shore.⁴⁶

In mid-April, after the United States had ceased its lead in offensive operations against Gadhafi's regime, the *Washington Post* claimed that the US Armed Forces were doing virtually all of the intelligence, surveillance, and reconnaissance (ISR) and "thus are chiefly responsible for targeting".⁴⁷ True, the United States continued to make significant contributions to ISR, but the newspaper's claim completely ignored European ISR assets involved in the campaign. Accordingly, the chief of staff of the French Air Force put into perspective American contributions in an interview of June 2011. Although he acknowledged the vital US support in air-to-air refuelling, European reliance upon American ISR was less severe. In particular, he highlighted the French Air Force and the French Navy's role in supplying the coalition with imagery intelligence by means of the Rafale's advanced digital reconnaissance pod.⁴⁸ The

French Navy also deployed maritime patrol aircraft to Souda Bay, those platforms performing surveillance and guiding coalition strike aircraft.⁴⁹ Moreover, the Harfang – the French MALE UAV – conducted its first sortie over Libya on 24 August.⁵⁰ Finally, one should note that France is the European key player in military satellite ISR.

Within the first 24 hours of Odyssey Dawn, the RAF's Sentinel R1 Airborne Stand-Off Radar aircraft, essentially an equivalent of the E-8 Joint Surveillance Target Attack Radar System, began to conduct wide-area surveillance.⁵¹ Given the size of Libya, it provided NATO with a unique capability. In particular, it proved instrumental in cueing the USAF's MALE UAVs, which then identified targets and cleared them for air strikes.⁵² During the siege of Misrata, USAF MQ-9 Reaper MALE UAVs were crucial in identifying regime forces in built-up areas.⁵³ In the ensuing sensor-to-shooter loop, NATO, USAF, RAF, and French E-3 Airborne Warning and Control System (AWACS) aircraft relayed attack authorizations from the combined air operations centre at Poggio Renatico in northern Italy to NATO's strike aircraft.⁵⁴

According to a statement by Brigadier General Mark van Uhm, Chief of Allied Operations at NATO's Supreme Headquarters Allied Powers, Europe, in late April, only 10 percent of the daily sorties represented designated targets; dynamic strikes dealt with the remaining targets. In these cases, strike pilots regularly loitered for a couple of hours in search of targets.⁵⁵ So-called "strike coordination and reconnaissance" (SCAR) boxes were established over specific areas and main lines of communications.

About a month after NATO had taken charge of the air operations, it claimed to have degraded Gadhafi's military machinery by one-third.⁵⁶ In light of an apparent stalemate, these claims seemed to lack credibility. The target sets consisted of: military headquarters; communications nodes; ammunition bunkers; defence radar sites; artillery pieces, including multiple rocket launchers; tanks; armoured personnel carriers; armed vehicles; and other military assets. The French effort, as is examined above, concentrated on fielded forces that immediately threatened the civil population. This focus, however, did not preclude taking out operational- and strategic- level headquarters. Unlike Operation Allied Force in Kosovo, this operation included no dispute about the most effective centres of gravity. In 1999 some military leaders were not inclined to emphasize the destruction of Serb forces in the field.⁵⁷ Despite NATO's continued focus on fielded forces, better-armed regime troops forestalled rebel advances. As of late June, the Western Mountains south of Tripoli represented the only front where the rebels had steadily advanced.⁵⁸ Though this front initially received the least attention by allied air power, it finally proved decisive in overcoming the stalemate on the ground – reportedly French Special Forces played a crucial role in establishing an effective air-land interface.

The extremely fluid situation on the ground in the early stages of the campaign complicated the synchronization of ground manoeuvres and air strikes. Unlike the early phases of Operation Enduring Freedom in Afghanistan in 2001, during which American special operations forces tightly synchronized air strikes with Northern Alliance movements, the political situation dictated that NATO air power should not serve as the immediate air arm of the rebels.⁵⁹ Thus NATO air power occasionally hit rebel forces, particularly when they used captured tanks, though this might have been by accident.⁶⁰ Synchronization also proved difficult

because the rebel forces lacked effective organization. By early June, coordination of air and ground manoeuvres had reportedly improved.⁶¹ Yet one might attribute this to the fact that the front lines had become less fluid and more rigid. Coalition aircraft also minimized collateral damage by using only PGMs, a landmark for Western air power.⁶²

Like its French counterpart, the RAF shouldered a heavy burden of the air attacks and proved its effectiveness once more. Over the weekend of 9 to 10 April, for instance, NATO reportedly destroyed 61 armoured vehicles and air defence assets, the RAF engaging one-third of the targets.⁶³ In the second half of May, RAF attack aircraft also engaged Gadhafi's navy. On 19 May, they destroyed two corvettes at the naval base at Al Khums, the nearest military harbour to the port of Misrata, as well as a facility in the dockyard that constructed fast, inflatable boats by means of which, regime forces intended to mine the harbour of Misrata and attack nearby vessels.⁶⁴ The RAF particularly excelled through demanding targeting. According to sources in the United Kingdom, the RAF had flown approximately 90 percent of its combat missions against dynamic targets, which are more demanding than pre-planned static objectives.⁶⁵ As of 24 August 2011, UK forces had destroyed over 890 former regime targets, including several hundred tanks, artillery pieces, and armed vehicles.⁶⁶ When the street fighting started in Tripoli, RAF aircraft maintained a presence over the city, destroying military intelligence facilities in a pre-dawn strike on 21 August or engaging heavy weapons such as main battle tanks on the outskirts of Tripoli.⁶⁷

Interestingly, British attack aircraft staged a mini Scud hunt on 24 August, destroying three Scud-support vehicles near Sirte, a site from which former regime forces launched Scud ballistic missiles against the city of Misrata.⁶⁸ British forces flew more than 3,000 sorties, including more than 2,100 strike sorties. The latter corresponds to approximately 22 percent of the coalition's strike sortie total. By 24 October, a week before the formal cessation of operations, RAF fighter-bombers released approximately 1,400 PGMs, including air-launched cruise missiles. These were supplemented by Royal Navy TLAM strikes in the early stages of the campaign.⁶⁹

As in the case of the French Air Force, the RAF contingent changed over time. Originally, the RAF force consisted of 10 Typhoons in the air defence role and eight Tornado GR4s in the attack role. Libya was a first for the Eurofighter Typhoon. Two days after the start of the air campaign, on 21 March 2011, RAF Typhoons patrolled the Libyan NFZ, their first-ever combat mission. However, the air-to-air component gradually decreased in favour of the ground attack component. In early April, two Typhoons returned to the United Kingdom, while the addition of four aircraft boosted the Tornado GR4 component to a total of 12. Simultaneously, four of the remaining eight Typhoons had shifted from air defence to ground attack. The resulting 16 ground-attack aircraft allowed the RAF to provide a quarter of NATO's ground-attack assets.⁷⁰ In the second half of July, the RAF once more boosted its attack and reconnaissance capabilities by deploying another four Tornado GR4s, one of them equipped with a reconnaissance pod.

Henceforth, the RAF operated 16 Tornado GR4s and six Eurofighter Typhoons from Gioia del Colle Air Base in southern Italy.⁷¹ Notably, the combat-proven Tornado GR4 (Figure 15.1) remained the RAF's preferred aircraft.



Figure 15.1 A Royal Air Force Tornado GR4 takes off from a United Kingdom airfield for service over Libya

Source: UK Ministry of Defence, Photo 45152525.

Other Nations' Contributions and the Importance of a UN Mandate

Canada put a particular premium on a robust UN mandate authorizing the use of military force. In his 18 March statement, just one day prior to the beginning of combat operations, Canadian Prime Minister Stephen Harper established an explicit linkage between SCR 1973 and Canada's military commitment.⁷² With a Canadian, Lieutenant-General Charles Bouchard, in charge of the NATO mission, the Royal Canadian Air Force (RCAF) provided – besides its fighter–bomber deployment – some sought-after capabilities such as air-to-air refuelling. Against the backdrop of a scarcity in ISR assets, the two deployed Canadian CP-140 Aurora maritime patrol aircraft (a derivative of the Lockheed P-3C Orion) also played a significant role throughout the campaign.⁷³

The European F-16 operators – Denmark, Norway, and Belgium – once more proved that smaller air forces with the right equipment, training, and attitude can punch above their weight. Though the Royal Netherlands Air Force has proven time and again that it fulfils the criteria above, it was politically hamstrung in displaying its full potential and as such was not authorized to carry out air-to-ground attacks. Without a UN mandate, one could hardly have expected such significant contributions from Denmark and especially from Belgium and Norway.

What made Libya different – according to Danish scholars – was the perceived need to act swiftly to prevent genocide and the fact that ground forces were ruled out from the start. Libya thus presented a perfect opportunity for doing good with UN authorization in a way that presented few risks to Danish personnel.⁷⁴ The Royal Danish Air Force (RDAF) was at the vanguard of operations against the Gadhafi regime. Its six F-16 fighter–bombers – two of them kept in reserve – released in excess of 900 PGMs.⁷⁵ Given the limited size of Denmark, the

number of PGMs expended is impressive and comes close to UK and French PGM volumes released over Libya. The RDAF's outstanding performance was also fully embraced by Danish political decision makers. Lene Espersen, Denmark's foreign minister, stated:

We went into this operation in Libya with open eyes and knew that it could cost us. ... The important thing is that Denmark has been at the forefront, and helped to keep civilians safe and ensure that the UN resolution is carried out.⁷⁶

Yet Denmark's outstanding contribution to the air campaign also proved challenging. In June, the Danish government was reported to be in talks with a number of NATO allies, particularly the United States, to get its PGM stocks topped up.⁷⁷

On 23 March, the Norwegian Prime Minister adopted a royal decree authorizing the Royal Norwegian Air Force to contribute to the implementation of SCR 1973 and participate in the American-led Operation Odyssey Dawn.⁷⁸ The decree explicitly highlighted the legal foundations for Norway's participation in the Libya campaign, referring not only to SCR 1973 but also to the Arab League's 12 March decision to request the UN Security Council to establish a NFZ and safe havens to protect the civilian population. Yet Norwegian decision makers viewed SCR 1973, based on Chapter VII of the UN Charter, as the ultimate legal authorization for the use and necessity of military force.⁷⁹

The Royal Norwegian Air Force (RNoAF) deployed its aircraft to Souda Bay in Crete. By the end of July, when Norway formally ceased its combat aircraft contribution to Operation Unified Protector, Norwegian F-16 fighter-bombers had dropped 588 PGM – again an impressive volume in relation to the size of the Norwegian armed forces. The RNoAF engaged a variety of targets, ranging from tanks and armoured personnel carriers to Scud-related facilities.⁸⁰ Yet Libya operations apparently also represented an unsustainable burden for Norway, hence the premature redeployment of the Norwegian F-16 detachment from Souda Bay. The Norwegian Defence Minister, Grete Faremo, stated on 13 June that:

It's important that Norway continues to contribute, but we must expect understanding from our allies that having such a small air force means we cannot maintain such a large fighter contribution over a prolonged period.⁸¹

There is also speculation that – with the Libya operation going beyond the protection-of-civilians mission towards regime change – there was no longer sufficient consensus within Norway's government to wholeheartedly back the RNoAF's fighter-bomber commitment.

According to Belgian scholars, the Belgian Air Force's participation in Libya air operations was made possible primarily by three factors: SCR 1973, which was widely regarded as a solid foundation for action; the wide media coverage, which created a sense of necessity; and the public antipathy towards Gadhafi. Like the RDAF, the Belgian Air Force was among the first to contribute to Operation Odyssey Dawn. The Belgian detachment, based at Araxos air base, Greece, conducted its first combat air patrol to enforce the NFZ on 21 March, only two days after the initial strikes were flown by French fighter-bombers.⁸² The first air-to-ground strikes followed suit on 27 March. These were offensive counter-air missions.⁸³ Shortly before

the formal closure of Operation Unified Protector on 20 October, the Belgian Minister of Defence, Pieter de Crem, stated at a press conference that the Belgian detachment at Araxos airbase, consisting of six F-16 fighter-bombers, had accumulated approximately 2,500 flying hours and conducted 473 weapon engagements.⁸⁴

The Royal Netherlands Air Force (RNLAf) for its part was restricted from conducting air-to-ground strikes and so had to focus on the air-to-air role. Nevertheless, a by-product of the air-defence sorties was intelligence gathering. In this area, Royal Netherlands Air Force F-16 fighter-bombers could make a valuable contribution to the campaign that went beyond simply imposing the NFZ. In total, the RNLAf conducted 591 sorties and accumulated 2,845.5 flying hours. For a brief period, at the beginning of the campaign, one of the RNLAf's two KDC-10 tanker aircraft also provided air refuelling to both Netherlands and alliance F-16s.⁸⁵

Undoubtedly, the European F-16 operators punched above their weight and their performance was by any standards remarkable. Yet it also needs to be pointed out that, with the exception of the brief appearance of the Netherlands KDC-10 tanker, they primarily contributed to the offensive efforts and were completely dependent on their alliance partners, particularly the United States, when it came to force-enabling aspects, such as air-to-air refuelling.

For Sweden, the Libya crisis resulted in the first deployment of combat aircraft to a real operation since the early 1960s, when Swedish fighter-bombers supported UN operations in the former Belgian Congo.⁸⁶ Initially, this Nordic country with a legacy of neutrality deployed eight JAS 39 Gripen aircraft supported by a Swedish Air Force C-130 tanker on 2 April. The deployment took place only 23 hours after a Swedish parliamentary decision to help enforce the NFZ over Libya. National rules of engagement were tight. This meant that the Swedish government relegated missions to implementing the NFZ and conducting counter-air-oriented reconnaissance missions, so that Swedish Air Force intelligence-gathering was basically restricted to airfields and ground-based air defence systems. These restrictions were in place despite the first Swedish Air Force detachment's aircraft and pilots being multirole-capable. After the first Swedish detachment had been redeployed and relieved by a reduced force consisting of five Gripen combat aircraft, national rules of engagement were relaxed. As a consequence, the successor detachment conducted a variety of reconnaissance missions. Equipped with dedicated reconnaissance and Litening III targeting pods, the Swedish detachment delivered 250,000 images. The total amounted to 650 sorties and 2,000 flying hours.⁸⁷

Task Force Hawk Coming of Age

During the course of Allied Force in 1999 over Kosovo and Serbia, General Wesley Clark – Supreme Allied Commander, Europe – assembled Task Force Hawk in Albania, intending to bring more pressure to bear against Slobodan Milošević, then President of the former Federal Republic of Yugoslavia. Task Force Hawk's main manoeuvre element was its Apache combat

helicopter component. After Clark's attempts to request permission to employ the Apaches, Washington finally turned him down. The Joint Chiefs of Staff had severe concerns about risking sophisticated combat helicopters to attack tactical forces. According to Clark, though, the Apaches could identify targets from across the border that fixed-wing aircraft had not struck.⁸⁸

Twelve years later, in May 2011, the resolve to deploy combat helicopters gradually grew both in the United Kingdom and France in order to further restrain the ground manoeuvres of Gadhafi's forces. In the night from 3 to 4 June, French and British combat helicopters for the first time engaged ground targets. British Army Apache helicopters, launched from helicopter carrier HMS *Ocean*, operated in the area of Brega, helping to soften the front deadlock in eastern Libya. They reportedly faced incoming fire.⁸⁹ Despite the threat, *Ocean* again launched its combat helicopters the next night to engage multiple-launch rocket systems.⁹⁰ French and British combat helicopters operated in close cooperation with fixed-wing aircraft, the latter gathering intelligence both to select targets and to provide assessments of potential surface-to-air missile threats. They also remained on standby to launch complementary strikes.⁹¹ On a raid in early June, British Army Apache helicopters first destroyed high-speed inflatable boats attacking the harbour of Misrata and then opened fire on a ZSU-23-4 self-propelled anti-aircraft gun near Zlitan, as well as a number of armed vehicles, displaying the flexibility of helicopter operations in this particular theatre.⁹²

Launched from France's amphibious assault ship *Tonnerre* in the night from 3 to 4 June, Tigre and Gazelle combat helicopters engaged approximately 20 ground targets.⁹³ Like their British counterparts, the French Army combat helicopters reportedly faced incoming fire by man-portable air defence systems. In the first week of French helicopter operations, the number of destroyed Libyan military vehicles increased. Among the 70 targets destroyed by French forces from 2 to 9 June, approximately 40 were military vehicles, two-thirds of them destroyed by helicopters.⁹⁴ In mid-August, French attack helicopters, launching from the amphibious assault ship *Mistral*, conducted a major interdiction strike. Ten of them struck at two choke points along the lines of communications west of the front deadlock at Brega, destroying several vehicles, surveillance radars, and defensive positions.⁹⁵ According to rebel commanders, sustained helicopter strikes were crucial in turning the table at the Brega front. French attack helicopters carried out the majority of these strikes, launching in excess of 430 HOT⁹⁶ anti-tank missiles and an unspecified number of cannon rounds and rockets.⁹⁷ Still, helicopter strikes against the backdrop of Operation Unified Protector remain a controversial issue. In particular, many Western airmen believe that their employment was tying down too many fixed-wing aircraft, which were needed to provide cover and could have done the same job as effectively.

Drawing upon Comparative Advantages: General Observations

In his book *The Causes of Wars*, renowned British scholar Sir Michael Howard outlined four dimensions of strategy: the social, operational, logistical, and technological. In his view, "no

successful strategy could be formulated that did not take account of them all, but under different circumstances, one or another of these dimensions might dominate”.⁹⁸ The German Wehrmacht of World War II, for instance, is a prime example of an armed force that attempted to exploit the operational dimension. On most occasions outgunned and outnumbered, it nevertheless remained confident of achieving victory by virtue of superior skills in the operational dimension. Yet as the logistical dimension started to dominate, superior allied resources in equipment and manpower undermined this German strategy. The technological dimension very much shaped the battle of the Atlantic. The British achievement in breaking the Enigma code, combined with US and British advances in anti-submarine warfare, gave the Western allies the decisive advantage to secure a safe passage across the Atlantic and to mitigate the German U-boat threat to a “tolerable” level. Counter-insurgency campaigns, such as the involvement of France or the United States in Vietnam, are by their very nature dominated by the social dimension while one strives for success in the operational dimension. As recent campaigns in Iraq and Afghanistan have borne witness, winning hearts and minds is extremely difficult. Can Western armed forces effectively bring across their benign intentions in a culturally alien environment? Hinging upon air and naval power, the Western alliance could confine its intervention to the operational and technological dimensions as the predominant ones with regard to Libya, the wider Arab community, and their domestic constituencies. Support for the campaign in France and the United Kingdom did not wane. The zero own-casualty toll, enabled by the superior technology of air power, might have significantly contributed to this public backing. In the absence of ground troops in Libya, France disclosed on 29 June that it had airdropped weapons to rebel fighters in the Western Mountains south of Tripoli – the first time that a Western country acknowledged arming the rebels.⁹⁹ Qatar, for its part, supported the rebels by funnelling arms into Benghazi, from where they were further distributed to the various fronts, also by air.¹⁰⁰ In addition, various allied countries sent military-liaison advisory teams to support the National Transitional Council, and Western alliance Special Forces evidently offered immediate advice to rebel front-line forces. All of these measures fall short of deploying regular ground forces with a large footprint into the theatre.

By staging successive offensives, Western forces have repeatedly attempted to turn the Afghan conflict into a situation dominated by the operational dimension. Though most of these offensives have been militarily successful, the conflict remains dominated by the social dimension, making it nearly impossible for the West to effect decisive results at the strategic level, even after 10 years of continuous deployments.

In the 1970s and the 1980s, the United States confined its military involvement in the Persian Gulf to carrier strike groups and naval air power without a single boot on the Arabian Peninsula. “Offshore balancing” allowed the United States to secure its oil interests effectively at the lowest price. In the context of Michael Howard’s theory of the dimensions of strategy, the reason for this becomes obvious. By concentrating on the maritime and air environments, the United States could draw upon comparative advantages, at the same time managing to avoid becoming an occupying force and arousing grievances in the local populations. This was no longer the case in the 1990s. Al-Qaeda founder Osama bin Laden’s speeches and sermons drew attention to the massive Western, particularly American, military presence on the Arabian Peninsula. In this regard, the American scholar Robert Pape, author of *Bombing to Win: Air*

Power and Coercion in War and the more recent book *Dying to Win: The Strategic Logic of Suicide Terrorism*, argues that the presence of American ground troops in Muslim countries is the main factor driving suicide terrorism.¹⁰¹ According to this logic, Islamic fundamentalism is not the principal driving factor of suicide terrorism against the United States' interests. This explains the absence of al-Qaeda terrorists from Iran or Sudan, which harboured bin Laden in the 1990s. Suicide attacks aimed against the West, however, surged in Iraq after Western forces with a different religious background occupied that country. This difference in religion between the occupier and the occupied community is – according to Pape – the key reason for suicide attacks. Prior to Iraqi Freedom, Iraq reportedly had never experienced a suicide terrorist attack.¹⁰²

From this vantage point, arguments made by various commentators, for example, retired general Henning von Ondarza, former commanding officer of Allied Forces Central Europe, which called for ground troops to control the situation in Libya, do not take account of all dimensions of strategy.¹⁰³ Although such an approach might have delivered swift military results in the operational dimension, “infidels” on the ground scoring decisive victories and “occupying yet another Muslim country” might have led to strategic backlashes, with the great potential for the social dimension to predominate. Western boots on the ground, also not backed by the Arab League, would likely have caused massive grievances, including suicide terrorism. The very fact that the Western alliance refrained from deploying ground units helped retain the intervention in a situation that placed the operational and technological dimensions at the forefront, despite concerns about collateral damage and international objections to issues such as airdrops of weapons violating the UN arms embargo.

Most interestingly, making sure that the operational and technological dimensions remain predominant helps to prevent significant strains in the logistical dimension of strategy. According to the UK Defence Committee's fifth report, of 19 July 2011, estimates of additional costs of operations in Afghanistan during that year amounted to just over £4 billion (approximately US\$6.3 billion). Yet the report admitted that the total costs of operations in Afghanistan remained unknown.¹⁰⁴ In contrast, Secretary of State for Defence Fox estimated the costs of six months of military operations in the framework of Operation Ellamy, the United Kingdom's contribution to the allied effort in support of SCR 1973, at £260 million (approximately US\$410 million). This figure includes the cost of replenishing munitions.¹⁰⁵ Accordingly, one can estimate an entire year at approximately £520 million (approximately US\$820 million). Although they are very rough estimates, these figures by no means fail to reveal the large discrepancy between the costs of UK operations in Afghanistan and Operation Ellamy in Libya.

To put the UK costs involved into perspective, the RAF was providing about a quarter of the ground-attack assets as of mid-April.¹⁰⁶ Given the estimated yearly UK costs of US\$820 million and its estimated 25 percent share of the offensive air campaign, about US\$3.3 billion would have theoretically covered the costs of an entire operation at that pace for a year's duration. Particularly expensive were TLAMs launched from US Navy ships to shut down Libya's IADS and other strategic key targets at the onset of the campaign. The approximate cost of missiles and other American munitions expended from 19 to 28 March came to US\$340

million.¹⁰⁷ The above figures combined would be significantly less than the United Kingdom's estimated additional costs of operations in Afghanistan during 2011.

Towards the end of operations Northern and Southern Watch over Iraq before March 2003, General John P. Jumper, the USAF Chief of Staff, argued that the air blockades caused his service to fly some aircraft longer than the average amount of time. However, he was not certain whether doing so would actually result in more wear and tear on the fleet, since the majority of missions did not involve violent manoeuvring.¹⁰⁸ The degree to which European air forces in Libya will feel the effects of increased wear and tear and additional costs involved remains to be seen. Based upon Jumper's comments on the USAF's experience in Iraq, though, these additional costs are unlikely to be excessive.

Not only are costs in treasure significantly lower in comparison to those associated with operations in Afghanistan but also – and even more importantly – the human cost is dramatically reduced. For instance, in the first half of 2011 the British armed forces suffered 27 fatalities in Afghanistan, not to mention the number of wounded and maimed. The 108 fatalities in 2009 and 103 fatalities in 2010 made the two previous years the bloodiest for British troops in Afghanistan.¹⁰⁹ Throughout the 2011 Libya campaign, however, the allies had suffered no fatalities in Libya. Unlike the situation in Afghanistan, the allies could draw fully upon their asymmetric advantages in the technological dimension of strategy, significantly improving force protection.

This article does not contend that the use of ground forces is too costly in modern warfare. In fact, joint manoeuvre warfare, as conducted by the West's most advanced forces, has proven extremely effective and powerful in conventional campaigns, sweeping away conventional resistance. Yet in stabilization operations, Western allies should shape their involvement in ways that allow them to effectively draw upon the comparative advantages in the operational and technological dimensions. In contrast, winning hearts and minds is excessively difficult, highlighting the extreme challenges for Western intervention forces in the social dimension.

As a rule, warfare does not lend itself to a recipe and the weight and characteristics of each dimension of strategy depend upon its context. In Bosnia in 1995, deployment of a heavy multinational brigade in the United Nations Protection Force did not undermine the West's standing in the social dimension. Together with air power, it produced synergistic joint effects against the Bosnian Serbs' ground manoeuvres, thereby providing the significant combined-arms leverage that Allied Force lacked in 1999. Hence, ground forces strengthened the operational dimension of strategy during Operation Deliberate Force (see Chapter 13 in this volume), which led to the Dayton Peace Accords in late 1995. Due to the specific circumstances, however, the West made air power its weapon of choice against Gadhafi. However protracted the campaign seemed, it proved significantly cheaper in both resources and lives than current or recent stabilization operations in Iraq and Afghanistan, which demanded a great influx of ground forces.

Conclusion

The Libyan campaign stands as a successful example of how Western air power shifted the balance of power in favour of a resistance movement against superior armed regime forces. Essentially, it levelled the playing field. Nevertheless, the Libyans themselves made the final decision. Without intervention from the West's air power, forces loyal to Gadhafi could have inflicted tremendous carnage on both Benghazi and Misrata. Gadhafi's siege of Misrata was terrible, but without air power it most certainly would have become another dark chapter in history. With the United States relegating its major contribution to force enablers, there was a need for offensive contributions by smaller NATO countries. As such, SCR 1973 – viewed by many as the ultimate legal authorization – was a prerequisite to muster sufficient NATO air power. During the course of the campaign, renowned commentators made various claims. Against the backdrop of the air campaign's becoming protracted, one of them argued that the West should have better armed and trained the rebels before intervening militarily. Aside from political concerns, this proposed course of action completely ignores the time sensitivity of this operation. The overrunning of the rebel strongholds in late March would have left no time for such arming and training. Other commentators downplayed the intervention as a rather small campaign. Yet assessing a campaign by assets involved is not the most sophisticated approach. At the end of the day, the effect is important. Probably the most frequently raised criticism involved the need for ground forces to effectively turn the tables in Libya. Granted, this strategy might have produced swift military effect, but at the strategic level of warfare it might have caused backlashes – allowing the social dimension of strategy to dominate the conflict.

Moreover, commentators raised concerns about a “protracted” air campaign, implicitly referring to the excessive costs involved. Both the Iraqi NFZs and the Libya campaign, however, bear witness to the fact that relegating an intervention to air power – if circumstances permit – is far less costly than, for instance, ongoing operations in Afghanistan. For some unjustified reason, interventions by air power attract criticism that they consume vast amounts of treasure. Yet air power, combined with its ability to reduce collateral damage significantly, helps keep an intervention in the operational and technological dimensions of strategy, where the West can draw upon its comparative advantages. In particular, the technological dimension yields an asymmetric advantage in force protection that can reduce allied fatalities to a minimum. Short of deploying ground troops, the British and French deployed combat helicopters. After their first missions in the night of 3 to 4 June, commentators expected casualties. These daring attacks undoubtedly and visibly demonstrated NATO's resolve and thereby generated additional coercive leverage.

Other critics charged that, instead of conducting a shock-and-awe campaign, the West used air power only gradually, thus dissipating its true value. Even if the coalition had staged massive air strikes, who could have actually exploited their effects in the early phase of the conflict? This campaign was as much about protecting civilians as about a contest of will between Gadhafi's regime and NATO, whose willingness and ability to conduct a protracted air campaign slowly ground down the dictator's forces and denied him the use of superior conventional weapons on the ground. As it proved, NATO occupied a position from which to

do this. The French Air Force's contingent on Crete, for instance, contained about one-tenth of the entire French Mirage 2000D and 2000N fleets, a ratio perfectly suited for a prolonged air campaign.

However, the campaign once more revealed the European imbalance between spear and shaft (or "tooth and tail"), the effects of which could be mitigated only through significant American support and Libya's geographical position. This imbalance will likely persist – witness the RAF's and the French Air Force's acquisition of or plans to acquire 12 to 14 modern multirole transport tanker aircraft each and the remainder of Europe placing even less emphasis on air-to-air refuelling, a situation that will hamper Europe's reach and mobility in the future. Luckily, Europe's only true aircraft carrier, the *Charles de Gaulle*, was immediately ready for action, but France had to pull it out of operations on 12 August after more than eight months of almost continuous service. Clearly, the West could have waged the Libyan campaign without naval air power, but the geographical position of the next contingency might require the availability of more seaborne flight decks.

The campaign has also shown the limits of force specialization within Europe. With countries such as Germany opting out, or others, such as Italy, offering only hesitant support, the campaign kicked off without vital European capabilities (both Germany and Italy operate the most advanced European SEAD forces). To secure political discretion, the larger European countries need to retain balanced air forces. Smaller European air forces that are willing to deploy could punch above their weight by reinforcing Europe's force enablers. A willingness to take risks could also make up for the absence of certain capabilities. Thus French fighter-bombers opened the campaign on 19 March with no dedicated SEAD aircraft, and the employment of combat helicopters effectively compensated for limited numbers of fixed-wing aircraft.

The campaign is likely to reshape European force transformation. For example, the authors of the United Kingdom's *Strategic Defence and Security Review* of late 2010 undoubtedly wrote that document against the backdrop of ongoing operations in Afghanistan.¹¹⁰ The RAF earmarked such assets as the Sentinel wide-area surveillance aircraft, which saw only limited use in Afghanistan but proved extremely valuable in Libya, for phasing out in the coming years. Consequently, decision makers might need to reconsider certain plans. At the least, the RAF deferred retiring its last Nimrod R1 signals intelligence aircraft by three months, extending its service to support Operation Ellamy – the United Kingdom's contribution to NATO's air campaign. Overall, even though the military gap across the Atlantic undoubtedly remains, the Libyan campaign demonstrated that the gap had narrowed, not only in terms of quality of equipment but also in terms of willingness to intervene.

Endnotes

¹ This chapter is a revised version of Christian F. Anrig's article "Allied Air Power over Libya: A Preliminary Assessment", *Air and Space Power Journal* XXV(4) (Winter 2011), 89–109. Permission from *Air and Space Power Journal* to use the paper is gratefully acknowledged.

² United Nations Security Council Resolution 1973 mandated the implementation of a no-fly zone in Libya's airspace and the use of force to protect civilians under the threat of attack without deploying an occupation force. From 19 March 2011 until the end of that month, an American-led coalition of the willing enforced SCR 1973. The operation was codenamed Operation Odyssey Dawn (though various countries had their own codenames) and involved the United States, other selected NATO alliance members and countries from the Middle East. NATO-led Operation Unified Protector began as an arms embargo operation on 23 March 2011 to enforce the earlier SCR 1970 of 26 February 2011. The enforcement of SCR 1970 mostly involved alliance navies. On 25 March 2011, Operation Unified Protector was extended to include a no-fly zone component. Finally, on 31 March, Operation Unified Protector became the framework for all military operations to address the humanitarian crisis in Libya and supplanted Operation Odyssey Dawn. Sweden joined this operation as a non-NATO member.

³ Tran, P. and Chuter, A. "U.K., France Vault to Center of Euro Defense", *Defense News* 26(14) (11 April 2011), 1.

⁴ "Cameron: UK Working on 'No-Fly Zone' Plan for Libya", BBC News, 28 February 2011. Available at: <http://www.bbc.co.uk/news/uk-politics-12598674>

⁵ Freedman, C., Meo, N. and Hennessy, P. "Libya: Arab League Calls for United Nations No-Fly Zone", *The Daily Telegraph*, 12 March 2011. Available at: <http://www.telegraph.co.uk/news/worldnews/africaandindianoc/Arab-League-calls-for-United-Nations-no-fly-zone.html> [accessed 7 May 2014].

⁶ Ibid.

⁷ "Libya: UK No-Fly Zone Proposal to Enter UN Talks", BBC News, 16 March 2011. Available at: <http://www.bbc.co.uk/news/uk-politics-12755896> [accessed 7 May 2014].

⁸ Chivvis, C.S. "Libya and the Future of Liberal Intervention", *Survival* 54(6) (December 2012–January 2013), 70.

⁹ Security Council, "Security Council Approves 'No-Fly Zone' over Libya, Authorizing 'All Necessary Measures' to Protect Civilians, by Vote of 10 in Favour with 5 Abstentions", SC/10200, 6498th Meeting (night) (New York: United Nations, Department of Public Information, News and Media Division, 17 March 2011). Available at: <http://www.un.org/News/Press/docs/2011/sc10200.doc.htm> [accessed 7 May 2014].

¹⁰ "Gates: Libyan No-Fly Zone Would Require Attack", *CBSNews.com*, 2 March 2011. Available at: <http://www.cbsnews.com/stories/2011/03/02/501364/main200>

-
- ¹¹ Whitlock, C. “Pentagon Hesitant on No-Fly Zone over Libya”, *Washington Post*, 2 March 2011. Available at: <http://www.washingtonpost.com/wp-dyn/content/article/2011/03/01/AR2011030105317.html> [accessed 7 May 2014].
- ¹² Leiby, R. and Wilson, S. “Arab League’s Backing of No-Fly Zone over Libya Ramps Up Pressure on West”, *Washington Post*, 13 March 2011. Available at: <http://www.washingtonpost.com/wp-dyn/content/article/2011/03/12/AR2011031205484.html>
- ¹³ Tran, P. and Chuter, A. “French, U.K. Air Forces Boost Cooperation”, *Defense News* 25(43) (15 November 2010), 8.
- ¹⁴ Tran, P. and Chuter, A. “Cross-Channel Cooperation”, *Defense News* 25(33) (6 September 2010), 1.
- ¹⁵ Reed, J. and Tran, P. “Leading Air Forces Cooperate: France, U.K., U.S. Work Strategy, Doctrine, Systems”, *Defense News* 25(35) (20 September 2010), 1.
- ¹⁶ Tran, P. “[Interview with] Gen. Jean-Paul Palomeros, Chief of Staff, French Air Force”, *Defense News* 26(25) (27 June 2011), 22.
- ¹⁷ “Libya: Obama, Cameron and Sarkozy Vow Gaddafi Must Go”, BBC News, 15 April 2011. Available at: <http://www.bbc.co.uk/news/world-africa-13089758>
- ¹⁸ See, for instance, Dwyer, D. “Doubts about NATO in Libya as US Takes Backseat”, *abcNews*, 1 April 2011. Available at: <http://abcnews.go.com/m/story?id=13274607&sid=77>
- ¹⁹ “Libya: Obama, Cameron and Sarkozy Vow Gaddafi Must Go”, BBC News.
- ²⁰ Joyce, Brigadier-General D. (Commander TF Libeccio), “End of Tour Report – Task Force L(unclassified document provided by the Canadian Aerospace Warfare Centre), document 1630–31, November 2011, 1.libeccio”,
- ²¹ Freedman, L. “Can the EU Develop an Effective Military Doctrine?”, in *A European Way of War*, ed. Steven Everts et al. (London: Centre for European Reform, 2004), 16. Available at: http://www.cer.org.uk/sites/default/files/publications/attachmen_4464.pdf [accessed 7 May 2014].
- ²² Luca Peruzzi, “Italian Air Force Chief Details Libyan Operations”, *Flight International*, 17 June 2011. Available at: <http://www.flightglobal.com/articles/2011/06/17/358044/italia-air-force-chief-details-libyan-operations.html> [accessed 7 May 2014].
- ²³ Brunnstrom, D. “Analysis: French Arms Move Shows Libya Pressure on West”, Reuters, 30 June 2011. Available at: <http://af.reuters.com/article/libyaNews/idAFLDE75T18L20110> [accessed 7 May 2014].
- ²⁴ Anrig, C.F. “The Quest for Relevant Air Power –Continental Europe”, *Royal Air Force Air Power Review* 12(1) (Spring 2009), 84. Available at: http://www.raf.mod.uk/rafcms/mediafiles/CA6EA006_1143_E
- ²⁵ Hewson, R. “United Arab Emirates Signals Shift to Attack Role”, *Jane’s Defence Weekly* 48(19) (11 May 2011), 6.
- ²⁶ Ministère de la Défense [Ministry of Defence], “Libye: point de situation opération Harmattan no. 7” [Libya: Progress report on Operation Harmattan no. 7], 26 March 2011. Available at: <http://www.defense.gouv.fr/content/view/full/112895> [accessed 7 May 2014].
- ²⁷ Anrig, “The Quest for Relevant Air Power”, 86–7.

-
- ²⁸ Ministère de la Défense, “Libye: point de situation opération Harmattan no. 1” [Libya: Progress report on Operation Harmattan no. 1], 25 March 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/libye-pointde-situation-operation-harmattan-n-1>. Ministère de la Défense, “Libye: point de situation opération Harmattan no. 2” [Libya: Progress report on Operation Harmattan no. 2], 25 March 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/libye-pointde-situation-operation-harmattan-n-2>
- ²⁹ Ministère de la Défense, “L’opération Harmattan” [Operation Harmattan], 27 September 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/l-operationharmattan> [accessed 7 May 2014].
- ³⁰ Tirpak, J.A. “Odyssey Dawn Units Identified”, *AirForce Magazine*, 22 March 2011. Available at: <http://www.airforce-magazine.com/DRArchive/Pages/2011/March%202011/March> [accessed 7 May 2014].
- ³¹ Tran, “[Interview with] Gen. Jean-Paul Palomeros”, 22.
- ³² Ripley, T. “UK RAF Looks to Slow VC10 Drawdown Rate”, *Jane’s Defence Weekly* 48(31) (3 August 2011), 12.
- ³³ Gertler, J. CRS Report for Congress: *Operation Odyssey Dawn (Libya): Background and Issues for Congress*, 30 March 2011 – R41725 (Washington, DC: Congressional Research Service, Library of Congress), 8. Available at: <http://fpc.state.gov/documents/organization/161350.pdf> [accessed 7 May 2014].
- ³⁴ Ministry of Defence, “NATO Delivers Update on Libya Operations”, 7 April 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014]. Ministry of Defence, “Typhoon Joins Tornado in Libya Ground Attack Operations”, 13 April 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014]
- ³⁵ Ministère de la Défense, “Libye: point de situation hebdomadaire no. 21” [Weekly progress report no. 21], 18 April 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/libye-pointde-situation-hebdomadaire-n-21> [accessed 7 May 2014].
- ³⁶ Ministère de la Défense, “Libye: point de situation no.28” [Libya: Progress report no. 28], 6 June 2011. Available at: <http://www.defense.gouv.fr/content/view/full/121771> [accessed 7 May 2014].
- ³⁷ Ministère de la Défense, “Libye: point de situation no.32” [Libya: Progress report no. 32], 7 July 2011. Available at: <http://www.defense.gouv.fr/actualites/international/libyepoint-de-situation-n-32#.U2p76bLDwzU> [accessed 7 May 2014].
- ³⁸ Ministère de la Défense, “Libye: point de situation no. 38” [Libya: Progress report no. 38], 11 August 2011. Available at: <http://www.defense.gouv.fr/content/view/full/130650>
- ³⁹ “UK, France Detail Sorties Mounted, Ordnance Expended”, *Jane’s Defence Weekly* 48(44) (2 November 2011), 5.
- ⁴⁰ Hebert, A.J. “Libya: Victory Through Airpower”, *Air Force Magazine* 94(12) (December 2011), 4.
- ⁴¹ Ministère de la Défense, “Libye: point sur le dispositif Harmattan” [Libya: Brief on Harmattan deployment], 19 July 2011. Available at:

<http://www.defense.gouv.fr/operations/actualites/libye-pointsur-le-dispositif-harmattan> [accessed 7 May 2014].

⁴² Ministère de la Défense, “Libye: réorganisation du dispositif militaire français” [Libya: Reorganization of the French military deployment], 17 August 2011. Available at: <http://www.defense.gouv.fr/actualites/international/libyereorganisation-du-dispositif-militaire-francais#.U2p8lVsg7uE> [accessed 7 May 2014].

⁴³ Ministère de la Défense, “Libye: point de situation no. 40” [Libya: Progress report no. 40], 29 August 2011. Available at: <http://www.defense.gouv.fr/operations/actualites/libye-pointde-situation-n-40>

⁴⁴ Ministère de la Défense, “Libye: réorganisation du dispositif militaire français” [Libya: Reorganization of the French military deployment]; and Ministère de la Défense, “Libye: qu’est-ce que la Task Force 473?” [Libya: What is Task Force 473?], 29 March 2011. Available at: <http://www.defense.gouv.fr/content/view/full/113211#.U2p9EC> [accessed 7 May 2014].

⁴⁵ Ministère de la Défense, “Libye: point de situation no. 25” [Libya: Progress report no. 25], 16 May 2011. Available at: <http://www.defense.gouv.fr/content/view/full/119212>

⁴⁶ Ministry of Defence, “RAF and Navy Continue to Strike at Gaddafi Regime”, 21 July 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp>

⁴⁷ Cody, E. “French, British Leaders Meet about West’s Role in Libyan Uprising”, *Washington Post*, 14 April 2011. Available at: http://www.washingtonpost.com/world/francebritain-call-for-summit-on-natos-role-in-libyanuprising/2011/04/13/AFy71qVD_story.html

⁴⁸ Tran, “[Interview with] Gen. Jean-Paul Palomeros”, 22.

⁴⁹ Ministère de la Défense, “Libye: arrivée des Atlantique 2 à la Sude” [Arrival of the Atlantique 2 at Souda], 4 August 2011. Available at: <http://www.defense.gouv.fr/actualites/international/libyearrivee-des-atlantique-2-a-la-sude#.U2p9bMfMpHw> [accessed 7 May 2014].

⁵⁰ Ministère de la Défense, “Libye: premier vol du Harfang au profit d’Harmattan” [Libya: Harfang’s first flight for Harmattan], 25 August 2011. Available at: <http://www.defense.gouv.fr/operations/autres-operations/operation-harmattan-libye/actualites/libye-premiervol-du-harfang-au-profit-d-harmattan> [accessed 7 May 2014].

⁵¹ Ministry of Defence, “RAF ISTAR Squadrons Keep Watch over Libya”, 1 April 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].

⁵² See, for instance, Ripley, T. “AWACS Provides Key Link for NATO Strikes over Libya”, *Jane’s Defence Weekly* 48(31) (3 August 2011), 7.

⁵³ Ripley, T. “USAF Predators Direct Tornado Strikes”, *Jane’s Defence Weekly* 48(20) (18 May 2011), 6.

⁵⁴ Ripley, “AWACS Provides Key Link”, 7.

⁵⁵ Tigner, Brooks. “NATO Cripples Ghadaffi Forces, C2 Capabilities”, *Jane’s Defence Weekly* 48(17) (27 April 2011), 8.

⁵⁶ *Ibid.*; and Tigner, B. “‘More Work to Be Done’ in Libya, Reports NATO”, *Jane’s Defence Weekly* 48(19) (11 May 2011), 6.

-
- ⁵⁷ Clark, General W.K. *Waging Modern War: Bosnia, Kosovo, and the Future of Combat* (New York: Public Affairs, 2002), 303.
- ⁵⁸ Mili, A. “Libya Rebels Prepare for Fight over Strategic Town”, Reuters, 30 June 2011. Available at: <http://af.reuters.com/article/libyaNews/idAFLDE75T1S220110>
- ⁵⁹ See Biddle, S. *Afghanistan and the Future of Warfare: Implications for Army and Defense Policy* (Carlisle Barracks, PA: Strategic Studies Institute, US Army War College, 2002), 38–39.
- ⁶⁰ See Tigner, B. “NATO Blames ‘Fluid’ Situation for Allied Airstrikes on Rebels”, *Jane’s Defence Weekly* 48(15) (13 April 2011), 7.
- ⁶¹ Gelfand, L. “NATO Extends Operation in Libya for 90Days”, *Jane’s Defence Weekly* 48(23) (8 June 2011), 4.
- ⁶² Chuter, A. and Hale, J. “NATO’s Libyan Air War Uses Only Precision Bombs”, *Defense News* 26(28) (25 July 2011), 3.
- ⁶³ Ministry of Defence, “Typhoon Joins Tornado”.
- ⁶⁴ Ministry of Defence, “RAF Strikes Gaddafi’s Navy”, 20 May 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].
- ⁶⁵ Jennings, G. “Royal Air Force Downplays Carrier Aviation”, *Jane’s Defence Weekly* 48(30) (27 July 2011), 12.
- ⁶⁶ Ministry of Defence, “NATO Mission Not over Yet in Libya”, 24 August 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].
- ⁶⁷ Ministry of Defence, “RAF Ready for Further Action over Tripoli”, 23 August 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].
- ⁶⁸ Ministry of Defence, “RAF Strikes Targets Near Tripoli and Sirte”, 25 August 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].
- ⁶⁹ “UK, France Detail Sorties Mounted”, *Jane’s Defence Weekly*, 5.
- ⁷⁰ Ministry of Defence, “RAF Typhoons Patrol Libyan No-Fly Zone”, 22 March 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> Ministry of Defence, “PM Visits RAF Crews Deployed on Libya Operations”, 5 April 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> Ministry of Defence, “Action in Libya Has Prevented ‘Humanitarian Catastrophe’”, 6 April 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> and Ministry of Defence, “Typhoon Joins Tornado”.
- ⁷¹ Ministry of Defence, “Additional RAF Tornado Jets Arrive in Italy”, 20 July 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp>
- ⁷² Canada, Government of, Statement by the Prime Minister of Canada on the situation in Libya, 18 March 2011. Available at: <http://pm.gc.ca/eng/media.asp?id=4048>
- ⁷³ Joyce, D. “TF LIB Operations; Chronologies– Acronyms”, Annex A in Joyce, “End of Tour Report”, 2, November 2011.
- ⁷⁴ Jakobsen P.V. and Møller, K.J. “Good News: Libya and the Danish Way of War”, in Nanna Hvidt and Hans Mouritzen (eds), *Danish Foreign Policy Yearbook 2012* (Copenhagen: Danish Institute for International Studies, 2012), 109–112.

-
- ⁷⁵ Haynes, D. “Denmark’s Top Guns Trump RAF in Libya”, *The Times*, 29 September 2011, 13.
- ⁷⁶ O’Dwyer, G. “Libya Operations Threaten Nordic Budgets”, *Defense News* 26(24) (20 June 2011), 8.
- ⁷⁷ Kington, T. and O’Dwyer, G., “Small Bombs Loom Big as Libya War Grinds On”, *Defense News* 26(25) (27 June 2011), 1.
- ⁷⁸ Statsministerens Kontor [Prime Minister’s Office], “Norge med i operasjoner i Libya” [Norway participates in operations in Libya], *Pressemelding* [press release], 23 March 2011. Available at: <http://www.regjeringen.no/nb/dep/smk/pressecenter/presse/melmed-i-operasjoner-i-libya.html?id=636399> [accessed 7 May 2014].
- ⁷⁹ Minister of Defense Grete Faremo, “Fullmakt til deltakelse med norske militære bidrag i operasjoner til gjennomføring av FNs sikkerhetsrådsresolusjon 1973 (2011)” [Authorization for the participation of a Norwegian military contribution in operations for the implementation of UN Security Council Resolution 1973 (2011)], *Kongelig Resolusjon* [Royal Decree], 23 March 2011, Sections 1, 2. Available at: http://www.regjeringen.no/upload/FD/Temadokumenter/Libyadeltakelse_kgl-res-23-3-2011.pdf [accessed 7 May 2014].
- ⁸⁰ Forsvaret [Defence (Norway)], “Sluttrapport Libya” [Final Report on Libya Operations], 2 December 2012. Available at: http://forsvaret.no/operasjoner/rapporter/sluttrapporter/Sider/SI_Libya.aspx
- ⁸¹ O’Dwyer, “Libya Operations Threaten Nordic Budgets”, 1.
- ⁸² La Défense [Defence (Belgium)], “Aperçu hebdomadaire des opérations extérieures” [Weekly Report on Deployed Operations], 17 March 2011–23 March 2011. Available at: <http://www.mil.be/def/doc/viewdoc.asp?LAN=fr&FILE=&ID=2452>
- ⁸³ La Défense [Defence (Belgium)], “Aperçu hebdomadaire des opérations extérieures” [Weekly Report on Deployed Operations], 24 March 2011–30 March 2011. Available at: <http://www.mil.be/def/doc/viewdoc.asp?LAN=fr&FILE=&ID=2457>
- ⁸⁴ La Défense [Defence (Belgium)], “Khadafi et son régime neutralisés” [Gadhafi and His Regime Neutralized], 20 October 2011. Available at: <http://www.mil.be/def/news/index.asp?LAN=fr&ID=3155>
- ⁸⁵ Erwin van Loo, Netherlands Military History Institute, to the author, email, 21 February 2012.
- ⁸⁶ *Editor’s note*: see Part I of this volume on the UN’s 1960s Congo mission; in particular see Chapter 2 in this volume.
- ⁸⁷ Pengelley, R. “Swedish Gripens over Libya”, *Jane’s International Defence Review* 45 (January 2012), 34–5.
- ⁸⁸ Clark, *Waging Modern War*, 303, 337 and 367.
- ⁸⁹ “Libya: UK Apache Helicopters Used in NATO Attacks”, BBC News, 4 June 2011. Available at: <http://www.bbc.co.uk/news/uk-13651736> [accessed 7 May 2014].
- ⁹⁰ Ministry of Defence, “HMS Bangor En Route to Libya”, 7 June 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].
- ⁹¹ Ministry of Defence, “Good Progress Seen in Libya Operations”, 24 June 2011. Available at:

<http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].

⁹² Ministry of Defence, “RAF Destroys Nine of Gaddafi’s Underground Storage Bunkers in Libya”, 13 June 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/MilitaryOp> [accessed 7 May 2014].

⁹³ Ministère de la Défense, “Libye: engagement des hélicoptères français depuis le BPC Tonnerre” [Libya: Use of French helicopters from BPC Tonnerre], 4 June 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/libyeengagement-des-helicopteres-francais-depuis-le-bpc-tonnerre> [accessed 7 May 2014].

⁹⁴ Ministère de la Défense, “Libye: point de situation no. 29” [Libya: Progress report no. 29], 11 June 2011. Available at: <http://www.defense.gouv.fr/actualites/operations/libyepoint-de-situation-n-29> [accessed 7 May 2014].

⁹⁵ Ministère de la Défense, “Libye: les hélicoptères français en opération dans le secteur de Brega” [Libya: French helicopters operating in the area of Brega], 25 August 2011.

⁹⁶ The HOT missile is a joint French–German creation, a second-generation, long-range anti-tank missile that can be launched from ground vehicles or helicopters. HOT stands for *Haut subsonique Optiquement Téléguidé Tiré d’un Tube*, or High Subsonic Optical Remote-Guided, Tube-Launched.

⁹⁷ “UK, France Detail Sorties Mounted”, *Jane’s Defence Weekly*, 5.

⁹⁸ Howard, M. “The Forgotten Dimensions of Strategy”, in *The Causes of Wars and Other Essays*, 2nd ed., enlarged, ed. Michael Howard (Cambridge, MA: Harvard University Press, 1983), 105.

⁹⁹ Mili, “Libya Rebels Prepare for Fight”.

¹⁰⁰ *Editor’s note*: supplying arms to any group in Libya was a violation of the arms embargo imposed by UNSCR 1970 (2011).

¹⁰¹ See: Pape, R.A. *Bombing to Win: Air Power and Coercion in War*. Cornell Studies in Security Affairs (Ithaca, NY: Cornell University Press, 1996); Pape, R.A. *Dying to Win: The Strategic Logic of Suicide Terrorism* (Random House, 2006).

¹⁰² Pape, R. “The Logic of Suicide Terrorism: It’s the Occupation, Not the Fundamentalism”, *American Conservative*, 18 July 2005. Available at: <http://www.theamericanconservative.com/article/2005/jul/18/0> [accessed 7 May 2014].

¹⁰³ Solms-Laubach, F. and Reichelt, J. “Warum packt die NATO Gaddafi nicht?” [Why doesn’t NATO seize Gaddafi?], *Bild. de*, 30 July 2011. Available at: <http://www.bild.de/politik/ausland/muammar-gaddafi/warumpackt-die-nato-ihn-nicht-19129868.bild.html> [accessed 7 May 2014].

¹⁰⁴ Defence Committee, *Fifth Report: Ministry of Defence Main Estimates* (London: Defence Committee, 19 July 2011). Available at: <http://www.publications.parliament.uk/pa/cm201012/cmselect/> [accessed 7 May 2014].

¹⁰⁵ Ministry of Defence, “Cost of Libya Operations”, 23 June 2011. Available at: <http://www.mod.uk/DefenceInternet/DefenceNews/DefencePol> [accessed 7 May 2014].

¹⁰⁶ Ministry of Defence, “Typhoon Joins Tornado”.

¹⁰⁷ Gertler, *Operation Odyssey Dawn (Libya)*, 21–2.

¹⁰⁸ Tirpak, J.A. “Legacy of the Air Blockades”, *Air Force Magazine* 86 (2) (February 2003), 50. Available at: <http://www.airforce-magazine.com/MagazineArchive/Documents/2003/February%2> [accessed 7 May 2014].

¹⁰⁹ “British Dead and Wounded in Afghanistan, Month by Month”, *Guardian.co.uk*, 2011. Available at: <http://www.guardian.co.uk/news/datablog/2009/sep/17/afghan-casualties-dead-wounded-british-data> [accessed 7 May 2014].

¹¹⁰ HM Government, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, presented to Parliament by the Prime Minister by Command of Her Majesty, October 2010 (London: The Stationery Office, 2010). Available at: http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitala [accessed 7 May 2014].