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Air Power

Modern Air Operations and Wylie's Cumulative and Sequential Operational Patterns

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Strategist Joseph Caldwell Wylie argued that strategies were implemented through two general types of operational patterns: sequential and cumulative. This article discusses the conceptualisations of these two patterns and then applies them to three modern air war cases to bring out their subtleties and nuances. Wylie's simple typology has a surprising depth that makes it useful to air strategists when considering future air operations whether in peace of war.

1. Introduction

In the air domain, there are no single decisive battles or moments, only a continuous operational tempo. Consequently, air strategists must be far-sighted in their planning and patient in assessing outcomes. This reality fits well with Rear Admiral Joseph Caldwell Wylie's conceptualisation that military strategies are implemented through two general types of operational patterns (Wylie, 1952). Sequential warfare refers to 'a series of discrete steps' where each lead to the next while cumulative warfare involves 'a collection of lesser actions' that gradually builds up to have a strategic impact (Wylie, 1952).

This paper applies Wylie's patterns to some recent and ongoing air operations: last decade's air war led by the United States (US) against the Islamic State of Iraq and Syria (ISIS); the Japan Air Self-Defense Force's (JASDF) peacetime air policing activities; and Israel's 12-day air war against Iran in mid-2025. These cases confirm that Wylie's conceptualisations are appropriate to modern air operations and usefully illustrate certain aspects of air warfare planning.

The air war against ISIS reveals that, even if already undertaking sequential air operations, shifting to cumulative air operations requires some crucial preparations. The JASDF's peacetime competition case uses cumulative air operations and highlights issues of ongoing resourcing and exhaustion. Lastly, the 12-day war illustrates the significance of integrating sequential and cumulative air actions.

Importantly, these operational patterns are not only relevant or found at one of the commonly-called 'levels of war', a term that actually denotes levels of analysis rather than combat activities (Harvey, 2021). The air war against ISIS applied the patterns at the strategic, operational and tactical levels of war; the JASDF at the strategic level; and Israel at the grand strategic and tactical levels.

This paper explains Wylie's sequential and cumulative operational patterns in more depth and applies them to the three cases. Air strategists will find Wylie's cumulative and sequential patterns of air operations useful, whether planning during peace or in war.

2. Wylie's operational patterns

Wylie concisely sets out the strategist's task:

> *[t]he primary aim of the strategist in the conduct of war is some selected degree of control of the enemy for the strategist's own purpose; this is achieved by control of the pattern of war; and this control of the pattern of war is had by manipulation of the centre of gravity of war to the advantage of the strategist and the disadvantage of the opponent. (Wylie, 1967)*

This is different to coercion that aims to deny, through threat or physical means, an enemy achieving their objectives. In contrast, control means denying the enemy freedom of action or movement, thereby reducing uncertainty and making the war's progression more predictable (Zilincik, 2026). Controlling the operational patterns of the war involves commanding key lines of manoeuvre or positions in a way that progressively reduces the adversary's operational options and leads to their loss of the initiative (Milevski, 2012).

Wylie perceived two distinct types of operational patterns through which control might be gained. The first pattern perceived was sequential, which refers to a series of discrete phases, with each one of these growing from, and dependent upon, the preceding one. When combined, the discrete phases make up the complete sequence of the war. If at any stage of the war one of these phases happen differently, then the sequence of the war would be interrupted and altered. The Pacific island 'hopping campaign' during World War II is an example of a sequential operational pattern (Wylie, 1952).

The second operational pattern perceived by Wylie was cumulative. The pattern is made up of many lesser independent actions such as are typical of tactical air activities. Each individual action is a single statistic, an isolated plus or a minus that, when summed, produces the final result. Cumulative strategies typically work in the background, applying slow, steady pressure. Wylie (1952) wrote of the 'perceptible minute accumulation of little items piling one on top of the other until at some unknown point the mass of accumulated actions may be large enough to be critical'.

Wylie considered that maritime and air forces could undertake cumulative operations while maritime and land forces could undertake sequential operations. This application of forces should not be seen as an exact allocation of forces to operational patterns but more related to the US Services' roles and responsibilities in the mid-20th century. For Wylie, maritime meant not just warships and submarines but also naval marines capable of capturing or holding ground, and of large air formations able to attack hostile forces on land, at sea or in the air.

Wylie felt integrating sequential and cumulative operations was essential. He believed the two operational patterns reinforced each other's effectiveness. Relatively weak sequential strategies could still be successful if paired with strong cumulative campaigns. In pairing the two patterns, there are clear echoes of today's arguments in favour of multidomain integration. Even so, while arguing for achieving control over the enemy, he was deliberately vague about how this was to be done. Wyle wrote in discussing his general theory of strategy that:

> *It would be satisfying to state [control] more precisely, but the more it is considered the more it appears that such precision would be unduly restrictive. The specific requirements for the kind and degree and intensity and duration and extent of control can be determined only when a specific situation presents itself … and has developed to a point where a specific decision is possible. (Wylie, 1967)*

Wylie's general theory of strategy also included a fourth point about victory requiring a man on the ground with a gun: 'He is in control. He determines who wins.' Wylie conceded that this was arguable since the war he fought in World War II had not involved a ground invasion of Japan. Nevertheless, he argued that this was implied as possible and accordingly his fourth point held in a practical if not theoretical sense (Wylie, 1967).

2.1. Implications

The two patterns are not incompatible or mutually exclusive but instead are ideally used in combination to reinforce each other's effectiveness. In most wars, the ends of a strategy cannot be instantly achieved. Instead, a series of phases is required to be taken to progressively advance to the objective. For example, gaining control of the air is often a necessary phase before conducting further military operations. Gaining this control generally involves multiple independent air activities that gradually gain the degree of control sought. The individual effect of each activity has a certain value that is, in effect, amassed. When the total value reaches a certain level, the strategy can move ahead to the next phase (Ducharme, 2000).

Accordingly, the sequential and cumulative operational patterns are not opposites albeit they are, in a practical and experiential sense, dissimilar. In air strategy, the opposite of the sequential strategy would be parallel warfare where many air operations would be taking place simultaneously, rather than in sequential increments over time (Deptula, 2001). The opposite of a cumulative pattern might then be thought to be one in which the effect of a single action brings victory (Ducharme, 2000). However, in considering warfighting, a single point success seems improbable. Instead, the dictionary opposite of cumulative might be more useful, that is of actions unhelpfully subtracting from the progress being made. This is a useful warning when planning air strategies.

In designing an air strategy, ideally the first phase in the envisaged sequence would be making decisions about the force structure required to implement it. This phase and the succeeding sequences would be planned to incorporate the cumulative logic in each phase. In such an air strategy design, the effects of each stage in the sequence would not disappear with the beginning of the next phase. Instead, there would be a progressively accumulating impact at each sequence from all the previous air operations undertaken. Overtime, the overall strategic momentum would be steadily accelerating (Ducharme, 2000). However, this cumulative logic requires allowing enough time at each phase for it to have its full impact, being more analogous to an insidious slow-acting poison than a sudden limb amputation (Milevski, 2012).

Cumulative logic may be particularly noticeable in attacks on a system of systems such as a command-and-control network or an integrated air defence system. The actions or behaviours of a system as a whole is an emergent consequence of the interdependent actions of the various individual nodes that make up the system. Initially, as various nodes are attacked and become inoperable, there may be little discernible change in the overall system performance. At some point, however, the losses will accumulate sufficiently to reach a tipping point where the system of systems collapses into a collection of non-cooperating individual nodes. To an outside observer, this tipping point may not be apparent until it is reached.

Importantly, the actions taken in each phase of the cumulative pattern must include a cautious use of resources that leaves enough of the friendly force still remaining to be able to complete the succeeding phases. Hence, force attrition rates need careful monitoring. If friendly force loss rates edge up, then alternative actions need to be considered – whether getting more resources, changing tactical activities or altering the overall air strategy. It may be advantageous to purposefully keep in reserve an air 'fleet in being' that is safeguarded for use in future phases.

Conceptually, attrition is broader than simply losses to hostile action. Attrition can be due to the destruction of the asset, unrepairable damage, an inability to sustain operating the assets because of a shortage of maintenance items or personnel, or sheer exhaustion. The sustainment losses

can be forced through usage rates exceeding available supplies, or agreed to if it is necessary to shift resources and workforce to other tasks considered more important, or to rest them.

The need to balance effectiveness against attrition highlights that the choice of the target sets is crucial. There are two different distinct alternatives. The first is to focus air power on a narrow target set that is assumed to be both critical to the adversary waging war and irreplaceable for the duration required. Choosing such target sets means limited flexibility in undertaking the required air operations making secondary factors like weather and aircraft availability important to success. The order of attack then drives air operations.

The alternative is to apply air power to strike a wide array of targets that have no particular individual importance or need to attack in a certain order. This option assumes that a measured dispersion of effects across many targets will gradually bring success. Such imprecision gives air commanders much more flexibility in what, when and where to attack. Inherent in this can be difficulty in measuring the cumulative air operation's progress. At some time, a critical point will be reached and the desired impact achieved. However, it is generally hard to forecast when the critical point will occur. In contrast, the alternative of focusing on a narrow target set means the impact on the adversary can be more quickly understood leading to early strategy advancement if successful or, conversely, abandoning that target set if not (Ducharme, 2000).

There is a further, more overarching, issue in the planning of air operations using Wylie's patterns. Since Wylie's time, most nations have focused their armed forces on preparing for joint warfare. As armies are generally the dominant service in terms of personnel numbers, the joint warfare planning processes commonly adopted in peacetime tend to reflect land force methodologies. Land forces, as Wylie noted, generally employ sequential operations. Consequently the joint planning processes may be unintentionally ill-suited to cumulative operations. A recent book on naval operational art by two retired US Navy captains observed:

> *as it is presented today at the Naval War College, naval operational art* is *joint operational art, which is at its core Army operational art. It is as if [Rear Admiral] Wylie and [Admiral] Fiske never existed. Today a 'joint sailor' is not someone who thinks like a sailor at all but one who thinks almost entirely like a 1980s-vintage Army planner. This is harsh criticism but not unwarranted. The services play their own unique roles within the context of a joint campaign. Universal, Army-derived joint language is twice insufficient: it is too generic for services' use in planning their idiosyncratic missions, and it fails to give the joint planner a complete understanding of how the unique parts fit into a complex whole. (Cares & Cowden, 2021)*

This observation also arguably holds for the art of air operations and their planning, and finds some resonances in the recent air war against ISIS.

3. The US-led air war against ISIS

In September 2014, an international coalition led by the US was formed to undertake Operation Inherent Resolve (OIR) and militarily defeat ISIS. To accomplish this mission, the campaign's design was broken into four sequential phases: degrade, counterattack, defeat and support stabilization (Combined Joint Task Force, n.d.). The intent was for indigenous ground forces to recapture the ground lost to ISIS, while US and its coalition partners would provide air support. No American ground troops were to be involved in combat.

3.1. Sequential air operations

Phase I, degrade (2014–2015), quickly began. It aimed to blunt ISIS's expansion into Iraq and begin to reduce the group's combat effectiveness. During this phase, the Iraqi Security Forces and partner forces on the ground in Syria received training, equipment, advice and assistance. A combined joint task force was set up with a US Army General appointed to command the campaign. The General asked for his deputy to be a USAF major general, but many positions earmarked for airmen within the task force staff were left unfilled as the US Air Force (USAF) did not initially prioritise filling the positions (Wasser et al., 2021).

Appointing an Army General to command a primarily air operation proved controversial although it had a certain logic in following on from preceding US activities in Iraq. There is, however, a strong argument that it fundamentally shaped how the air war was prosecuted in the war's early stages. David Deptula asserts that:

> *if there was an Airman in charge … the air operations against ISIS would have been designed as an air campaign against a state, rather than as another chapter of the counterinsurgency campaigns waged in Iraq and Afghanistan that were the recent experience of the U.S. Army commanders in charge (Wasser et al., 2021).*

Supporting Deptula's assertion, in the first half of Phase I, the principal use of air power was in close air support (CAS) to ground forces. Consequently, air operations fell into a sequential pattern driven by the land force's linear tactical fight that sought to capture and hold ground.

Less than 10% of the OIR air strikes were allocated to attacks on ISIS beyond the frontline. This meant that when the ground offensive paused or stalled, ISIS was able to quickly regenerate. Not targeting ISIS in its deep areas allowed the group to manoeuvre with impunity, reinforcing and resupplying the close fight as needed. Air power was not used to achieve the degree of control necessary to deny ISIS's freedom of action and movement.

The lack of balance between the close and the deep battles was not due to a shortage of coalition combat airpower. Some 70 to 80 combat aircraft were flying each day, enabling continuous CAS coverage over two to three locations but leaving little excess capacity for strikes elsewhere. However, for the first half of Phase I (August 2014–May 2015) the ground war was relatively static which, combined with rules of engagement constraints, meant only about a

quarter of the CAS missions dropped at least one weapon (Wasser et al., 2021).

The exception was the retaking of the city of Kobani (Syria) where ISIS forces massed, presenting many lucrative targets that coalition aircraft could quickly and easily identify and hit. During this battle, there was a clear forward line of troops delineating the ISIS-controlled areas where bombs could be released without concern about hitting friendly forces. Impacted by its heavy losses, ISIS from January 2015 shifted to a defensive posture, constructing layered defences to hold the swaths of land captured earlier (Wasser et al., 2021).

With ISIS digging in, and ground operations slowing, the air war seemed to lose momentum. There was even less need for CAS and so fewer weapons were delivered albeit the rate of air combat sorties was maintained. The air war now seemed to be becoming ineffective, suggesting a stalemated conflict was being generated.

3.2. Cumulative air operations

In June 2015, a new air commander sought to change the balance of air operations away from being principally CAS and more towards deep strike. Such strikes inherently have a cumulative pattern. However, while there were adequate air combat assets available, the command-and-control capabilities needed for this form of cumulative air operations were lacking.

Having flown mainly CAS missions since 11 September 2001, the USAF's ability and capacity to plan deep area and deliberate strike operations had atrophied. Most individuals involved lacked experience in planning such operations, the targeting enterprise was poorly resourced, there were insufficient people, antiquated software tools and cumbersome outdated processes. Importantly, deep area targeting required a shift in mindset from a focus on providing time-sensitive on-call support to a longer-term perspective where successes gradually accumulated.

Effort now went into building the larger intelligence capacity needed to develop targeting packages and creating a federated system that pulled together information from intelligence organisations across the wider US Department of Defense. An extensive target system analysis was begun to understand how the ISIS network functioned and to identify the group's centres of gravity to attack. Even so, the deep target-development process remained challenging as ISIS was not a conventional army with an array of traditional military targets (Wasser et al., 2021).

Deep strike operations were also hamstrung by very limited access to long-range intelligence, surveillance and reconnaissance (ISR) assets. USAF's uncrewed aerial vehicles (UAVs), such as MQ-1 Predators, were assigned as joint theatre assets and were in high demand by ground commanders wanting full motion video feeds to support partner ground forces. The thin spread of ISR assets meant that the deep area targeting process proceeded very slowly.

Exacerbating the tension over scarce ISR assets availability was that some US Army units were allowed to retain for their own UAVs (MQ-1C Gray Eagles), an improved MQ-1 Predator as these were designated as organic assets. Eventually, the air component identified a workaround in acquiring government-owned, contractor-owned and contractor-operated MQ-1 Predators paid for with USAF funding albeit this required additional resources. These were then classified as organic assets under a joint headquarters ruling about component-procured ISR and used for deep area target intelligence development (Wasser et al., 2021).

A final enhancement needed for cumulative air operations were more appropriate airspace control processes. Initially, the processes set in place divided the battlespace into separate areas of operations each with different fire-control measures that potentially impacted the execution of deep-strike operations. Consequently, there was no airspace controlled by the air component. This had implications for the target-engagement process because, by default, air-to-ground operations required coordination with ground commanders and often control by a Joint Terminal Attack Controller, which noticeably slowed down air strike approvals. This sideways coordination was particularly frustrating in Syrian air operations given that some 90% of the time, it was the air component not another commander undertaking deep strikes to support the task force's campaign plan.

Airspace management issues became even more complicated when Russia began conducting air strikes in Syria in late September 2015. These air strikes supported the crumbling al-Assad regime and were consequently against all regime opponents rather than just ISIS. However, the OIR coalition now had to compete with Russia fighters trying to intimidate coalition aircraft by flying aggressively near them, as well as the potential threat from the capable Russian surface-to-air missile systems being deployed (Wasser et al., 2021).

The rebalancing between the close and deep fight saw a significant increase in combat air operations during the second part of Phase I. The number of air-to-ground sorties nearly doubled, with just over 18,000 missions flown, with more aircraft engaging targets than in the first 10 months of the operation. By the end of Phase I of OIR, it was clear that momentum had shifted to the US-led coalition and that ISIS was on the defensive (Wasser et al., 2021).

In Phase II (2015–2016), Iraqi and Syrian forces began the counterattack on ISIS's two capitals – Mosul and then Raqqa. This was the most intense period of ground operations and accordingly the most active period for air operations. After a prolonged battle in Phase II, Iraqi forces reclaimed Mosul and the Syrian Democratic Forces began its counterattack on Raqqa. Air power was used for both close and deep strikes with CAS dominating.

Phase III (2017–2020) resulted in the destruction of ISIS's territorial caliphate and forced its remaining fighters to operate covertly. In the final months of the attack on Raqqa, air operations reached their peak in terms of the number of weapons released in one month, some 5,075. After Raqqa was recaptured, weapon releases dropped precipitously. From then on, coalition aircraft mostly undertook overwatch missions where they flew to an assigned 30-by-30-mile kill box. Only 15% of these CAS missions resulted in at least one weapon release (Wasser et al., 2021).

4. Japanese Air Self-Defense Force air policing

Since the early 2000s, People's Liberation Army Air Force (PLAAF) and PLA Navy (PLAN) aircraft have flown into Japan's Air Defence Identification Zone (ADIZ). An ADIZ is a block of international airspace adjacent to a country's territorial airspace where the country can request unknown approaching aircraft comply with identification protocols. If the approaching aircraft do not, they may be intercepted by a fighter aircraft that can visually determine the identity of the intruders (Jakhar, 2019).

In the 2009–2013 period, the number of intrusions annually into Japan's ADIZ rose sharply from a few dozen to several hundred. In November 2013, China declared a large portion of the airspace in the East China Sea an ADIZ, which then overlapped with Japan's ADIZ (Asia Maritime Transparency Initiative, 2024).

4.1. Cumulative air operations

The Japanese response to the PLA intrusions follows the cumulative pattern with numerous independent actions where each is seemingly a single statistic, an isolated plus or a minus. JASDF fighters are frequently scrambled to identify ADIZ-penetrating PLA aircraft.

The rate of PLA incursions has risen from about 306 annually in 2012 to peak at about 850 in 2016 (Asia Maritime Transparency Initiative, 2024). In recent years, the rate of PLA intrusions has varied being 458 in FY2020; 722 in FY2021; 575 in FY2022; 479 in FY2023; 464 in FY2024 and 366 in FY2025 (Joint Staff Japan, 2025, 2026; Nikkei, 2026). Most Chinese aircraft are fighter aircraft with the occasional long-range bomber, electronic reconnaissance aircraft and UAVs. In passing, there are also some 150–200 JASDF scrambles each year against Russian aircraft incursions.

To respond, the JASDF mainly uses the F-15J/DJ Eagle aircraft. The F-15J/DJ is an excellent platform for air policing tasks, having a fast cruise speed to reach the intruding aircraft quickly, a good range and endurance, and reasonable manoeuvrability for close in visual identification of air targets. Scrambles also include use of E-2C Hawkeye airborne early warning and control aircraft to coordinate the intercept, sanitise the airspace and avoid being tactically surprised.

The almost daily scrambles are gradually wearing the F-15J/DJ fleet out, a form of attrition in itself. The 'new normal' heavy scramble rates are using up the fatigue lives of the JASDF F-15J/DJ fleet considerably sooner than was planned. The concern is that the PLA has some six times as many fighters than the JASDF and could further increase air intrusions whenever it considers appropriate. The in-service life of Japan's F-15J/DJ fleet is now almost a decision that lies with the PLA. A RAND study determined that:

> *In the long term, Japan's approach to responding to the higher level of Chinese military air activity is not sustainable … China's air activities … have spurred Japan to extraordinary measures, such as reorganizing its air defence structures, including establishing new units in all domains; doubling the number of fighters in the sector to respond to Chinese aviators; and increasing its defense spending. (Burke et al., 2018, p. 23)*

Japan considers that China is engaging in a salami-slicing strategy of incremental power projection to gain de facto control of at least some of the ADIZ airspace. China's 2013 ADIZ declaration over the islands is seen as a part of this strategy. If Japan cuts back on intercepting intruding Chinese aircraft, this may create a vacuum that China will try to fill. Moreover, if China's air activities go unchallenged, other countries may gradually come to accept or at least acquiesce to China's claims over Japan's (Oguro, 2018). This worry drives Japan to believe it needs to continuously demonstrate Japan's strong determination. For Japan, the scrambles have a major role in creating a favourable security environment and deterring future Chinese adventurism.

4.2. Sequential nesting

The JASDF's constant air policing activities can be framed as being within the 'competition below armed conflict' phase of the competition continuum. This is the middle phase of the highly simplified three-part continuum comprising cooperation, competition below armed conflict and armed conflict (Department of Defense, 2019). Using this framing, the PLA and JASDF are both following a cumulative pattern of air operations to each seek and assert control of the same airspace.

The PLA has the initiative in being able to oblige the JASDF to respond. Moreover, the PLA is making gradual changes over time towards increasingly threatening behaviour. These include a PLAAF Y-9 electronic surveillance aircraft directly infringing Japanese territorial airspace for the first time in mid-2024 (Guinto & Marsh, 2024); PLAN J-15 fighters twice locking their radars onto JASDF F-15 air policing aircraft in late 2025 (Mahadzir, 2025); an increasing number of joint Russian/ Chinese bomber formations flying near Japan during 2025 (Mahadzir, 2026); and greater use of UAVs (Jackson, 2025). On the other hand, the overall number of PLA air intrusions has been gradually declining each year since 2021. In this, it is apparent that the PLA's cumulative air operations has both qualitative and quantitative dimensions.

The use of Wylie's sequential and cumulative framework raises some force structure and force posture planning issues. There are three possible sequential paths that PLA air operations may follow in the future. The PLA could return to the peacetime phase, which is modest cooperation between the PLA and the JASDF aimed to avoid incidents. Alternatively, the PLA could remain in the competition below armed conflict phase indefinitely and keep imposing high costs and permanent strain on the JASDF. Lastly, the PLA could go beyond the current phase into armed conflict. Each option has different solutions. The uncertainty over the next phase is always present to varying degrees in sequential pattern air operations. In this case, the initiative lies with the PLA.

5. Israel's 12-day air war against Iran

Israel and Iran have been adversaries since the Islamic Republic of Iran was created in 1979. While the two countries share no borders, Iran has waged a quasi-war by exploiting linkages with Shiites in Lebanon, assisting Palestinians in Gaza, supporting the al-Assad regime in Syria and helping the Houthis in Yemen. For Iran, this was an 'axis of resistance' composed of like-minded others but for the Israeli Defence Minister Naftali Bennett in 2019, it was an octopus, with Iran as the head and the tentacles its regional allies and supporters (Keinon, 2020). By the late 2010s, the undeclared conflict between the two nations had become more violent and more openly fought, being colloquially labelled by the Israelis as the 'Campaign Between Wars' (Layton, 2019).

Israel considered Iran deeply involved in the incursion by Hamas into Israel on 7 October 2023, not the least through funding and arming Hamas. The assault acted as a catalyst for the Israeli government to sharply increase its attacks on Iran, with the first assassinations by Israel in bordering countries of Iranian Republic Guard senior officers seen as a strong visible indicator of this change (Keinon, 2024). In late 2025, USAF retired General Charles Wald and his colleagues interviewed numerous senior Israeli defense and security commanders and staff and concluded that: 'Israel's military campaign against Iran and its proxies beyond Gaza … paved the way for Israel to launch its historic June 2025 [air] attack [on Iran] (Wald et al., 2025, p. 15).'

Israeli contingency planning for air strikes on Iran had begun 30 years before, with detailed operational elaboration beginning in May 2024. Initially, the focus was preventing Iran developing nuclear weapons. However, Iran responded to the assassination in early April 2024 of several senior commanders in its diplomatic compound in Syria and attacked Israel 12 days later using drones, cruise missiles and ballistic missiles. The operation, called True Promise 1, was relatively ineffective but Iran's use of ballistic missiles had a marked psychological impact on Israeli decision-makers. Destroying Iran's long range ballistic missile force and its manufacturing capabilities now became as important as the long-planned nuclear facilities strikes (Wald et al., 2025).

These expanded ambitions required using not just long-range F-15 aircraft but also the shorter-range F-16 and F-35 fleets, the small air-to-air refuelling force, and Heron and Hermes drones. Israel began the 12-day Operation Rising Lion on 13 June 2025. With no land border, it was mainly an air war.

5.1. Cumulative air operations

Israel's defence against Iran's primary strategic weapon, long-range ballistic missiles, involved a pattern of cumulative air actions. Firstly, air superiority was gained, with most of the Israeli Air Force's (IAF) effort in this allocated to the Suppression of Enemy Air Defences (SEAD) mission. SEAD involved the use of F-35 Lightning II as electronic reconnaissance and warning aircraft to detect operating radars and surface-to-air (SAM) systems (Wald et al., 2025); new long-range air-launched ballistic missile systems being fired at these radars and SAM systems from F-15 Eagle and F-16 Fighting Falcon aircraft flying well outside SAM range; covert ground forces using small drones and remotely-operated Spike anti-tank missiles to attack other radar and SAM systems deep in Iran; and Heron drones undertaking 15 hours-a-day surveillance. Some 80 of the 100 SAM systems in areas being attacked were destroyed, together with 70 associated air defence radars (Fabian, 2025b). Moving replacement SAM systems from other parts of Iran simply saw them destroyed while en route.

The SAM suppression was very effective and allowed the IAF's Heron UAVs to conduct long-duration stand-in surveillance searching for missile launchers and missile stockpiles. Once found, these were then attacked by armed Hermes drones and crewed aircraft. In 12 days, some 400 of about 500 launchers were believed rendered inoperative (Wald et al., 2025). Iran's earlier True Promise II operation in October 2024 saw some 200 ballistic missiles fired in a day. In contrast, in the 12-day war with active IAF attacks on Iran's ballistic missiles before they were fired, the average ballistic launch rate was only about 50 a day.

Overall, some 570 ballistic missiles were launched, with 36 (some say 57) hitting populated areas and 13 Israeli defence bases and infrastructure (Cicurel, 2025). The attacks killed 28, hospitalised 3,238 and displaced more than 9,000 from their damaged homes (Fabian, 2025a). The Israeli and US missile defence systems attempted to intercept some 320 of the ballistic missiles fired and achieved an 85% success rate. For this, the US deployed two THAAD batteries that fired some 150 interceptors, USN warships fired about 80 SM-3s, and Israel launched an estimated 21 Arrow-2s and 80 Arrow-3s (Lair, 2025).

Even so, the usage of interceptor missiles rapidly depleted the American and Israeli stockholdings (Holliday et al., 2025). Had Iran's missile launches not been contested on the ground before launch, the interceptor supply may have run out and left Israeli cities defenceless. Iran's strategy that relied on deterring Israel through missile attacks failed through the cumulative effect of missile defence actions before and after launch. Numerous individual tactical actions compounded.

5.2. Sequential air operations

Israel's ability to undertake its 12-day air war rested on the previous two years. Israel had progressively countered threats to its homeland from first Gaza in 2023–2024, and then Hezbollah in Lebanon in 2023–24. While, Hezbollah's man-portable anti-air missile threat remained, this was only low altitude and within Lebanese territory.

Among Israel's neighbours there now remained only Syria's air defences as a potential danger to IAF cross-border air operations. In December 2024, the Syrian civil war ended and the al-Assad regime fell. Having anticipated this, the IAF quickly launched its pre-planned and large-scale Bashan Arrow operation, commencing with some 350 air attacks against 320 targets within a day (Daoud, 2024). Syrian air defences were rapidly obliterated with some 90% of

its medium altitude SAM batteries destroyed (Forey & Sallon, 2024).

Bashan Arrow led to the air routes from Israel to Iran via Syria and Iraq becoming essentially undefended. Israeli fighter, tanker and electronic reconnaissance aircraft could gain unimpeded access into and through Syrian air space to the Iraqi border. Iraq while having a small number of F-16 fighters choose not to interfere with transiting IAF aircraft, although complaining at the United Nations about Israel's violation of Iraqi airspace (Iddon, 2025). While Israel could also reach Iran by flying through Jordan, this had diplomatic drawbacks as Israel has a peace treaty with Jordan, a US regional partner that hosted US aircraft at its airbases (Wald et al., 2025).

There was another development in 2024. US ballistic missile defence systems had been deployed to Israel and these proved very effective in defending against the Iranian ballistic missiles attacks of April and October 2024 (Wald et al., 2025). For the Israeli government, this constrained the apparent threat from Iran's large ballistic missile force, reducing its deterrent value.

The 12-day air war was then the fourth step in a sequence of Gaza, Hezbollah, Syria and Iran. Over three years, each step led to the next with the IAF displaying patience, persistence and long-term planning. While the sequence was real, the purposeful nature of each step might be argued until Israeli government archives are opened. Even so, the numerous interviews with senior Israelis held by General Wald and others noted earlier support this assessment (Wald et al., 2025).

Israel demonstrated that sequencing can be important as not all tasks may be able to be completed simultaneously with the forces available. Middle powers in particular need to use their limited military power in a methodical and prudent manner that is both effective and efficient. Longer-term planning and force preparation can ensure the capabilities required are available when the next step is taken.

Some capabilities Israel needed to undertake the fourth step did not enter service until just before the 12-day air war was planned to start (Wald et al., 2025). An example appears to be Oron, a modified Gulfstream G-550 fitted with radar, electro-optics and SIGINT, that collected detailed intelligence, provided better early warning of Iranian missile and drone attacks, and supported real-time strike management (Israel Aerospace Industries, 2025).

Considered overall, the key was integrating the cumulative and sequential patterns of air operations. In the Israeli case, gaining unimpeded and uninterrupted access to Iranian airspace required strategically stepping sequentially through Gaza, Hezbollah and Syria. At each step, many small cumulative air actions were undertaken involving many individual aircraft sorties. Over time the results of these cumulative actions summed together to achieve that step, allowing moving to the next level and towards the final goal: attacking Iran.

The cumulative pattern at each step then becomes critical. The force at the end of each step must be adequate to then advance to the next; prudently managing the resources available and constraining attrition is key. Moreover, the target types selected at each step must be those that will allow advancement.

6. Conclusion

Wylie's framework of sequential and cumulative patterns of air operations were evident across all three cases. Each illustrated different aspects.

The US-led war against ISIS was undertaken in four sequential phases. The first part of Phase I involved mainly CAS and relied heavily on land force command and control. However, when it was realised there was a need for cumulative pattern deep strike air operations, extensive preparation was found necessary. Such operations required developing appropriate targeting systems, intelligence capabilities and capacities, and air planning expertise. Moreover, suitable long-range ISR assets needed to be allocated to collect the detailed information the operations required. Lastly, appropriate airspace management processes needed to be implemented.

This case suggested some six months might be needed before a suitable level of competence in undertaking cumulative pattern deep strike air operations tasking was in place. Having adequate numbers of aircraft available in theatre in itself is insufficient.

The JASDF case involves PLA cumulative pattern air operations being countered by JASDF cumulative pattern air operations. These can be framed as being within a sequential pattern, that of the competition continuum. The PLA holds the initiative and is imposing high resource costs on the JASDF including progressively reducing the in-service life of the JASDF response aircraft.

Attrition is demonstrably not just a feature of just wartime operations. Cumulative operations involve individual actions but these can each contribute or detract from the final result. Each action needs to be careful considered for its overall impact on the phase of the sequence it forms part of and, importantly, also the later sequences.

In the JASDF case the next phase in the sequence could be combat; not having enough F-15 aircraft available at that time might be critical. Uncertainties over what the next phase may be presents real force structure and posture challenges.

The Israeli 12-day war against Iran showed how effectively numerous different individual actions across the air and space domain can have a cumulative effect. Successful ballistic missile defence requires integrating a series of offensive and defensive cumulative actions. On the other hand, the air war was only possible as Israel had undertaken a sequence of wars to clear the pathway to attack Iran. Each sequence involved cumulative actions that summed together to complete each phase before moving to the next sequence.

At times, the application of air power can appear simply to be targeting, a somewhat mechanical process (Meilinger, 1995). The three cases reveal this as somewhat simplistic. Among other skills, air strategists need to master the integration of Wylie's cumulative and sequential patterns of air operations.

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