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Strategy

Deterrence by Deception: Historic Lessons and Contemporary Methods

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This paper examines how the Royal Australian Air Force (RAAF) has incorporated deception into its ground operations historically, and what lessons can be identified from this experience. Lessons include acknowledging the importance of engaging both experts and the wider public in deception efforts; and recognising that deception is both a passive and active means of deterrence. The paper then explores how the RAAF can apply deception in new and innovative ways. This work focusses on the airpower ground environment for two reasons: (1) deception is less widely employed compared to other means of deception applied for airborne capabilities; and (2) deception can be more effective, cheaper and easier to implement compared to other means of denial applied in the ground environment. These reasons make the inclusion of deception measures attractive in the current Defence environment.

Introduction

> *In wartime, truth is so precious that she should always be attended by a bodyguard of lies*. Winston Churchill to Joseph Stalin, 1943 (Brown, 1977).

Deterrence is classically separated into two categories, deterrence by denial and deterrence by punishment. Deterrence by denial seeks to deter actions of an aggressor by making their aims infeasible or unlikely to succeed, i.e. denying a potential aggressor's confidence in attaining their objectives. On the other hand, deterrence by punishment threatens penalties such as a retaliatory attack or severe economic sanctions, in the event an attack occurs (Mazarr, 2018, pp. 2–3).

Deterrence by denial can be in the form of deception. Deception can be defined as 'the act of hiding the truth, especially to get an advantage.'[1] In a deterrence by denial context, hiding the 'truth' involves obscuring both our capability and intentions from an opponent. However, deterrence relies on the receiver of the threat *choosing* to be deterred: it is the receiver that ultimately makes the decision to be deterred and in that sense they hold the initiative (Biddle, 2020, p. 102; Hood, 2023; Mazarr, 2018, pp. 7–10). Deception can provide deterrence by creating ambiguity and lessening the confidence of an opponent, thereby constraining their choice to act. Deception can take many forms, including: camouflaging real assets; deploying decoy assets to draw attention away from real assets; and projecting false or misleading information to create confusion and ambiguity about future actions. Deception is only one element of a strategy of denial, which can also be achieved through other means, for example having the capability to deny an adversary's freedom of movement, hardening potential targets or stockpiling key materiel to provide resilience.

In the contemporary Australian context, the recently released Defence Strategic Review (DSR) prescribes a 'strategy of denial' for Australia (Houston & Smith, 2023, Chapter 7). In relation to Australia's airpower ground environment more specifically, the DSR clearly identifies the need for deception through a recommendation for 'immediate and comprehensive work on [northern] air bases' to achieve 'dispersal, redundancy and resilience' (Houston & Smith, 2023, p. 76).

This paper explores how deception can be used as part of DSR's strategy of denial, in the airpower ground-context. The first section examines how the Royal Australian Air Force (RAAF) incorporated deception into its ground operations historically, while the second section identifies lessons from this experience. The final section explores how the RAAF can learn from these lessons to apply deception in new ways, as part of a contemporary deterrence by denial strategy. This paper focusses on the airpower ground environment because deception measures can be more effective, cheaper and easier to implement compared to other means of denial such as airbase hardening. Moreover, the modern-day RAAF implements fewer deception measures in the ground environment compared to airborne capabil-

1 Refer https://dictionary.cambridge.org/dictionary/english/deception.

ities like advanced aircraft stealth technologies and countermeasures.

Historical accounts

Since its inception, Australian airpower practitioners have applied deception as part of military operations. In 1916, the 'greatest and most fundamental change ever to affect the markings of British service aircraft' was introduced: camouflage. One primary aim of camouflage was to better conceal aircraft on airfields (Robertson, 1972, p. 29). While there are no accounts of the use of deception at ground stations in the Official History of the Australian Flying Corps (AFC) (Cutlack), evidence shows modest attempts were made to deceive the enemy during World War One (WW1). For example, 1917 Routine Orders for Number 3 Squadron AFC included instructions to prevent espionage by French or German civilians (Carwardine, 2020, pp. 1–2).

Active efforts were aided by the reality that relatively little supporting infrastructure and logistics were required to support operations, meaning airfields could—to some degree—blend into their natural surroundings: many airfields on the Western Front were simply unprepared fields. One aviator recalled his aerodrome 'was occupied by a herd of cows… each pilot taking off or landing in whatever direction seemed to be most suitable to avoid the animal' (Kennett, 1999, p. 136). Australian aviators were also identifying lessons. In a paper published after the war, Flight Lieutenant Henry Wrigley observed '[d]uring the war, sufficient attention was not paid to laying out the depots so as to minimise the risk and effect of hostile bombing' (Wrigley, 1990). Wrigley then listed several means of deception which, in his view, could deter such attacks including siting aerodromes so they were difficult to locate; camouflaging aerodromes; constructing dummy aerodromes; and dispersing both aircraft and hangars (Wrigley, 1990, pp. 63–64).[2] Figure 1 is a post-war photograph showing AFC aeroplanes in front of camouflaged canvas hangars. These and other lessons would be adopted by the RAAF during World War Two (WW2).

In WW2, the growing threat of Japanese invasion resulted in the RAAF adopting expanded methods of ground-environment deception. In 1939, RAAF aircraft adopted the three-tone camouflage scheme of the Royal Air Force. As the war progressed, this scheme evolved to better suit the Australian environment (Pentland, 1980, pp. 9–16, 47). The change sought to address a uniquely Australian difficulty: the significant variation in colours, tones and patterns across Australia's vast geography, combined with large seasonal variations, which made camouflage difficult. Camouflage also deteriorated rapidly in Australian and Pacific conditions and the availability of paint, and the differing quality of its application under field conditions, meant variations from standards were the norm (Pentland, 1980, pp. 55–57, 1989, pp. 12–16, 22, 41, 55, 126–129).

Figure 1. Australian Flying Corps aeroplanes in front of camouflaged hangars in Gloucestershire, Minchinhampton, UK taken in 1919. (Australian War Memorial, n.d.)

These challenges led the RAAF to adopt other deception methods to minimise ground detection including: experimenting with innovative aircraft camouflage schemes; dispersing aircraft among natural cover and shade to hide equipment (Figure 2); constructing large numbers of aircraft and equipment decoys; and camouflaging airbases, airbase infrastructure and radar installations (Elias, 2016b, pp. 153–154; Pentland, 1980, p. chap. 4). Corunna Downs Airfield in Western Australia was described as an 'invisible airfield' not only because of its camouflaged buildings and revetments, but also because it was situated to allow the natural heat haze to obscure it from overhead (Cafarella, 1998; Purser, 1988). A significant, and successful, effort at deception came in 1943 during Operation Hackney, which sought to project a fictional landing force onto Goodenough Island and its airfield, to deter a Japanese invasion. The RAAF provided real air cover for the fake landing force. Importantly, the operation was judged a success and associated financial and logistics costs were 'negligible' (Davies, 2018, pp. 8, 16).

Civilian efforts to develop and apply ground-environment deception were arguably even more impressive. Professor William Dakin was the Technical Director of Camouflage within the Department of Home Security during WW2. A zoologist by background, Dakin demonstrated a passion for the art of deception, and together with his team, they implemented a range of solutions ranging from dummy aircraft kits to camouflaging RAAF Base Darwin (Elias, 2020). Dakin's team also produced several publications on deception techniques, including for airpower applications (Dakin, 1942, 1947, especially Appendix 2).

A significant and sustained deception activity was conducted at Bankstown fighter aerodrome, to disguise it as a rural town. Measures included the use of camouflage netting; hangars which looked like houses; and the application of paint, soot and oil to the ground to eradicate signs of

2 Henry Neilson Wrigley, CBE DFC AFC would go on to become an Air Vice Marshal, and one of the RAAF's earliest airpower thinkers.

Figure 2. A poster by Frank Hinder (Camouflage Research Section, Department of Home Security) and Leslie Ferdinand Johnston (Commonwealth Government Printer) (Australian War Memorial, 1943)

aircraft traffic and mimic a rural environment. A combination of real and fake trees were also planted. The success of these methods required a deep understanding of local conditions, geography, and the creative talents of a diverse range of civilian experts (or *camoufleurs*) such as biologists, film directors, artists, designers, architects, photographers, scientists, engineers, picture restorers, sculptors and even magicians (Elias, 2016b, pp. 30–31, 34–40, 2020).

Despite the high level of activity, relationships between military and civilian *camoufleurs* were fractious. Dakin strongly believed that better planning of aerodromes, including the incorporation of camouflage by design, would have prevented both materiel losses and human casualties (Elias, 2020). Lamenting the tense relationship with Defence staff, Dakin complained to Prime Minister John Curtin that 'our one sin is that we are a civilian body' (Elias, 2020). He blamed the armed forces for underestimating the significance of camouflage to warfare, and for ignoring the advice of what he believed were better-informed civilian scientists and artists (Elias, 2016b, p. 6). In a post-war report, Dakin devoted an entire chapter to describing the difficulties in cooperation between Defence and the Department of Home Security (Dakin, 1947, Chapter 13). From Defence's perspective, Dakin was considered a provocative character whose insistence that civilians knew more about camouflage than the military led to discord and the Army's outright rejection of Dakin's counsel (Elias, 2016a, p. 6).

Finally, and despite being largely ignorant of deception measures implemented by the RAAF and the Department of Home Security, members of the Australian public submitted unsolicited deception schemes to the Government, to help protect Defence assets (Elias, 2020).

Historical lessons

Several lessons can be identified from Australian experiences during WW2. Dakin's observation that deception should be embedded by design is especially relevant today. Deception measures like camouflage and dispersal are likely to be cheaper and easier to implement, compared to other means of deterrence such as building expensive hardened facilities which have lengthy construction schedules. Furthermore, the locations of RAAF airbases are well known (even to adversaries), and it is difficult, or practically impossible, to adequately harden them against modern weapons. Moreover, point-defence missile systems are themselves vulnerable to attack and have operating limitations against many contemporary threats. It is therefore timely to rethink the push to upgrade and harden Australia's northern airbases (Kerr, 2023; Morgan, 2023), and incorporate deception schemes by design. Current plans to upgrade and harden bases should include new schemes of deception described in the next section.

Civilian and military specialists who can contribute to the design and development of innovative deception schemes must be able to work together for best effect. Doing so should be easier given the RAAF's mantra on delivering strategic airpower effects into the joint force (Director Strategic Design, 2020, pp. 7, 10). However, coordination of these efforts from a whole-of-government (WoG) perspective could be problematic without a central coordinating agency. In this regard, Defence could establish an agency that brings together a range of specialists to develop airpower deception schemes.

Noting the art of deception is a product of creativity and diversity of thought, the RAAF could take steps beyond its historically neglectful approach to seek ideas on implementing deception schemes by actively engaging with the public and the private sector. These steps include engagement with artists, geologists, agriculturalists, cyber specialists, physicists, chemists, First Nations Australians, and other specialists who understand our multi-domain environment and how it can be used for deception schemes. Done through competitions to engender greater interest, this approach could be a straightforward and near-zero-cost means toward mobilising the nation in support of Defence. Such an approach could also result in other benefits such as increased Defence recruitment. A range of other engagement opportunities could be explored including funding university projects and seeking volunteers from the private sector to contribute to innovative deception schemes.

Perhaps, the greatest lesson from WW2 is that deception is not simply a passive means of deterrence: it also has utility when deterrence fails. The Bankstown airfield initiative demonstrated that deception was both an *offensive*, as well as a *defensive*, tool:

> *The purpose of the Bankstown scheme was more than just hiding equipment and targets and misdirecting enemy attention. It was designed for attack as well as defence, and*

> *for aggressive surprise. These roughly made large-scale buildings mimicking the vernacular architecture of Sydney concealed bomber and fighter planes ready to take to the air at short notice in defence of Sydney* (Elias, 2016b, p. 37)

The Bankstown airfield initiative illustrated that while deception was an important tool for deterrence by denial, it was also able to protect strike capabilities for offensive action when deterrence failed. Hence, deception is a form of force multiplier, allowing the RAAF to both maintain a broader deterrence posture and execute military missions if called upon. It can be a very effective means for both deterrence and resilience.

After WW2, the RAAF progressively reduced its efforts to apply deception as a tool for ground environment deterrence. By 1950, the RAAF was finding it difficult to maintain a capacity for ground defence of airbases, let alone consider methods for deception (Stephens, 2021, pp. 80–83). Today, deception rarely exists in the RAAF's ground environment order of battle and it does not feature strongly in airpower policy documents. For example, 'deception' rates only three mentions-in-passing in the Air Power Manual (Air and Space Power Centre, 2022). Arguably, the reasons for this decline in focus are based on the lack of credible threat which obviated the need for employing deception as part of a deterrence strategy. The new strategy of forward defence made the defence of infrastructure and airpower assets within Australia relatively unimportant (Lax, 2021, pp. 13–15). Subsequent drives for efficiency across the Department of Defence saw several reviews into air basing arrangements, which also directed spending away from 'discretionary' ground-environment deception measures (Lax, 2021, pp. 59–87; O'Brien, 2009, pp. 89–120).

Noting the strategic factors described above, it would be unreasonable to suggest that the post-WW2 decline in focus on deception was a failure to learn the hard-won lessons of WW2. Nevertheless, the current strategic environment suggests this decline must be reversed. Fortunately, a rapid reversal of the post-WW2 trend is feasible because of the nature of contemporary methods of deception.

Contemporary methods: new and novel forms of deception

While many historic methods of deception may now offer less utility, deception can be employed in a range of new and novel ways to support a contemporary deterrence by denial strategy. For example, visually camouflaging airpower assets may be of little value given modern sensors can precisely locate fixed installations, and methods of striking targets include missiles that do not require visual identification. However, modern advances in camouflage still have relevance. Multi-Spectral Camouflage (MSC) provides concealment across many parts of the electromagnetic spectrum and is planned for Australian applications including Army Main Battle Tanks (APDR, 2021). MSC is an effective, low cost, low risk and rapidly implementable solution for a range of airpower assets including aircraft, mobile radars and even large, fixed infrastructure. Australian research has demonstrated the potential for advanced MSC which changes adaptably to the surrounding environment (Zuber et al., 2018). **Figure 3** shows an example for MSC to prevent detection by a combination of sensors and radars (Zhu et al., 2021). The proposed coating material includes multiple semi-conducting layers capable of providing a broad range of camouflage within the electromagnetic spectrum.

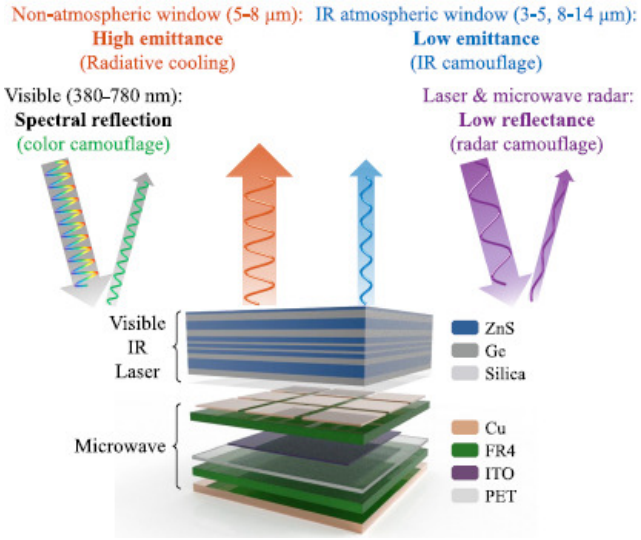

Figure 3. Scheme for multi-spectral camouflage (MSC) covering a section in the electromagnetic spectrum from visible to microwave wavelengths. Military equipment can be coated with multiple semi-conducting layers capable of providing camouflage within a broad range of the electromagnetic spectrum (Zhu et al., 2021).

Advances in decoy technology also enable the production of a range of relatively cheap, portable and highly realistic objects (**Figure 4**). Modern decoys can already be equipped with thermal and radar signatures for added realism (Childs, 2023). It would require only small modifications to make these decoys even more realistic, for example by fitting them with motors and automated navigation systems to allow decoy aircraft to taxi, fuel tankers to move, and radar stations to rotate. Electromagnetic emitters could also be incorporated to simulate aircraft emissions, communications equipment, or other sensors.

While an attack on Australia's soil seems unlikely, the 10-year warning time for high-intensity conflict is no longer applicable (Department of Defence, 2020). As such, timely and appropriate WoG planning is necessary. Based on historical lessons, an effective way to mobilise the WoG approach is to engage both civilian and military specialists in developing deception measures. Crowd-sourced three-dimensional (3D) printing of a wide range of decoys can be achieved with plans provided by Defence. This initiative could generate the mass production of a range of decoys, to be delivered and assembled when needed. Potentially, even large, more complex decoys such as dummy runways, hangars, aircraft, electromagnetic emitters, and fuel farms

Figure 4. General Dynamics F-16 aircraft with a customisable, inflatable dummy in the foreground. Photo courtesy of i2K Defense (https://i2kdefense.com/inflatable-military-aircraft/).

could be produced and subsequently constructed like giant Lego kits. Artificial Over The Horizon Radar sites and fake mobile missile launchers could be deployed. Decoys would then be used to hide real assets that are dispersed or situated among them. Done *en masse*, this form of deception could deter an adversary by creating an overwhelming targeting problem. The possibilities for 3D printing are endless but should be prioritised based on what is judged to provide the best deterrent effect, for example protecting high value, low number capabilities first.

While some may argue that crowd-sourcing the construction of decoys presents a security concern, the reality is that a belligerent would obtain very little, if any, meaningful information on RAAF capabilities that was not already in the public domain. Furthermore, it matters little whether the enemy becomes aware that decoys are being developed, only whether those decoys are discernible at the tactical level and hence can be segregated from targeting activity.

Deception can also employ the power of illusion for deterrent effect. Modern cinematographic techniques could be used to project fake infrastructure, equipment and aircraft onto vacant land, or project fake landscapes onto real installations. Instead of demolishing disused hangars, buildings and other airbase infrastructure, their facades and surroundings could be revitalised using a modern variant of the WW2 Bankstown strategy, to give the illusion of renewed use. These deceptive infrastructure schemes can be done concurrently with actual airbase construction or redevelopment. If undertaken across multiple locations, this method could provide an illusion of a large number of assets, indicating a significant power projection capability and/or a targeting dilemma, and hence a deterrent effect. These methods are a form of information warfare, analogous to the concept of 'virtual deception' which can be employed to 'alter, interdict, or destroy information and information assets thereby determining the outcome of military operations' (Ryan, 1994–1995, p. 116).

The currently allocated funding to upgrade and harden established airbases could instead be invested in developing a dispersed airbase capability. Selected small civilian airfields, roadways, even dry lake beds and other selected sites could be quickly and relatively cheaply converted for use as dispersal and operating bases (Kitfield, 2023; Robinson, 2023). This initiative would provide a deception effect in terms of making it more difficult to successfully locate and disable RAAF airpower, especially if real assets were rotated with decoys. While dispersed operations complicate the logistical supply of fuel, munitions and other essential equipment to effect airpower operations, Australia's established highway network and commercial road-haul fleets would not make the resupply of aircraft or other assets infeasible. Given that existing airbases are obvious and easy targets, operations from such locations on day two of a conflict may be impossible. Dispersed operations may therefore be a worthwhile compromise, and a better choice of investment in the current funding-constrained environment.

The methods discussed above are almost certainly aligned with ethical and cultural facets of an Australian way of war (Evans, 2004), meaning they could be employed without risking the public support so vital to the Government and its military. Notwithstanding, other methods of deception, arguably not so comfortably aligned, should also be examined, if only to allow them to be ruled out on the basis of informed choice. These measures include information warfare (for example, encouraging Australians to promote openly, and even exaggerate, their engagement in producing decoys for the Australian military) and cyber warfare (for example, infiltrating an adversary's intelligence systems to project the maturity in implementation of the methods described in this paper).

Conclusion

The use of deception in the airpower ground environment should be more attractive than other forms of deterrence currently pursued, such as airbase hardening. A strategy based on deception is likely to be cheaper and easier to implement, and be more effective, which are imperatives the DSR went to great lengths to spell out. However, we must first understand and learn from history to employ deception in the contemporary setting. A range of literature exists to help identify and prioritise methods of deception for the Australian context. This literature should be reviewed, beginning with the resources listed in the bibliography. Ann Elias has published a range of literature on deception in Australian military history (Elias, 2016a, 2016b, 2020). Sal Sidoti's *Airbase Operability* is also an excellent resource, analysing a range of techniques and providing a selection methodology tailored for airbase deception in the Australian context (Sidoti, 2001, especially Chapters 8-10). Sanu Kainikara's *The Art of Air Power: Sun Tzu Revisited* highlights deception as a fundamental part of airpower strategy (Kainikara, 2009). Barton Whaley has published several resources, including *Practise to Deceive* which gives a general examination of deception, including

a ten-step planning process and an assessment of the role culture plays in determining what kinds of deception are palatable (Whaley, 2016). While the Australian experience was the focus of this paper, it is likely that important lessons could also be drawn from the use of deception by other actors including Ukraine, Russia, North Korea and China.

Equipped with historical understanding, airpower practitioners can then engage across government and society to elicit ideas and solutions for deception as part of a new RAAF order of battle. For the RAAF, deception directly addresses the inherent weakness that our small size infers, by protecting it so it remains capable for both deterrence and response. Engaging the public in deterrence by deception activities could also be a popular, low-risk and effective means to mobilise the nation. While deterrence relies on the receiver of the threat *choosing* to be deterred (Biddle, 2020, p. 102; Hood, 2023; Mazarr, 2018, pp. 7–10), deception can provide deterrence by creating ambiguity and lessening the confidence of a would-be aggressor. If all warfare is based on deception (Tzu, 1963, p. 41), the RAAF has much work to do in the ground environment to ensure it remains able to achieve its mission.

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