Institution: York St John University

Unit of Assessment: UoA 28 History

Title of case study: Science and Twentieth Century British Warfare: Impacting Professional and Public Understanding

Period when the underpinning research was undertaken: 2010 - present

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Ian Horwood	Senior Lecturer	1992 – present
Dr Christopher Price	Senior Lecturer	1998 – 2001; 2010 – present

Period when the claimed impact occurred: 2014 - present

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact (indicative maximum 100 words)

This impact case study is the result of a multidisciplinary collaboration between mathematicians and historians in York (the York Historical Warfare Analysis Group) which integrates historical and mathematical models of war and combat. The impact is in the form of:

1. Contribution to the interaction of interdisciplinary historical research and defence organisations through delivery to and dialogue with a wide variety of defence-analysis and military audiences at professional meetings and symposia and in the military organisations themselves – the US Naval Postgraduate School and US Naval War College, and Royal Air Force Air Command HQ, resulting in a reappraisal of current practice based on the latest research into its historical context.

2. Expanding the arena of historical debate in established areas of public interest, for example the Battle of Britain, a major historical event with high salience in national and international popular culture. Our 2020 article in JMH coincided with the battle's 80th anniversary and sparked a lively and global public debate about its significance and outcome.

2. Underpinning research (indicative maximum 500 words)

The narrative of Britain's performance in the wars of the twentieth century has largely been shaped by 'popular' historians whose work straddles the academic and media spheres. Such figures have considerable ability to influence public perceptions and from the 1960s a 'declinist' narrative emerged, particularly influenced by Corelli Barnett which suggested a fundamentally poor British performance in war understood in the context of Britain's accelerating relative decline as a power in the post war period. This analysis is concentrated on technical shortcomings in the scientific and industrial spheres. Our view was that this was fundamentally problematical because historians from a humanities background were ill qualified to comment on such issues, whereas scientific academics do not normally enter debates on national performance in a historical context. As historical specialists in this field Horwood and Price were able to provide the historical context by which the scientific academics were able to present and amplify their research in these areas in ways not previously attempted. No articles had previously appeared in leading historical journals co-authored by academics in History and Mathematics departments.

This, therefore, is multidisciplinary work, involving historians (Horwood and Price, of York St John University) working with mathematicians (Mackay and Wood at York) in a collaboration which has gradually built up to produce research papers in the leading academic journals in

history and operations research, and in leading professional journals for military matters. Our aim has been to influence public and professional debate and perception with appropriate and hitherto un-attempted collaboration between scientific and historical academics.

Our research has concentrated on two areas of historical controversy.

Air Power

The main strand of the underpinning research is on air power which began with a study of the military principle of concentration and its importance to the tactics employed by the RAF in the Battle of Britain **[3.1].** The central outcome is that air combat is *asymmetric*: the scaling of losses is different for attackers (of ground targets) and defenders. Air doctrine tends to stress the overwhelming importance of air power as an offensive weapon, but is largely silent on the most effective means to deny this weapon. These emerge clearly from the research: deterrence, dispersal, parsimonious use of resources to deny attacks, and maintenance of a force in being. This impacted the 'big wing' controversy, which is a perennial aspect of the public Battle of Britain debate. The most recent piece of research is methodological **[3.2]**, using weighted bootstrap techniques for counterfactual history, and validated on Battle of Britain data.

Naval Warfare

A second historical strand concerns naval warfare which allowed us to analyse the Battle of Jutland **[3.3]**, in World War One. We argued that the Battle was the culmination of a decade-long programme of naval construction of *Dreadnought* battleships which was guided by a correct understanding of the novel tactics they required, in contrast to a prevalent assumption that British doctrine and equipment were fundamentally flawed. This understanding was argued to result from the underlying mathematical models (which were simultaneously developed in the UK, USA, France and Russia). A more detailed simulation of Jutland's precursor, the Battle of the Dogger Bank, allowed us to propose and test a novel application of Approximate Bayesian Computation to history **[3.4].**

3. References to the research (indicative maximum of six references)

[3.1] Niall MacKay and Christopher Price, Safety in Numbers: Ideas of concentration in Royal Air Force fighter defence from Lanchester to the Battle of Britain, *History* 96 (2011) 304-325. https://doi.org/10.1111/j.1468-229X.2011.00521.x

[3.2] Brennen Fagan, Ian Horwood, Niall MacKay, Christopher Price, Ed Richards and A. Jamie Wood, Bootstrapping the Battle of Britain, *Journal of Military History* 84 no. 1 (2020) 151-186. [Listed in REF 2]

[3.3] Niall MacKay, Christopher Price and A. Jamie Wood, Weight of Shell Must Tell: A Lanchestrian reappraisal of the Battle of Jutland, *History* 101 (2016) 536-563. https://doi.org/10.1111/1468-229X.12241

[3.4] Niall MacKay, Christopher Price and A. Jamie Wood, Weighing the Fog of War: Illustrating the power of Bayesian methods for historical analysis through the Battle of the Dogger Bank, *Historical Methods* 49 (2016) 80-9. https://doi.org/10.1080/01615440.2015.1072071

4. Details of the impact (indicative maximum 750 words)

Professional Military and Defence Engagement

Our work has been widely shared with professional military organisations outside the University sector in the US and the UK. MacKay visited the US Naval Postgraduate School twice to give the main Operations Research colloquium, to a mixed audience of about 100 faculty and students (module OA2900), speaking in 2016 on *Concentration and Asymmetry in Air Combat* (28/1/2016). This was based on the culmination of the air power strand in a professional journal *Royal Air Force Air Power Review*, **[5.5]** with general analyses which included the US-Japanese Pacific Air War, Korea, the Falklands, Vietnam and the First Gulf War. This work has also been

presented to other professional audiences composing defence analysts and ranking service personnel, including *Historical Analysis for Defence and Security* (HADSS) 2014, DSTL Portsdown, (22/5/2014); the *International Symposium on Military Operations Research* (ISMOR), London, (31/7/2014). Our paper at the latter event led through an audience member to an exceptional invited lecture to Royal Air Force Air Command HQ, High Wycombe, (11/11/2014) delivered to 'Service personnel of mixed rank from Airmen to Officers and civilian grades from junior to principle scientists'. The organiser of the event said, summarising audience response, that the presentation 'was pitched at about the right level, one adding it was the best explanation of Lanchester he'd seen, and it was complemented well by the historical context; it all flowed well.' **[5.1]** This event further resulted in extended email discussion, one senior audience member remarking that our research dealt with issues in which 'I am very interested, and which seems to me vitally important when planning not only tactics, but also future force structures, basing, etc.' **[5.1]** Academic presentations also included professional and service personnel – for example, the audience at a seminar for the University of Oxford *Changing Character of War* series, 24/2/2015, included the commander of the Australian Defence College, who subsequently visited YHWAG in York for discussions.

The naval warfare strand has been presented to professional audiences including ranking officers at HADSS 2017, (24/5/2017); as a specialist seminar at the NPS (29/1/2016); and as an *Eight Bells* lecture to a mixed audience of public, students (staff course officers) and faculty at the US Naval War College. **[5.2]** This lecture is currently on YouTube, (11/01/21) showing 7,781 views, plus comments.

[3.4], the simulation of the Battle of the Dogger Bank, was statistically innovative and arrived at novel historical conclusions suggesting that the British victory in the battle was highly improbable based on historical evidence and statistical analysis. This led to an invited cover feature in June 2017 for *Significance* magazine, **[5.6]** the joint ASA/RSS, US/UK professional magazine for the statistics community which presented our findings to a wider audience**.**

Public Engagement

Our research has been judged important by national and international media outlets and their presentation of it has generated considerable and intense public debate. **[3.2]** *Bootstrapping the Battle of Britain* generated a great deal of media coverage, **[5.3]** including a controversial *Daily Mail* article which received 1990 Comments (17/12/20 comments, and articles in *Ars Technica* (USA/UK)*, Popular Mechanics* (USA)*, New Atlas* (Australia), *Big Think* (USA)*, Fox News* (USA)*, Business Telegraph* (UK) and *Legion* (Canada), among others. **[3.2]** was perceived as 'a startling study' (Fox News) challenging the "myth" of the Battle of Britain in British popular culture, and its impact on popular discourse. According to historical communicator Dan Snow, it 'sent the history world into meltdown', largely due to its discussion of a probable German victory in certain possible circumstances, which generated a heated dispute beyond academia between members of the public in many countries who either supported the findings of the research or disputed them, the latter group being described as 'proud Britons who would rather let their "finest hour" speak for itself' *(Legion* **[5.3]**)**.** A different view was expressed in a comment on the *Popular Mechanics* article discussing **[3.2]** which argued that: 'I appreciate being reminded of my history as I have family on both sides. This type of study is essential to prevent future wars on this scale. Knowledge is a powerful tool in life. Thank you for sharing this story'. **[5.3]** An interesting contributor was the important independent scholar Stephen Bungay, author of the influential and commercially successful *The Most Dangerous Enemy: A History of the Battle of Britain* who came across a report on **[3.2]** in *Sci-Tech Daily* and was 'anxious to learn more about the methodology you used' as we appeared to contradict his own conclusions presented in the 2005 Granada series *Battlefield Detectives*. **[5.3]** A friendly and fruitful dialogue has ensued. The initial response to **[3.2]** led to a second stage of coverage, including a further *Legion* article and an article for *Weekendavisen* (Denmark). In response to the public debate generated by the *Daily Mail* Article, Dan Snow interviewed Mackay and Wood for an episode of his *HistoryHit* podcast entitled *Battle of Britain What Ifs* which also covered our published research into the Battle of Jutland and broader questions about probabilities in history and their

quantification, generating a second stage of impact. The full episode was listened to 105,000 times, Dan adding that: 'I loved these guys and hope we get to work together again' **[5.3]**

At the local level, The York Historical Warfare Analysis Group (YHWAG) has delivered a range of public engagement events **[5.4],** including:

- *Friction in War*, York Festival of Ideas, (19/6/14), combined lecture/simulation
- *The Battle of Jutland: Mathematical Wargaming of Naval Conflict*, combined lecture/simulation Jutland centenary event, (5/6/16).

5. Sources to corroborate the impact (indicative maximum of 10 references)

[5.1] Correspondence: Referencing lecture at RAF Air Command High Wycombe 11/11/2014.

[5.2] Media: US Naval War College. *Eight Bells* lecture, Naval War College Museum, Feb 4, 2016.
https://www.youtube.com/watch?v=IuFgJULHI7g
YouTube. Accessed: 11/01/21.

[5.3] Report: Battle of Britain. Press clippings from all cited sources & e-mail discussion with Dan Snow & Stephen Bungay. *HistoryHit* is Dan Snow's subscriber video & podcast channel, which has 12K subscribers and has received a total of 4M views/listens. The episode in which we appeared has been listened to 105,000 times (full episode, not the 2 second metric used by online video platforms like YouTube). The quotation in Section 4 is from "Episode details" for the interview, at https://play.acast.com/s/dansnowshistoryhit/402b3157-6b34-4811-aa8c-61ce4016ece0 Accessed: 11/01/21.

[5.4] York Historical Warfare Analysis Group:
http://www-users.york.ac.uk/~nm15/YHWAG/events.html Accessed: 11/01/21.

Publications in professional journals:

[5.5] Ian Horwood, Niall MacKay and Christopher Price, Concentration and Asymmetry in Air Combat: Lessons for the defensive employment of air power, *Royal Air Force Air Power Review* 17 no.2 (2014) 68-91.

[5.6] Niall MacKay, Chris Price and Jamie Wood, Dogger Bank: Weighing the Fog of War, *Significance* 14 no.3 (June 2017) 14-19
https://rss.onlinelibrary.wiley.com/doi/full/10.1111/j.1740-9713.2017.01034.x
Accessed: 11/01/21.