

*Camilla Wilkinson***Distortion, Illusion and Transformation: the Evolution of Dazzle Painting, a Camouflage System to Protect Allied Shipping from Unrestricted Submarine Warfare, 1917–1918**

In October 1917 the War Cabinet was notified in Admiralty Memorandum 2256 “Dazzle Scheme of painting ships” that artist Norman Wilkinson’s camouflage proposal to paint the entire external surfaces of vessels in highly contrasting asymmetric patterns would be applied to merchant and some naval vessels with the aim of disrupting the crippling effects on British commerce from Unrestricted Submarine Warfare waged by Germany in January of that year.

This paper, based on close reading of the surviving archives of design material and documentation concerning the 14–18 War Dazzle camouflage scheme, provides a means to re-interpret the visual language of the designs that have been read (or misread) and popularised through contextualisation in art history and association with notions of avant-garde spatial practice since 1919. Testing and representing this argument has been achieved through drawing research methodologies as well as textual and archival research.

Dazzle Painting was developed in response to a major offensive during the 14–18 War by the U-boat section of the Imperial German Navy. Frustrated by British naval blockade of its ports, Germany declared the sea around Britain a war zone and waged Unrestricted Submarine Warfare on British and neutral merchant shipping. This resulted in enormous numbers of ships being sunk, causing considerable loss of life and loss of vital supplies to Britain and Allied nations.<sup>1</sup> The huge losses destabilised finance in the United Kingdom and were reported to be an attack on the civilian population. In response to the number of ships being sunk, by September 1917 the Admiralty had deployed a number of tactics simultaneously to counter submarine attack that included Dazzle Camouflage.<sup>2</sup>

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1 Between February and April 1917, U-boats sank more than 500 merchant ships. In the second half of April, an average of 13 ships were sunk each day. See: Mason, 2018.

2 The use of naval convoy to escort merchant ships was believed to be the most successful tactic, for ships travelling alone, zig-zagging was recommended to prevent the submarine tracking a ship’s course. The introduction of different tactics simultaneously has made gauging the success of Dazzle Camouflage more complex.

It was the marine artist and graphic illustrator Norman Wilkinson who invented the Dazzle Camouflage system and persuaded the Admiralty to let him set up the Naval Camouflage Dazzle Section, giving priority to the protection of merchant shipping. Dazzle camouflage was a system based on carefully tested designs applied in paint to the entire external surfaces of a ship to create an illusion of distortion. Both hull and superstructure were painted with bold monochrome geometric shapes in highly contrasting tones of black, white, blue, grey and green. The juxtaposition of the shapes, sometimes figurative, mostly abstract, was designed to distort the outward appearance of the ship viewed from the low perspective of submarine periscope. The aim was to confuse U-boat commanders as they tried to calculate their position in relation to Allied and neutral ships in order to fire a torpedo.

In order to calculate the trajectory of a torpedo, the U-boat commander used his telescopic eye to calculate the relative course of the target ship as well as its speed and size. The illusory patterns were designed to falsify the angle on the bow and frustrate the use of the graticule, which required measurement of vertical elements of the superstructure, poop deck or masts. The visual confusion wrought by Dazzle Camouflage sought to lengthen the time a submarine was exposed at the surface of the sea, making it vulnerable to sighting and attack by enemy ships. It could also result in firing the torpedo on a false course resulting in wasted torpedoes.

As well as confusing the U-boat commanders there is evidence to show that the classified status of Dazzle-painting resulted in confusion among the foreman painters, merchant seamen and naval commanders as to how Dazzle should work. The term camouflage, which was otherwise understood to mean rendering an object less visible, was now reversed as Dazzle patterns appeared vibrant and dynamic at close range. As late as September 1918 a circular was issued to ship owners and masters titled *An Explanation of the Objects of "Dazzle" by the Admiralty*: "The designs for painting Merchant ships are not haphazard arrangements of colours, but are made after careful experiments on models of ships carried out from a Submarine's periscope with a view to obtaining the maximum distortion."

A century later, the narrative for Dazzle Camouflage is still one of misconceptions, misinterpretation and misappropriation. The artifacts and surviving material from Dazzle-painting have been open to interpretation by art, maritime and cultural historians, artists, designers and musicians. From Armistice in October 1918 onwards, the rich body of artwork that recorded the 14-18 War was exhibited in public exhibitions. The paintings of Dazzle Camouflage produced by modernist artists such as John Everett and Edward Wadsworth have influenced how the scheme has been understood and interpreted (or misinterpreted) by journalists, critics and art historians. This paper attempts to reconstruct the ideas and working practices, which drove the actual development of Dazzle, within the art-historical narratives and interpretations, which developed around it.

This process began following the end of the war, with a number of exhibitions of the work of Official Artists, whose work had been commissioned or acquired by the newly formed Imperial War Museum; artist camoufleurs were given the opportunity

to exhibit their work at the Royal Academy of Arts.<sup>3</sup> Ships in Dazzle camouflage were represented by a number of artists, marine artists and camoufleurs including the inventor of the scheme Norman Wilkinson.

Wilkinson's paintings, unlike those of his contemporaries, did not represent the heraldic quality of Dazzle evidenced in John Everett's *A Convoy* of 1919 or the deliberate confusion of Wadsworth's monochrome woodcuts such as *Dry Docked for Scaling and Painting*, 1919. Wilkinson's paintings of Dazzle Camouflage generally record a naval or merchant shipping event and often appear awkward in their execution. His *Convoy* of 1919 represents the narrative of the convoy, the black and white striped Dazzle Ships painted as though viewed from the distance of another ship. As the 14-18 War ended Wilkinson was re-establishing himself as a serious maritime artist and was, possibly, disengaging himself from the more exuberant appearance of Dazzle.

Journalists from British national newspapers could not resist observing the similarities between Dazzle Camouflage and the avant-garde art that had attracted attention before the war. An article in the *The Times* dated 6<sup>th</sup> December 1918 began:

There is a department of Burlington House, now closing, which is called the Dazzle Section. A stranger who should come there by chance might suppose that the New Art, Futurism, and Cubism and what not, had penetrated the Royal Academy. But the hundreds of little model ships, which line the walls in a strange decoration of waving lines, stars, and streaks, indicate this is the home of marine camouflage.

The occasion for Norman Wilkinson's major commentary on Dazzle Camouflage was a speech he gave to the North East Coast Institution of Engineers and Shipbuilders, in which he described the process of Dazzle-painting applied to ships in Great Britain, the United States of America, France, Italy and Japan. The transcription of this talk, communicating to marine engineers, was the text he chose to submit to a number of other publications (Wilkinson, 1920: 263–273). Public accounts of Dazzle Camouflage by the camoufleurs (perhaps still deeply engaged in the process of Dazzle-painting) focused on explaining the development and implementation of the scheme, confident of its success in the protection of merchant shipping. They did not refer to the context of artistic practice, even though the Dazzle Section was based in the Royal Academy of Arts.<sup>4</sup>

The books and articles that have been published on Dazzle Camouflage repeatedly describe Norman Wilkinson as a conventional marine painter. Yet there is a general acceptance (with exceptions: notably Paul Atterbury in his article *Dazzle Painting in the First World War* of 1975) that the wide publicity Futurist and Cubists

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<sup>3</sup> Wilkinson was on the committee of the *Exhibition of Camoufleur Artists with Examples of Camouflage* organised by the Imperial War Museum, on show at the galleries of the Royal Academy of Arts, and would have had a strong influence over which of his were paintings exhibited.

<sup>4</sup> Dazzle Camoufleur Jan Gordon wrote an article on Dazzle Camouflage, *The Art of Dazzle Painting*, published in the journal *Land and Sea*, 12 December 1918, and Cecil King produced an author's note to *General Directions for Dazzle Painting (Illustrated)*, a technical manual to be provided to foremen and painters at dockyards.

artists received, as well as the employment of Edward Wadsworth in the Dazzle Section, suggests an influence of avant-garde works on Dazzle Camouflage. In his early writing on Dazzle Camouflage (1974), Richard Cork questioned whether a conventional marine painter could have conceived the spatial qualities that dense multiple perspectives produced without the influence of the early modernist artists.

It is now generally accepted by writers on Dazzle Camouflage that these divisions were less clear-cut. Wilkinson was working for the *Illustrated London News*, from 1901 to 1915, during which time avant-garde artworks of the Futurists and Cubists were published. On the 17<sup>th</sup> February 1912 a full page of the *Illustrated London News* featured nine futurist paintings exhibited in Paris under the title *States-of-Mind Pictures: Italian "Futurist" Paintings* and accompanied by P.G. Konody's article *Futurism The Latest Art Sensation*. Whilst it is impossible to find both avant-garde works and Wilkinson's illustrative work appearing in the same issue, it is highly likely his close ties to the *Illustrated London News*, his role as regular contributor and reader would almost certainly have brought the images of this major shift in artistic practices to his notice, here if not elsewhere.

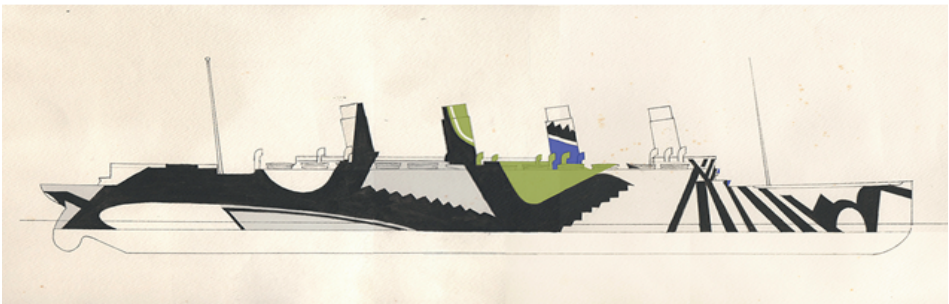
Yet this theory alone does not explain how Wilkinson could have developed a spatial autonomy for ships that was essentially modernist in function as well as form. Wilkinson had extensive experience as a sailor and his knowledge of naval and ship technology has yet to be acknowledged as a significant factor in the development of Dazzle painting.

The similarities between Dazzle Camouflage and Vorticism are well documented by Richard Cork in *Vorticism and Its Allies* (1974: 22) catalogue to an exhibition he curated in the Hayward Gallery, London: "Typical Vorticist design shoots out in iconoclastic shafts, zig-zags or diagonally oriented fragments, and at the same time asserts the need for solidly impacted, almost sculptural order." This description could as easily describe the Dazzle design for the liner turned troop transport RMS Aquitania that has been linked with Edward Wadsworth.<sup>5</sup> However, the Aquitania, sister ship to RMS Lusitania, was much favoured by Norman Wilkinson and the design for her pattern is a very rare example of a plan signed by him. The Dazzle design for Aquitania appears to have been produced at speed (a clue to the urgency is the date 31<sup>st</sup> December 2017) and is painted directly over a copy of the naval architect's elevation drawing. The record copy, kept at the Imperial War Museum archive, is one of very few Dazzle patterns to be signed by Wilkinson. The plan appears to be well worn and water marked suggesting it travelled to the dockyard before being returned as a record copy. In this plan Wilkinson has assimilated a number of figurative elements, ship and dockyard motifs, placing them strategically over the elevation of the ship. On the starboard elevation a black painted image of a funnel breaks the outline of the backward slope of the ship's funnel. This device was used to try and falsify the direction of raked funnels, which easily identified the direction of movement.

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<sup>5</sup> A newspaper caption *A Cubist who disguised the Aquitania* linked to a photograph of Wadsworth at work on *Dazzle-ships in Dry-dock at Liverpool 1919*. From *Edward Wadsworth: A Painter's Life* by Barbara Wadsworth.

The imploding funnel image appears in Wilkinson's illustration of the sinking of HMS Amphion (the first ship of the Royal Navy to be sunk in the 14–18 War). For the Aquitania, a stern appears at her bow and behind this a striped radial device used in many dazzle patterns to distort perspective is very similar to structure of a dock-side-dredging crane. The saw tooth motif, also found in Wadsworth's artworks, is the jagged profile of the bucket dredger. Each element is used to confuse and distort. Edward Wadsworth was captivated by the repetitive elements of dockyard architecture, the visual complexity it created, the scale of ship technology. So too were the conventional marine artists of the Dazzle Section, namely Frank Mason and Norman Wilkinson. The flat planes of colour in Wadsworth's prints appear to be replicated in his Dazzle camouflage designs. In fact, the requirement for flat patterns was dictated by the Admiralty as patterns had to be applied quickly to ships to prevent extended time in dock.



Author's copy of the first starboard Dazzle pattern for RMS Aquitania, original held by the IWM and signed by Norman Wilkinson. ©camillawilkinson

It is fair to conjecture that in placing elements together, creating different perspectival spaces within the same picture plane, the creation of an autonomous space is common to modernist artworks of the avant-garde and Dazzle Camouflage. There are differences in the placing of one perspectival space against the other. In Dazzle Camouflage, a line or shape such as a false bow is juxtaposed with another set of perpendicular lines or shapes. In the paintings of the avant-gardes, the juxtaposition of non-perspectival planes is more nuanced.

The world of Naval and merchant shipping was the subject of a prolific body of Wilkinson's artwork as for fifteen years prior to the outbreak of the Great War Wilkinson had worked for the *Illustrated London News* and become their 'Special

Naval Artist.' Since 1901 Wilkinson had recorded the naval arms race between nations. For the newspaper he had illustrated comparative schedules of the Navies of world – ships drawn in long elevation, short elevation and section. Wilkinson had become a respected marine artist in his own right. In 1911 his painting of dreadnoughts titled *National Insurance* exhibited in the Royal Academy Summer Exhibition put his support for Sea Power in the public sphere. The painting was reproduced in the *Illustrated London News* under the headline: 'An Object-lesson at the Royal Academy: A Canvas Whose Title is Causing Much Comment.'

Wilkinson's illustrations of dreadnoughts showed them cutting through walls of water at accelerated speeds of 21 knots<sup>6</sup> creating enormous bow waves. His black and white graphics convey the feverish atmosphere of nations preparing for war, at times bolstering British confidence with the illustrated series *Standards of Strength*, reminding Britain of her Naval superiority, at times anticipating fear of the invisible through illustrations of the enemy U-boat viewed beneath the waves from the aerial perspective of an aeroplane. These black and white illustrations pre-date, and perhaps anticipate the writing of Paul Virilio on military space. It is significant that the constant act of scanning, and the introduction of vertical space – the view from the air – was already a demonstrable feature of Wilkinson's pre-war consciousness.

Wilkinson's illustrations changed at the start of war; their dynamic energy shifted from the scale and speed of the dreadnoughts to the force of explosions and the distorted forms of wreckage. In 1915 he illustrated the sinking of the *Lusitania*, her stern thrust high out of the water. It has not yet been recognised that the repetitive stripes of black funnels from this illustration are found in a number of Dazzle designs, or that the graphical images of real wrecks would play such a direct role in the development of Dazzle.

Yet this is visible from the start, and from Wilkinson's own account. In Wilkinson's chapter on Dazzle Painting of ships, 1917–1918 from his autobiography *A Brush With Life* (1969: 80), he has included the original sketch for *The Store Ship Industry* and labelled it: "the first rough sketch made in the Commander's room at Devonport Barracks."

This concept drawing of two starboard elevations of the *Store Ship Industry* is depicted by a pencilled outline. Over this, within the perimeter line, the solid black silhouette is a sinking ship. The first elevation (labelled starboard) appears to have been torpedoed amidships and is beginning to break in two and roll over into capsized. The ship (labelled port) has the silhouette of a ship that has been hit close to the bow, is split and sinking. Both ships demonstrate a roll as they begin to capsize into the water, waves surging up the hull.

Wilkinson's working method was traditional – he made observational drawings from life. His sketchbooks show multiple pages of shipping, clouds, and the sea, sketched and annotated with notes on colour and action. He made small water-colour paintings and oil sketches to observe colour and movement. In the style of

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<sup>6</sup> 21 knots is equivalent to 40 km/h, Merchant ships travelled at approximately 10–12 knots, U-boats 16 knots surface, and a slow 9 knots submerged.



maritime artists before him, he had ship models in his studio to ensure accuracy of rigging. With this information he devised compositions for his paintings in his studio. Wilkinson's experience as illustrator of war, drawing images of destruction, and his experience on a minesweeper in the English Channel prior to his work on Dazzle Camouflage would have provided him with visual material for the dazzle plans.

In his book, *Dazzle, Disguise and Disruption in War and Art*, James Taylor has published a drawing from Frank Mason's sketch book, a fellow marine artist and camoufleur, depicting a harbour with ship, smoke and warehouses, which is framed by the outline of a ship, suggesting this could have been a common method of devising plans.

As a designer and artist myself, I interpret the sketches as suggesting a clear and direct working methodology in action. Watching films of ships being torpedoed and sunk from this era, and through my own redrawing of Wilkinson's sketches, it is clear how distortion could be achieved through false perspectives painted on the hull.

On the reverse side of Wilkinson's sketch, further drawings depict stages of capsizing applied to the elevation of a ship. The sketches feature not only the breaking up of the form of the hull and superstructure, but perspectival foreshortening. The aspect of distortion has been re-enforced by the process of drawing animations that imagine the time before and after the sinking of the ship recorded on the hull of *Industry*. Through reading and redrawing the drawings of Dazzle Camouflage I have tested and developed an animation *Dazzle Camouflage: War and Space*, 2017 ([vimeo.com/287048415](https://vimeo.com/287048415)) as part of my own working interpretation of the scheme, leading to a different argument as to how and why it took this remarkable form.

In early plans, drawn as port and starboard ship elevations at scale 1:16, Norman Wilkinson and artist and fellow camoufleur Captain Cecil King used both figurative and abstract patterns to distort the appearance of ships. It is notable that both lead figures were themselves used to the actual processes of navigation and assessing the progress of other ships from the point of view of those commanding a ship. Through their art production they understood the speed with which transformations of colour, atmosphere and movement of the sea occur and how its variations change the environment, so that invisibility was deemed impossible.

At the start of the scheme, plans were given order numbers, so that the full chronology of the plans held at the Imperial War Museum (when fully archived) can be read. In early plans such as order number 11, SS *Glenart Castle*, has dynamic ship motifs echoing Wilkinson's original concept sketch. Order 22 SS *War Shamrock* clearly shows a gun turret painted on the hull (Wilkinson's painting of this Dazzled ship was reproduced in *The Studio* 1919). SS *Port Darwin* has an up-turned stern frame at her bow. Patterns, whether directly representational or not, have a function. The distortion patterns are best understood by studying the small models used to create them. In the models the distortion at bow and stern renders the ship unrecognisable from either end. This aspect of disguising the identity of the ship was important because U-boat commanders were familiar with details of individual ships (size and length) or would refer to ship schedules for this information. The ship's elevations were painted differently port to starboard and larger

ships, such as Aquitania, given two or three changes of Dazzle pattern for reasons of disguise.

From the perspective of the submariner's periscope the presence of a ship at sea could be identified by its smoke from up to 50 miles away or tracked by hydrophone. This would give the submarine time to observe and position itself in preparation for attack. From the low perspective of the periscope the outline of a ship could be sighted first (depending on the weather) at 5 miles, the ship picked out against the horizon line. The large scale of broken and highly contrasting shapes was designed to work between 5 miles and 400 yards, at the distance the submarine commander was trying to calculate the range (distance from the ship), speed and course of the ship. The large diagonal shapes, with curved or straight edges, worked to create maximum distortion of the form of the ship so that it was difficult to calculate its relative position. A number of devices were used to prevent submarine commanders calculating the speed of the ship. Painting a false bow wave on the hull could give the impression of increased speed. Using strong blocks of tone to break up the masts was key as calculating the height of the mast was used in range finding (distance of submarine from ship) Masts were located away from the centre line of the ship to prevent alignment. Strong contrasts of tone between the blacks, greys and white were necessary (although highly visible) to achieve a volumetric twist of the hull, and this distortion aimed to delude the commander at the periscope.

By the end of the war, two different illusory effects had been developed; in the United Kingdom Wilkinson and his Dazzle Section developed illusory effects using highly contrasting stripes to confuse the submariner to create rapid eye movement now referred to in the science of perception as gamma oscillation. In the US, the artist and naval camoufleur Everett Warner analysed the most effective distortion patterns provided by the British and realised that solid geometry created the strongest illusory effects. In the exchange of ideas across the Atlantic both approaches were combined to create some of the most striking and memorable designs. A photograph of SS West Mahomet, one of the final ships in the US to be Dazzle painted during the war, represents the final phase of this development and has become a popular example of Dazzle Camouflage. She was painted at the time of Armistice, her pattern never tested.

## Conclusion

In Barbara Wadsworth's biography of her father *Edward Wadsworth: A Painter's Life* (1989: 77) she quotes a critic from *The Evening Standard* writing about the *Exhibition of Camoufleur Artists with Examples of Camouflage* of 1919 held at the Royal Academy of Arts: "The 'dazzle' section illustrates amusingly an inversion of some of the principles of Post-Impressionism – how to destroy form instead of emphasizing it – and the woodcuts of ships by Mr Edward Wadsworth, are by far the best things artistically in the exhibition."

The cultural success of Dazzle Camouflage may be attributed to the extraordinary visual similarities between certain Dazzle patterns and early modernist



artworks, but looking at the working practices and direct naval intentions provides a different interpretation, in which the similarities are part of the wider context of the relationship of culture and war.<sup>7</sup>

The employment of Edward Wadsworth as a port officer and the extraordinary similarities between Dazzle camouflage and early modernist movements, particularly Vorticism has encouraged connections to be drawn as to the level of influence and porosity between them. That anti-establishment avant-garde art should be applied to establishment vessels wholesale has been an irresistible and engaging narrative to both art historians and journalists of the press, which continues today.<sup>8</sup>

It can be argued that the contextualisation of Dazzle Camouflage in art history (and design) has maintained Dazzle Camouflage remains in the public realm. Edward Wadsworth's post-war paintings and prints of docks harbouring Dazzled ships have drawn attention to Dazzle Camouflage from the end of the closing of the Great War until today. Vorticism, the lone avant-garde movement in Britain, although limited in output, has been the focus of exhibitions and writing on early modernist movements. Dazzle Camouflage has an awkward tangential relation to the cultural context of these exhibitions, the functional role of the patterned ships limiting its high art status. The Dazzle Ships project by public arts commissioning body 14-18 NOW, which commissioned art works applied to ships, is a further example of its legacy.

This paper forms part of a longer study that seeks to acknowledge Dazzle Camouflage as a live design experiment originally conceived by making drawings of war casualties at sea. The aim is not to exclude other influences such as early ship camouflage<sup>9</sup> or the popularisation of avant-garde works in the press, but to address the question of its conception by re-visiting and analysing the work produced by the Dazzle Section. The paper seeks to expand interpretations of the spatial concerns of the maritime artists of the Dazzle Section, whose wealth of knowledge and experience in relation to challenges of perception in the environment of the sea,

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7 In his article, *Technicities of Deception: Dazzle Camouflage, Avant-Gardes and Sensory Augmentation in the First World War*, Eric White argues that avant-garde artists responded to the enhanced technologies of the early 20<sup>th</sup> Century and that Dazzle designs "serve as a crucial metonym" (2017: 39).

8 In his article, *Dazzle Ships and the Art of Confusion*, the BBC Arts Editor Will Gompertz comments: "There was nothing conventional about Wilkinson's dazzle ship concept. It was an eccentric idea inspired by the most cutting-edge contemporary art of the time; namely Cubism, Futurism and Vorticism" <https://www.bbc.co.uk/news/entertainment-arts-27818134> Dazzle Ships and the art of confusion (12.06.2014). In relation to the Dazzle installation by Pentagram at the Victoria and Albert Museum, London, its website states: "Drawing on avant-garde artistic movements such as Cubism and Vorticism, as well as animal camouflage, these bewildering shapes and angles were designed to confuse the enemy as they struggled to make out the dazzle ships against shifting waves and clouds" <https://www.vam.ac.uk/event/A8wymWVn/ldf-2018-dazzle>

Dazzle (Design Festival) at the V&A Museum, London, 15-23 September 2018.

9 In his book, *Disguise and Disruption in War and Art*, James Taylor claims that a drawing of a camouflaged ship for Henry Newbolt's book of 1918 *Submarine and Antisubmarine* (Longmans, Green & Co) is an early form of camouflage aiming at disruption.

their experience of the technologies of modern warfare in addition to their graphic skills resulted in the dense multi-perspectival distortion patterns for Dazzle Ships. It argues that working practices shaped the development of Dazzle, more directly than the contemporaneous artworks which surrounded it, and the changing wider consciousness of the space and its representation of the age naturally shaped both.

The methodologies I have used in developing the body of work from which this paper is drawn comes, like my grandfather's, from my own experience as a designer, working through iterative versions of trial and error in reading and comparing drawings alongside archival research; through using drawing itself as a testing methodology to reconstruct the workings of Dazzle, and through the testing of these ideas at various forums both historical, naval and academic. Dazzle did not emerge as a critical or art historical practice, but as a creative, working response to a critical and drastic event.

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