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To Professor Michael J. Crawley FRS

Strategic Scenography
Staging the Landscape of War

German and British trenches Neuve Chapelle, France, March 1918

‘A landscape is such a natural setting for a battle or a play, that one must write plays.’

Gertrude Stein

‘Old soldiers have a vision of every battle as part of some great war that has been going on since human began. Some pieces of the landscape are so perfect for battle that they have been chosen over and over again, they say, and one of these is the shoulder of northwest France. The mud and massacre that framed the battle of Azincourt is too like the battle of the Somme to deny the old soldiers’ delusion. That is why one must write plays’.

Paul Shepheard *What is Architecture* (1994: 199)

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Contents

Introduction

My research is concerned with the 'staging' of the landscapes of twentieth century military conflict in the American and European theatres of war. An investigation of the history, theory, and application of camouflage provides the basis for a discussion of the interrelation between camouflage and scenography. The emphasis will be on the visualisation of landscape and the strategies adopted to control the conditions of perception; to demonstrate how the wartime landscape was a constructed space of the imagination- an object of vision and a place of action reinvented and redefined through the 'logistics of perception' and the aerial view. The focus will be on the scenarios, terrain models and scenic effects of the wartime scenographers. Examples of decoy landscapes including camouflage and terrain models will be used to illustrate how scenographic methods were deployed to create and visualise strategies of disguise and exposure.

This is a multi-disciplinary perspective informed by a wide range of literature concerning perception, the aerial view, the miniaturisation of landscape, the theatrical metaphor, landscape as theatre and the theatre of war. I intend to discuss the wartime construction of performative spaces and experiences by professional scenographers and to analyse the construction and viewing in complex (scenographic, aesthetic, psychological, historic) terms. Both identification and distancing were necessary for the wartime scenographers to deal with their activities. Creativity, subjectivity and theatricality were prerequisites to design and construct an effective terrain model and I wish to show how the creation of a 'theatre of war' came to be at conflict with itself in the work of the camoufleurs. In this dissertation I use the term strategic scenography to refer to practices produced during wartime. The waging of war depends upon the mobilization of a range of artistic and performative activities. The theory and practice of conflict is not only informed by the tactical rules of engagement or the technicalities of ballistics and surveillance, weapons systems, operations but by the language and cultural frames provided by theatre. Similarly the strategy of the military is to impose their own vision of war on theatre practice through recruiting manuals, training manuals, propaganda and film.

An important discovery made during my research was the complete report produced by the Federal Security Agency for the U.S. Office of Education in Washington in 1943. Compiled by a committee of academics at the leading Universities and Colleges of Art it listed recommendations for the 'Adjustment of the College Curriculum to Wartime Conditions and Needs. Along with guidelines for Departments of Art and Architecture, there were specific suggestions made for Theatre Departments. These included instruction in camouflage and model building.
The following text provides revealing evidence of the theatrical contribution that was considered valuable by the military establishment.

> IV. Departments of Drama.
> A. Military: (1) Morale. Students trained in the theatre can do much within camps to arrange entertainments. Here the basic training is useful in all branches from play writing to stage management, production, and acting.
> (2) Model making. As in architecture. model making is useful in all branches of the service. Practice in model theatre making can be of great value.
> (3) Camouflage. Basic training in scene design, construction, and lighting provides valuable preliminary experience.
> B. Civilian, Industrial, and Cultural: (1) Motion-picture work. This is generally connected with the theatre, and in some departments is given special attention.
> (2) Propaganda. The possibility of using the legitimate stage for this purpose has been exploited in Russia.
> (3) Morale. The statements issued by the CEMA and the ENSA in England prove the value of the theatre in this respect. Serious drama has a growing importance as the tension of the war increases and its significance in the reconstruction should not be overlooked.
>
> (U.S. Federal Security Agency, 1943)

War has long relied on the processes and practices of theatre. The discussion here will centre on the theatrical representations of the wartime landscape. It will consider the relationship between representation and the places and things represented and the crucial roles of selection and transformation. Theatre with its associations of illusion, magic, artifice, deception and concealment makes it particularly well suited for the spectacular narrative presentations staged by the military. Theatre as a metaphor has been used to

provide a methodological model/framework for a wide range of cultural, social and political activities but especially the performance of war. As Paul Virilio maintains, war has always been 'the magical spectacle because its very purpose is to *produce* that spectacle'(Virilio, 1989: 5). War through its appropriation of perceptual fields, is de-materialized; it is theatrical. The emphasis on the ocular, results from the desire to obtain a detached overview and the creation of the illusion of dimensionality. This study goes beyond an examination of the conventional techniques and operations deployed in producing traditional theatre. I shall be considering the spatial implications of the processes of scenography. In this new critical context, scenography can refer to a multitude of processes, from the cognitive operations implied in the structuring of spatial knowledge to the discursive implications of a particular visual regime.

My study will examine the notion of the staged landscape and the perceptual theories associated with ideas of disguise and exposure; how camouflage shifts the focus between the spatiality of the landscape and the aerial spectator and how the camoufleur encodes the surface of the landscape with visual and spatial disguises intended to deceive the aerial gaze and the stereoscopic lens. This research will then form the context for an exploration of the deployment of similar scenographic strategies in contemporary artistic practice. Drawing on my research into the use of simulation and deception in the target landscapes of modern military conflict, I discuss how artists are representing the distortions, disinformation, the cartographic omissions, the 'black worlds', and the silences of erasure and re-location; annihilation and elimination. By addressing the myths and narratives of disclosure, secrecy and invisibility, their projects present a challenge to the ascendancy of military procedures and work to reclaim the 'real'.

This dissertation will require a close reading of key texts and documents published in English including those contemporary documents produced between 1910 and 1950. This study will draw on much original material including recently declassified military documents and archival photographs to provide a new perspective and theoretical framework for the artist-scenographer as camoufleur. Important references include the eminent psychologist Kurt Lewin's *War Landscape* first expose of his influential field theory first published in 1917; the American performance historian, Tracy Davis's *Stages of Emergency* a 2007 study of Cold War civil defense exercises and the works of

the visual theorist Paul Virilio, in particular *War and Cinema* (1989). I shall also draw upon the personal memoirs and eyewitness accounts of the theatre designers and art directors working in the camouflage units, for example Robert Medley, Geoffrey Barkas, Oliver Percy Bernard and the photo interpreters Ursula Powys Lybbe and Constance Babington-Smith.

Robert Breckenridge's 1942 book *Modern Camouflage the New Science of Protective Concealment* and Harrison P. Reed's 1946 article on 'The Development of the Terrain model in war' published in *The Geographical Review* will provide the basis for further research into camouflage methods and it is Solomon J. Solomon's *Strategic Camouflage* published in 1920 that has given me the title for my dissertation. I shall also be looking at contemporary publications including newspapers and magazines such as *Popular Science* and *Popular Mechanics* to investigate how the work of the camoufleurs was reported in the popular press.

Although the history of camouflage is widely documented and the role of artists, designers and architects examined in some detail, the particular scenographic view has not been explored in any significant way. However, a number of sources provide valuable insights into the activities of the theatre designers and art directors in the camouflage units. These include Elisabeth Kahn's authoritative study *The Neglected Majority* (1984) an account of "Les Camoufleurs" during the First World War; Colin Dobinson's *Fields of Perception* (1996) a historical record of the decoys and deceptions created in the UK during World War II to the work of the designers and technicians from Century Studios and Sound City; Henrietta Goodden's *Camouflage and Art* (2007) which identifies many of the key artistic figures in the British camouflage units and Roy E. Behrens's *Camoupedia a compendium of research on art, architecture and camouflage* (2009) which cites a wide range of biographical and bibliographical references. Behrens has also written extensively on illusion, perception and psychological aspects of camouflage and has compiled an annotated listing of books, exhibition catalogues and articles on Art and Camouflage for the Leonardo bibliography project.

My literature review will be supplemented by archival research in the collections of the Imperial War Museum, the Bel Geddes collection at the Harry Ransom Center at the

University of Texas in Austin, the National Archives at Kew, and the Medmenham Collection at Intelligence Corps Museum at RAF Chicksands and the U.S. National Archives at College Park, Maryland. However it is in the work of contemporary writers such as Virgina Woolf, Vernon Lee, Antoine de Saint Exupéry, C.S. Lewis, and H.G. Wells that I have so far found the most compelling powerful examples of the staging of theatres of war. I intend, therefore, to continue to uncover similar literary material that will support my proposition that theatrical metaphors and scenographic practices permeated all aspects of the military and cultural landscape of war.

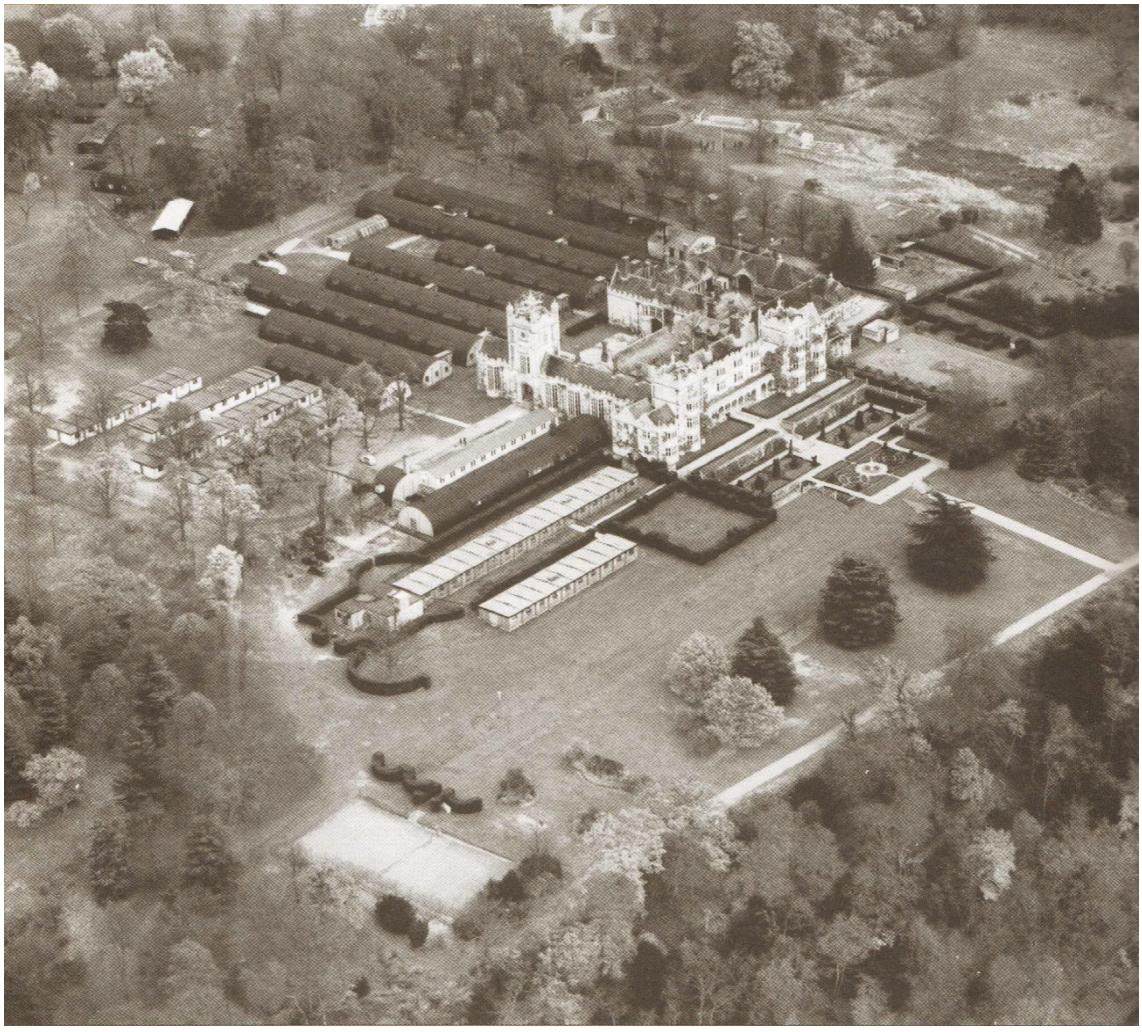
This study of scenographic practices and the 'staged landscape' originated in my earlier research as a landscape studies student into the adoption of military forms and technologies in the design of late seventeenth and eighteenth centuries landscapes. Working with archaeological evidence provided by aerial photographs, I developed a further interest in stereoscopy and the aerial perspective. In my work as a landscape designer, I was able to use these tools together with the model and maps as design methodologies for surveying, recording and planning landscape schemes. A number of these projects involved a consideration of the site as a place for performance which reflected a parallel interest in theories of site specific theatre and landscape as event. In 2005, I gave a paper entitled 'Pageant and Performance', paper for the *Heart of England* Conference, V&A/BCUC. Inspiration for this came from Powell and Pressburger's film *A Canterbury Tale* made in 1944. In the film the landscape is the subject of Thomas Colpeper's lectures to the local servicemen and his slide shows on the English landscape and its cultural significance. The film brought together the themes of pageantry, war and the picturesque which I went on to investigate further in contemporary literature and film. It was then that I discovered the first references to the activities of the theatre and production designers in the camouflage units of the Second World War.

I also found that there was a significant association between the camoufleurs and High Wycombe, the location of Buckinghamshire New University where I was a research associate. It was the headquarters of Royal Air Force Bomber Command in World War II and is close to Danesfield House at Marlow which became RAF station Medmenham the base for the Allied model makers and the photo interpreters (Fig.1). High Wycombe is also surrounded by the former military airfields from which the reconnaissance planes

flew and is close to the film studies and the West End of London which supplied so many of the wartime artists for the units.

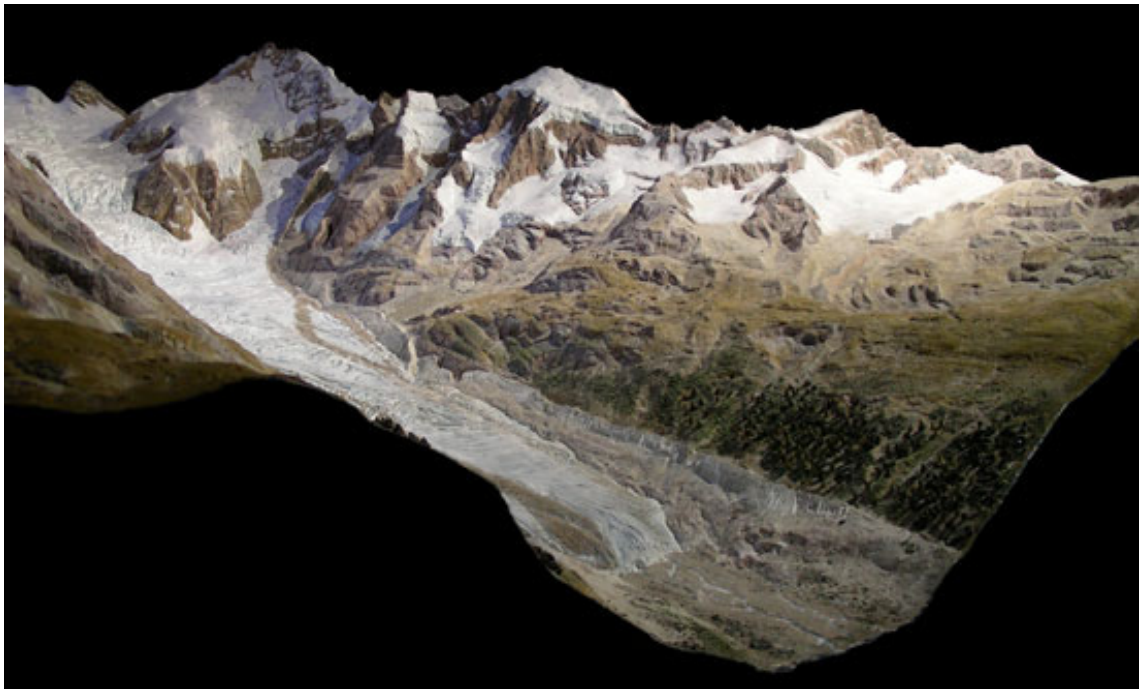
As well as these local connections, my interest in this subject as an area for post doctoral research was also motivated by seeing the use of scenic camouflage by the Swiss military in disguising their wartime bunkers and nuclear defences. These highly theatrical presentations draw on the scenographic methodologies of both theatre and landscape design (Fig.2). In addition, Switzerland has a long history and tradition of relief modelmaking both for peacetime and wartime use. ETH houses a large terrain model collection and maintains a website devoted to the subject (Fig.3). I became a member of 'Art and Scenography' working group of the International Cartographic Association which is co chaired by Dr. Barbara Piatti project leader at the Institute of Cartography at ETH. The Art and Cartography conference was held in Vienna in 2008 and the working group will be meeting again at the International conference in Paris in July 2011. It is as part of this group that I hope to pursue my research into contemporary artists who use modelmaking and scenographic procedures for their representation of the terrain. The model as the primary tool of communication for both theatre designers and spatial designers has been the subject for a number of short research papers which I have presented to conferences in the UK and abroad. I am particularly concerned with the similarities and difference between the perceptual experience of the model box and the terrain model; the projective possibilities of both and the comparison between the perspectival and the aerial viewpoints. I am continuing to explore how designers and artists are using models to test out and examine the real and the imagined.

Figure 1



Danesfield, the country house at Medmenham taken over by the RAF. The site of the Photogrpahic Interpretation Unit

Figure 2



Berninagroup, 4049 m (Switzerland), Terrain Model 1:4,000

Figure 3

Swiss Camouflage

Figure 4

Mariele Neudecker working on mountain landscape

An Overview of the Chapters

Chapter 1: Scenographic Strategies
In this chapter I intend to identify the scenographic strategies that produce the performance landscape for the rehearsal and re-enactment of the Theatre of War. The aim is to define what is meant by strategic scenography and to establish the basic theoretical foundations upon which to build my argument.

Chapter 2: The Aerial Perspective focuses on the aerial view and the methodology of the stereoscope. This analysis of the relationship between scenography and topography from an aerial perspective will expand on theories of aerial perception and stereoscopy. Drawing on the experiences of the reconnaissance pilots and photo interpreters during wartime, it will attempt to understand the scopic conditions under which they visualised the landscape.

Chapter 3: Strategies of Perception deals in the first section with the perception of landscape and its representation. This is a key chapter in which I look at the work of Kurt Lewin's important contribution to an understanding of the perception of landscape. The second section deals specifically with the camouflage strategies adopted by the camoufleurs when staging their illusions in the First and Second World Wars. It will provide a historical overview of the main camouflage strategies and then focus on particular scenic elements, e.g. scenery, lighting, props, sound, costume.

Chapter 4: The Territory of the Model begins with an examination of the methodologies of the map, model and games; the role of mimesis and performativity and the representation of the terrain. What follows is a consideration of the model as a strategic spectacle and its use to represent political ideologies, commercial and military interests and utopian visions. Within a historical context, I examine how the application of new technologies and scopic regimes has expanded the scenographic possibilities of the terrain model.

Chapter 5: Artists' Manoeuvres is an exploration of the deployment of scenographic strategies in contemporary artistic practice (Fig.4). In my five case studies, I examine how the artist as scenographer has adopted theatrical practices and the methodologies of the model, camera and film as means of representing the political and cultural landscape. The analysis will focus on the work of Katrin Sigurdardottir, Wafa Hourani, Michael Ashkin, Hans Op de Beeck, Mariele Neudecker and Gerry Judah. Among the questions I shall be asking are: why do they make models? How do their cartographic representations compare to the strategic terrain models? How does aerial photography link the historic and the contemporary examples?

The conclusion will summarise my findings and present new directions for further research.

Chapter 1: Scenographic Strategies

In this chapter I intend to identify the scenographic strategies that produce the performance landscape for the rehearsal and re-enactment of the Theatre of War. The main aim is to illustrate what is meant by strategic scenography and to establish the basic theoretical foundations upon which to build my argument.

Theatre of War

When writing about the 'Theatre of War' it is important to acknowledge the works of the philosopher Paul Virilio who pioneered studies on and about war and framed his analysis of the war landscape in terms of the scenographic. As the geographers Luke and Tuathail observes in 'Thinking Geopolitical Space', for Virilio, there are three distinct orders of military knowledge: tactics, strategy and logistics. Strategy is the organization of space as a theatre in preparation for war. (Luke & Tuathail, 2000: 371). In his studies of the spatiality of war, Virilio suggests that the correspondence between theatre and politics is embedded in the organisation of the Greek city state as a double construction of a theatre of military operation. The agora, the public place, was both a 'political stage for democratic confrontations and a "staging ground" for the mobilization of soldier-citizens before they would head out, united, to defend the gates and walls of the urban fortification'(Virilio, 2002: 5).

Nuremberg provided the political stages for two distinctive theatres of war that bracketed the spectacle that was World War II. Albert Speer, Paul Hirst tells us, 'had designed the Party assembly complex at Nuremberg as a setting for politics as theatre. This aesthetic was in Carl Schmitt's terms, a form of 'political romanticism- promoting in the contemporary participant an awareness of the audience. Thus things are not done in and for themselves, but to create an effect' (Hirst, 1997: 16).

> For the Nuremberg Party Congress in 1935, [wrote Speer, quoted by Virilio] I used 150 anti-aircraft searchlights whose perpendicular, skyward beams formed a luminous rectangle in the night. Within these walls of light, the first of their kind, the

> congress unfolded in all its ritual. It was a fairy-like decor, reminding one of the glass castles imagined by poets in the Middle Ages. I now have a strange feeling when I think that my most successful architectural creation was a phantasmagoria, an unreal mirage.
>
> (Virilio, 1989: 78)

Although Virilio sees the Nuremberg spectacle as a dress rehearsal a ‘holographic harbinger’ for the great stage managed 'command operas' of war, the final act of the Fascist drama was ultimately acted out in the court of justice in Nuremberg, in 1945. The planners for the International Military Tribunal (IMT) appointed American landscape architect Dan Kiley to design every facet of the courtroom in the bombed out Palace of Justice, where the unprecedented trial of ‘Axis criminality’ would be held and all the testimonies, cross-examination and presentation of evidence heard. In its design, the room which was is in essence a retrofitting of Courtroom 600 in the Palace of Justice was not unlike a theatre (Fig.5). In changing the usual configuration of a court room, in which the bench would be located at the far end, Kiley ‘altered the... arrangement in a simple yet dramatic way.’ Shifting the international panel of judges ninety degrees to one side he placed the Nazi defendants facing them in an amphitheatre-like arrangement. The side walls were ‘reserved for lawyers and press’ with the central space for use by defence attorneys and prosecutors. In this unconventional design, the accused became an audience for the various films, photographs, and information graphics that were projected onto a screen positioned where the judge’s bench would be situated in a typical courtroom (Fitch, 1999: 11).

Samuel Weber writing on the militarization of thinking observes that ‘political power, usually associated with the executive, reveals a "telling" dependence upon a narrative power, associated with the medium of a certain theatricality, an allegorical theater’ (Weber, 2004a: 16-17). It could be argued that rulers and revolutionaries may always have benefited from theatrical forms of presentation. Guy Hartcup in *Camouflage* describes how in 1513 the Flemish defenders of Tournai set up lengths of painted canvas resembling fortifications to deceive the Engish about the extent of their defences. He also gives an earlier example of a cardboard fort made by the Venetians in their attack on Ragusa in 1171 (Hartcup, 1979: 11). In the 1790s, the anti-revolutionary parliamentarian and political philosopher Edmund Burke was accused by Thomas Paine

of having dramatized the French Revolution as a tragedy; and he himself condemned the French Jacobins for replacing the Roman Catholic Church with 'Impious, blasphemous, indecent theatric rites, in honour of their vitiated, perverted reason'(Wright, 2007: 141).

In war and politics, theatrical, spectacular, and psychological stagings may be scripted and directed by the strategists, but are performed by civilians as well as combatants. Deer points out how the metaphor of ‘having a part to play’ was part of the rhetoric of war. In James Hanley’s novel *No Directions,* one of the characters complains about the lack of direction:

> You waited there in the dark, you had a part to play. You didn't know what part you would take in this play, it was like a play. You just sat and waited there, the other actors and none of them knew the name of the play, what their parts would be. They just waited, play unknown, actors unseen.
>
> (Deer, 2009: 145)

It was this perception that one was always on stage during war-taking part in some fantastically scripted production over which one had little control that permeates throughout the descriptions of war. As Virilio writes, ‘war can never break free from the magical spectacle because its very purpose is to produce that spectacle: to fell the enemy is not so much to capture as to 'captivate' him, to instil the fear of death before he actually dies’(Virilio, 1989: 5).

It was during WWII, as Virilio advises us that:

> The military commands and war cabinets no longer needed to set up their bunkers near the field of battle, but were able to remain in Berlin or London, in command centres which bore a passable resemblance to huge theatre-halls, for a war which had already become a Space Opera. (Fig.6)
>
> (Virilio, 1989: 50)

In his novel *Bomber*, Len Deighton describes the scene inside such a command centre, when he wrote that, as his fictional character entered the ‘Battle Room’:

> He saw only the backs of the heads of operational personnel, as would a person standing at the rear of a steep theatre balcony. Far below him, in the orchestra stalls, were rows of high-ranking control officers. Everyone's attention was upon the stage. For hanging where a theatre's curtain would hang there was a glass map of Northern Europe. The green glass map was fifteen metres wide and its glow provided enough light... to see the rows of white faces peering at it and the papers on their desks. On the walls beside the map there were weather charts and a complex board that showed the availability of reserve night fighters. Each of the girls in the balcony... had a spotlight. From the fresnelled lens of each one was beamed a small white T to represent a constantly moving RAF bomber or a green T to represent the fighter hunting it. As the map-references came over the [operators'] headsets they moved the white bombers across Holland and Northern Germany in a neat line. Down in the stalls the phones were in constant use and there was a shuffle of papers and movement. From here phone and teleprinter cables stretched across the land to airfields, watchtowers, radar stations, radio monitors and civil-defence headquarters. Even U-boats, and flak ships off the Dutch coast, reported aircraft movements to this bunker which the Luftwaffe had christened the Battle Opera House.
>
> (Deighton, 1970: 149)

In addition to the theatrics of the command centres and briefing rooms, scenographic strategies were being deployed in the training of the combat troops. In Britain, in the middle of the Second World War, villages were evacuated from a 13,355 hectare site in Norfolk, East Anglia, to provide the army with a 'Nazi Village' for exercises. Similar villages were created in the U.S. The 'German Village' was part of a German/Japanese simulation built in the desert in Utah during the early 1940s by members of the 'Authenticity Division' of RKO studios in Hollywood and Standard Oil to replicate the working-class neighbourhoods in Berlin and Tokyo (Fig.7). They provided the necessary conditions to test the incendiary and regular bombs that would be used in firebombing Hamburg, Dresden, and eventually Tokyo (Mendieta, 2004: 11). Mike Davis in *Dead Cities* provides a detailed description of the design and construction of the buildings and the nature of the experiments that were being conducted at the German/Japanese 'doomtown' built on the U.S. Army's Dugway Proving Ground southwest of Salt Lake City in Utah. The architect Eric Mendelsohn had been recruited to work on the project

which was to create ‘a miniature Hohenzollern slum in the Utah desert’(M. Davis, 2002: 66).

Alongside the German village, the construction of a Japanese village was coordinated by the architect Antonin Raymond who had worked previously in Japan before the war. Of particular concern was the level of authenticity required to test the effectiveness of the incendiaries e.g. the rate of ignition and burn. The furnishing of the interiors of the houses was subcontracted to the Authenticity Division of the American film studio RKO(Radio-Keith-Orpheum). German-trained craftsmen were used to recreate traditional German ‘proletarian’ furniture and through the study of ‘German linen’ the appropriate weight and material for fabrics for upholstery and curtains was specified.(M. Davis, 2002: 67) Davis tells us how the entire complex was firebombed at least three times with thermite and napalm and completely reconstructed between May and September 1943. The consequences of the experiments was destruction of forty-five percent of German housing by Bomber command and the Eighth Air Force by the spring of 1945 (M. Davis, 2002: 68). These were the stages for the rehearsal of scenarios that would be played out on an epic scale in the European and Pacific Theatre of Wars. Writing of his visit to the German Village in 1997, Davis said how ‘standing in front of Building 8100, I couldn’t help but think ‘this is like bombing Brecht’(M. Davis, 2002: 66).

The construction of staging grounds continues to be a feature of military operations. In Norfolk, England, the original ‘Nazi’ village has been transformed into Northern Ireland and Bosnia and is now the site of the newly created village of ‘Sindh Kalay’, where Afghan compounds surround a busy marketplace complete with ‘authentic’ smells and sounds. Constructed at a cost of £14m, it is ‘inhabited’ by hundreds of expatriate Afghans, as well as Gurkha soldiers, who take on the roles of tribal leaders, native army and police and the Taliban (Fig.8). There are parts for a suicide bomber, snipers and insurgents. A team of film make-up artists and extras from *Amputees in Action* provide further authentic and ‘atmospheric’ detail. There is also an area of rivers and high vegetation that is similar to the terrain of the Green Zone in the Helmand province. Crossroads have sandy lanes where every inch must be checked for roadside bombs. ‘If the Taliban changes its bomb-making tactics, a team in Helmand feeds it straight back and the new information is incorporated’ (Judd, 2010).

Major-General Andrew Kennett, Director General Land Warfare said:

> We are much more effective in our response and much better at trying to predict what might come next. We have changed the culture here. The culture was one of waiting to be told. Now we go to theatre [Helmand] and find out … In a year and a half, there have been an awful lot of changes. There has been an increase in the realism and sophistication of training, making sure the environment now reflects realistic sights, sounds and smells.
>
> (Judd, 2010)

The 'military–industrial–media–entertainment network' is a term devised by James Der Derian to describe the 'connections between the military, defence industries, popular culture and electronic entertainment' which enable the creation of both virtual and 'real' simulations of warfare. Specialists from the film studios create warfare scenarios on the ground and on the screen which are 'complete with vast forces, casualties, the gaze of the media and three-dimensional, real time participation by thousands' (Graham, 2004: 189). The architect and writer, Eyal Weizman describes how

> Simulations have been designed by funfair, theme-park and film-set specialists. Action film directors are brought in to help military planners think up possible scenarios for complex urban fights. Soldiers, actors, civilians − and sometimes prisoners – simulate urban crowds. Special effects and "cold-fire" systems, recordings of urban life, the sounds of planes, tanks and gunfire, and the revolting combination of smells from cooking, decomposing bodies, sewage and stagnant water are released throughout this and other mock-up cities, to give military forces a taste of the urban mayhem of refugee camps and urban slums.
>
> (Weizman, 2007: 10)

The photographers Adam Broomberg and Oliver Chanarin have made a study of the Israeli Army's training village 'Chicago' (Fig. 9). Weizman in an essay on their work relates how in the early 1980s, the core of Chicago was constructed by the creation of a small training site that was intended to simulate a Lebanese village at a time when Lebanon was occupied by Israeli forces. The site was then extended into a larger urban environment to accommodate the training of special forces in their operation to

assassinate Saddam Hussein in Tikrit. During the second Palestinian Intifada, Chicago was further expanded to offer a blueprint for different types of Palestinian urban environment. It now includes an area called the Kasbah, a section simulating a refugee camp, a downtown neighbourhood with broad streets, a section resembling a rural village, a dense market area with narrow alleys and urban outskirts. For special training sessions, and to make the site look realistic and alive, the military employs a stage-set designer normally employed in a well-known Tel Aviv theatre to provide and organize the relevant props and effects. (Weizman, 2007: 11)

The selection of props assumes a heightened importance in these reconstructions. It was Stanislavski who recognised the presence of the prop as something more than a theatrical object, by first suggesting that it gives the actor a means of obtaining 'a state of concentration'(Brignone, 2010:62). In these theatrical scenographies, the exits and entrances to the spaces also become highly important. Doors are key scenic elements. On the stages of both theatre and war, they mark the liminal space between the seen and unseen/ the known and unknown. The rooms bear the traces of previous action and will undergo further theatrical transformation in future military scenarios. While what is in the scene is important to the sense of authenticity, what is excluded provides an equally valuable insight into the level of realism thought necessary for an accurate perception of the situation. Like other briefing tools including the map and the terrain model, the villages are selective in their content. The relationship between the representation and the place or thing it represents has been carefully constructed to tell a particular story. 'These kinds of sets are imaginatively powerful in as much as they represent the accumulation of institutionally encoded knowledge, knowledge about where barricades will be built or bottles thrown, where the bomb will go off' (Lowry, 2009: 84).

The photographer, Sarah Pickering in her series *Explosions, Fires and Public Order*, records the pyrotechnics of various types of bombs and explosives used to prepare troops for actual combat (Fig. 10). She captures the moments of detonations on the proving grounds of the British military and police. The events like the photographs themselves are both representations and real. Karen Irvine, curator Museum of Contemporary Photography at Columbia College, Chicago tells us that Sarah Pickering's photographs are documentary yet complicated by the fictitious theatrical nature of the subjects that she records.

> Made to imitate artillery, napalm and land mines, these explosions are controlled, and like toys or fireworks are much smaller in scale than their real-life counterparts... The clouds of smoke, all in different shapes and colours, hover a few feet above the ground as if a magic trick has just occurred, capturing a fleeting occurrence that is mysterious and beautiful but odd in its lack of context. The explosion pictures document the literal theatre of war-the detailed level of artifice used to prepare men and women for combat on the front lines.
>
> (Irvine, 2010: 8)

Dramatic enactment has another role outside of training. Studies have shown it is often an effective way of transforming traumatic experiences. Bessel van der Kolk a clinician and researcher in the area of posttraumatic stress tells us that 'Until the advent of modern psychological treatment, many societies used theatre and ritual to deal with communal traumas, Greek tragedies being one example'(Kolk, 2002: 388).
Aeschylus' *The Persians* is the oldest surviving play in the western canon. It came in the wake of the Greeks' victory over Xerxes' Imperial Army in the second phase of the Greco-Persian wars (480-479 BCE), a feat that would have been considered at the time to be the greatest military triumph in history. It depicted the Athenians' victory, but this time from the Persian point of view. The Persians' mourning, Aeschylus shows us, was no different from the Greeks. In August 2010, the National Theatre of Wales became the latest company to stage a new version of Aeschylus' classic play, by Kate O'Reilly and directed by Mike Pearson. Performed over ten days, it was staged not in a theatre but outdoors on the Brecon Beacons in the still operational military village of Cilieni on the edge of the Epynt Hills (Fig. 11). Built by the British army for training in urban warfare, originally in anticipation of a Russian invasion of West Germany, it was never a place the public saw... until *The Persians* arrived. Passing burnt out tanks, spent shell cases and houses with missing walls, audiences took their places facing a grey concrete house with no facade and open rooms dotted with monitors, designed to suggest past, present and future. Aeschylus's play, which tells how the news of a crushing defeat by the Greeks at the Battle of Salamis, was received by the Persian court, has been variously read as a critique of war, a celebration of victory or a mockery of a vanquished enemy. In praising the production, however, Cilieni's commanding officer offered an alternative view, saying 'We recognize it [and] we learn from our mistakes'(Brennan, 2010).

Samuel Weber writes:

> ‘Politics is supposed to involve an appeal to reason, whereas theater frequently appeals unabashedly to desire and emotion.... Perhaps most important of all, politics as generally practiced claims to be the most effective means of regulating or at least controlling conflict, whereas theater flourishes by exacerbating it. Yet both the thinkers of politics and its practitioners have recognized a need to come to terms with theater, lest it wind up dictating its terms to them.
>
> (Weber, 2004b: 31)

What has become apparent, in this study of the scenography of war is the ready adoption of theatrical language by politicians and the military to frame their productions. The use of scripted scenarios, dramatic descriptions and scenic effects creates a theatrical environment which legitimizes their actions and elevates their fantasies of domination and control to the cultural stage.

Strategic Fantasy

While modern technologies of violence are central to the vision of war projected by the military authorities, ‘strategic fantasy’ as Deer observes in *Culture in Camouflage* ‘plays a central role in the reimagining of conflict’ (Deer, 2009: 4).
The construction of illusion and the scenographic representation of landscape are two themes in Virginia Woolf’s 1941 novel *Between the Acts*. The narrative revolves around a historical pageant, performed by the local villagers, which is being staged in the grounds of Pointz Hall, an English country house. It is June 1939; war is imminent. As the RAF planes practise their military manoeuvres overhead, the play’s director despairs over the shattering of her illusion.

> A sheet had been spread on the Terrace. It was a lake apparently. Roughly painted ripples represented water. Those green stakes were bulrushes. Rather prettily, real swallows darted across the sheet…Miss La Trobe stood there with her eye on her script. “After Vic.” She had written, “try ten mins. Of present time. Swallows, cows etc.” She wanted to expose them to present–time reality. But something was going wrong with the experiment. “reality too strong,” she muttered...Audiences were the

> devil…every second they were slipping the noose. Her little game had gone wrong. If only she'd a blackcloth to hang between the trees-to shut out cows, swallows, present time!...This is death, death, death, she noted in the margin of her mind; when illusion fails.
>
> (Woolf, 1941; 1992: 98-107)

This notion of a reality defined and represented through illusion is central to Woolf's *Between the Acts*. Hana Wirth Nesher points out how the novel

> is a continuation of Woolf's earlier formal experimentation, but the stylistic daring is shaped by her response to war as the cognitive disorientation recorded in her diaries becomes inscribed into the fictional world as well in the form of a figure and ground enigma.
>
> (Wirth-Nesher, 1994: 183-200)

In the final act of the pageant at Pointz Hall, Miss La Trobe aims to confront the audience with 'The Present Time'; to disrupt their perceptions and draw them into the spectacle. Sound, paint and mirrors are used to disorient the viewer. The boundary between spectator and performer is blurred. Woolf's artistic strategy like that of the camoufleurs is scenographic. She controls the act of looking. Her audience like the viewers in the military briefing rooms both observe and experience the illusion.

During the Second World War, lighting designers, scenic artists, film makers and set designers working in the camouflage units were required to construct illusions that could not afford to fail. Phantom sites and mirrored cities were painted and modelled to create an expertly realised mise-en-scène; dramaturgy, choreography, lighting and pyrotechnics all contributing to the deception. Designers and scenic artists from film and theatre were recruited to create dramatic dioramas to direct navigators to their targets and elaborate decoys to mislead enemy pilots lost in hostile airspace.

Von Clausewitz, the 19th century military historian, recognised that: 'War is the province of uncertainty: three fourths of those things upon which action in war must be calculated are hidden more or less in the clouds of great uncertainty'(Young & Stamp, 1989: 9). Deception probes that uncertainty. Military deception can be conceived on three levels: the strategic, the operational and the tactical. Every act of deception is constructed. Both simulation and dis-simulation are always present together in any act of deception. Dissimulation is hiding the real (Dewar, 1989: 197).

The 20th century military historian, Colonel Michael Dewer, in his study *The Art of Deception* claims that 'the main, almost the only, weapon of the deception analyst is to put himself in the mind of the deceiver. This requires a certain imagination, a flair, if you like, for theatre' (Dewar, 1989:198).

Many areas of cultural, scientific and political study employ the concept of theatre as an analytic strategy and model. Helmar Schamm points out that the metaphorical usage was not a superficial conceit but reflected the etymological connection between 'theory' and 'theatre'. 'Both concepts originate in the idea of an observer who actively watches' (Schramm, 1995: 115). A further etymological link can be made with scenography which according to Vitruvius was exclusively concerned with the *species*, which derives from the verb *specio* that is associated with the verb *specto*, to watch, to observe, the presence of which can be traced in the words spectacle and spectator (Azara, 2000: 21).

These scopic regimes of theatre and the theatrical emphasis on movement, perception and representation make the analogy with war defensible. There are significant parallels between theatre and war. They both have a similar concern with the spatial and temporal organisation, the ideal position of the viewing subject and modes of 'acting'. Theatre provides the metaphors for strategic presentations and the language with which to speak about the trauma, and horror of war as well as its operations.

How do we recognise the presence of theatricality –what are its signs? Can it exist outside of theatre? The theatre historian, Josette Feral suggests a scenario where:

> You enter a theater. The play has not yet begun. In front of you is a stage; the curtain is open; the actors are absent. The set, in plain view, seems to await the beginning of the play. Is theatricality at work here? If one answers in the affirmative, one recognizes that the set alone can convey a certain theatricality. Although the theatrical process has not yet been set in motion, certain constraints are already imposed, certain signs are already in place.
>
> (Feral, 2002: 95).

In *Bomber* the military historian Len Deighton describes the Briefing Room at 'Watley Fen'. Although this is a fictional account of events on the 31 [sic] June 1943, it was

based on extensive research and acclaimed widely as a well documented account of war time operations.

> An Intelligence Officer's special responsibility was the Briefing Room. At Watley Fen it was a large wooden hut that could seat one hundred and fifty aircrew on benches. There was a stage at one end and behind it a map of Europe that stretched the width of the hut. Covering the map there was a red curtain that swept aside at the pull of a string. It had become usual for the Station commander to pull the string. In the few moments before the curtain rises at the opera there is a sound, a presence, an indefinable and unique mood. The audience are hushed and expectant, their throats are tight and even the nervous coughs are shrill and have an overtone of hysteria. Imagine then the mood that would prevail if – like these crews – it was the audience that were about to mount the stage: mouthing their dialogue lest they forget it, noting their cues, worrying about lights and timings and fussed over by a dozen stage managers who will take the blame should the performance become a disaster. It was a complex theatrical drama that this audience were about to stage and one mistake would bring them, not a boo or a jeer or a poor review but a sudden, nasty, fiery death.
>
> (Deighton, 1970: 200)

Deighton shows the reader how his bomber crew knows what to expect from the place in which they find themselves. They recognize the inherent theatricality of the space and as Feral has observed ‘Because a semiotization of space has already occurred[...]the subject perceives certain relations within that space; he perceives the spectacular nature of the stage’(Feral, 2002: 96).

In the theatres of war, the drama is rehearsed and then acted out in carefully conceived scenographies. The Greek term skenographia was originally applied exclusively to the theatre. It referred to a dramatic account, something written in order to be staged, performed with words and gestures (drama, in Greek, meant 'action' in general, and 'stage action' in particular. According to Aristotle, the drama was an imitation of men in action (Azara, 2000: 7). A prerequisite of theatrical action is to have a scenographic strategy to frame it. It is also an essential characteristic of camouflage. The camoufleurs used scenographic strategies and theatrical practises of rehearsal and acting to visualize

and perform experience (Fig. 12 & 13). In her authoritative study of cold war defence exercises, Tracy Davis explains how the procedures of rehearsal, i.e. ‘learning through doing, repeating for mastery, and improvising with given circumstances[...] were intended to lead to a performance [...]in the sense that performance is a naturalized execution of an uninterrupted unfolding sequence of action’. While not requiring any particular acting skills, Davis says it still ‘is acting; this is not theater, but it is theatrical; this is not performance but it has a methexic relationship to what could someday be performed’ (T. C. Davis, 2007: 88). The rehearsal has a strategic purpose which is to produce a favourable outcome.

Citing the work of Della Pollock, Davis describes the participants’ absorption in the narrative of the simulated event, as ‘the performative mode, imagining "then" as now, what could be as if it were, and calling the future into the present as easily as if it were the past’. Rehearsal was intended to create ‘real possibilities’ or ‘possible realities’ (T. C. Davis, 2007: 101). The painter and theatre designer Robert Medley writing of his experience as a camoufleur in World War II drew on his experience in the theatre to find parallels for the rehearsal and performance of war.

> The winter offensive of I941-2 meant a wide disposal of the Army over the Western Desert. My first real task in the field was to assist Captain Stephen Sykes in work on a decoy line that had been laid to distract enemy attention from the railway supply line to those in the South. This ran to what was to be enticingly baited as a tank delivery point. Here indeed my instinct for an effective *mise-en-scène* was deeply satisfied by the set created by Stephen Sykes. Inspired improvisation with two small camouflage units (also reminiscent of Group Theatre days) gave the appearance of a fully operational supply point; and when the performance began and the German bombers arrived to play their part I was highly delighted. The essential importance of the project lay in its use as a dress rehearsal for the infinitely larger role camouflage was to play, a year later, in the counter-plan at El Alamein.
>
> (Medley, 1983: 187)

In these exercises, according to Davis the actor is someone or something ‘made to act.’ She writes that ‘Essentialisms are eroded not only in terms of scale, so "micro" and "macro" actors are the same "size," but also in terms of the human and non-human, the

social and the material'(Law, 1999: 7-8). This view based on the actor network theories examined by John Law in 'After ANT Complexity, Naming and Topology' insists upon the performative character of objects as well as individuals (T. C. Davis, 2007: 100). In the case of the terrain model and camouflage, the model planes and special effects would be part of the actor network.

The artist, director and writer Mike Pearson believes that: 'Whatever the degree of verisimilitude of scenography and objects, it provides the physical, working environment of performance, a set of material imperatives that allow and demand that the performer go to work' (M. Pearson, 2006: 220). For Pearson, performers bring the performance landscape into being.

> Performance exists for them as a pattern of tasks, and as a series of places to be. And they are skilled: rehearsal may involve processes of habituation, of developing 'ways of going on', of wayfinding, that may nevertheless exist provisionally, or as strategies: they know what they must do without knowing quite how, but they will produce appropriate actions.
>
> (M. Pearson, 2006: 220)

In theatre and war, scenographic strategies are not just concerned with image making or creating scenic representations. They involve an embodied engagement what Pearson describes as 'a way of going on'. Here:

> Strategy takes the place of rule': the agent gradually learns 'how to go on' in particular circumstances...These movements and activities imbricate time, involving overlapping tempos of building tension and resolution. And in all this coming and going, past, present and future collide in memories of events that have occurred, in aspirations of events that will occur.
>
> (M. Pearson, 2006: 220)

It is a performance strategy that has been adopted and practised by the military in the theatre of war; something that Pearson and other performance practitioners have recognised and have made a focus of their own activities in the performance landscape.

Staging the Landscape

‘All spatial activity is consciously or unconsciously performative. The sense of sight plays a critical but by no means exclusive role in bringing together the human and natural actors who perform the landscape.’ (Cosgrove, 2000: 265)

In *Spectacle and Text in Place/Culture/representation*, Daniels and Cosgrove point out how the adoption of spectacle, theatre and text as metaphor and analogies reflect the emphasis on meaning rather than function (Daniels & Cosgrove, 1993: 57). They note that these analogies have a long ancestry. ‘In sixteenth century Europe, Renaissance humanism’s capacity for analogical reasoning developed close links between all these metaphors, using their semantic complexity to develop holistic understanding through a play of metaphorical meaning’(Daniels & Cosgrove, 1993: 57). Moreover the theatre itself ‘had the meaning not only of a playhouse, but also a conspectus, a place, region or text in which phenomena are presented together for public understanding’ (Daniels & Cosgrove, 1993: 58).

J.B. Jackson has also pointed out how historically, the theatre metaphor implied both spatial as well as visual analogies.

> The word [theatre] of course emphasized the visual, the spectacular aspect of the environment but it also suggested a spectacle in the sense of a dramatic production with a well-defined space, an organization of place and time, and coherent action. Theater was thus a useful and appropriate metaphor, but more than that, it gave the ultimate three dimensional form to all the chorographic, esthetic and philosophical theories redefining men and the world.
>
> (Jackson, 1980: 70)

Clemens Steenbergen and Wouter Reh in their scenographic analysis of western European landscape design have examined this reoccurring theatrical metaphor. They describe how the radical experiments in perspective created new spatial relationships both in landscape and theatre and apply the phrase ‘the concept of rational stage

management' to their analysis of the villa garden where the illusion of spatial unity in which the 'landscape was no longer a changeable backcloth but an integral part of the composition'(Steenbergen & Reh, 1996:42). Their analysis of trompe l'oeil, anamorphosis and the coulisse demonstrate how these optical strategies contributed to the increasingly illusionary space of the 17th century landscape and theatre. In their discussion of 'The Scenography of the Axis', Steenbergen and Reh show how it not only with had a geometric role in the composition but also in the 'spacial stage management'(Steenbergen & Reh, 1996: 143). They go on to discuss how in the 18th century, landscape compositions 'harked back to the picturesque conventions in classical set design and painting. The landscape setting of the *scena satirica* that had been represented in theatre design by Sebastiano Serlio in 1545 as rustic landscape became the inspiration for the development for the visual and spatial arrangements of the 18th century landscape. (Steenbergen & Reh, 1996: 249) In addition to the visual reference to theatre arrangements, the landscape itself became performative. Laid out in narrative sequences, scenic views required both perceived and physical movement. The eye and body of the spectator were engaged imaginatively and actively in the landscape. Through movement, the scenic perspectives were constantly being shifted. 'A body was both actor in and spectator of the drama of the space' (Bruno, 2002: 194). The action unfolded in front of a landscape read as stage. Landscape functioned as theatre providing the stage without which 'society could never have scripted and dramatized its essential ideologies'(Hunt, 2000: 163).

The perception that there is a relationship between theatre and landscape still has a powerful hold on the artistic and scientific imaginations. This conception of the landscape has shaped our present myth of the modern landscape. Daniel and Cosgrove commenting on contemporary use of the theatre metaphor in geography write, 'for some years geographers have been using the terms 'theatre' and 'text' in a casual way, referring to spatial conduct as 'role-playing'...but we are now witnessing a more sustained use of these analogies to formulate a new configuration of geographical enquiry' (Daniels & Cosgrove, 1993: 57).

The geographer William Cartwright, for example, suggests that a better understanding of places could be achieved through the consideration of emotion, perception and sense of place. He proposes the adoption of a 'Theatre Metaphor' in which the 'script is the

environment, the stage is the part of the landscape being depicted and the actors are the elements that act upon or move through the landscape' (Caquard & Fraser Taylor, 2009: 7). In physically providing the *mise-en- scene*, landscape is both the backdrop for a form of 'social theatre' in which individuals play their roles and live out their lives, and a site of performance, a place in which the rituals of collective existence are acted out and reinforced at the level of the spectacular. Performance is a way of bringing the physicality of the land into discourse. Through acting out rituals and symbolic narratives in the raw physicality of place, we bring its meaning into the power structures of human society – at its levels of material daily existence, local identification and conceptualized/imagined nation.

Twice a week during each summer season since 1929, a mock naval combat traditionally known as a naumachia, has been staged on the lake of Peasholm Park in the Yorkshire seaside resort of Scarborough (Fig. 14). A fleet of scale model ships perform *Naval Warfare* a dramatic spectacle with a choreographed narrative accompanied by fireworks and patriotic music. (Eyres, 2007: 183) For the duration of World War II, the Scarborough naumachia was suspended but relaunched with a new fleet in 1951 to commemorate the Festival of Britain. Five ships reenacted the first British naval victory of the war in December 1939 in which the German battleship, The *Admiral Graf Spee* is intercepted by the cruisers *Exeter, Ajax*, and *Achilles* off the mouth of the River Plate. The model battleship self-destructs in an explosion of fireworks. During the mid-1950s, further merchant ships, and a submarine, and an aircraft carrier and aircraft were added to the spectacle.(Eyres, 2007: 185) Patrick Eyres describes how the commentary delivered over a loudspeaker cues the various maneuvers and action.

> At the flick of a switch on the control panel in each vessel, the gun turrets will "fire," "direct hits" will explode, "fires" will break out on deck, and the underwater charges will be detonated as the "near misses" that throw up plumes of water. Although the warplanes swoop into the attack from high above, and behind the audience (to general surprise, consternation, and delight), they are, in fact, ingeniously suspended on "invisible" wires. A haze veils the lake as vessels "steam" and stricken ships pour smoke. The prescribed order comprises a sequence of engagements dramatized by organ music.
>
> (Eyres, 2007: 188)

Naval Warfare is a now rare survivor of a long-standing cultural tradition that had its origins in the classical world. Roman naumachias took the forms of both elaborate public spectacles staged within specially designed water basins and smaller scale mock battles performed for a selected audience within the imperial villa gardens. It was the latter model of courtly spectacle that was subsequently appropriated by European aristocracy (Eyres, 2007: 172). In September 1591, the entertainment staged by the Earl of Hertford at Elvetham in Hampshire for the visit of Queen Elizabeth I was a 'fusion of fantasy and political reality' (Fig. 15). Jane Avner tells us that miniature battleships 'entered into symbolic combat, recomposing an imaginary geopolitical order in a re-enactment of the victory of the Queen's Armada in 1588.(Avner, 2003: 194). These military inspired landscapes were not isolated instances. They were the products of the widespread political and social unrest and military activity that was evident throughout Europe. Indeed, militarism played an influential role in the landscape design. It was military engineers who developed standard forms of measurement which were applied then to all forms of landscape organisation. The engineers' standard measure was the firing range of weapons, i.e. the angle of sight, the direction of fire, and the disposition of defences and the topography (Verin, 1990: 135). The landscape historian Verin observed that 'Precision in measurement is essential in a war which pits artifice against artifice'(Verin, 1990: 140). It is a lesson that became essential to the landscape arrangements of the camoufleurs and military strategists. In their representations of landscape just as in those of the military engineers, 'considerations of ballistics linked visible lines of sight to invisible places, where death determined the articulation between the visible and the invisible'(Weiss, 1998: 50). Allen Weiss describes how the axonometric projections known as 'perspective cavaliers' or 'military perspective' had 'an optical rigidity' that implied 'the extreme, mortal dynamism of the projectiles intended to destroy such fortifications'. He goes on to cite Philippe Comar's observation that the drawing served an operational, tactical purpose; 'the goal was to construct the image not of a simple edifice, but of an entire strategy' (Comar, 1992: 59) (Weiss, 1998: 50). That strategy was the control of spatiality. The landscape was regulated and ordered through geometric projection and symbolic representation. Armies, as J. B. Jackson wrote, 'do more than destroy, they create an order of their own.' Jackson in his description of the military landscape he experienced as a serving officer in wartime France points out how symbolic representations were used to create a performative

space that served to define the soldiers' roles in this theatre of war (Fig. 16). For Jackson, pageantry:

> Comes to mind when I recall the display of signs and notices that covered almost every lamp post and tree in the military landscape. The signs were often large and striking, composed of symbols and acronyms and colors, which had to be deciphered before they could be understood. Code names for units, drawn from mythology or comic strip characters, were inscribed on directional arrows: "Wieland," "Mickey Mouse," "Gasoline Alley Four," "Walhalla West." Bedraggled flags and pennants, lengths of colored wire and tape festooned the fences and the walls of houses like remnants of a bygone carnival, a medieval holiday, perhaps, where everyone appeared in the costume of his trade or craft.
>
> (Jackson, 1980: 12)

Mark Dorrian in his analysis of the analogy between landscape and theatre has highlighted the representational power of theatre – 'a domain poised between fiction and reality' that is 'heightened in theatrical installations occupying or creating ambiguously 'real' landscape conditions. …it is in this theatrical effect of the suspension of, or oscillation between, normally clear-cut distinctions that a moment of political possibility resides' (Dorrian, 2003: 188). Military landscapes are shaped by defensive and offensive strategies that deploy symbolism and scenography to create politically and culturally compelling narratives. For example, military cemeteries are conceived as extensions and representations of the 'Theatre of war'. When Sir Frederic Kenyon, Director of the British Museum was appointed Adviser to the Commonwealth War Graves Commission in 1917, he recommended that the cemeteries should 'create a pastoral idyll, reminiscent of a mixture between an English country garden and a village churchyard'. The Commission wanted the basic styling of the 'sacred islands of Empire' to be 'dignified and respectful to soldiers of all ranks, from privates to generals, and irrespective of race, creed or civilian status'. The uniform gravestones were positioned to symbolise an army unit on parade. (Iles, 2003: 239)

John Dixon Hunt argues in his discussion of landscape design as a representative art that 'It re-presents forms and motifs… Representation is a thing *res* made present'. A representation that unveils, uncovers and reveals'(Hunt, 2000: 115). That is to say the

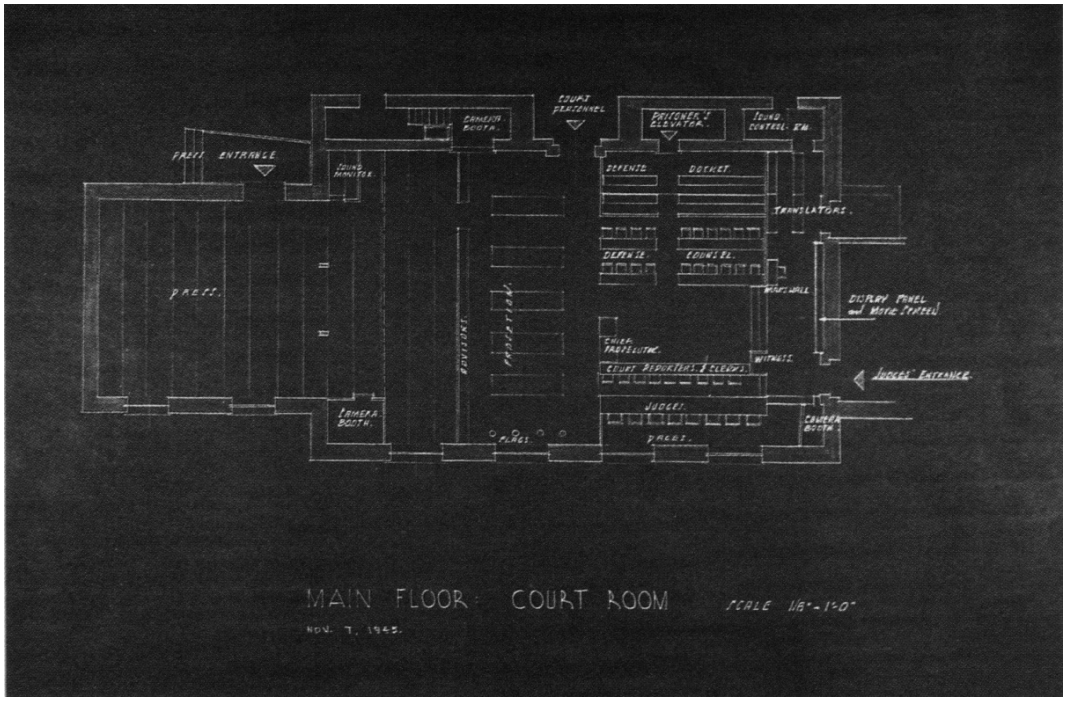
landscape exists as essentially symbolic. This was not only a physical restructuring of the land but a reordering of its symbolic content. The physical restructuring of the land and therefore of the possible social relations it allows, or indeed demands, is a symbolic reordering of the performative space. We can see this particularly in the theatre of the military landscape –a landscape that exists for us primarily in its representation. The military landscape can be conceived as a tableau/pageant (passive, consumed, nostalgia etc.); and as a participatory, active event.

In Virgina Woolf's novel *Between the Acts*, the pageant-play can be seen as representing Woolf's attempts to reclaim the landscape from the growing claims of the military. Woolf points out in her novel essay *Three Guineas* (1938) that pageantry needs to be dispensed with: 'the dictated, regimented, official pageantry − those ceremonies [and] personal distinctions − medals, ribbons, badges, hoods, gowns […]because of the obvious effect of such distinctions to constrict, to stereotype and to destroy'(Woolf, 1967: 104). The hierarchal presentations of authority are illustrated in the text with photographs of men in full regalia including a military man whose jacket is heavily encrusted with medals and ribbons. Pageants, parades and staged displays provided spectacles of military and technical prowess on both sides of the channel. Although, Woolf's village pageant was an attempt to depict English history 'without the army' – the military presence permeates the narrative and the landscape. While Colonel Mahew a member of the audience expresses his dismay at the lack of accounts military exploits 'what's history without the army, eh?' reality suddenly intervenes:

'Twelve aeroplanes in perfect formation like a flight of wild duck came overhead. *That* was the music. The audience gaped; the audience gazed. Then zoom became a drone. The planes had passed.'(Woolf, 1941; 1992: 115)

Woolf acknowledges here the emergence of a modern military landscape produced by a new level of theatrical presentation. It is war as aerial spectacle. The landscape becomes staged for the airborne observer while the sky provides the performance space for aerial action.

Figure 5



Interior of Kiley's Nuremberg courtroom in mock session, November 1945

Plan of courtroom design for Nuremberg tribunal, November 1945

Figure 6

The underground bunker location of No 10 Group Fighter Command Operations Room archives, RAF Rudloe Manor, Bath U.K

Figure 7

Standard Oil Development Co.

Testing the M-69 incendiary bomb on a model enemy building

Dugway

Figure 8

Welcome to Afghanistan No Norfolk

Figure 9

Chicago

Figure 10

Shellburst-Day, 2005, Sarah Pickering

Figure 11

The Persians, The German Village, Cileni, Epynt hills Ministry of Defence, National Theatre of Wales, 11 – 21 August 2010

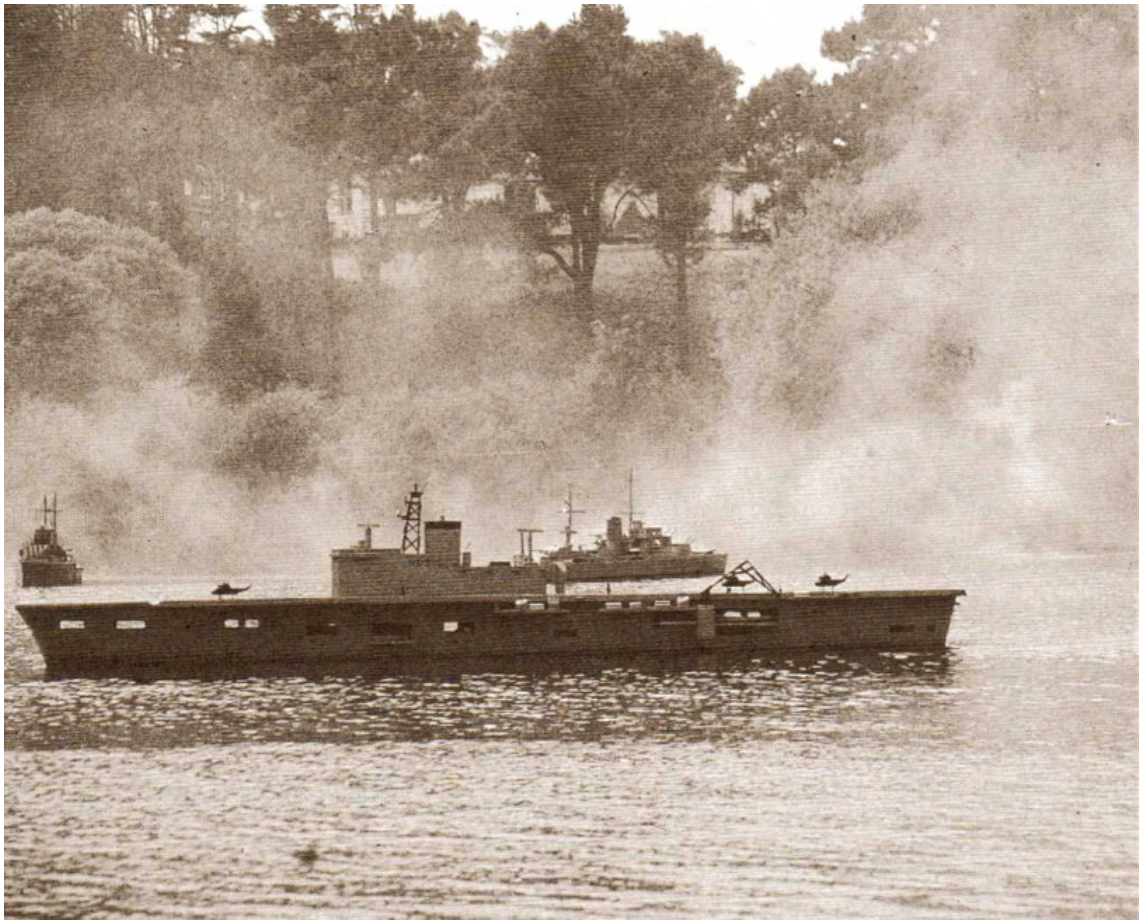
Figure 12

'Using models to represent a task force, an instructor demonstrates methods of attacking an enemy fleet', *Popular Mechanics*, March 1943

Figure 13

'A miniature reproduction of outdoor scene trains tankmen in distinguishing at a glance the wartanks of various warring nations' Lt. Willis S. Brown Jr. *Popular Mechanics*, December 1942

Figure 14



Naval Warfare, the Ark Royal, the Ajax, and the Achilles. (Patrick Eyres, 2002)

Figure 15

Elvetham Entertainment of 1593-94 from "Progresses and Public Processions of Queen Elizabeth", 1823

Figure 16

A portion of the tent city that was Camp Twenty Grand, Henouville/Duclair, France, December 1945.

Camp Pall Mall Le Havre, France 1944

Chapter 2: The Aerial Perspective

This chapter focuses on the aerial view and the methodology of the stereoscope. Landscape representation was constructed through the study of aerial photographs and imaginative projection. Perceptual shifts in scale and stereoscopic effects created new optical and spatial 'truths'.

Aerial Theatre

'Military intelligence is always looking for the point from which the whole picture is visible, while camouflaging itself. It has a horror of perspective, it wants nothing to hide from its sights'(Hauser, 2008: 37).

Throughout the history of warfare, the strategic position is the commanding view from which the battlefield can be observed and assessed. There has been a long tradition of attempts to gain an overview of the battlefield. In ground warfare, the oblique aerial view- the prospect, is obtained from high points in the landscape. Since the 17th century, its range has been increased through the development of lens based technologies binoculars, telescopes, spyglasses (Dorrian, 2007: 3). The problem is that from the perspective of the oblique aerial view there are still hidden, occluded spaces – blind spots. As Dorrian has pointed out it was a deficiency that caused the Duke of Wellington to complain that he had spent his life trying to guess what was over the next hill (Dorrian, 2007: 3). The bird's eye views obtained from balloons provided a slightly wider range of vision but were still essentially oblique views. It wasn't until the First World War that both oblique and vertical aerial views became accessible to both the military. Cities and landscapes could now be seen in their entirety. William Robson writing in 1916 in *Aircraft in War and Peace* recognised the importance of the new aerial view to the strategic and tactical planning of war.
'In the domain of the air there are no geographical advantages, no mountains, rivers, valleys, cliffs, woods, towns, fortresses or railways; no boundaries, fortifications, frontiers or limitations'(Robson, 1916: 10). For Robson, a good airborne observer is:

> One with an "eye" for country and location and, just as the manipulation of the aeroplane is to a certain extent instinctive to the former [pilot], so is the immediate mental grasp of the essential details of a panorama more or less natural to the latter.
>
> (Robson, 1916: 51)

What Robson recognised was that aerial perception involves both visual and mental information. It does not only deal with "aerial perspective"—the visual aspect—but as Margret Dreikausen observed it involves all the senses. 'The bodily sensation of being airborne psychologically influences visual perception of the earth'(Dreikausen, 1985: 9). Gyorgy Kepes in his seminal text on visual perception and art the *Language of Vision* also noted how:

> For the airman, as well as for the photographer, the horizon line changes constantly and consequently loses its absolute validity. No longer was it inevitable that the visual understanding of objects and their spatial relationships be based upon a frame of reference which had a constant – the fixed visible or latent horizon.
>
> (Kepes, [1944] 1995 : 75)

Among those that attended Kepes's lectures at the University of Chicago was the psychologist James J. Gibson who was to make significant contributions to perceptual science. In the preface to *Art and Illusion*, the art historian E.H. Gombrich acknowledged his indebtedness to Gibson whose work, Gombrich suggests, 'led to a radical revolution in the psychology of perception' (E.H. Gombrich, 2000). During World War II, Gombrich while working for the BBC's Monitoring Service, had become interested in the phenomenon of projection and its role in hearing. Among his conclusions noted in 'Some Axioms, Musings and Hints on Hearing' were that 'hearing depends on knowledge;' that in hearing the 'whole comes before the part' and that projection was significant for aural perception (E.H. Gombrich, 2000: 75). Gombrich's perceptual observations were paralleled by Gibson's own wartime experiences gained while training fighter pilots (Fig.17).

Gombrich recalls how Gibson developed his theory of information flow from his research on the extent of visual information received by a fighter pilot landing on the deck of an aircraft carrier.

> It is not a static image which gives the pilot the required estimate of the distance and position of the runway but the flow of information he receives, the sequence of transformations all around which show him across these rapid changes, the invariants of the lay of the land, invariants he must pick up if he is to survive.
>
> (Gombrich1980: 188)

What matters to the pilot is not the image formed on the retina of his stationary eye, but the transformation of that image as he swoops down towards the deck. Gibson's experience of using pictures with pilots led him to appreciate the importance of motion and textural gradients for the perception of objects in space. In a review of *James J. Gibson and the Psychology of Perception* by Edward S. Reed, Gombrich summarised Gibson's theory of the reception of visual information:

> What matters to the pilot in his orientation is not the static picture but the flow of information received by the eye in the context of the permanent structure of our environment - the earth below, the sky above, and the horizon in-between provide the anchorage for this performance. There is a vital difference, moreover, between the sky and the ground; the ground is normally textured and the appearance of this texture changes with the distance. We know where we are as we move through the world, because even a featureless landscape will exhibit those gradients of apparent density which assist orientation.
>
> (Gombrich 1989: 13)

Gibson wrote extensively on the aerial view and aerial perspective. Among his observations he uses the analogy of theatre to illustrate his theory of optical array describing how the appearance of sky is produced, 'as every theatergoer knows, by a finely textured curved surface at the back of a stage which can be flooded with illumination. It is called a cyclorama. The actual surface may be only a few feet [...] but to the audience 50 feet away the illusion of depthless space will be compelling'(Gibson, 1966: 293).

The aerial perspective shapes the airborne viewer's perception of the landscape. While no longer able to focus on the detail and subtleties of the terrain, they are able to perceive the larger structure and to make new connections and relationships between

widespread elements. The film historian and theorist, Noa Steimatsky writing on the relationship between aviation and aerial photography notes how previously imperceptible forms and patterns suggested the possibility of a hidden reality pertaining to some grand plan only accessible to the aerial observer. For Steimatsky the aerial view ‘emblematises spatial perception in modernity’ and she points out how the alienation-effects of the aerial view and the collapse of landscape became manifested in the Futurist aerial theatre (Fig.18) (Steimatsky, 2003: 46).

Futurism's original engagement with the dynamism of modernity was revived by a new obsession with flight and the ‘liberation of perception from the forces of gravity and from a limited human viewpoint’ (Steimatsky, 2003). The Futurist’s aerial imagination had also been re-invigorated by Italy's imperialist aviation exploits in East Africa. The Battle of Tripoli in 1911 provided the opportunity to test the new aerial technologies and cognitive possibilities. Marinetti in a war dispatch from Libya described the aerial combat between the Italian and Turkish as ‘the most beautiful aesthetic spectacle of my existence’(Schnapp, 1994: 68). Scenes of destruction were spectacles for the aerial audience and created a distinctively futurist sensibility and aesthetic that was reflected in writings on the aeroplane. For example, Mussolini’s son, who flew in the Abyssinian war, reported − ‘I still remember the effect I produced on a small group of Galla tribesmen massed around a man in black clothes. I dropped an aerial torpedo right in the center, and the group opened up just like a flowering rose. It was most entertaining’(Steimatsky, 2003: 47). The Futurists and the military believed that aerial vision provided an ‘unmediated accelerated mode of apprehending the real’ (Schnapp, 1994: 166). By 1914, the aerial overview had become the preferred way of seeing the battlefield.

The early reconnaissance pilots preferred to fly solo, performing all the tasks of navigation, photography and targeting alone. Stunt pilots were recruited from Hollywood and the circus. Virilio tells us how in July 1917 Manfred von Richthofen, the famous 'Red Baron', introduced his tactic of the `flying circus' – wing formations containing four squadrons of eighteen aircraft each. War pilots had what Virilio describes as their own special effects, acrobatics which they called 'looping', 'failing-leaf roll', 'figure of eight'(Virilio, 1989: 18). Shifts in scale and perspective were created by the movement of the plane diving and soaring above the terrain. This was war as aerial

theatre and within this culture of war, the horrifying chaos of the terrestrial battlefield made a dramatic contrast with the Futurist spectacle of the air war.

In 1907, H. G. Wells had written his fantasy *The War in the Air*, in which the world is under continual attack by airships 'dripping death'. Well's insights into the effects of the new technologies of war on its combatants and civilians were prophetic. Richard Wohl points out that Well's book argued that:

> Killing from the sky was all too easy because aviators were in little danger from ground fire and people seen from the air lost their humanity. [Smallways, the main character] finds comic the agitated movements of a man on the ground jumping to flee a falling bomb.
>
> (Wohl, 1994: 74)

As a tool of observation and reconnaissance, aviation transformed the theatre of war. In the new aerial theatres, the aerial perspective had superiority over the foot soldier's earthbound perspective. For the soldier on the ground the experience of war is 'agentless, random, and catastrophic' while the commander has 'a greatly expanded sense of individual agency "greatly expanded" because, through the eyes and bodies of his aviators, he can now see the enemy from the air, penetrate his airspace, and be simultaneously present at every point along the front'(Schnapp, 1994: 167). Two key areas of military experimentation were wireless links between aircraft and the ground and the development of aircraft for reconnaissance. Air to ground wireless connections as well as enhancing reconnaissance by penetrating the 'fog of war' facilitated the expansion of aerial action directed from a distant central command. While the infantryman is disoriented and unable to see the larger picture, the commander's aerial vision allows him to recognise and plan strategic formations.

The aviator was envied by the soldiers in the trenches who saw above them a nobility of combat that had been lost in the war on the ground. The codes for the conduct of war were rapidly changing and destabilising the perceptions of both the terrestrial and airborne. The traumatic experience of combat was producing what Eric Leed in his classic study *No Man's Land* describes as 'liminal men'. According to Richard Schechner's performance theory, in the liminal phase of ritual, the subject is reduced

first to a state of vulnerability and stripped of their identity. In this powerless state, they are then able to assume new powers and new personas. (Schechner, 2002: 57-8) Leed uses the concept of liminality to explain the transformation of identity in war. Drawing on the firsthand accounts of German, French, British, and American front-line soldiers, he examines how the first modern, industrialized war annihilated long established myths and created new ones. Leed writes:

> The flier is a figure woven out of the expectations defeated by the actualities of war. By assuming the perspective of the flier, the front soldier could gain some psychic distance from the crushing actualities of trench war. The aerial eye orders the twists and turns of the trench labyrinth into an organic whole and reinvests the actuality of war with its initial purposes. The flier, in fact and fantasy, keeps open the possibility of an escape (Leed, 1979: 134).

Bernd Huppauf also argues that the landscape of destruction revitalised Kant's discourse of the sublime and created sublime experiences for the young officer pilots. Huppauf in *Fields of Vision* cites a dramatic report of 1915 in which an airborne spectator describes the sublimity of the battlefield view.

> We quickly climbed to 1800 m. The view became ever clearer, ever more distinctly we could see the atrocities of the war. A sensation of sublime horror welled up as we now for the first time moved over this vast battlefield. Like a huge relief everything was spread out before us.
>
> (Huppauf, 1995: 105)

The development of aerial photography in World War I was as Mark Dorrian observes 'intimately related to its object: an annihilated terrain that was no longer a landscape but a topography' continually being reconfigured by the destructive forces of heavy artillery. The instability of the ground required new rapid forms of strategic representation (Dorrian, 2007). Sequential aerial photographs were geometrically interlocked to create photo mosaics. Bernd Hüppauf argues that these demonstrated a 'new perception and experience of landscape hitherto unknown.' The old 'natural' landscape had been 'killed by war'. The aerial photograph established a "metalevel of artificiality" that reduced the landscape to abstract patterns of strategic information and removes the traditional points

of orientation (Huppauf, 1995: 105). Details are reduced to the surface textures. The human form is hard to distinguish without the aid of high magnification and in photographs taken from certain altitudes disappears altogether. The eye of the airborne observer is distanced by altitude and the camera lens from the landscape and its inhabitants. Saint-Exupéry in his war writings gives the following description of his experience of photographic reconnaissance:

> The earth is empty. Man does not exist when you look at the earth from thirty-three thousand feet. His actions cannot be read on that scale. Our long-focus cameras serve as microscopes. Their task is to capture not men who remain beyond their penetration, but the signs of human presence: roads, canals, goods trains, barges. Men can sow seed on a microscope slide. I am a scientist of the ice-cold sky and their war is a laboratory observation for me.
>
> (Saint-Exupéry, 1995: 36)

This experience of being under the glass lens as the subject of observation is also reflected in Ernst Jünger's famous description of his experience in the First World War cited by Virilio in *War and Cinema*:

> In this war where fire already attacked space more than men, I felt completely alien to my own person, as if I had been looking at myself through binoculars... I could hear the tiny projectiles whistling past my ear as if they were brushing an inanimate object.... The landscape had the transparency of glass.
>
> (Jünger in:Virilio, 1989: 72)

For Paul Virilio, this transparency represents the 'derangement of perception' on a battlefield where space and vision are distorted by military technology (Virilio, 1989: 72). By World War II, the military strategists had become experts at learning to see through the lens of stereoscopes and bombsights (Fig.19). They studied and planned the marks and targets, the decoys and disguises. Leroy Newby recounted his wartime exploits in Target Ploesti. As a young officer with the Fifteenth Air Force based during the Second World War in Italy, he flew B-24 Liberator bombers and described in graphic detail the fifty combat missions he undertook. His writing reflects the level of

danger and stress the crew endured but also revealed the exhilaration and sense of detachment experienced in flight.

> The rate hair tended to hang on any object on which it was placed when I moved it down directly in front of the airplane, because of this preset dropping angle − it was almost synchronized. I moved it onto a farmhouse that happened to be on the course hair line... I homed in on the house and the cross hairs were synchronized, glued to the "target." If that were the real target, I would have hit it, or come very close, but I still had several more miles to go. It struck me as funny at the time − I was thinking about a farm family having a quiet breakfast in the house as the cross hairs of my bombsight were synchronized on their ham and eggs, or whatever they were eating for breakfast, oblivious to their unwitting role in a major military effort.
>
> (Newby, 1983: 118)

As with so many wartime recollections, the metaphors and similes applied to dangerous and often murderous activities were drawn from childhood. Remembering flying through a barrage of enemy flak, Newby writes ‘I was so enthralled by it all, I innocently pushed my face up against the window like a kid in a candy store’ (Newby, 1983).

The training methods used for reconnaissance and the bombardier also often had a childlike quality of improvisation and play acting. An illustrated article in *Popular Mechanics* in May 1944 entitled ‘More Bull’s-Eye Bombardiers’ gives the description of one such training method for a student bombardier.

> A wooden mock-up of the bombardier's compartment is mounted on high legs, with motored wheels so that it can creep over enlarged aerial photographs of typical target areas at a speed scaled to the photographs. From his seat in the overhead mock-up the trainee with his bombsight picks out the target on the map and goes through the bombing procedure.
>
> (Anon, 1944b: 162)

The accompanying illustration shows a trainee in his turret a set up that resembles more a children’s game than a serious training procedure. (Fig. 20) It also suggests that the

bombardier has some autonomy and some control over ‘targeting’. But as Deer has observed both the fighter and bomber crews in reality ‘often found themselves inhabiting a visionless present, cut off from the strategic view’ (Deer, 2009: 84). The report in *Popular Mechanics* tells us in unemotional, matter - of - fact prose that:

> From the time the bombardier lines up the cross hairs of his bombsight - with the target and then sets the trigger, the results are practically inevitable. At that moment the huge bomber becomes a mechanical robot that could complete its purpose without human supervision. The crew could vanish and still the plane would maintain its course, the bomb release would operate at the correct instant, and the bombs would hurtle down on a collision course with the target.
>
> (Anon, 1944b: 162)

Virilio’s ‘growing derealization of military engagement’ (Virilio, 1989: 1) became the overriding experience of war through the technological development of aerial bombing. The mechanised act of seeing led to profound experiences of alienation both in the air and on the ground. In a study on Airborne Operations written in 1951 by a committee of former German officers for the History division of EUCOM United States European Command, it was recorded that the psychological effect of vertical envelopment was considerably greater than that produced by horizontal envelopment. ‘It can affect the enemy command and troops solely by reason of its menace - the uncertainty of when and where a bombing might take place’(Army, 1951: 41).

The dehumanisation of war is chillingly reflected in the advice given in a Second World War Camouflage course training manual which is advises the soldier on the ground on how to dehumanise himself from the aerial view:

> If the head and shoulders of a human are visible then the human is readily identifiable. The characteristic line by which a human is distinguished from an animal or from any other object from any great distance is that line over the shoulder, up the side of the neck, over the of the head and down the other side. When that outline of the head, neck and shoulders is visible then the human form may be recognised. There is one other part of the human body which has enough characteristic lines by which he may be identified. This fact indicates that if caught in an open field while

> enemy aircraft are flying overhead, a person should not just fall to the ground in spread-eagle fashion, but should pull himself into a ball which will destroy all the characteristics links by which he may be recognised as being human.
>
> (Anon, 1942c)

The uncertainty about what is and can be perceived affected both the forces on the ground and those in the air. Saint-Exupéry in *Flight to Arras* writes of his flight over German controlled France in 1940.

> This is a poisoned landscape, filled with conspiracies. Even the little provincial manor houses, each with its rather ridiculous lawn and its dozens of domesticated trees, each apparently an artless jewel-box for an ingenuous little girl, are no more than traps of war. A low pass over them will produce no friendly waves, but exploding shells.
>
> (Saint-Exupéry, 1995: 95)

Mechanised war distorted the conditions of perception. The landscape took on new aspects and dimensions. Familiar views and domestic details became conflated with the abstraction of the aerial overview. This abstraction is, as Dorrian observes ‘estrangement radicalised’. And the aerial is ‘the agency of abstraction, the means whereby the earth is detached from itself’(Dorrian, 2007: 11) The visual surveys of the war landscape became diagrammatic representations of strategy not land. The maps and mosaics produced from reconnaissance photographs and used for military briefings had a deliberately neutral appearance. They were intended to resist attempts for sentimental analysis or identification by the viewer beyond an awareness of the flight route and target location. Len Deighton in *Bomber* writes about how the appearance of the target maps changed during the course of the war.

> The target maps had been gaily coloured, fully detailed ones of the sort that a hiker would take on a cross-country stroll. Now the target maps were sombre things: inflammable forest and built-up areas defined as grey blocks and shaded angular shapes. The only white marks were the thin rivers and blobs of lake. The roads were purple veins so that the whole thing was like a badly bruised torso. On the old ones the rivers were bright blue and the trees green and hospitals were marked with a neat

> red cross. But now the urban conglomerations were just shapes like the ill-defined blurs that passed across the H2S radar tube. That, of course, was the whole idea. The old maps were as ancient as the idea of looking over the side of the cockpit to see the enemy you bombed. The new grey faceless maps were just one aspect of a new kind of war.
>
> (Deighton, 1970: 383)

This is a landscape composed for a gunsight (Fig.21).

> From the perspective of a bomber pilot...Black or white puffs in the sky are not necessarily clouds, and lights below are not always those illuminating buildings or streets. During war, they might point to burning buildings or firing targets. On radar screens after bombing raids, the fires of cities, not autumnal grain fields, appear golden from high altitudes...images, taken at high altitudes from the belly-mounted laser designator of a F-117A Stealth bomber, are especially dehumanized − it is too easy to forget that the buildings are real, and that they shelter people.
>
> (Schwarzer, 2004: 146)

In *The Nomos of the Earth* Carl Schmitt is clear that the aeroplane has changed the nature of war and military strategy by challenging traditional spatial concepts of war, especially the idea of a ‘theatre of war’ and ‘the front’, and even the distinction between a land-war and a sea-war and the rules governing them. Because it is a purely destructive operation, with no relation between military personnel in the air and those on the earth, as well as no positive relation to the inhabitants, it is not associated with the attempt to bring order to territories. The latter depends on the relation between soldiers and civilians within an occupied territory (Dean, 2006: 15).
But in the scopic regime of contemporary aerial warfare this relationship does not exist. Perception and the relationship to landscape have been radically reoriented.

The Stereoscopic View

In 1922 Walter Raleigh wrote that ‘reconnaissance, or observation can never be superseded ; knowledge comes before power; and the air is first of all a place to see from’ (Raleigh, 1922: 446). But in order to understand and interpret the new war landscape from an aerial viewpoint, complex physical and mental procedures have to be put in place. During the First World War, a whole school of aerial photographic interpretation grew up to extract information from reconnaissance photos, which, though they did not necessarily lie, also did not represent the truth in a way that was immediately legible or self-evident to the untrained viewer. The belief that the aerial photographs could ‘reveal facts, objects, and strategic intentions not otherwise accessible’ was as Paul Saint Amour observed:

> Mitigated by an accompanying insistence on the defamiliarizing power of the vertical view, on the sense that even the reality beneath the enemy's camouflage was self-camouflaging and on the need for new codes by which a highly trained interpretive elite could decipher the camouflage of the real.
>
> (Saint-Amour, 2003: 356)

In fact, the movement of the airplane, variations in altitude and scale, atmospheric haze, faulty cameras and film warping and shrinkage distorted the photographic images giving a false reading that needed to be rectified by the interpreters. Aerial stereoscopy was the mechanism by which the images were made legible. In aerial interpretation, stereoscopy was seen as a vital tool in the representation of reality but paradoxically, its optical experience relied on distortion and the rejection of visual conventions. The user needed to relearn how to see and what to see and to understand stereopsis − ‘that quality of being at once theatrically distortive and revealingly… accurate’ (Saint-Amour, 2003: 378).

In 1838, Charles Wheatstone delivered the first of two papers to the Royal Society in which he outlined his experiments on binocular vision. Observing that each eye must necessarily afford a slightly different ‘perspective projection’, Wheatstone in his studies

of stereoscopy (the illusion of depths created by binocular sight) considered the relative disparities that arose from viewing objects at different distances. The stereoscope followed – a 'philosophical toy', one of the many quasi scientific devices that played with the modes of human perception and illusions (Warner, 2004: 19).
Wheatstone's experiments with simple stereoscopic drawings and reflecting mirror stereoscope were superseded by David Brewster's invention in 1849 of a binocular camera, and the first of many thousand stereoscopic photographs began to be produced. The combination of the stereoscope and the camera enabled the production of images with a previously unseen level of 'realism'. It was the pairing of photography with the stereoscope that was to facilitate the construction of the compelling new form of visual experience offered by stereo-photography. In 1867 Hermann von Helmholtz illustrated his lecture on 'The Recent Progress of the Theory of Vision,' with the example of the stereoscope's capacity to use two flat pictures to simulate the depth perception of normal binocular vision. 'None of our sensations' Helmholtz explained 'give us anything more than 'signs' for external objects and movements,' so that what we call seeing is really a matter of learning 'how to interpret these signs by means of experience and practice' (R. E. Krauss, 1993: 133).

In these early stereoscopic photographs, the views were carefully composed to emphasize spatial depth. The selection of objects and landscape features was made to augment the sense of recession in the view. In 1861, the American author Oliver Wendell Holmes (who invented a handheld stereo viewer), remarked on the extraordinary sensation of looking at stereoscopic photographs: 'The shutting out of surrounding objects, and the concentration of the whole attention... produces a dreamlike exaltation... in which we seem to leave the body behind us and sail into one strange scene after another, like disembodied spirits' (Wallinger, 2009: 111).
By the First World War, the stereoscope found a new application in decoding the landscape (Fig.22). Neither visual observation from the air or single aerial photographs had proved very effective at penetrating camouflage disguises or decoys. However, by the summer of 1915, the introduction of semiautomatic cameras enabled a sequence of overlapping shots to be taken an airplane (Nesbit, 1996: 35). By putting these overlapping pairs of aerial photos under the stereoscope, photo interpreters could use the device's stereopsis to tell bomb craters from mounds and trenches from embankments. They could distinguish decoy factories and airplanes from real ones; they could see

through some kinds of camouflage. Aerial stereoscopy depended for its effectiveness on the viewer's optical physiology as much as on the mechanics of viewing which involved the measured placement of overlapping pairs of stereoscopic images. (Fig. 23) Just as binocular vision brought together two images to form one, so the stereoscope and the photo interpreter merged to become an integrated viewing machine. ‘By conjuring the impression of elevation from flat images of a remote and miniaturized surface, aerial stereoscopy put the photographic interpreter above, and seemingly inside, a three-dimensional scale model of the landscape. In a sense, the stereoscope also put the landscape inside the viewer’ (Saint-Amour, 2003: 358).

There was, however, an inherent problem with the aerial stereoscopic view. At the altitudes necessary for a reconnaissance plane to fly to avoid enemy detection or range of fire, the distances are too great for unaided human stereopsis. Therefore, Saint Amour suggests that the wartime photographic interpreters constructed their ‘narratives about the location, circulation, and strategic significance of military resources by way of a detour through magic’ (Saint-Amour, 2003: 360). The interpreters exposed the illusions of the camoufleurs through the counter illusionist optical trick of hyperstereoscopy.

To overcome the problem of the lack of three dimensionality in vertical aerial photographs which was inevitable when reconnaissance aircraft were flying at heights above 2000 feet, stereo pairs of photos were taken by cameras set further apart than the interpupillary distance, i.e. the distance between the centre of the pupils of the two eyes. The artificially adjusted sightlines creates hyperstereoscopy; stereoscopic viewing in which the relief effect is noticeably exaggerated (Department of Defense, 1942).

Unlike the normal depth perception experienced using the Victorian parlour stereoscopes, where the stereopairs were taken through lens which were the same distance apart as human pupils, hyperstereoscopy gives an exaggerated highly distorted sense of depth. It also creates a strange illusion sometimes referred to as ‘the model effect’. Because the viewer seems to have eyes much further apart than normal, it is though they have a giant’s perspective on a miniature world (Fig. 24). The interpreters experienced the effects of giganticism and miniaturization simultaneously. The aerial photographs themselves like the world seen in the hyperstereoscopic view were

miniatures, often at scales of 1:25,000 or smaller. Saint Amour noted how the interpreters became accustomed to this 'vertiginous elasticity of scale, oscillating between the scale of their own bodies, the minute scale of the aerial photo, and the colossal scale of hyperstereopsis' (Saint-Amour, 2003: 360).

To achieve stereopsis, the observer needed to align themselves with the sightlines and shadowlines of stereopairs. This meant learning or relearning stereoscopic behaviours (Fig. 25). Former WAAF photo interpreter Constance Babington-Smith describes her first successful stereoscopic session during the early months of World War II:

> I stood [the stereoscope] above a pair of prints as I had seen some of the others doing. I could see two images, not one, and there really did not seem much point. It was much simpler to work with an ordinary magnifying glass. I edged the two prints backward and forward a hit—still two images; and then suddenly the thing happened, the images fused, and the buildings in the photograph shot up toward me so that I almost drew back. It was the same sort of feeling of triumph and wonder that I remember long ago when I first stayed up on a bicycle without someone holding on behind. From then on interpretation was much easier.
>
> (Babington-Smith, 1957: 60)

Just as Babington-Smith first experience of artificial stereopsis aroused childhood memories, her WAAF colleague, Ursula Powys-Lybbe, also recalled her own childhood and compared her current intelligence work with stereo pairs with playing with a toy stereoscope.

> Sometimes, when I was a small girl, a treasured box of glass slides would be brought out accompanied by a wooden viewer with two black eyepieces, and I would be allowed to put a slide into the viewer and stare through the eyepieces at a fairy-tale world...that childish thrill was felt by everyone who, for the first time managed to shuffle a stereo pair of aerial photographs into the correct position in the viewer. It might have taken a little time, and you felt convinced that something was wrong with your eyes, and you strained your muscles and tried squinting and then magic! Shapes in plan were transformed into real-life ships or churches or bridges. You begged for

> more prints, and like the child with its new plaything, you spent a half-hour in a wonderland of discovery.
>
> (Powys-Lybbe, 1983: 47)

Powys Lybbe‘s enthusiasm and pleasure in observation are also apparent in her poetic descriptions. Artistically the shadows were beautiful — the tracery of trees in winter, the outlines of cathedrals, spired churches or suspension bridges gave me enormous pleasure.’ She justifies these ‘moments of self indulgence’ by commenting that ‘the shadows served as an immediate check in the identification of an object seen from the vertical viewpoint’(Powys-Lybbe, 1983: 50).

The fascination exerted by aerial photographs was widely acknowledged. The artists and designers recruited to the camouflage and reconnaissance units wrote frequently of their delight in the aerial images seeing new aesthetic possibilities not only applicable to their camouflage schemes but to future artistic developments. The much admired aerial abstraction of the vertical perspective was augmented during wartime by the atmospheric and terrestrial effects created by bombardment and heavy artillery. ‘Aerial photographs developed an aesthetic in their own right beyond their tactical and strategic functions. A cloud of mustard gas may produce aesthetically attractive light grey shades on a darker grey background, and regular patterns of dark circles with sharp edges may result from the last long-range bombardment’ (Huppauf, 1995: 106).

In addition to their reconnaissance work in camouflage recognition, the interpreters were producing the data and information for the maps and models to be used in the planning of bombing missions. ‘After the missions, they would confirm the destruction of the same enchanting objects that had held them in a reverie of detection’ (Saint-Amour, 2003: 368). Powys Lybbe describes in almost rapturous detail a sequence of images that show for the first time the whole development of a bombing strike in stereo (Fig.26).

> One of the finest and most dramatic pictures taken of bomb damage [showed] a most vivid, awesome low-angled shot of the double viaduct at Bielefeld showing the arches stretching right across the print like a row of teeth with a gap of about six arches width in the centre, and festooned between this gap are delicate strands formed by two railway lines still attached to the ends of the gap. Enormous circular puddles

> surround this aiming point for hundreds of square yards, as these are the craters of Tallboy and Grand Slam bombs, with great numbers of minor heavies. There is a row of little houses still with their roof structure apparently intact, but with most of the tiles gone − not surprisingly.
>
> (Powys-Lybbe, 1983: 162)

The persuasive potential of stereoscopic pictures for both propaganda and reconnaissance purposes was exploited perhaps most infamously by Arthur Harris, Air Officer Commanding-in-Chief (AOC-in-C) of RAF Bomber Command. From his base at High Wycombe, Buckinghamshire, Harris commanded and controlled his aircrews executing the area bombing campaign from February 1942 to the end of the war. In his memoirs, Harris describes his Blue Books which were 'two or three enormous volumes' of reconnaissance pictures of the bombed German cities on which 'the area of devastation was progressively marked with blue paint over an air photograph or rather a mosaic of... the city as a whole'. Wanting 'the people that mattered' to 'see the damage for themselves, and not in diagrammatic form', Harris obtained one of 'those stereoscopes with which the Victorians used to amuse themselves' and had several other 'stereopticons' made and set out in what he called the 'conversion room'. An audience of politicians, journalists, newspaper proprietors and military officers were invited to come to this stereoscopic theatre for a demonstration of Harris's strategic scenarios. (Harris, 1947: 149) There they would have the opportunity to see in remarkably detailed relief the remote enemy landscapes and cities. The viewer would assume what they are seeing was 'real' but as Jean Clair observed 'the stereoscopic photograph has no material reality...as a virtual image [it is] an immaterial imitation, a totally transparent, all-too-perfect delusion of reality' (Clair, 1978: 103).

The Germans also used stereo photography for their own propaganda purposes producing numerous folios of *Der Kampf im Westen Die Soldaten des Führers im Felde* (The Battle in the West: The Soldiers of the Führer in the Field) which included stereocards and metal stereoscopes (Fig.27). However, although the Press Office of the NSDAP (Nationalsozialistische Deutsche Arbeiterpartei) recognised the inherent theatricality of the stereoscopic presentation, and used it highly effectively in their publicity material, German military intelligence had less success with its application in

aerial reconnaissance. After the war, Alice Davey, who had worked in the Pentagon putting together interpretation manuals for the Allies, was able to interview the head of the German Interpretation School. She learned that a major problem in the German photo intelligence units was the widespread belief 'that because a camera is a machine, all you've got to do is improve mechanical quality.' (McAuley, 2005: 8).

The stereoscopic image, however, was constructed within the mind of the viewer. Roger Shattuck in his analysis of the stereoscope as metaphor in Proust's *Remembrance of Things Past*, describes a form of 'double consciousness', a 'stereologic vision in time'. He proposes that just as in stereoscopy a single three-dimensional image is formed the mind, and 'there is a piercing of the veil of illusion' so the experience of two related events separated and connected through memory forms one four-dimensional image in the consciousness. (Shattuck, 1963: 131) He suggests that through literature the reader is introduced to an 'intensified repertory of feelings and events and possibilities' and when he or she subsequently encounters similar events is then able to say: '"This is it." For we have lived it once already' (Shattuck, 1963: 131). For Shattuck , our 'own life', our personal experience is the first half of a double process which proceeds 'directly into the second beat: recognition' (Shattuck, 1963: 133) He gives as his example the training that pilots were given in World War Two.

> The action I am trying to describe resembles the elaborate training pilots were put through in the Second World War in order to be able to recognize instantaneously all enemy aircraft. In a flash lasting one hundredth of a second, a pilot could know, "That's a Zero." He could not be taught exactly how to bag the Japanese plane when he met one; but he could be taught, through this preparation, to concentrate all his powers on the task when the time came. (Shattuck, 1963: 134)

Shattuck's stereologic process[1] is similar to the drama theorist Bert States's application of binocular vision to scenographic perception. States suggests that semiotics and

[1] The parallels between theatre and the stereoscopic were highlighted when I discovered in my first edition copy of Shattuck's book purchased from Abebooks.co.uk there was a calling card (carte de visite) for Simon Watson Taylor, Provediteur Delegataire du College de Pataphysique Grand Maitre de l'Ordre de la Grande Gidouille, 33 Tregunter Road, London, S.W. 10. An inscription on the reverse of the card is addressed to Martin Esslin and reads: 'Here it is: rather you than me...I gather Peter Brook is preparing a version of the Ubus for the Royal Shakespeare Company. Cyril has apparently produced a version of most "Ubu Roi" now. I don't know about "Enchaine". For Faustroll's sake keep them from an excess of heresy.'

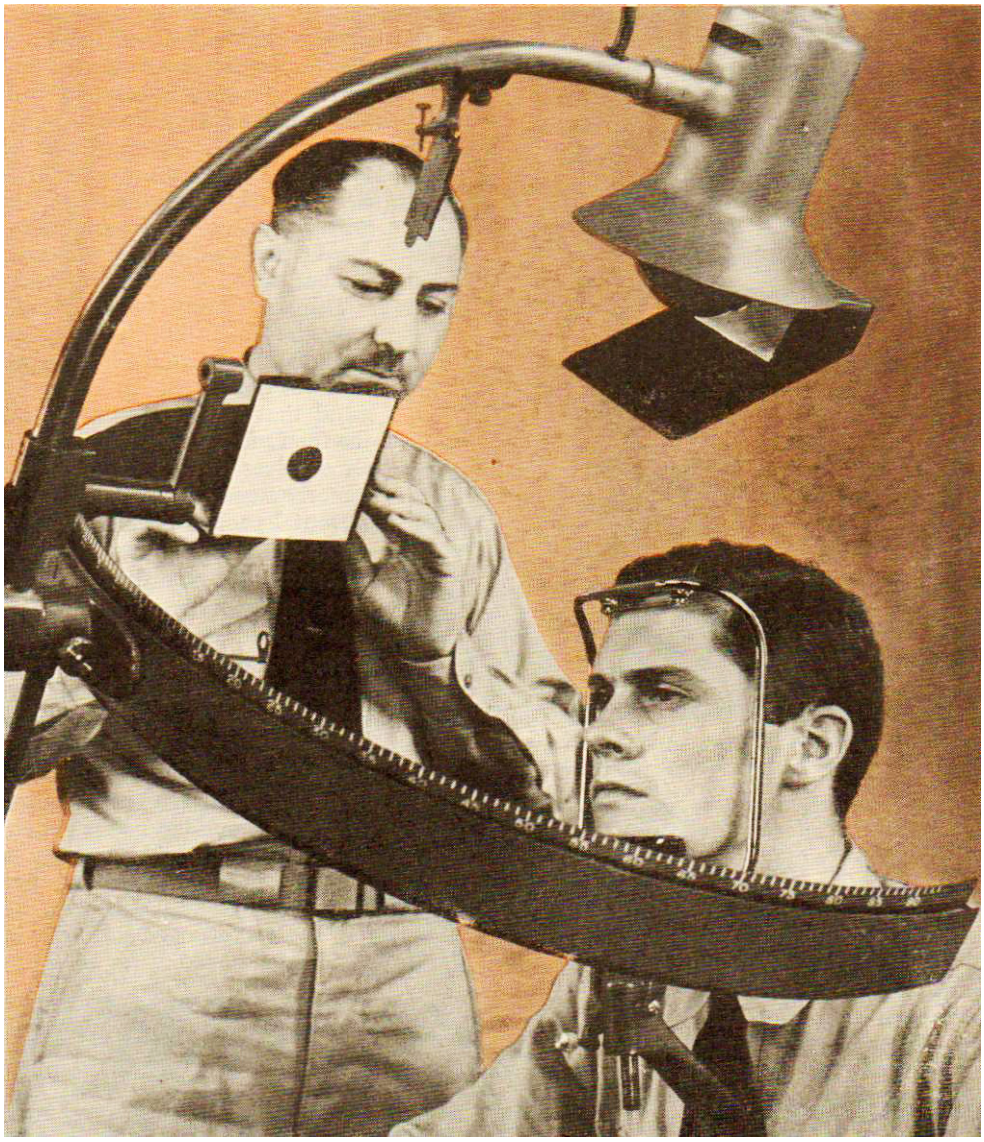
phenomenology are the dual perspectives that in the theatre form the spectatorial experience. The viewer immerses themselves in the entire event while retaining an objective distance from which to identify the significant details interpret the signs. ‘One eye enables us to see the world phenomenally; the other eye enables us to see it’ (States, 1985: 8)

This stereoscopic view is also reflected in Anne Ubersfeld's description of scenographic engagement:

> It is the spectators, much more than the director, who create the spectacle: they must reconstruct the totality of the performance, along both the vertical axis and the horizontal axis. Spectators are obliged not only to follow a story, a fabula (horizontal axis), but also to constantly reconstruct the total figure of all the signs engaged concurrently in the performance. They are at one and the same time required to engage themselves in the spectacle (identification) and to back off from it (distancing).
>
> (Ubersfeld, 1999: 23)

The experience of the theatre goer, therefore like that of the photo interpreter involves both immersion and detachment in order to perceive the scenographic patterns through their stereoscopic lenses.

Figure 17

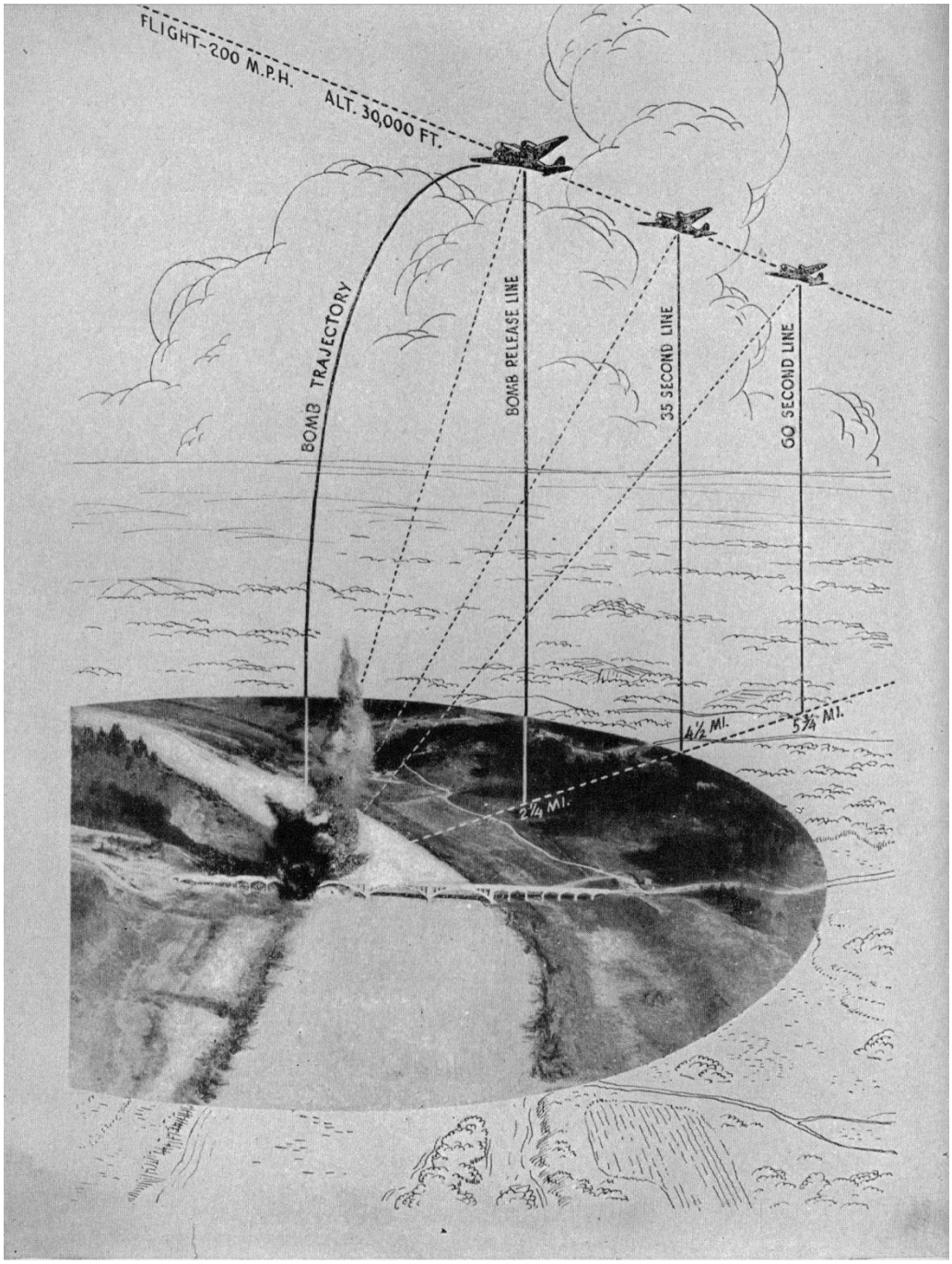


‘Testing angle of vision of cadet who soon may be flying a fighting plane. Doctor adjusts card with black spot to point where it disappears from vision; exceptional vision spans 160 degrees.’ *Popular Mechanics*, March 1943

Figure 18

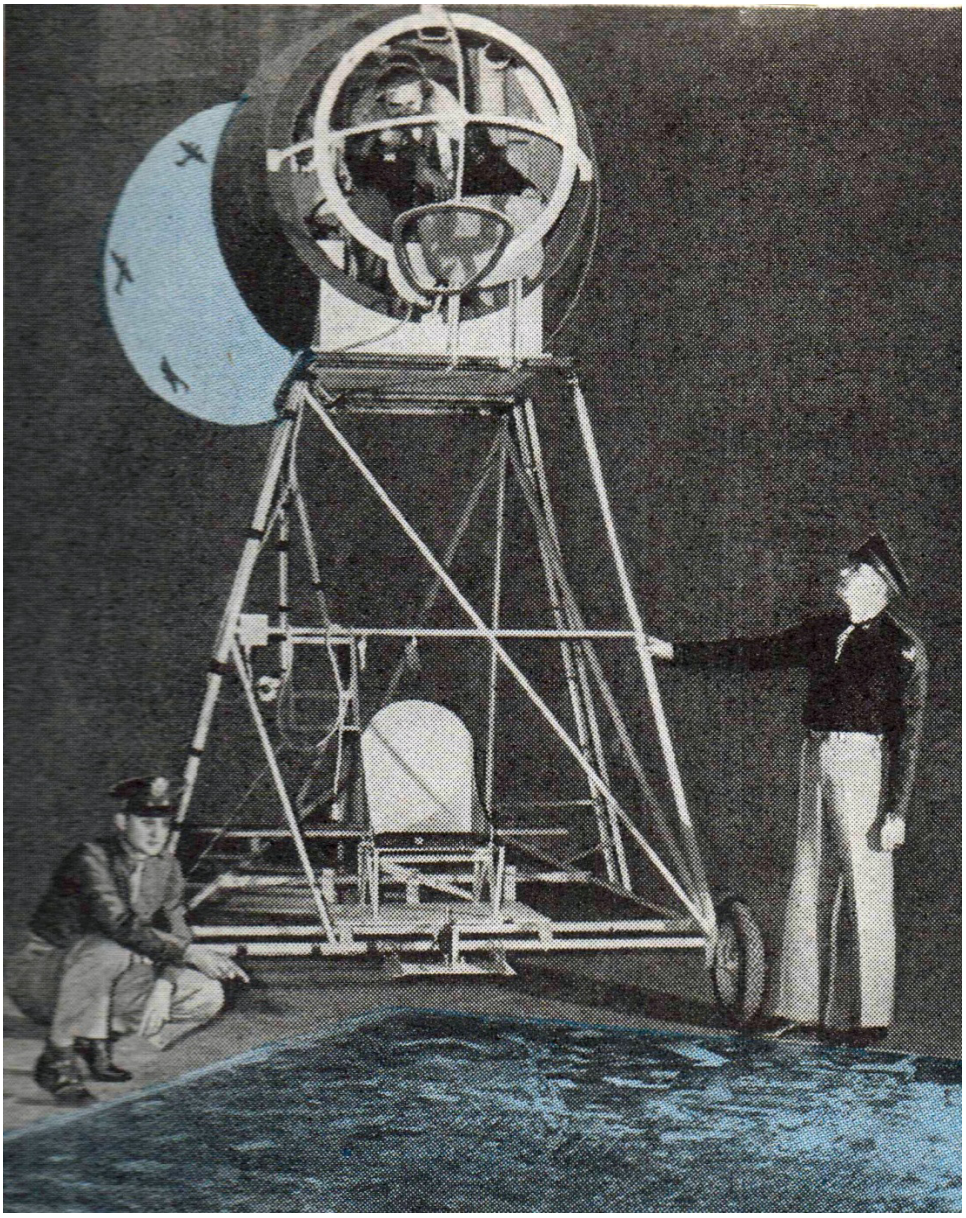
Tullio Crali, Incuneandosi nell'abitato, 1939

Figure 19



'Precision bombing diagram. Bombardier must see the target and have bomb sight in operation at 35-second line for precision bombing. Greater accuracy is possible if target can be seen from the 60-second line.' (Robert Breckenridge, 1942)

Figure 20



‘In the mockup of his flight quarters, a student bombardier makes a “bombing run” over a mosaic map of enemy area.’ *Popular Mechanics*, May 1944

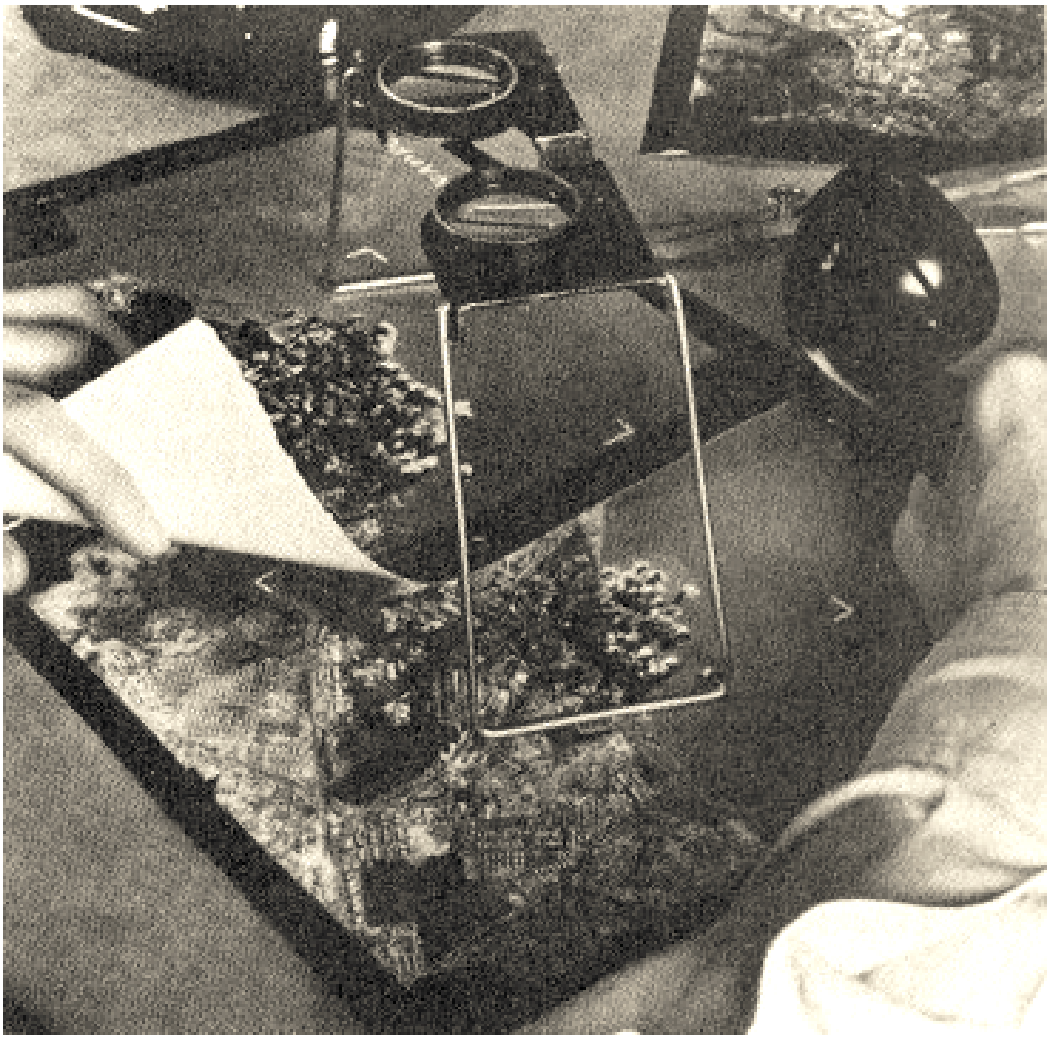
Figure 21

WWII Night time Aerial Reconnaissance photograph of Battle of Monte Casino somewhere between Naples and Rome, 11 March 1944.

Figure 22

Keystone Image, “She Sees Her Son in France”, advert for Stereopticon images during World War I

Figure 23



‘Bomb Damage. Change Detection’

Figure 24

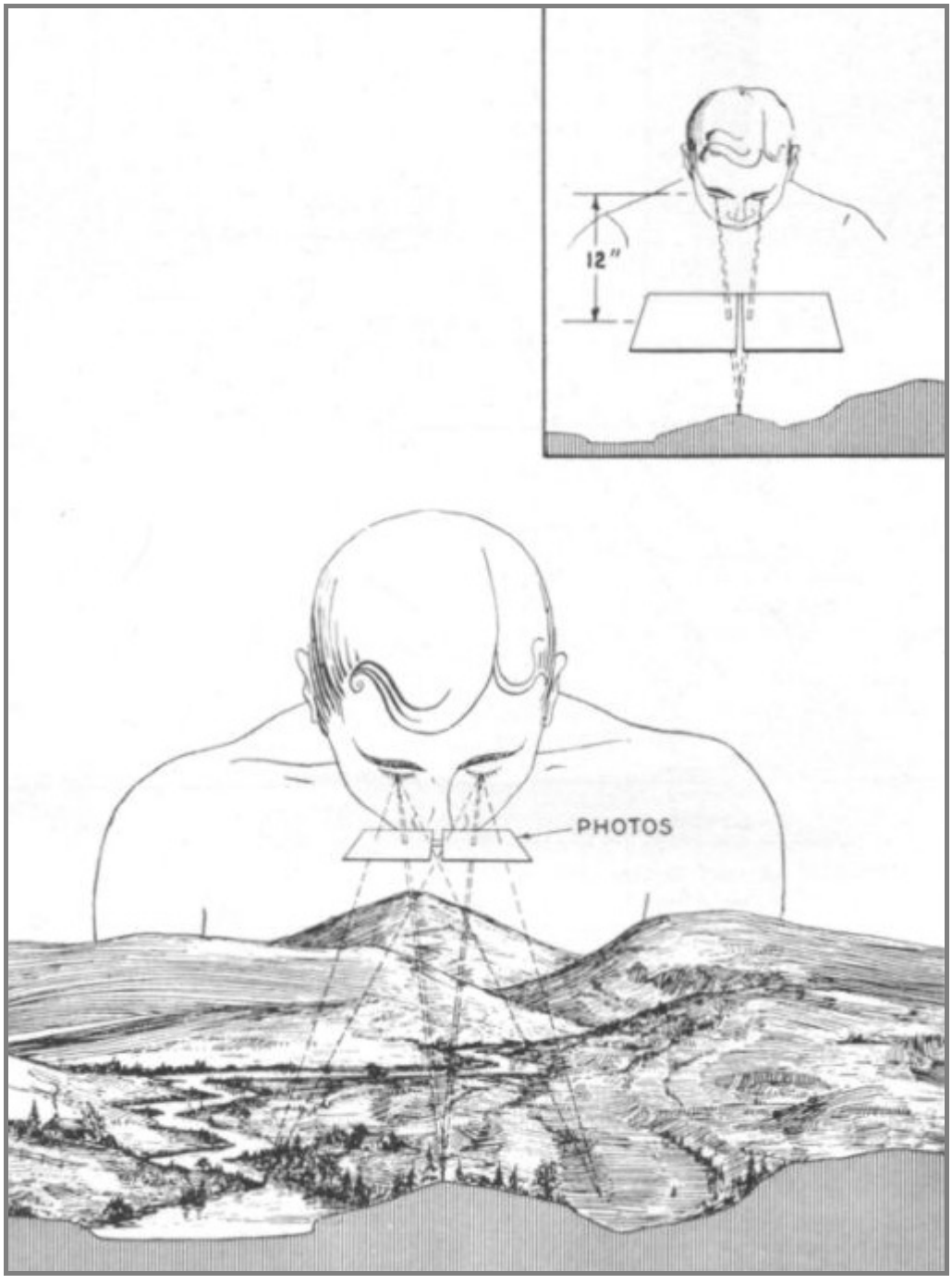


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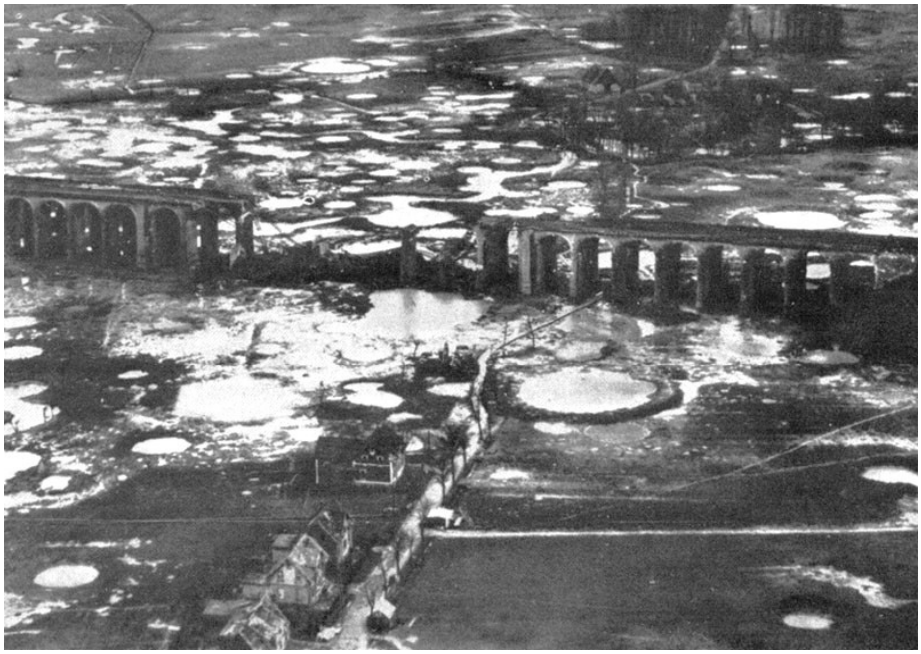
Figure 25

RAF: Operations by the photographic reconnaissance units 1939-1945

A flight officer photographic interpreter with two Canadian pilots of a photographic reconnaissance squadron, examining newly developed 8”x7” film at Benson, Oxfordshire

Figure 26



Bomb damage at the Bielefeld railway viaduct.

Figure 27

Stereoscopic images from The Battle in the West: The soldiers of the Fuhrer on the Field Der Kampf inWesten : Die Soldaten des Fuhrers im Felde. Munchen: Raumbild-Verlag Otto Schönstein

Chapter 3: Strategies of Perception

> On the plains of northern France in 1917, all the armies participating in the conflict − American, French, British, German − had a different camouflage. Though they were fighting over the same terrain, using the same tactics in the same corners of the same fields, their camouflages had different shapes and colors to them. I suppose there are camouflage designers − what a job! − and everyone's eyes are different, slightly. Or perhaps camouflage is the ultimate committee decision − "hands up all you who can still see this!"
>
> (Shepheard, 1994:106)

This section is concerned with the perception of landscape and its representation. In order to understand the strategies of camouflage and the mechanism of the terrain model in camouflage testing and briefing, one needs to understand how landscape is perceived. The emphasis in camouflage training as in reconnaissance training was on the application of perceptual skills; testing and comparing the reality represented. The camoufleur like the photo interpreter needed the ability to identify objects and their relationship to the observer and surrounding objects. To read the landscape – its textures, light and shadow, colour. The lecture notes of a trainee camoufleur in WW2 list the following questions that needed to be addressed:
'What will the observer or attacker see?
Why will he see it? ' (Goodden, 2007: 38).

In the 4th century B.C.E., the Chinese strategist Sun Tzu described in *The Art of War* the six principles 'connected with Earth' and how 'The general who has attained a responsible post must be careful to Study them'. He wrote:

> We may distinguish six kinds of terrain, to wit: (1) Accessible ground; (2) entangling ground, (3) temporizing ground; (4) narrow passes; (5) precipitous heights. (6) positions at a great distance from the enemy.

> The natural formation of the country is the soldier's best ally, but a power of estimating the adversary, of controlling the forces of victory, and of shrewdly calculating difficulties, dangers and distances, constitutes the test of a great general. (Tzu, 2006: 45)

Two centuries later, the U.S. Marine Corp in their manual *Small Unit Leader's Guide to Weather and Terrain* were still advising that the successful commander should maximizes his advantages through the study of the terrain. 'With the spread of technologically advanced weapons systems, Marines can expect to face opposing forces on the battlefield with combat power equal or greater than ours. The preparedness to deal with weather conditions, and the ability to read, understand, and exploit the terrain can mean the difference between victory and defeat'. The report continues by observing that 'Manoeuvres that are possible and dispositions that are essential are indelibly written on the ground. The intelligent leader knows that the terrain is his staunchest ally, and that it virtually determines his formation and scheme of manoeuvre. Therefore he constantly studies it for indicated lines of action' (Anon, 1990: FMFRP 0-51).

Clausewitz described how the connection between war and the ground on which it is fought is the most important aspect of military strategy. For Clausewitz, the strategist must have 'a natural mental gift' − (*Ortsinn*) a sense of locality. He sees it as an act of imagination:

> The power of quickly forming a correct geometrical idea of any portion of country, and consequently of being able to find one's place in it exactly at any time. The perception no doubt is formed partly by means of the physical eye, partly by the mind, which fills up what is wanting with ideas derived from knowledge and experience, and out of the fragments visible to the physical eye forms a whole; but that this whole should present itself vividly to the reason, should become a picture, a mentally drawn map, that this picture should be fixed, that the details should never again separate themselves − all that can only be effected by the mental faculty which we call imagination. (Clausewitz, 1997: 54)

The landscape historian, J. B. Jackson writing of his experience in World War I describes how this sense of locality - the *Ortsinn* was what distinguished the soldiers in

the field from their colleagues at headquarters. They developed a greater awareness of the environment by learning to rely on their senses for guidance (Jackson, 1980: 15).

> In peacetime, weather and topography − to say nothing of the texture of the soil and the density of the foliage − were never looked upon as of much consequence, but in the outlying units, always aware of the night patrols ahead of them, and of the need for supplies, they were sometimes inflated into matters of life and death. Even the phases of the moon were worried about. In itself there was nothing unusual about this environmental awareness. Experience promptly showed how essential it was, and every man took pains to cultivate it.
>
> (Jackson, 1980: 16)

In Jackson's phenomenological interpretation 'The viewer becomes and is part of the environment viewed' (Jackson, 1980: 16).

Throughout history, the military have developed strategies and the prosthetic devices for extending the visual engagement with the terrain. During World War I, the field archaeologist and pioneer of aerial archaeology, O.G.S. Crawford's whose work in the Topographical Section included taking panorama photographs along the length of the front line, used a small periscope attached to his camera in order to see above the parapet of the observation posts and church towers where he would position himself. Kitty Hauser, his biographer has written how 'Crawford's camera was an extension of bodily vision, a revolving eye on a stick, and when it was hit by a sniper at Fricourt, he photographed its damaged bodywork, displaying it proudly in his autobiography many years later, almost as if it were a surrogate of himself' (Hauser, 2008: 32).

Here vision and visuality has become an integrated constructs of both body and mind. In Merleau-Ponty's theory of perception the structure of vision involves both immersion and detachment; an immersion in the visible indeterminate world through embodied experience of all possible viewpoints and the detachment of the reflective and interpretative overview. Meaning is generated when these different perspectives come together to create the totality of perception. Seeing something in the landscape or 'on stage' is as McKinney and Butterworth observed 'inevitably linked with embodied

understanding, or memories of actual bodily experience'(McKinney & Butterworth, 2009: 170).

In the staged landscape of war, the notion of stage is inseparable from the notion of body, as the stage promises and is completed by the body of the performer. The notion of 'disguise and exposure' is connected to the body, a 'staged' body, a conspicuous / inconspicuous, vulnerable theatrical body. Camouflage shifts focus between the spatiality of the body that is the landscape and the aerial body. From the distanced embodied position, the camouflaged landscape is perceived as pattern, terrain; edges of form are broken and redefined. This disguised landscape –becomes associated with 'deception and decoy', whist providing protection from 'exposure'. The body camouflaged absorbs the landscape for its disappearance. In doing so, the disappearing body becomes part of the space that contains it (Fig.28).

Landscape becomes something that interacts with the subject. In Gestalt theory entities made up of interacting forces are described as field processes. (Arnheim, 2004: 200). The concepts of Gestalt field theory and topological relationships have informed developments in perceptual science and landscape studies. The German school of Gestalt psychology developed around Kurt Koffka, Wolfgang Kohler and Max Wertheimer in Frankfurt at the beginning of the twentieth century. Marrow writing in *The Practical Theorist* relates how the Gestaltists argued that perception could and should be considered in terms of "forms of organized wholes." These wholes are not merely sums of their parts; they have an added characteristic or quality; 'they are entities with distinctive structures—changeable, to be sure, by any change in any part, but, although changing, definitely recognizable wholes, or Gestalts' (Marrow, 1969: 13). Wertheimer, Koffka, and Kohler were members of the faculty at the Psychological Institute of the University of Berlin, and among the students drawn to study there was the doctoral student Kurt Lewin. Having served in the Kaiser's army in the First World War, Lewin had returned to develop ideas that he had begun to formulate during his time in the trenches. Although he did not adopt the orthodox Gestalt canon, he did make original contributions to the debate. To Lewin, Gestaltism had valuable implications for perceptual theory (Marrow, 1969: 13).

After serving near the war front for two years, Lewin had been injured in combat and it was during his convalescence that he wrote his 1917 article ‘War Landscape’ which represents the early development of his concept of field theory (Marrow, 1969: 10). The article presents the first expose of his concept of "life space". He tells us how the appearance of the landscape is transformed as a soldier approaches the front lines. It is Lewin’s proposition that a soldier's needs, determine how he sees the landscape which will look different according to those particular requirements, e.g. for physical safety, food, a favourable vantage point or position etc.

Lewin saw on the land the effect of past action which created a directive landscape, a *gerichtete Landschaft*. Through his own experience as a field artillery soldier, Lewin tries to explain his relative approach to space, i.e. the ‘reality structure’ of an image is dependent on an observer or ‘viewer’. If one was to define the use of the word perception for the purposes of phenomenology in relation to ‘reality’ or ‘real’ it would be expressed as the following: the seeing of an area as a hill is not a reality but a perception/imagination. The juxtaposition of the perceived and the real landscape is not influenced by the actual ‘seeing’ of the perceived landscape: The fact is that the perception of an area as a hill does not make it a real hill but remains only a hill, a structure that has been perceived (Lewin, 1917: 440-7).

If one moves from behind the lines towards the front line one would experience a rather unusual reshaping of the landscape. It is not the case of becoming more alert and conscious of the imminent danger towards the front and its ultimate inaccessibility, but more a case of changes in the landscape itself. The area seems to have an end somewhere ahead after which follows a ‘nothing’. If during mobile warfare the position is broken up, then it is apparent that not only will the border move and the character of the danger area change, but one would notice with surprise that the position has been replaced by land. The area where one constantly ducked in readiness to defend has now become part of the land which is to be passed through. Without having noticed the change itself, in place of battle objects there are suddenly meadows, farmland, etc which now relate to the surrounding landscape i.e. fields and woodlands all around. The farmland now assumes its own directions instead of the definition of the area determined through the front. Paths that connect villages and towns become proper paths again, instead of being seen as compact earth that was difficult to dig for the purposes of battle.

What was previously seen as a flattish dip in the ground and considered as good cover is now seen as reasonably flat gently undulating land without real height differences. The previous reality of a landscape with all the usual markers such as trees, paths, forests, hills etc. would take on a different understanding and connotations with different situations. This becomes clear in Lewin's war example where the 'front' no longer forms part of the landscape but an area with a completely different meaning to that in peacetim. As soon as the front 'moves on' for instance, or the war ceases the landscape regains its original individual character as 'a landscape without war'. In this context Lewin explains the term 'different image or perception' (Lewin, 1917: 441).

In the 1930s, Lewin took up professorships in the US and during the Second World War, he worked with other social scientists advising the military on psychological warfare programmes. According to Marrow writing in 1969, Lewin's activities were still classified and never fully documented. However, it was known that he made 'very creative contributions to the working out of the proper relations between psychological warfare, target setting, field operations, and evaluative reconnaissance' (Marrow, 1969: 338).

Another young psychologist who was to come under the influence of the Gestaltists was James Gibson who in 1928 went to teach psychology at Smith College, where Kurt Koffka had relocated from Berlin. To Koffka, the central question was 'why do things look as they do?' and the answer lay in the organization imposed by the 'field forces' of the central nervous system. To Koffka, the organization necessary to provide for object perception could come only from the viewer (Hochberg, 1994: 160).

Although Gibson never fully accepted the Gestalt theory, he was eventually to take a position that was close in several important respects to Koffka's. When the United States entered World War II, Gibson joined the Army Air Force. He was stationed briefly in Washington, where a program of psychological research was being organized, then in Fort Worth at the Flying Training Command for one and a half years, and then at the Santa Anna Army Air Base for another two and a half years. After demobilization, he became director of the Motion Picture Research Unit in the Aviation Psychology Program that was to develop visual aptitude tests for the screening of pilot applicants (Hochberg, 1994 : 160).

Gibson was one of the most important 20th century psychologists in the field of visual perception, developing the concept of 'affordance' optical structures of information about the environment, that are defined in terms of the needs and potential behaviours of the individual. Writing in *The Senses Considered as Perceptual Systems*, Gibson argued that the 'cluttered' environment presents an optic array with some surfaces hidden, others in sight. For Gibson, the visible and invisible surfaces are continuously interchanging. It is his view that 'the frozen optic of a stationary point of observation is a limited case' that the eyes do not remain fixed on a single point. The field of vision responds to the shifting movement of the observer's position and eyes and head. The world surrounds the observer instead of having a window-like boundary (Gibson, 1966: 256). 'The problem of perceiving by scanning, the puzzle of how a sequence can be converted into a scene, only arises if each sample is assumed to be discrete from its neighbours in the series. However if the sequence contains the scene, it does not have to be converted into one'(Gibson, 1966: 262). In Gibson's model, a perceptual system hunts for a state of 'clarity'. The activity of orientating and that of exploring and selecting is seen to be one that extracts the external information from the stimulus flux while registering the change as subjective feeling (Gibson, 1966: 264). Gibson's contribution to perceptual psychology was to demonstrate that sensory systems are active systems sensitive to the invariant under transformation, not arrays of passive receptors merely responding to stimulation. Perceptual information becomes available, therefore, through the interaction of the perceiver and the environment (Hochberg, 1994: 161).

This interaction has also been the subject of research in behavioural geography.(G.T. Moore and Reginald Golledge in *Environmental Knowing: Theories, Research and methods*, 1976), Helen Coucelis, for example, discovered in her studies of location, place and space, that optimal locations and routes are not necessarily the ones people will or should adopt. Individual behaviour and decision making in space is based on knowledge that is often incomplete and distorted (Couclelis, 1992: 226). Similarly, Harvey Smallman, Mark St. John and Michael Cowen discovered in their research into the human factors of visualizing tactical and spatial information in 3-D, users 'naïvely' perceive superior performance for highly realistic displays in spite of being shown to perform poorly. They termed this paradoxical behaviour 'Naïve Realism' (Smallman, John, & Cowen, 2005: 16-2). For Smallman and Cowen, Naïve Realism has its origin in

perception and it is our perception that ‘leads us to harbour an inflated view of our ability to extract information from the world and from realistic depictions of it in displays.’ However as they point out, current perceptual theory sees the representation of the visual scene as flawed. They cite the studies by O’Regan (1992) that demonstrated that a spate of change blindness and related cognitive studies suggests that little is actually sensed of a scene other than a sample of fixations, but that the brain ‘fills in’ the remainder and gives the viewer the sense of having an accurate representation of the entire scene. It is this sparse sampling that leads to change blindness and the occasional feeling of surprise at suddenly seeing something that has been ‘hidden in plain sight’ (Smallman, et al., 2005: 16-13). It was as Clausewitz observed over a century before: ‘This difficulty of seeing things correctly, which is one of the greatest sources of friction in war, makes things appear quite different from what was expected. The impression of the senses is stronger than the force of the ideas resulting from methodical reflection’ (Clausewitz, 1997: 65).

This sparseness of perception has been recognised and exploited throughout history by a range of practitioners in the military, advertising and the theatre. Film and theatre directors, politicians and camoufleurs and magicians all rely on the permeability of visual attention. Perceptual phenomena such as change blindness have now become the focus of cognitive science research. (Smallman, et al., 2005: 16-13) Smallman et al have found that an overconfidence in perceptual abilities coupled with display realism produces a dangerous complacency about the accuracy of the experience and its interpretation. ‘Naïve Realism leads to the fallacy that the gold standard of displays is one that shows the user what it is like to “be there”’ (Smallman, et al., 2005: 16-14). They argue that even with the addition of the depth cues that the participants would have in the real world, such ‘super-realistic’ displays are still dependant on the viewer’s own imperfect ability to extract information from natural scenes (Smallman, et al., 2005: 16-14).

The process of highlighting or foregrounding the information that is most relevant for the task inevitably requires a selective reality, which is the antithesis of Naïve Realism display philosophy. These realist displays are visually crowded with details that cloud the essential features. Smallman, St John and Cowen give as an example the shaded texture gradients across a 3-D landscape that mask the extraction of such symbolic

information as the location and identity of an antenna on a hillside. Their conclusion is that the principles of basic perceptual science and display design philosophy are completely misaligned. The result is increasingly photo-realistic, real-time displays 'which beguile but under-perform' (Smallman, et al., 2005:16-15). In studies of perception, it is found that people frequently have to reform their ideas and strategies when and if they recognise disparity between what they imagined the landscape to be and what it actually was on the ground. The landscape is made up of both physical and perceived experiences. We construct the landscape through our imagination as much as through vision.

Camouflage Strategies

> The Allies decided to take part in the *mise en scène* of Hitler's newsreel and intelligence films. Their main technique was not classical camouflage but, on the contrary, overexposure. Enemy cameras were offered sight of scenery, material, troop movements – all part of the almost limitless repertoire of visual illusions in real space.
>
> (Virilio, 1989: 63)

The art of visual illusion involves transformations, disappearances or substitutions. It is in art and camouflage 'that a strategy of appearances has been conserved, that is, a mastery of apparitions and disappearances' (Baudrillard, 1999: 173). Baudrillard tells us that 'What we call art, theatre, language have worked for centuries to save illusion in this sense, that is, to maintain the tiny distance that makes the real play with its own reality, that plays with the disappearance of the real while exalting its appearance' (Baudrillard, 1999: 173).

In 1942 the US War Department issued one of many Camouflage instruction manuals. Discovered in a WWII vintage camouflage course training packet, the course introduction stated: 'Perhaps no phase of the operational techniques involved in the present world conflict has received more popular or general attention than camouflage. Many of our large industrial plants have as if by magic, been blended into the surrounding territory. These installations have often been looked upon by the public as

some sort of miracle... It is only human to be attracted by deception, and a certain unexplainable glamour seems to surround the deceiver. All of us enjoy a good performance by a capable magician.'

This section is concerned with the theatrical effects adopted by the camoufleurs when staging their illusions in the First and Second World Wars. It describes the extraordinary combination of artificial and naturalistic effects to create viable and convincing scenographic strategies for the Theatre of War.

Fake Nature

In 1915, the French army formed the first specialized camouflage unit, Les Peintres de la Guerre au Camouflage, at Noyon, to camouflage airfields and observation points against aerial reconnaissance (Kahn, 1984: 29). Elizabeth Khan in her important study on the French camoufleurs on World War I identifies the range of 'fake nature' that was devised and deployed, from hollowed-out trees to trompe l'oeil painted screens.

Jean Baptiste Eugene Corbin, a department store owner and patron of L'Ecole de Nancy an industrial collective of designers, provided the motivating force behind the first French camouflage unit, later overseen by Guirand de Scevola. With the help of Louis Guignot (1864-1948), an expert dye-maker who had developed colourants that did not fade in water or bright light, Corbin developed camouflage fabrics and wire umbrella devices to suspend over artillery installations. From October 1914, Corbin, Guignot, Henri Royer (1869-1938; another Ecole de Nancy artist) and Eugene Renain (dates unknown; a set-painter from the Paris Opera), amongst others, began producing camouflage fabric on a large scale and installing it, often whilst under fire (O'Mahoney, 2010: 17).

The camoufleurs were initially trained in Paris at the Atelier de Decors at the Opera. Then they were assigned to one of the three front-line studios at Amiens, Chalons-sur-Marne and Nancy. By 1918, two more front-line studios were instated at Chantilly and Epernay. Each studio and sub-section developed specialisms. The eighth army studio at Nancy specialized in raffia and trompe l'oeil paintings of trees and landscape. The fourth

army studio at Chalons-sur-Marne, housed in an old circus building, specialized in facsimiles in wood and metal of trees, tanks, locomotives, guns and even fake soldiers that were constructed from architects' and designers' plans. At the Amiens atelier the major type of camouflage production was the construction of *les faux arbres*, fake trees hiding observation posts which were installed at the front line (Kahn, 1984: 32). In addition to the front-line studios, a twenty camouflage 'factory' was established at Dijon which produced each day, '50,000 square yards of artillery cover in addition to observation posts, dummy heads and horses, snipers' suits and armour-plated tree trunks' (Behrens, 1981: 30).

The value of this form of strategic deception was quickly recognized by the Allies, and officers from the French camoufleur unit were soon sent to advise the British, Belgian and later Italian and Americans, in creating their own units. In 1915, the adjutant general at GHQ in France sent a letter on Christmas Eve requesting that artist Mr S.J. Solomon 'be despatched to this country at the earliest possible date, accompanied by sufficient personnel of his own selection to enable him to start work as soon as possible upon the construction of some urgently required special observation stations'. Solomon put together a team which included the 'ingenious and inventive' Lyndsay D. Symington, a theatre designer and illustrator, Roland Harker, a scenery painter and Oliver Bernard 'a small man, very deaf, who staged the operas at Covent Garden', known to be 'a good organiser'. Bernard brought with him E. W. Holmes of Leeds, who was head property man at the Drury Lane theatre and a master carpenter (Rankin, 2008: 83).

At the French studios, the British contingent learned the skill of making decoys including the life sized painted wooden silhouettes and dummy heads which were used in the trenches to draw enemy fire (Fig. 29) They were rigged with hinges and ropes for the so called 'Chinese attack' when 'at the appointed moment the ropes would all be pulled at once, and the appearance to the enemy would be that of a raiding party starting out at top speed' (Behrens, 1981: 30). Equally ingenious were the hollow paper mache horses used on the battlefield as 'hides' for snipers and as observation posts. (Fig. 30) Under the cover of darkness, they would be put in the place of actual carcasses. Soon the British artists and designers began making their own innovations. L.D. Symington, for example is credited with designing the 'Beehive' an observation post:

> Camouflaged with paint and bits of grass to simulate the appearance of the surrounding terrain, often being studded with tin cans or old shoes to make it appear to be an accumulation of rubbish. The favourite way of making the peephole for a beehive was to cover with gauze a hole cut in the bottom of an old shoe, which was then fastened to the observation post.
>
> (Behrens, 1981: 31)

The British also came up were their own version of the armor-plated tree trunks which were used as observation posts (Fig. 31 & 32). Although S. J. Solomon is credited with inventing fake ‘willow trees’ that were steel-cored observation posts it was the theatre designer Oliver Bernard who was to be one of the most productive of the British camoufleurs. Bernard had studied scenic arts where he taught himself to draw by sketching trees, a practice that would prove to be of great value in his camouflage work. In early May 1916, Bernard was appointed the erecting officer of the second, third and fourth camouflage trees at the front at Ypres. He was determined that his trees would be better designed and placed than Solomon's had been. Bernard described his observation posts as:

> Hollow imitations of pollard willow trees, consisting of bullet-proof steel cylinders composed of elliptical sections, assembled and cased in outer jackets or blindage of thin sheet iron; the blindage being framed, contoured and hammered, finally dressed to reproduce the external appearance of existing trees which were so replaced to accommodate observers.
>
> (Bernard, 1936: 83)

The British version frequently had ‘a flight of iron steps leading to a seat in the upper part of the trunk. At this seat were peep holes and a stand for the phone which was connected up with the exchange at the adjoining trench’ (Behrens, 1981: 30).

In July 1917, when King George V and the Prince of Wales visited one of the Special Works Parks, the *Daily Mail* reported: 'The King Saw all the latest Protean tricks for concealing or, as we all say now, for 'camouflaging' guns, snipers, observers.' *The Times* special correspondent also wrote about the visit:

> On Friday, July 6, the King drove first to the home of the high priests of the great mysteries of camouflage, a magician's palace in a Belgian farm, where nothing is what it seems to be. It is a bewildering place, which, of course, cannot be described in detail - a land on the other side of the looking-glass, where bushes are men and things dissolve when you look at them and the earth collapses, where visions are about and you walk among snares and pitfalls... It is the grown-up home of make-believe. Here the King was received by the chief magicians, who showed him their black arts and made him privy to all their secrets.
>
> (Rankin, 2008: 141)

By 1917, the scale of the French illusions had become scenographic. It was no longer confined to props and costume changes. The objective became, as Claire O'Mahoney pointed out to create fabrics and trompe l'oeil screens that blended into the surrounding landscape that no distinction could be seen (Fig. 33). A 1920 article published in *L'Illustration* included a set of samples of camouflage designed for specific battlefield locales reflecting the appearance of the 'natural tonalities of vegetation and climatic and seasonal effects' (O'Mahoney, 2010: 20). Peter Wright describes how the French camouflage section at Amiens produced large-scale illusions, like the vast painting that was 'raised suddenly on the crest of Messines in June 1917 to simulate an assault of 300 soldiers'(Wright, 2005). By 1918, the French were trying large-scale visual deception, *camouflage par faux-objectifs*. (Fig.34) Lakes and canals and rivers disguised with painted covers and in fields outside Paris, wood and canvas and strings of lights were used to reconstruct the Gare de l'Est railway station and fake boulevards and avenues (Rankin, 2008: 134). This 'luminous camouflage' described in 1930 by Paul Vauthier in his book, *Le danger aerien et l'avenir du pays* (Vauthier, 1930) had been conceived by the designer Fernand Jacopozzi. The original plan had been to replicate the entire city of Paris as a response to the threat of air attack but the war came to an end before it needed to be realised. According to an article published in the journal *L'Illustration* in 1920, German intelligence had been aware of the plans but concluded: 'even supposing that the German general staff had heard about our work, this would certainly not have prevented enemy aviators from being deceived by the mirage of a fake factory or a simulated station; and that was essential' (Deriu, 2004: 20).

The German use of camouflage had come late in the war, despite having an advanced prewar programme of experimentation. But when they did start to use camouflage methods they achieved extraordinary results. In April 1917, after the Germans withdrew from Adinfer Wood to the Hindenburg Line, it was recorded how they had made use of the whole wood:

> On its front, hidden in the beech hedge, are machine-gun emplacements of concrete and armour-plate, like large letter-boxes. Within it are gun emplacements and shelters built of large boles, planted over with ferns and grasses for concealment; smaller shelters are woven cleverly of branches, some growing and some partly or wholly cut. Its trees are erect and unbroken. Moss and ivy, violets, bluebells, anemones and wild strawberry carpet it. The relics of its occupation are unobtrusive.
>
> (Rankin, 2008: 141)

By the beginning of 1918, S. J. Solomon had begun to study the enemy's efforts at concealment. His conclusions however, were to be highly controversial. Solomon had become convinced Germany having recognised early in the war the strategic significance of the aerial view, had 'perfected her system of camouflage' by employing advanced scientific and artistic principles to produce an advanced form of concealment (Solomon, 1920: 2). In his book, *Strategic Camouflage*, published in May 1920, Solomon suggests that the German approach in contrast to the Allies' improvised camouflage measures, was based on experiment and planned organisation. (Fig.35) It was a 'special discipline' that adopted the 'only sound principle that of photographing the area to be dealt with, making from the photograph the initial model of roads and structures required and reproducing in them intact the features of the ground they covered as seen from above: the conjurer's false bottom' (Solomon, 1920: 2). Solomon's analysis of German camouflage was made by studying magnified aerial photographs of German-held areas and using drawing and models to confirm his hypotheses. Solomon wrote that for 'a constructive and synthetic analysis' of the enemy's camouflage that in addition to highly magnified photographs, enlarged drawings and experimental models were required. 'The making of drawings or models checks any tendency to misinterpretation; everything must explain itself and fit in as accurately as an architect's plan and elevation' (Solomon, 1920: 11).

His extensive investigation revealed ‘imitation shadows’ and ‘papier-mache-like bobbles’ which were indications to him of the existence of a massive system decoy structures raised above existing roads or fields to disguise military movements and positions. These raised structures formed what Solomon referred to as a ‘hollow landscape’ and he described in his book how dummy houses, horses, trucks or ‘any apparently weighty, bulky object’ was used on them to reinforce the illusion of solid ground (Solomon, 1920:16). He observed that ‘there are things which can be drawn on paper, or done in modelled scenery, which can destroy the sense of space, an defy the elements, which cannot be equalled in nature’ (Solomon, 1920: 13). Among the dummies, the ‘modelled fudge’, he identified were imitation hay stooks in the fields at St Pierre Chapelle. He suggests that a pre-war photograph of this field provided the ‘key to Zeebrugge’ from which the German camoufleurs designed ‘in all probability the original working model of its camouflage’ (Solomon, 1920: 15). In response to the suggestion that no camoufleurs would ever take so much trouble to reproduce the distinctive dome shaped stooks in such number, Solomon wrote that:

> The making of a few hundred papier-mache mounds would certainly not deter the manager of Grand Opera or of Drury Lane from Theatre from mounting a ballet, in which such *decors* might be needed for the *mise-en-scène*, so that it is hardly credible that the German who made up his mind after forty years of preparation to dominate Europe, would hesitate to give these very convincing touches to his work. Their very numbers helped the illusion.
>
> (Solomon, 1920: 16)

Solomon praises the German camoufleur for his ‘constructive artistry and patience’ in creating ‘the surface texture of this modelled Earl’s Court scenery on a large scale’(Solomon, 1920: 21). He concludes his book by claiming that ‘today their modelled scenery system and our shadowless method together, practically cover the ground of camouflage devised to screen from aerial observation’ (Solomon, 1920: 59). Solomon, however found it impossible to convince the Allied military hierarchy about the effectiveness of the German system. It was only after a review appeared in *Das Technische Blatt* that Solomon’s views were substantiated by a German observer (Wright, 2005: 144).

Solomon, a painter and Royal Academician also held very strong views about the effectiveness of the 'Cubist' form of painted camouflage (Fig. 36). He thought that in aerial photographs, the exaggerated shapes and colours 'proclaimed aloud the military nature of the object painted'. His own 'application of art to war' aimed at naturalism: the 'imitation of the ground and the roads it covers' (Wright, 2005). Although Dr. A. McKenzie, a major with the Royal Engineers Camouflage School was later to disagree with Solomon's findings about German camouflage[2] they both recognised the need for the camoufleur to be familiar with the natural aspects of the terrain. In 1917, Mackenzie 'a British Officer skilled in landscape gardening' in his lectures on methods of camouflage wrote that when 'devising traps for the enemy', one needed 'an eye for country, imitating and making the best use of natural features... to make every artificial feature of such a natural appearance that it cannot be distinguished from nature itself' (Mackenzie, 1917: 579). It was a viewpoint that was shared by a growing number of camoufleurs. Camouflage, said Homer Saint-Gaudens (1880-1958), the American theatre designer, 'is no vaudeville magic. It requires trouble, horse sense and an ability to take advantage of the local conditions. It is Indian fighting.' (Behrens, 2009: 312). With America's entry into the Great War, Saint-Gaudens found himself put in charge of the American camouflage corps, where he found himself 'guiding the emotional destinies of 400 tempermentalities in the forms of artists, plumbers, carpenters and other eccentrics who ultimately won the war by spreading scenery over the gory fields of the AEF (American Expedition Forces)'. It was Saint-Gaudens' view that: 'For our non-commissioned officers and privates,' he went on, 'the moving picture and stage property men and carpenters were by all odds, the most successful. An ability to handle those superior in rank and a resourcefulness at all hours was theirs' (Behrens, 2009: 312). Throughout World War I, there had been a continuous debate about who made the best camoufleur: artists, architects, theatre designers, or scientists. Khan tells us of a protest made by the decorators of the Syndicat des Decors de Theatre against the camouflage section when it was founded demanding to know 'why certain special painting jobs were not assigned to the Theater Decorators' Union which seemed the obvious choice and which offered much lower prices than those obtained by giving the work to artists who seem not to have been trained for such work' (Kahn, 1984: 23).

[2]The *Morning Post* of the 28th May, 1920 carried an item entitled 'Camouflage Col. Solomon's "Fantastic Ideas" which referred to an address given by Dr A. McKenzie to the International College of Chromatics in which he disparaged Solomon's conclusions.

The concerns about the nature of camouflage training and its suitability for aerial warfare grew during the interwar years. In 1939, the Silicate Paint Company, based in London produced a brochure entitled *Camouflage and Aerial Defense* which stressed the importance of training in aerial perspective:

> It must be borne in mind that protection from aerial observation requires a totally different technique from protection against direct observation. An aerial force will, in most cases, view objectives from an oblique angle, and consequently a knowledge of the perspective of shadows, or of landscape seen from an unaccustomed angle, is essential to the camouflage designers.
>
> (Silicate, 1939: 10)

The pamphlet also included advice on the assessment of the tonal qualities and texture and pattern of landscape and suggested that camouflage designers had to be artists with 'a real understanding of the scenic possibilities of landscape' (Deriu, 2004: 22). However in 1940, Lieutenant-Colonel Clement Chesney, wrote in his book *Art of Camouflage* 'Why a successful painter or scenic artist, say, who has perhaps never been in an aeroplane should be thought to be the most suitable person to undertake three-dimensional work of this nature, is rather astonishing' (Chesney, 1941: 42). Chesney an English camoufleur had trained as an engineer and worked as a camoufleur in WW1 at the Amiens studio. In some ways his vehement criticism of artists may have stemmed from the rivalry he experienced in France. Chesney had himself been 'ticked off' by the British theatre designer A.R. Harker 'in the early days for painting black lines between the colours of canvas' (Behrens, 2009: 178) and those in command over him were artists. Chesney, however was not alone in his dislike of the artist/camoufleurs. Captain Peter Rodyenko, an interior designer turned camoufleur, was highly critical of the use of artists. In his article, *Aerial Photography Outmodes Paint* written in 1941 he advised 'that the "crisscross and zigzag designs" (the dazzle of World War I) and the "strange Rube Goldberg contraptions" - most of which, Rodyenko laments, were "utter nonsense" anyway -had become archaic' (Behrens, 1981: 63). In England at the same time, an article in *Nature* deplored the fact that all but four of the sixty-five technical officers in the British Civil Defense Camouflage Establishment were 'either professional artists or, at the time of recruitment, were students at art schools,' so that the research and application of camouflage was 'controlled by people lacking the necessary scientific

training and with no knowledge of the fundamental biological and psychological principles involved' (Behrens, 1981: 64). 'Artists', the essay continued, 'rely too much on painting, and tend to forego patterns in favour of fanciful pictures, e. g. preposterous pictures of trees were painted on factory towers! It should scarcely be necessary to point out that the result of light and shade is such as absolutely to kill this piece of stage scenery at bombing range,' the author exclaims.(Behrens, 1981: 64) (Fig.37). Despite these criticisms, camouflage training was still predominantly seen as an artistic pursuit. Henrietta Goodden in her book *Camouflage and Art* identifies the large number of British camoufleurs that were recruited during WW2 from the colleges of art, theatres and film studios. It was a similar case in the U.S. where *Popular Mechanics* reported in its December 1942 issue that: 'Artists, architects, engineers, photographers, industrial designers, stage designers, magicians, chemists, sculptors, mathematicians, model makers, taxidermists, landscapers and movie technicians whose special training fits them for angles of the fooling game are contributing to the national effort'(Anon, 1942d: 68). In the same year, the U.S. government certified the School of Design of Chicago directed by Laszlo Moholy-Nagy an official centre for camouflage training. Gyorgy Kepes was given the responsibility for running the camouflage workshops. A list of evening classes (dated 1942-1943) includes the following entry: 'The Principles of Camouflage- Research in natural camouflage; surface covering; mimicry; visual illusions; basic photography; investigation of camouflage techniques. Conducted by George Kepes' (Behrens, 1981: 59).

Alain Findeli in *Le Bauhaus de Chicago: L'Oeuvre pedagogique de Lazlo Maholy-Nagy* has described how Gestalt psychology and the aerial perspective informed Kepes' teachings.

> The figure/ground model that [Kepes] developed in his researches describes succinctly but exactly the issues of camouflage: how to make sure that a certain factory or port installation, when seen from a plane, would not create a visual contrast with the surrounding landscape − that is, a field of forces attracting attention.
>
> (Deriu, 2004: 33)

Along with Moholy Nagy, Kepes was requested by the Mayor of Chicago to design a camouflage scheme to the city's shoreline from aerial attack. It is Judith Weschler's

view that Kepes created an environmental artform when he ‘explored the possibilities of transforming the large scale image of the city. To dislocate the night landmarks, he proposed to float on cables a network of lights that would hover over Lake Michigan so that the pattern would take on an apparent reality confusing to potential raiders’ (Weschler, 1978: 10).

Rival American colleges and universities were quick to respond setting up their own courses on all aspects of camouflage work. In 1942 *Popular Mechanics* reported that ‘Among America’s educational institutions, New York's Pratt Institute rated highly with the Army’. The magazine included photographs of student work (Fig. 38) which showed:

> A model waterfront and dock for studies in camouflage; a helmet of foliage [to be worn with a uniform] that will blend a soldier almost imperceptibly into his background; a camera test of camouflage on oil tank; a machine which duplicates sun-shadow conditions at any given moment of year; camouflaging spherical oil tanks with irregular superstructure that breaks up their tell tale pattern of shadows; and a sun machine which produced on a model the shadows that would occur in Philadelphia on a specified day of the year at nine a.m.
>
> (Anon, 1942d: 174)

In an attempt to bring some unity to the teaching, an official government report was issued in 1943 which was intended to: ‘suggest to teachers of art in colleges and universities the contributions that art instruction may make to the national war effort’. It included specific sections for fine artists, painters and sculptors; architecture and drama. Training was to include an ‘increased visual response to a new environment. By studying a number of different works of art a student can be taught to react more quickly to new surroundings and to increase his visual memory’. Other recommendations included studies in illusionary drawing and painting, optics, and the properties of light and color, plus the practice and skill ‘necessary to impressionistic painting’. It was noted that ‘the contribution of the painter is obvious as most camouflage is simply a reversal of all the optically illusionary effects of impressionistic painting’. Painting artillery range-finder scenery is to be ‘as illusionary as it is possible to make it’(Agency, 1943).

As well as the educational institutions, professional societies and institutions all over the U.S. were contributing to the war effort. Among them was the Camouflage Society of Professional Stage Designers, which had a camouflage laboratory in New York City and whose members, under the presidency of Jo Mielziner, included Donald Oenslager, Boris Aronson, Bradford Ashworth, Lemuel Ayres, Robert Barnhardt, Stewart Chaney, Adrian Cracraft, Manuel Esman, Fredrick Fox, Edward Gelbert, Phillip Gelbert, Mordecai Gorelik, Harry Horner, Carl Kent, David Langworthy, Johannes Larson, Thomas Lee, Sam Leve and Howard Wisler (Behrens, 2009: 82).

Donald Oenslager (1902-1975) in addition to his work with the Society of Professional Stage Designers, was also on the staff of a large school that had been established at Jefferson Barracks in St Louis, Missouri. As Camoufleur Officer for the Second Air Force, Donald Oenslager organized and inspected many of these training programs at bomber bases throughout the Midwestern states (Oenslager, 1978:12). Drawing on his theatrical background to help in this task, Oenslager in one instance had his artists paint a stage backdrop of the world military theatre 5.5 m^2 high by 10 m^2 wide to be used by his officers in educating the soldiers. Oenslager had very clear views about the skills of his profession. In an interview with Lucius Beebe in the *New York Herald Tribune* in 1935, he stated:

> Scenic design and stage settings are the field of the craftsman, not an artist. Not only must the man... visualize what theme treatment will be most effective in translating the feeling of the play to the audience, but he must know what objects, materials, and fabrications of them are available... what they will look like... under stage lights. He must be a combination of interior decorator, psychologist, antiquarian, and bogus antique dealer.
>
> (Beebe, 1935)

The theatre designer Jo Mielziner (1901-1976), in the meantime was supervising camouflage at Richmond Air Base in Virginia, a key installation. At Richmond, the base was designed to blend with surrounding civilian areas. The long low troop barracks were each painted in two pastel colors divided down the center, to resemble semidetached family dwellings. False chimneys for nonexistent fireplaces, small awnings, white picket fences, and a variety of shrubs and ‘front lawn’ treatments added to the make-believe.

Civilian cars were permitted on the base, but instead of being crowded into huge parking lots they were allowed to park at random along the many streets of this fictitious ‘suburban community’ (Reit, 1978: 81). For better protection, aircraft were dispersed and individually concealed, and hangar shapes were broken up with carefully placed nets. Mielziner had the field's runways coated with textured asphalt to reduce glare, then spray-painted them in patterns of green, brown, and yellow ochre to blend into the local countryside. By applying lighter and darker shades of colour at certain points, a three-dimensional foliage effect was also achieved (Reit, 1978: 81).

A description of Mielziner's skill in camouflage appeared in the *New York Herald Tribune* on the 24 March 1946. The article ‘Mielziner Marks 150th Show By Scoring One More Success’, reported that Mielziner’s:

> Theatrical training was ideal for his new work; his knowledge of quick effects, of expedients, of limited and substitute materials. His intimate “know how,” gained in the theatre was just the right equipment for an expert who had to be intimate with the chemistry of lighting, the principles of landscaping, architecture and hasty improvisation. The two important aspects of camouflage--self preservation and the protection of equipment on the ground--were natural for a scene designer who knew how to solve them with the use of light, shadow, color, texture, blending, use of drapes, netting and decoys. Back in full stride in the theatre, Mielziner's work in ‘Dream Girl’ illustrates how an expert in the art of camouflage can reverse the same principles and be an expert in the art of revelation.
>
> (Anon, 1946)

Camouflage training for the Western Defense Command was centred initially at Hamilton Field north of San Francisco, and then shifted to March Field, a large base on the fringe of the Mojave Desert some forty miles east of Los Angeles. The proximity to Hollywood meant that it was possible to recruit a large number of volunteers and draftees from the film industry. Art directors, scenic designers, painters, animators, landscape artists, lighting experts, carpenters, and prop men came from M-G-M, Warner Bros., Universal Pictures, the Disney Studios, Twentieth Century-Fox, and other companies. They ranged in experience from veteran art director Gabriel Scognamillo to Harry Horner, a protege of Max Reinhardt (Reit, 1978: 84). Seymour Reit, a member of

the US Camouflage Unit, tells us, that at March ‘it was hard to tell where reality ended and fantasy began. Reit describes how vast storage yards were hidden under fabricated trees and large factories were turned ‘into innocent pastoral landscapes’ (Reit, 1978: 85).

By the end of 1943, so the *Britannica Book of the Year 1944* recorded, it was estimated that of the 18,000 males normally employed in the actual production of motion pictures, nearly 7,000 were in the armed forces. The article highlighted the specialist skills of the film industry:

> Always, beneath the glamour and glitter that the world associates with motion pictures is solid, skilled, ingenious craftsmanship. It was this characteristic which, in 1943, enabled the industry to turn out a splendid assortment of product despite the disabilities imposed by war conditions. Much of the credit for this belongs to the technical workers. In fact, Hollywood was saying proudly that there was no task beyond the abilities of its technical corps.
>
> (Anon, 1944a: 455)

Reit in his book *Masquerade* gives a number of examples of the extensive camouflage schemes devised by the Hollywood camoufleurs. The disguise of the Lockheed-Vega aircraft plant at Burbank, hidden beneath a complete southern California ‘suburb’, was perhaps the one of the most ambitious (Fig. 39). The site was ‘landscaped’ into a gently sloping hill made of chicken wire, scrim netting, and painted canvas supported on scaffolding poles. Roads were painted up the sides of the structure, continued over the top, and down the other side; canvas houses were placed along the streets, and numerous trees and shrubs were ‘planted.’ Dummy cars were added here and there, as well as laundry lines and ‘victory gardens’ Numerous air ducts provided ventilation for the plant's workers, and trapdoors led up to the canopy through the factory roof. Reit describes how the camoufleurs would move the props around to create convincing signs of activity (Reit, 1978: 86).

The Boeing Aircraft plant in Seattle Washington was another major camouflage operation. This was overseen by John (Stewart) Detlie (1908 - 2005) the American architect and set designer. Born in Sioux Falls SD., he earned degrees in architecture at

the University of Pennsylvania, before moving to Hollywood in the early 1930s, where he worked as a set designer. Detli received an Oscar nomination for his production design of *Bitter Sweet* a 1940 production. In 1942, he left his position at MGM to supervise the Boeing Aircraft plant camouflage project for the US Army Corps of Engineers. In his obituary in The Washington Post in 2005 it was reported that:

> To confuse enemy bombers, Boeing Aircraft camouflaged nearly 26s of the plant in Seattle, where the B-17 and, later, the B-29 were built. Boeing's Plant was covered with a three-dimensional wire, plywood and canvas structure that was made to look like a town, including trees, houses and schools, instead of a wartime airplane factor.
>
> (Behrens, 2009: 116)

Camoufleurs on all sides were transforming the wartime landscape into an elaborately choreographed and scripted presentation. Derek Threadgall in his account of the wartime activities of Shepperton Studios outside London describes how in 1944, scenic designers and craftsmen fabricated a giant oil storage facility and docking area near Dover entirely from painted canvas, wooden scaffolding, and sections of old sewer pipe. Aerial photographs were taken of the completed stage set so that its effectiveness could be assessed and any changes made if necessary. Threadgall reports how one of the workers recalled that ‘Most of us were film and theatre people so naturally we wanted a proper dress rehearsal’ (Threadgall, 1994: 28). The German reconnaissance photographs taken at high level ‘showed an authentic terminal’ which became a target for long-range artillery from German emplacements on the French coast. The playacting continued when in response to the enemy fire, the camouflage crews faked the resulting ‘fire damage’ using sodium flares and mobile smoke generators (Threadgall, 1994: 28).

In the early years of the war the Germans had little interest in creating elaborate camouflage schemes themselves. But after the RAF gained air supremacy, they began to adopt new defensive strategies. As the night bombings intensified the Germans came to rely increasingly on ‘defence by misdirection’ (Reit, 1978: 109). One of the most famous Germans decoys was created in Hamburg (Fig.40). The Alster Basin in Hamburg is a large body of water situated at what was then the heart of the city's business and industrial life. Moonlight reflecting on the water made an ideal orientation

point for attacking planes. In addition, just a few hundred yards away were the inviting targets of the Hamburg railroad station and the Lombard bridge (Reit, 1978: 110).

The German plan was to conceal the entire Binnen Alster, some 188,129 m^2 of open water. Hundreds of poles were driven into the relatively soft bed of the basin as supports fors of wooden-canopy painted to simulate the rooftops of dwellings and office buildings, as well the streets of Hamburg. 'The railway station had a complete false roof built over it in the shape of a small hill. This false roof was completely covered with material resembling green grass, and artificial paths were made over the "hill"' (War Department, 1942) (Fig.41). To complete the illusion, a fake bridge more than half a mile long was built further north, across the outer Alster, exactly simulating the Lombard bridge. It too was built of wood, complete with imitation railroad tracks and a dummy 'train'. The vast camouflage project took four months to build, from January to April 1941, and involved hundreds of technicians and carpenters. British Intelligence, however, had already become aware of the scheme by April 1941. The interpreters at Medmenham studying reconnaissance photographs showing the area before and after camouflage recognised the differences in visual texture between the real fabric of the city and the simulation. The illusion was exposed and in the summer of 1943, Hamburg became the target for the horrific spectacle of 'Operation Gomorrah' the devastating firebombing raid on the city. The photographic interpreter, Powys-Lybbe wrote: 'If the German authorities had realized how much we knew about their methods of camouflage, and how we were able to watch every stage of the process, they might well have given it up as hopeless quite early on' (Powys-Lybbe, 1983: 91). It is a view that is reflected in a report issued by the British Air Ministry in March 1945 which found that the German camouflage programme 'achieved some success in confusing the naked eye of the observer from the air, but apart from a few exceptional cases of small structures... they failed to deceive the camera' (Anon, 1945: 27).

But not all observers were so critical of the German efforts. A 1942 U.S. War Department analysis commended a number of aspects of German camouflage, in particular the eye for detail and precision. (Fig. 42)

'The enemy's natural aptitude for painstaking craftsmanship seems to serve him in good stead when camouflage is to be undertaken. No matter whether the German is making

use of natural or artificial camouflage, his work is resourceful and thorough. He is aware that in camouflage, it's the small touches that count—"When time is short," the Germans say, "it is better to camouflage a few objects well than to camouflage everything badly". If a camouflage plan is linked with deception, such as the use of dummy materiel, it will be all the more effective. However, it must be remembered that a single blunder can ruin the success of an entire plan. Noise and light discipline are part and parcel of an over-all camouflage layout, and it is every soldier's responsibility to help maintain the general scheme to perfection' (War Department, 1942).

Among the outstanding German principles noted in the report was the emphasis on the value placed on darkness, mist and shadows and of the 'texture' of natural growth which was preferable to artificial camouflage. An exception to this was the spraying of white horses with 'a solution of about 10 percent permanganate of potash'. The report also acknowledges that:

> The Germans have evidently studied the problem very closely, and with their usual thoroughness have resorted to elaborate schemes of concealment and deception wherever they consider such measures justified by the importance of the target. Dummy farms and other buildings are disposed around airdromes to conceal workshops or isolated aircraft outside their hangars, while papier-mâché cows and beds of real flowers are used to add a convincing note.
>
> (War Department, 1942)

The report also included an extensive description of camouflage effects in Berlin. Camouflage netting covered important buildings and artificial farm buildings, and trees were put on the roofs. Pavements were sprayed with green paint to blend with the surrounding trees; monuments were painted with non reflective colours and overhead wire matting, interwoven with vegetation and artificial shrubs and trees was used to disguise existing roads. Care was taken to vary the colouring and texture at intervals and the netting was hung at an angle to eliminate casting shadows. Dummy streets were also simulated with wire netting. They frequently were connected with real roads and 'In one instance it is reported that a woods was created by fastening artificial sprigs about 1 foot high and about 1 to 2 inches apart to a wire net. Through these "woods" a system of "roads" was painted in brown on the mesh of the net'. (War Department, 1942).

The Scenic Effects

'As I did stand my watch upon the hill, I look'd toward Birnam, and anon, methought, The wood began to move' *Macbeth* Act 5, Scene 5

The scenic effects created by the wartime camoufleurs like those in the theatre can be divided into costume[3], props, scenery, lighting and sound. At the beginning of the Second World War most camouflage was created with paint. It was cheap and could be used to give quick effects. But as photo reconnaissance and interpretation became more sophisticated, camouflage needed to look less two dimensional and to become constructed and spatial. Julian Trevelyan wrote in 'The Technique of Camouflage' in the *Architectural Review* of September 1944 that there were two opposing schools of thought about how to realise camouflage schemes: the architects and artists who 'favoured the use of real materials for construction such as tile, brick, stone and timber' and the art directors who created illusions with plaster-cast sheets of these same materials' (Goodden, 2007: 156).

The architect Hugh Casson was appalled by the many examples he saw of painted camouflage: 'magnified trees...painted in elevation upon the lofty sides of some concrete cooling towers'; a cinema roof in 'alternate stripes and patches of grey, light yellow and a delicate apple green (Goodden, 2007: 49) (Fig.43). Geoffrey Barkas, the cinematographer and camoufleur was equally astounded by some of the camouflage work he saw. In *The Camouflage Story*, the book about his experiences in the Second World War he notes that:

> Later it proved that my earlier film work had much in common with camouflage, but at the time, and without the intrusion of Providence, it was the last form of war work that it would have occurred to me to seek. The word itself was familiar enough and there was no escaping some of its more startling manifestations − the strange and violent patterns daubed on vans and factories, the occasional tropical palm trees painted on provincial gas-holders − all this, I knew, was called camouflage. I might

[3] The subject of camouflage dress has been the subject of numerous studies and popular histories most notably Hardy Blechman's comprehensive volumes, *DPM Disruptive Pattern Material, An Encyclopedia of Camouflage: Nature, Military, Culture*, London: DPM Ltd, 2004.

> have been a little puzzled sometimes as to how the interests of concealment were served by making things so blatantly conspicuous.
>
> (Barkas, 1952: 23)

But Barkas's camouflage training and that of his fellow camoufleurs in WW II went beyond learning painting techniques. It included theoretical and scientific studies on perception, infra-red photography, wavelengths and the properties of chlorophyll. There was also instruction in scenic film techniques such as plaster moulding and other three-dimensional construction methods (Goodden, 2007: 39).

Robert P Breckenridge in his book, *Modern Camouflage* published in 1942, presented the case for 'the new science of protective concealment'. He suggested how to plan buildings with visibility from the air and advocated the design of low irregularly arranged structures of varying sizes with projecting elements that could cause shadows.(Breckenridge, 1942: 84) Breckenridge compared the relative merits of the different camouflage methodologies, whether painting was 'better' than planting or nets 'better' than painting. He concluded that the skilled camouflage engineer will 'draw on and use any and all techniques which are best fitted for the job at hand' (Breckenridge, 1942: 106). (Fig. 44)

Factories were disguised as suburbs, airfields like farmland with landing strips painted with coloured powders that imitated different agricultural surfaces. After a raid, realistic bomb craters were needed to show up on the enemy's reconnaissance photographs, so the camoufleurs mass-produced dummy craters painted on large sheets of canvas. They were two kinds. The one for cloudy weather had subdued shadows while the 'sunny' version had deep, sharp shadows painted around the crater's inner edge. The shadows on the canvas craters were continually oriented to the position of the sun (Reit, 1978: 56). Art director Peter Proud at Tobruk in North Africa designed numerous small 'bomb craters' with shadows made from oil or coal dust and scattered battle debris' around them. Other 'damage' was simulated with canvas, paint and cement and by blowing up surrounding disused buildings with pre-set charges (Threadgall, 1994: 26). The performative nature of the camoufleurs' activities was always evident in these schemes. It was never a case of just painting the scenery and leaving it. It needed to be acted out.

Rehearsals took place within the model box. Models were used to plan and test camouflage schemes and props in both the First and Second World Wars. (Fig. 45) In 1917, the New York Board of Education organised camouflage workshops for 'platoons' of artists. 'On two evenings per week, one could find each of the platoons busily engaged in camouflaging miniature ambulances, tanks, guns and other battlefield objects to conform with the color scheme and topography of miniature landscapes' (Behrens, 1981: 28). Elsewhere, as a later report in 1919 in *Technology Review* indicated, 'camouflage sets, theatres, apparatus, drawings and models were not only produced in New York, but also in Washington and Boston. After the end of the Great War, one of the most complete camouflage sets in the country went on public display at the Massachusetts Institute of Technology (MIT)' (Anon, 1919: 321).

In 1942, Major Robert Breckenridge in his book *Modern Camouflage*, recommended the use of models for their 'flexibility in both use and construction' and for providing a 'greater understanding of the problem'. As an aid to the selection of the most effective scheme, it was suggested that models were made to illustrate a number of variations or degrees of concealment. 'For difficult problems and if time and costs permit, models will be found helpful in conceiving as well as in evaluating preliminary designs' (Breckenridge, 1942: 231). The British costume designer Peter J. Hall (1926-2010) reported making scale models of his experiments with camouflage material to conceal airfields, gun emplacements. Another notable British theatre designer, Oliver Messel (1904-1978) applied the same concern with detail to his camouflage models as he showed in his theatre model boxes (Fig.46). Messel became particularly noted for the stagecraft of his pillboxes (Fig. 47). In *Down the Kitchen Sink*, Beverly Nichols recalled that: 'Oliver was doing a vital job but somehow one had the feeling that he regarded it as an exceptionally difficult assignment in the ballet rather than as part of the war effort' (Nichols, 1974: 50-51). Nevertheless, Messel's ingenuity was recalled by Julian Trevelyan in his book *Indigo Days.*

> 'It was the great age of pillboxes, and a line of them had been built across Somerset to stop a possible German invasion from farther west. These awkward little pentagonal objects had to be disguised, so as to deceive the German columns coming across the country, and we camouflage officers were given full rein to our wildest fancies. Oliver was here in his element, and he turned many of them into gothic

> lodges, and he even got special thatchers all the way from Norfolk to finish one of them. Others he ingeniously disguised as caravans, haystacks, ruins, and wayside cafes, always with great attention to detail. “Plant some old-man's-beard here in the spring” he would tell me, or “Paint a pot of flowers in that window”. He also revived the old West-country technique of “cob”, a mixture of lime, straw, and cow-dung, with which he made new walls look old almost before they were dry. Some of his designs looked a bit theatrical, as might be expected, but he built them at a lucky moment when labour was unlimited and the urgency of the situation worked miracles’ (Trevelyan, 1957: 122).

Both man-made and natural materials were used in combination. ‘Cullacoats material’ could be ordered from the manufacturers ready painted and its strong self supporting wire netting structure made it easy to’ garnished with feathers and other adornments’(Goodden, 2007: 101). Oliver Messel was especially enthusiastic about ‘Cullacorts' which he felt gave a better effect than steel wool as a material to disguise pillboxes. Although Messel’s highly theatrical methods might not have been entirely acceptable to Breckenridge, both considered the importance of using the local natural vegetation in camouflage schemes and specified suitable plant materials (Fig. 48). A Mr S. G. Butland, working on the Taunton Stop-line, remembers Messel accompanying him on a tour of sites.

> At each he made a sketch of the camouflage to be used to blend with the immediate surroundings – a number to look like hay or straw stacks, while some along the canal resembled workmen's huts. At Ilminster railway station one, partly sunk into an embankment, was covered with coal and, by the addition of-wheelbarrow and shovel, made to appear part of the coalyard.
>
> (Wills, 1985: 58)

Breckenridge particularly stressed the importance of natural cover and careful site selection. He recommended that native plants to the region should be used and their seasonal variations and habits studied. Botanists on all sides in the WW2 were researching suitable plants for camouflage, experimenting with methods to prolong the life of cut foliage as well as providing plant identification manuals for the different combat zones (Anon, 1944a: 117). U.S., U.K. and German horticultural growers were

also commissioned to produce a wide range of plant material for camouflage. The German transplanted large trees in concrete ‘tree pots’ to disguise their installations particularly in their forest locations where any disturbance of the natural density of the plantations would be noticed from the air. The British plant nurseries contributed to the war effort by supplying vast numbers of home grown trees and shrubs. During the Second World War, Hillier Nurseries in Hampshire in the U.K., at the request of the Air Ministry, developed techniques for growing on, lifting and transplanting large trees some 25-40 metres high to camouflage aircraft hangars. They also supplied portable hedgerows that could be wheeled onto airfield runways between sorties. These recall the previously well-publicised ‘hedge walls’ in mechanically operable trays which Le Corbusier had created as ‘stage scenery’ for the roof terrace belonging to the Count de Beistegui in Paris in the 1930s (Constant, 1991: 81).

Although camouflage efforts outside the Western theatre of war are not being examined in this study, it is worth mentioning at this point the extensive landscape scenographies created by the Japanese in WW2. The U.S. Bombing Survey described how at Kure, on the coast of Honshu and the shore of the Inland Sea, the Japanese Imperial Navy concealed its fleet by literally digging the ships into the hills and coastlines.

> Nets were strung from shore to superstructures, then covered heavily with foliage. In some cases the Japanese transplanted whole palm trees from the countryside to large tubs on the decks of the sheltered vessels, and gaps in between were strewn with moss and underbrush. In effect, the ships became an extension of the Honshu landscape.
>
> (Reit, 1978: 204)

Unfortunately as Reit pointed out there was a drawback. The warships were immobilised by their camouflage and when the American photo interpreters penetrated their cover in 1945, the ships could not escape U.S. attack. A more successful deception was achieved by the HNLMS Abraham Crijnssen, a Royal Netherlands Navy minesweeper which managed in 1942 to escape to Australia across Japanese lines camouflaged as a tropical island.

Camouflage manuals emphasised the need to ‘read’ the ‘texture’ of the landscape. Changes in texture were considered the most important ‘signatures’ for both the camoufleur and photo interpreter to recognise. (Fig.49) ‘Rolled or flattened grass, for instance, disrupts the natural texture of the ground and appears lighter which is why tracks across grassland are so noticeable from the air. These and many other clues make it possible for the trained observer to see through camouflage and concealment methods’ (Dewar, 1989: 202). The artist and camoufleur Julian Trevelyan in his memoirs *Indigo Days* makes the same point more amusingly when he describes how his fellow camoufleur, Godfrey Baxter, the West End and Glyndebourne theatrical producer, who ‘stood half the morning in the mess swallowing pink gins and taking snuff’ gave ‘racy’ lectures to the troops in which he would say “At every dance,” he would say, “you have probably noticed that girl with the black velvet dress, with a great hand-mark on her bottom where her partner has held her too tight. All he has done is to destroy the contained shadow on the velvet, as you are busy doing when you walk about in the grass around your gun-site.” ’ (Trevelyan, 1957: 122).

‘Velvet with some pattern’ in fact was one of the ‘textile pattern’ names along with the ‘Polka Dot Pattern that was applied to land configurations in the desert. Barkas who was assigned to the camouflage unit in the African desert, became an expert on desert camouflage through his recognition of the distinctive natural patterns that could be used by the camoufleur. He described how a small area of desert with a remarkable choice of different desert patterns became ‘an excellent place in which to test and photograph methods of concealment’ (Barkas, 1952: 154).

Colour was of secondary importance to texture and tone as it was seen to present problems in perception. ‘In night conditions landscape is ‘seen in monochrome’ and colour has no value) but general tone from the air appears much darker than expected owing to integral shadows’ (Goodden, 2007: 59). Ursula Powys-Lybbe pointed out how the monochrome image was perceived as a more objective and ‘realistic’ record than a colour photograph.

> There is an explanation for the apparent ease with which the interpreters could see through camouflage, both literally and figuratively, while a pilot might have been deceived. Camouflage was primarily designed in colour to blend with the

> background, so that aircrew would be unlikely to identify the target as they flashed by overhead with no time to search for it. Monochrome or black and white prints in front of the interpreters, meant that a range of neutral tones made it easier to define form, colour not being there to distract the eye, and also there was time for examination.
>
> (Powys-Lybbe, 1983: 79)

This awareness of the subtleties of pattern and texture, colour and form enabled the camoufleurs to create more convincing scenery for the aerial spectator. In this staged landscape, the performer/combatant is a 'staged' body, a conspicuous / inconspicuous, vulnerable theatrical body. The body camouflaged absorbs the landscape for its disappearance. In doing so, the disappearing body becomes part of the space that contains it. (Fig. 50) In an article published in 1936, Roger Caillois wrote that

> Morphological mimicry could then be [...] an actual photography, but of the form and the relief, a photography on the level of the object and not on that of the image, a reproduction in three-dimensional space with solids and voids: sculpture-photography or better teleplasty, if one strips the word of any metapsychical content.
>
> (Callois, 1984: 23)

This optical effect could be compared to the camoufleur's attempts to encode the surface of the landscape with physical and spatial disguises intended to deceive the aerial gaze and the stereoscopic lens.

In the First World War personal camouflage was not wide spread. The technology didn't exist to print on the wool used for the standard issue uniforms so most disguise had to be improvised with foliage and hand painting. For the regular soldiers, Solomon J. Solomon proposed the use of 'countershading' for the British army's khaki uniforms and believed that the 'broken effect' would be increased if soldiers in each unit wore differently coloured outfits. Solomon also declared that the conspicuous regulation cap should be replaced with a helmet-shaped version, fitted with a visor that could be lowered to break up the visible outline of the face. Picasso contributed to the discussion about suitable patterns for camouflage by suggesting in a letter to Guillaume Apollinaire in 1915 the adoption of the vivid colours of the harlequin costume (Caizergues & Seckel, 1992: 129). Although these geometric patterns were tried out on uniforms as

well as artillery and vehicles, they did not find wide favour. Hand painted camouflage robes and tunics were provided primarily for snipers, observers and artillery operators. In the workshops at Amiens, the theatre designer, L. D. Symington developed the camouflaged Symien sniper suit consisting of painted transparent scrim (Blechman, 2004: 126). These costumes were painted to blend with the local terrain and were often embellished with foliage and/ or raffia strips sewn into burlap sacking. Their appearance were quite extraordinary and contemporary photographs show bizarre theatrical figures whose extreme dress suggests that this is more than mere camouflage but has performative and ritualistic symbolism (Fig.51). These were 'Green men' the primeval inhabitants of the woods and forests who strike fear into the enemy through their appearances.

By the Second World War, the use of disruptive patterning was still limited. The Germans however had been experimenting and researching camouflage patterns since the late 1920s and in the 1930s introduced camouflage uniforms with forest patterns. The Waffen-SS designs were created by Professor Otto Schick based on three distinctive tree patterns: the 'plane' tree or Platanenmuster, the palm tree or 'Palmenmuster and the 'oak leaf' or Eichen laubmuster (Fig.52). The plane tree pattern looks like flaking plane tree bark. The Palmenmuster was a misnomer. It was not based on a exotic palm tree but probably the native ash tree which had bunches of long feather like leaves and seed pods or fruits. Strips of cloth were fixed to chest shoulders and neck to allow for foliage to be attached (Newark, 2007: 136). These designs were chosen not simply for their effectiveness as camouflage but also for their symbolic associations with the ancestral forest mythology of *Germania*. [4]

In Britain, Captain Denison who served in the camouflage unit commanded by Oliver Messel invented a costume which 'featured a handpainted pattern that had been applied with a mop so that the colours and shapes were inconsistent' (Blechman, 2004: 184). In 1941 paratroopers were issued with the 'Denison Smock' with its camouflage design of light green with ragged brush strokes of dark green and chocolate brown (Newark, 2007: 129). In the U.S., the horticulturist and gardening editor of *Better Homes and Gardens*

[4] Versions of Waffen-SS oak-leaf and plane-tree patterns were worn by Iraq, Libya, and Egypt, as what seems an intentional provocation to the Israelis.(Newark, Newark, & Borsarello, 1998: 30)

came up with the famous ‘frog-skin’ camouflage that was issued to the U.S. Marines (Newark, 2007: 130). (Fig.53)

As well as costume, make up was also an important consideration. Troops were provided with advice on how to make themselves less visible by applying colouring on face and hands (Fig. 54). Among the materials suggested were cocoa, soot, mud, printer’s ink and cow dung. None of these were, however, particularly satisfactory, either not being the right tone, waterproof or sterile. Better solutions were the commercial cosmetic products that had been adapted for camouflage use. For example, a darker version of a cream that had been developed for women to use ‘simulated the texture of silk stockings’ was produced for the military (Goodden, 2007: 103). The style of makeup was determined by the terrain ‘one should use thin strips for the highly reflective desert, big splashes in the typical European forests and wide strips for jungle warfare’ (Blechman, 2004: 242). Again, however as with the camouflage costume, the application of face paint was part of a performative staging of the body. The acquiring of a mask removed the soldier from their previous off stage existence and allowed them to assume their new roles in the theatre of war.

Along with the make-up, costume, puppetry, props and scenery, other stage managed effects were lighting, sound and smoke. Most of these were used in combination. In 1940, the Civil Defence Committee of the Ministry of Home Security started to investigate decoy lighting for towns and cities. It was decided that the artists and technicians from Leamington Spa should make night flights over Sheffield and Crewe in order to record impressions of industrial area lighting. At the same time, experiments were being made at Leamington with fire decoys. (Fig. 55) These ‘Special Fire’ or ‘Starfish’ sites built to replicate urban areas and under the army and naval programmes, the wide range of military targets, were in some ways the most ingenious decoys of the war (Threadgall, 1994: 28).

The archaeologist Colin Dobinson in his authoritative study of Britain’s bombing decoys records sites ranging from one to two hectare plots to exceptional displays that could extend to 12 hectares. (Dobinson, 1996) Many towns, important factories, and key installations were protected by elaborate fake lighting schemes which were simulations of furnaces, chimney flares, skylights not blacked out, light escaping from doors

carelessly left open, tramcar flashes, railway signals and locomotive glows (Cruikshank, 1979: 11).

Standard lighting devices were used to replicate streetlamps, car lights and domestic and industrial lighting were replicated. The precision of their position depended upon how clearly the lighting 'signature' of the target to be decoyed appeared from the air (Dobinson, 1996: 137). Among the other lighting deceptions were lights raised on poles around ten feet high arranged in lines to suggest the working illumination permitted in railway sidings. Coking furnaces in industrial area decoys were imitated by 'furnace glows', using a tray of sand or soil, a few yards across, with a canopy fitted with red and yellow electric lights suspended above it. Shining downward on the tray, the lights when seen from the air resembled the dim glow of a coking furnace at work. 'Loco glows' used a similar principle, in this case replicating the faint firelight produced by the open firebox door on the footplate of a steam locomotive. The loco and furnace glows were operated on a continuous cycle of rising and falling intensity which heightened the authenticity of the deception. The decoys also made use of reflection as well as illusion. Lights on poles were positioned to reflect downward onto small pools of water arranged in patterns to suggest the edges of dock basins (Dobinson, 1996: 139). In his book, Cruickshank writes that the rules of the game were simple. When the parent station was attacked the operators attempted to trick the enemy aircraft into bombing the dummy. The lights were switched on when enemy aircraft were reported to be approaching (Cruikshank, 1979: 4). The original decoys required only two trained men to throw the necessary switches and trigger the ‘fire damage’ (Reit, 1978: 58).

Just as in America, the film studios provided numerous recruits to work on these simulations. Dummy aircraft and buildings, artificial fires and deceptive lighting all stemmed from an Air Ministry team working jointly with Sound City Films at Shepperton Studios. (Dobinson, 1996: xi) The Sound City technicians constructed four decoy aircraft factories, two wireless telegraphy stations, four factories each a few miles from its target. The wireless stations consisted of little more than dummy aerial towers, but each of the factories was finished as a full-scale replica, complete with derelict vehicles in car parks and dummy aircraft parked out on the airfield. But as Dobinson reports the difficulty of maintaining the pretence of such complex decoys as a factory meant that daytime raids by enemy bombers were infrequent (Dobinson, 1996: 58).

Starfish decoys could be easily spotted by day light reconnaissance photography and many were probably unmasked as a result. But at night operating in darkness the German bombers could be easily deceived about their position in relation to the target or the known decoys. As Dobinson observes this was very much the experience of their British counterparts, who were themselves often misled by the increasingly sophisticated layout of decoys being created across the North Sea (Dobinson, 1996: 115).

It was at an early stage of the war that the Air Ministry started gathering information on German decoys. By 1940, Allied Bomber Command crews had identified a number of decoy airfields, dummy factories and the construction of six lighting decoys covering major cities such as Berlin and Stuttgart (Dobinson, 1996: 117). The German lighting decoy near Berlin was known to be masked from day observation by being disguised as a village. The Germans, by summer 1941, had also begun using, like the British, anti-aircraft and searchlight batteries in conjunction with decoys (Dobinson, 1996: 118) and both sides were using smoke extensively to conceal and deceive. Smoke has always been used as a tactical weapon in battles, but by World War II it had become an integral part of the *mise-en-scène* of the Theatre of War. Large mechanical smoke generators threw out massive offensive and defensive clouds of thick white phosphorous smoke, fog, and haze. Smaller vehicle mounted smoke generators were used to create more localised 'invisibility cloaks' (Reit, 1978: 213). Used in combination with sound, the effects could be deeply disturbing and disorientating for both the aerial and terrestrial participants.

Sonic devices were used to reproduce the sound of gunfire, tanks and troops (Cruikshank, 1979: 197). Harold Burris-Mayer had been director of Theatre and Sound on the staff of Stephens Institute in New Jersey. Funded by RCA, the Radio Corporation of America, he researched the control and use of sound and how it affected human perception. He then joined the Joint Chiefs of Staff to work on psychological warfare which gave him the opportunity put his theories into practise. His experiments with wire recorders and the development of high wattage output speakers were used to augment the realism behind the deceptions of the 'phantom army' and 'beach jumpers' the U.S. Navy's special unit that used sonic deception (Naverson, 1989). Equally the elimination of noise could be used for misdirection and disorientation. In the German camouflage manuals much emphasis was placed on the noise suppression in German camouflage.

‘Orders are given in a subdued tone, or are written. Hard ground is avoided as much as possible, and full use, is made of soft ground. For short distances the wheels of horse-drawn vehicles are wrapped in rags or similar in material, and horses' hooves are padded’ (Department, 1942).

The German camouflage methods, as they became detected, were documented and instruction in these techniques was provided alongside training in home grown methods for the allied soldiers in the field. As well as devising camouflage schemes, the camoufleurs in both the U.K. and U.S. toured army bases giving demonstrations and lectures. Reit explains how one of these U.S. camouflage tours had its ‘own miniconvoy complete with equipment, nets, displays, and collapsible ‘stage sets’ holding classes and giving hundreds of demonstrations which achieved a high level of showmanship’. He describes how one of these ‘showmen’ commented ‘After months on the road, we began to feel like actors on an old time vaudeville circuit’ (Reit, 1978: 86). The American theatre designer Harry Horner was one of those charged with staging these tours and he wrote to the editor of *Theatre Arts*, Rosamond Gilder complaining that:

> Camouflage is one of the most important weapons of the army. But due to the fact that it needs a certain mental alertness, it is still not sufficiently appreciated by enlisted men. There is no trigger to pull, no wheel to turn, no obvious mechanism to deal with, and therefore, camouflage has not penetrated the mind of the soldier as an absolute necessity. It would seem absurd to an infantryman if he were sent into action without a gun. As long as he does not think in the same terms about preparedness in camouflage, there is still a task to be done.
>
> (Naverson, 1989)

In order to gain the attention of the soldiers, Horner had devised a camouflage musical revue, entitled *You Bet Your Life*, which concluded with a rousing finale:
‘It's so confusing, / But so amusing, The ruses / One uses / Are nature's own scheme... Though we're like mirages,/ We're all camouflages-- Things Are Not What They Seem.... No, things are never quite what they seem!’

(Gilder, 1944:521-8)

Gilder published Horner's story along with some of Horner's sketches and working drawings for the show. It was 'this quality of theatre and stagecraft', as Reit put it, that 'crept into almost all wartime camouflage' (Reit, 1978: 86).

In 1832, Carl von Clausewitz wrote in *On War* that 'the conceptions of Army and Theatre as a rule go together and mutually include each other' (Clausewitz, 1832: 181). Paul Virilio also sees in the modern military landscape a theatrical level of presentation-war as spectacle. 'The artificial climate of the new arms required that military construction correspond exclusively to artifice. The last citadel is a theatre where wars past and present concentrate themselves, from the dagger, to the bow's silent attack on sentries, to the stratospheric missile' (Virilio, 1994: 48). In Virilio's writings the construction of artifice is a central preoccupation. From his studies of WW2 bunkers to the latest military technologies he presents the reader with evidence of the practice of stagecraft and argues how the war is a theatrical construct, a condition that its protagonists recognize. As Virilio notes in his book *War and Cinema,* 'Hitler violated only everyday realism, and the very nature of his crimes cannot be understood unless we remember his extraordinary technical knowledge of stage-direction, trick photography, trapdoor devices, revolving stages and, above all, the varied potential of illumination and floodlighting' (Virilio, 1989: 53). A familiarity with these same theatrical practices continues to be recommended in the training of contemporary camoufleurs. Colonel Michael Dewar, a highly respected British counter terrorism and security analyst writing in *The Art of Deception* argues that in contemporary warfare:

> Technology has turned darkness into daylight; removed the leaves from the trees and penetrated the smoke of the battlefield. We now need the modern equivalent of darkness which gave so many commanders the tactical edge in previous eras. Arguably, where near complete visibility exists, the requirement for deception is far greater than on the empty battlefield.
>
> (Dewar, 1989: 20)

Although the book was first published in 1989 as a response to the Soviet threat and *Maskirovka*[5], it is still considered an important and relevant text on the strategies of deception and is cited in bibliographies of military training manuals produced worldwide. In his chapter on 'Contemporary Technology' he suggests that even on the modern battlefield there are convincing deceptions that can be created with minimal means.

> Old camouflage nets draped over an abandoned vehicle make it live again. Mirrors can be hung in trees to reflect the sunlight, and bottles made to glint as if they were weapon optics. Dummy tank scrapes and dummy trenches can be dug. Heat sources as simple as an old paraffin stove can give the same infra-red signature as a running engine. Lights can be left on at night. Aerials can be left to poke through cover, phoney minefields constructed and barbed wire obstacles erected as if to help defend a position. Tracks leading to false positions can direct attention away from real positions. Route signs can be used to mislead. None of these measures require either sophisticated equipment or extensive training.(Dewar, 1989: 144)

Again it is the old stage magic that is called upon to provide the scenic effects in the contemporary theatres of war. Even with the advances in visual detection technologies, the camoufleur's smoke and mirrors, masks and painted cloths together with sound and lighting techniques continue to be required in the staging of the war landscape.

[5] Russian маскировка (maskiróvka), (military, especially regarding Soviet warfare) A set of procedures designed to confuse, mislead, and camouflage oneself from the enemy. It encompasses: camouflage, concealment, deception, imitation, disinformation, secrecy, security, feints, diversions, and simulation. Well disciplined, extensive and creative deception plans are integrated into all Soviet operations. Smith,Charles L. "Soviet Maskirovka," *Air and Power Journal*. Vol. II, No. 1 (Spring 1988): 28-39.

Figure 28

British sniper concealed in the ground

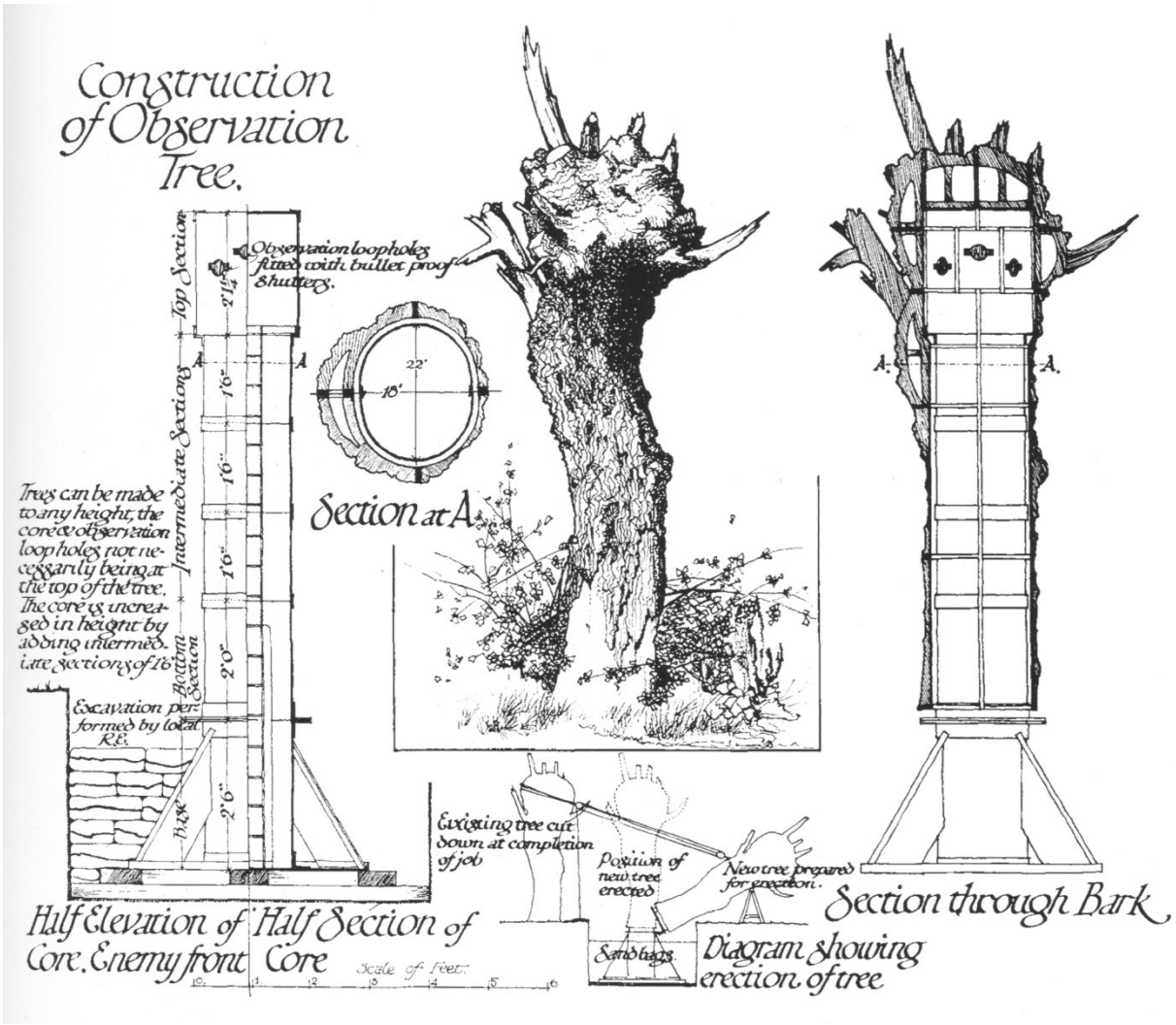
Figure 29

Pâpier maché heads used for the ‘Chinese attack’

Figure 30

‘The camoufleur with his magic art of scenery makes a dead horse.’
Samuel Benney Benson *Back From Hell* (Chicago: A.C. McClurg, 1918)

Figure 31



WWI British plans for an observation post possibly by Solomon J Solomon.

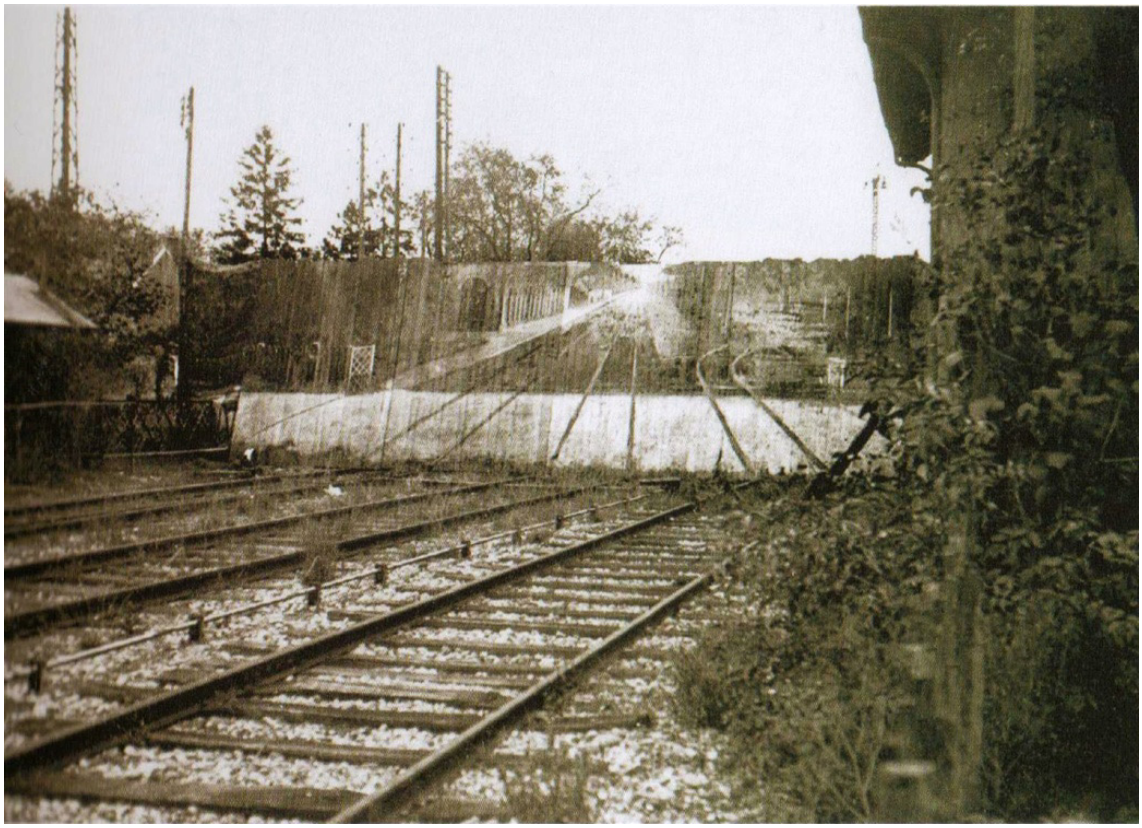
Figure 32

Examples of dummy trees used on the French front line in WWI

Figure 33

French camoufleur colour chart

Figure 34

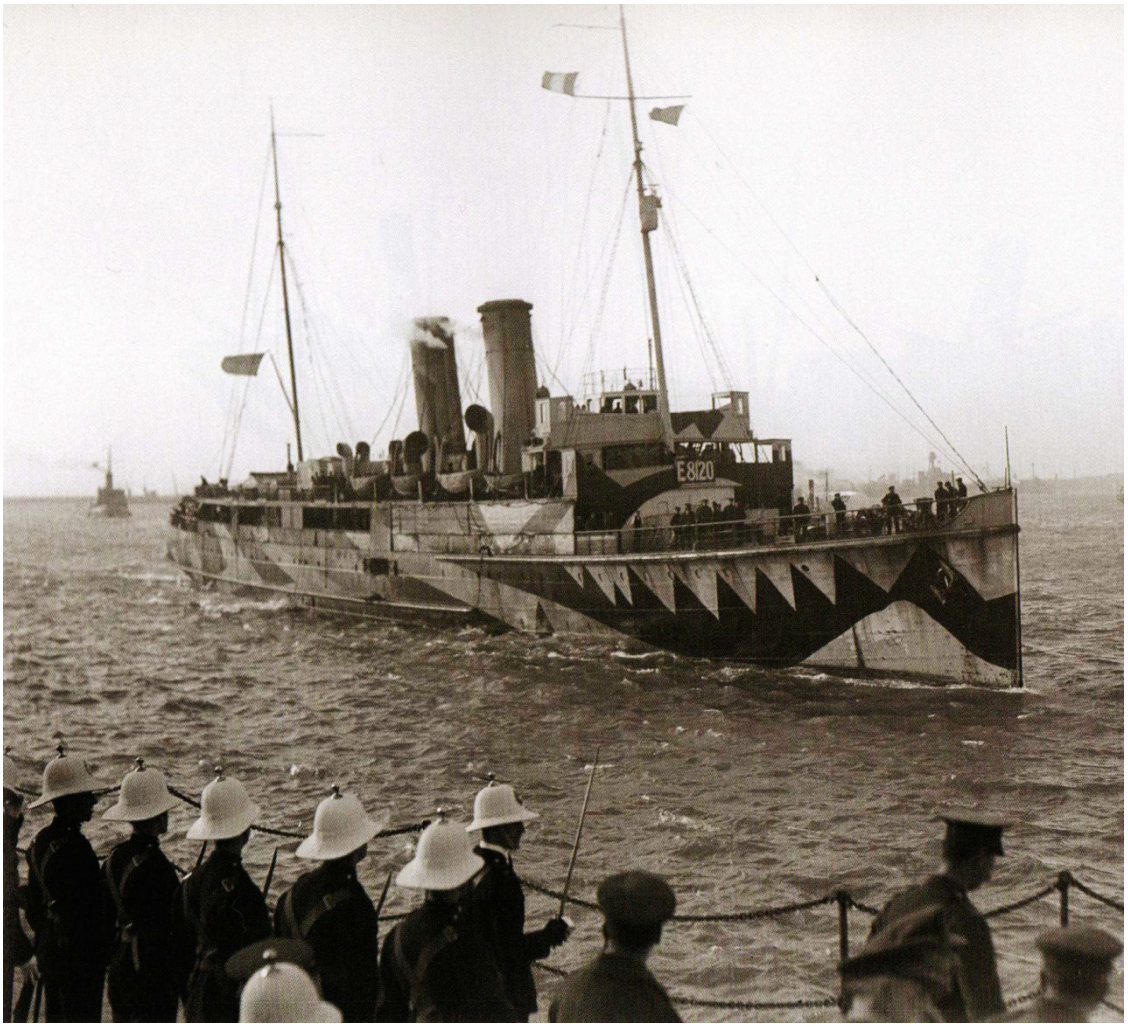


Trompe l’oeil railway lines at Pont-a-Mousson Station, 1915 used to disguise presence of munitions trains.

Figure 35

German Anti-Aircraft shelter for men, 1914 photograph from Solomon J. Solomon's *Strategic Camouflage*

Figure 36



A Dazzle camouflaged British ship, 1919.

Figure 37

Early WWII British aircraft hangers painted to look like houses and trees.

Figure 38

Pratt Institute students build a model of waterfront and dock area to be used for studies of camouflage.

Figure 39

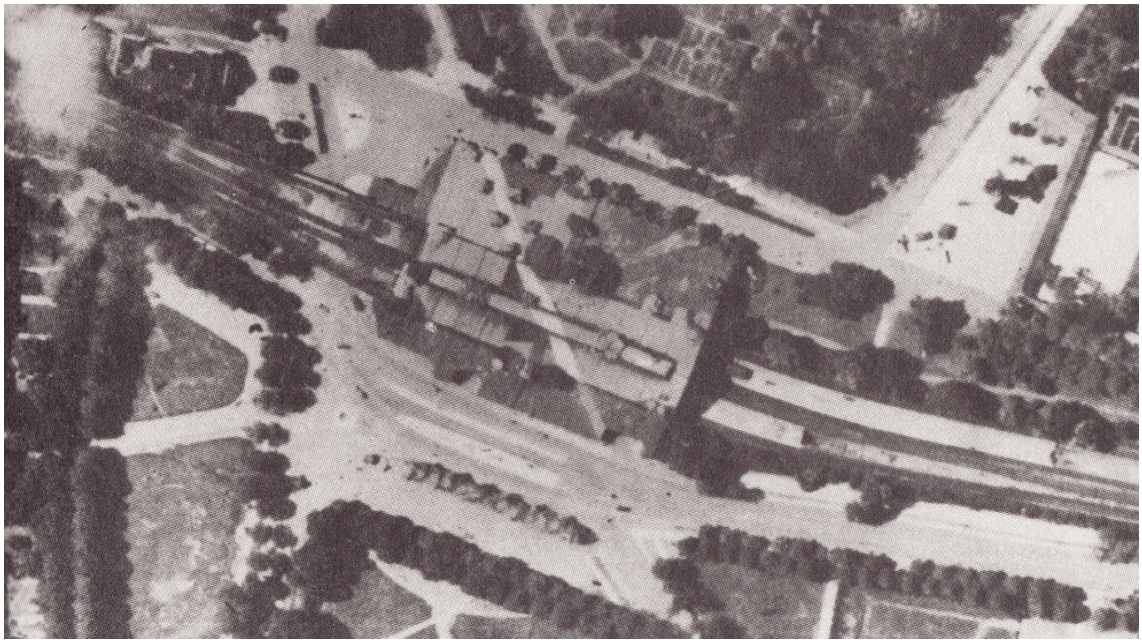
Lockheed-Vega Factory, Burbank California, 1943 from the archives of the U.S. Army Corp of Engineers.

Figure 40

Pre-war photo of the Lombards road and rail bridge, Binnen Alster in Hamburg.

Hamburg's camouflage project caught under construction by RAF photoreconnaissance, 8 April 1941. The upper three arrows show paintwork designed to disguise railway patterns. Arrows at lower right show the decoy Lombards Bridge and covered-over Binnen Alster.

Figure 41



Hamburg Railway station covered by trees and a road.

Figure 42

A disguised German control tower in Belgium, 1940.

Figure 43

Colin Moss, *Power Station*, 1943.

Figure 44

Camouflage building illustrating garnished net, genuine trees and decoy trees (two types), 1942

Figure 45

Examining camouflage texture on cross section of a shelter.

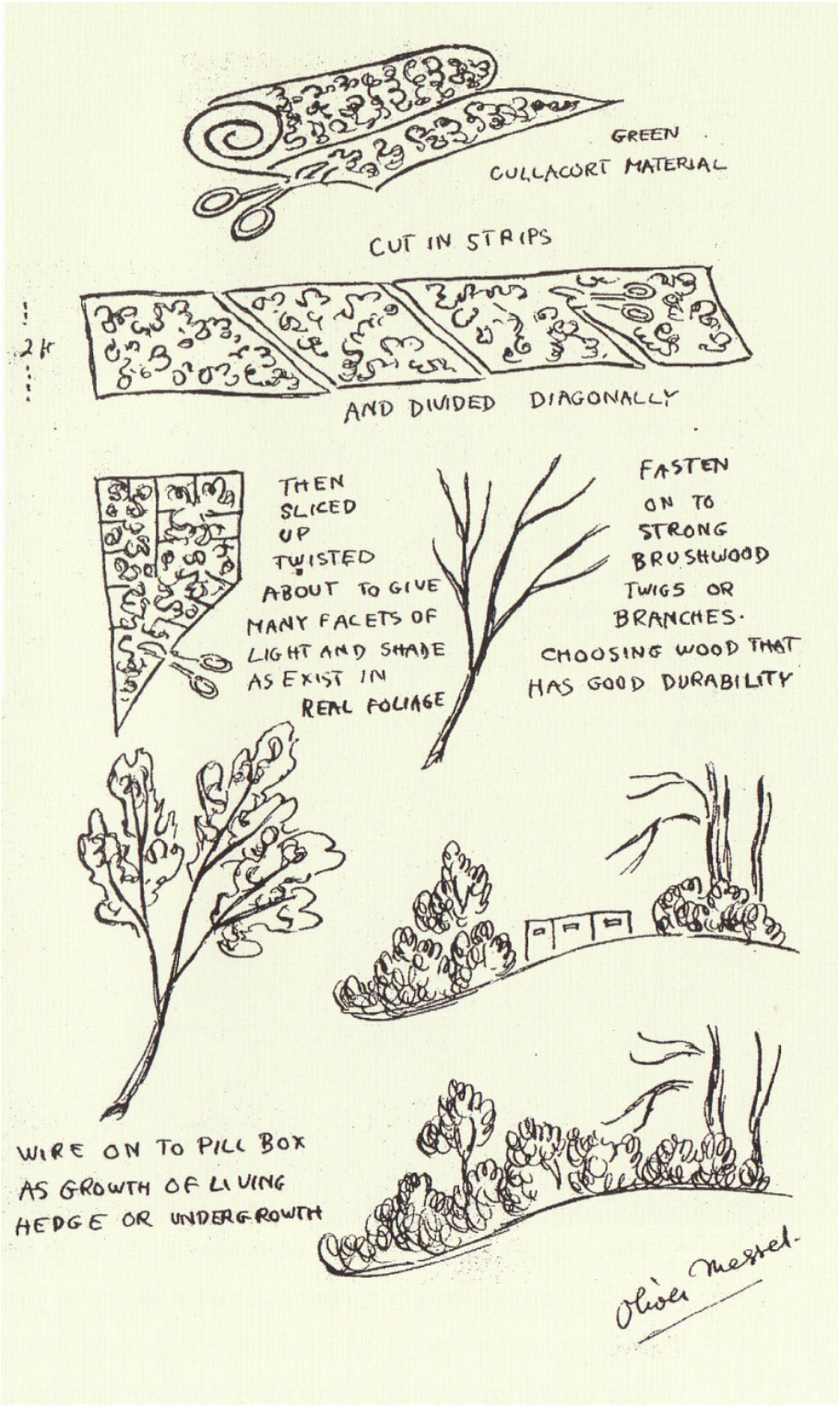
Figure 46

Oliver Messel in officer’s uniform, 1943.

Figure 47

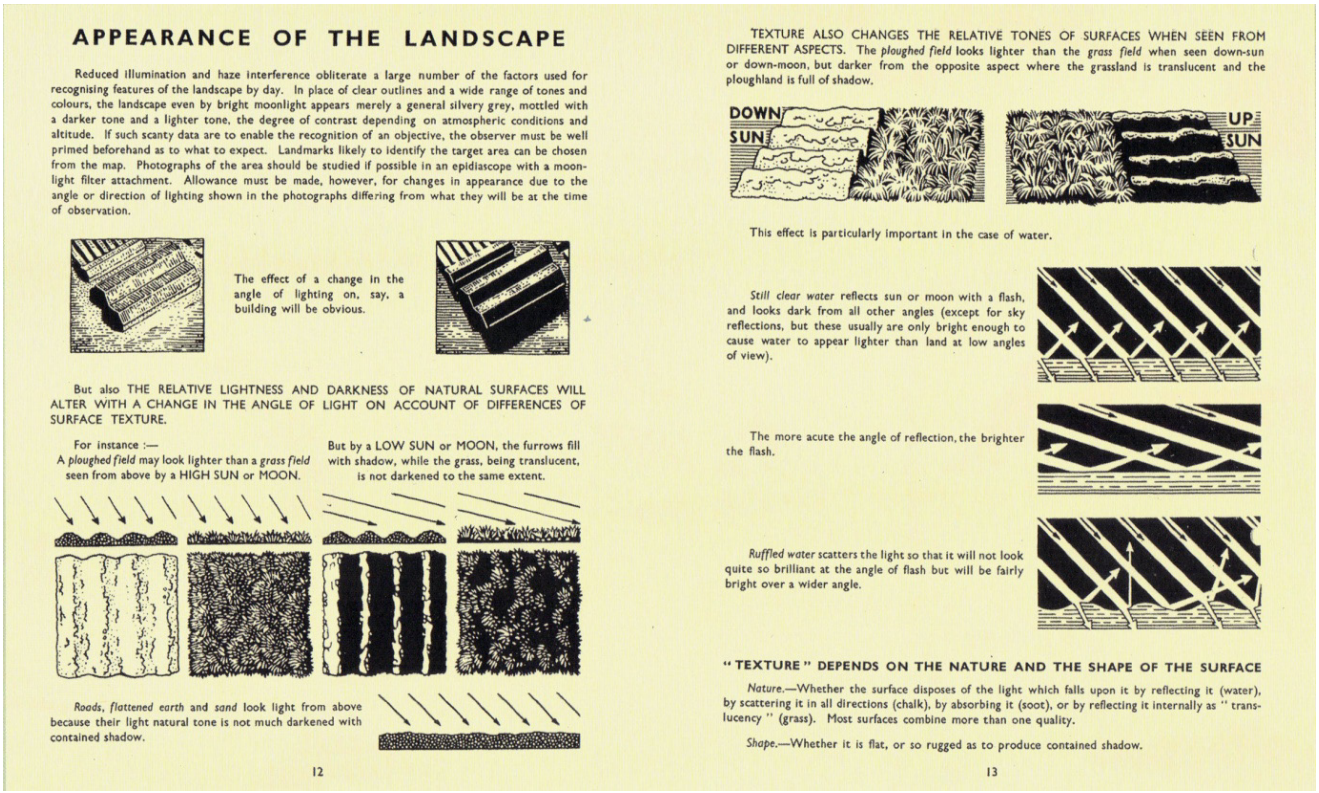
‘Camouflage Pill Box.’

Figure 48



A sketch by Oliver Messel, demonstrating the use of ‘Cullacorts’ material.

Figure 49



APPEARANCE OF THE LANDSCAPE

Reduced illumination and haze interference obliterate a large number of the factors used for recognising features of the landscape by day. In place of clear outlines and a wide range of tones and colours, the landscape even by bright moonlight appears merely a general silvery grey, mottled with a darker tone and a lighter tone, the degree of contrast depending on atmospheric conditions and altitude. If such scanty data are to enable the recognition of an objective, the observer must be well primed beforehand as to what to expect. Landmarks likely to identify the target area can be chosen from the map. Photographs of the area should be studied if possible in an epidiascope with a moonlight filter attachment. Allowance must be made, however, for changes in appearance due to the angle or direction of lighting shown in the photographs differing from what they will be at the time of observation.

The effect of a change in the angle of lighting on, say, a building will be obvious.

But also THE RELATIVE LIGHTNESS AND DARKNESS OF NATURAL SURFACES WILL ALTER WITH A CHANGE IN THE ANGLE OF LIGHT ON ACCOUNT OF DIFFERENCES OF SURFACE TEXTURE.

For instance :—
A *ploughed field* may look lighter than a *grass field* seen from above by a HIGH SUN or MOON.

But by a LOW SUN or MOON, the furrows fill with shadow, while the grass, being translucent, is not darkened to the same extent.

Roads, *flattened earth* and *sand* look light from above because their light natural tone is not much darkened with contained shadow.

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TEXTURE ALSO CHANGES THE RELATIVE TONES OF SURFACES WHEN SEEN FROM DIFFERENT ASPECTS. The *ploughed field* looks lighter than the *grass field* when seen down-sun or down-moon, but darker from the opposite aspect where the grassland is translucent and the ploughland is full of shadow.

DOWN SUN

UP SUN

This effect is particularly important in the case of water.

Still clear water reflects sun or moon with a flash, and looks dark from all other angles (except for sky reflections, but these usually are only bright enough to cause water to appear lighter than land at low angles of view).

The more acute the angle of reflection, the brighter the flash.

Ruffled water scatters the light so that it will not look quite so brilliant at the angle of flash but will be fairly bright over a wider angle.

"TEXTURE" DEPENDS ON THE NATURE AND THE SHAPE OF THE SURFACE

Nature.—Whether the surface disposes of the light which falls upon it by reflecting it (water), by scattering it in all directions (chalk), by absorbing it (soot), or by reflecting it internally as "translucency" (grass). Most surfaces combine more than one quality.

Shape.—Whether it is flat, or so rugged as to produce contained shadow.

13

Camouflage training notes.

Figure 50

‘Concealment is possible even in the desert!... There’s a platoon in the sand... “All those present, stand up!”...’Colonel Michael Dewar

Figure 51

Nine troops line up in hand-painted hooded overalls during a British camouflage demonstration at Langford, Wiltshire, UK, 13 March 1941.

Figure 52

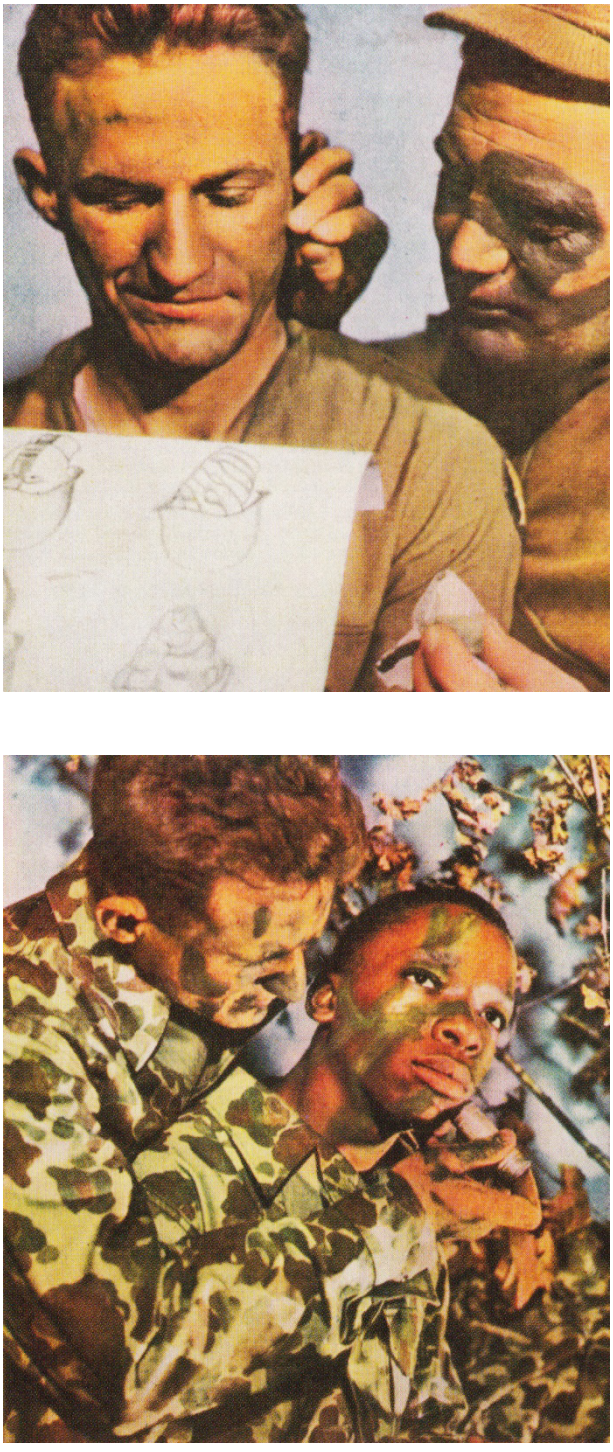
German Oak leaf pattern (Eichenlaubmuster) camouflage

Figure 53

‘Jungle’ side of the WWII reversible ‘frog skin’ uniform

Original UK WWII Denison smock pattern

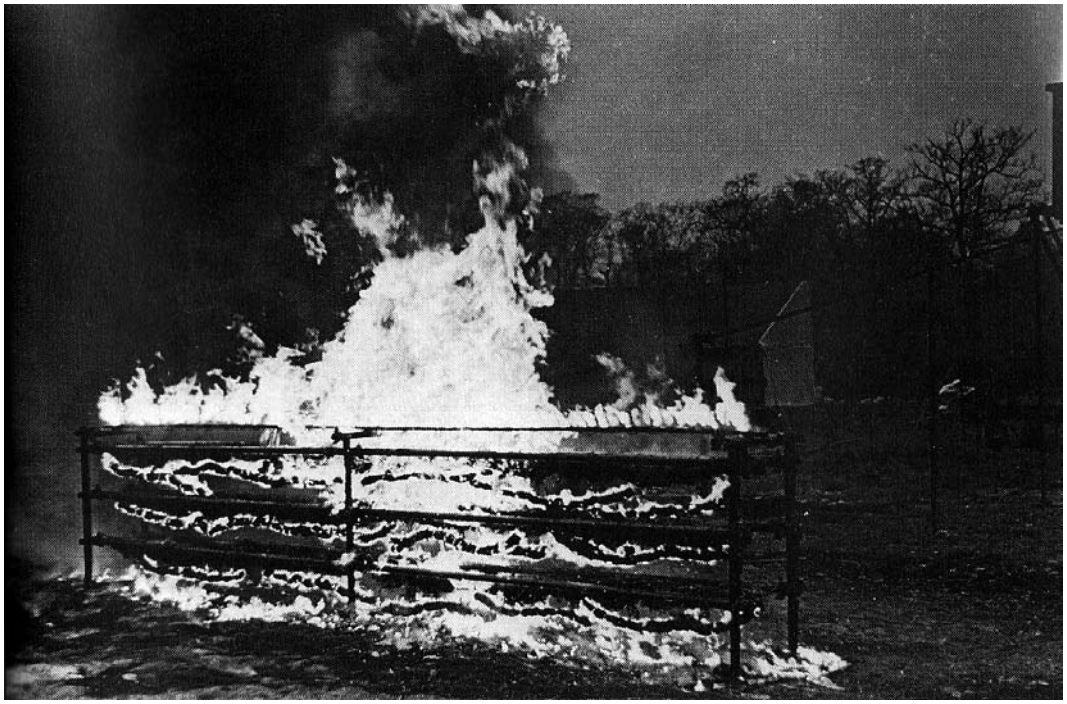
Figure 54



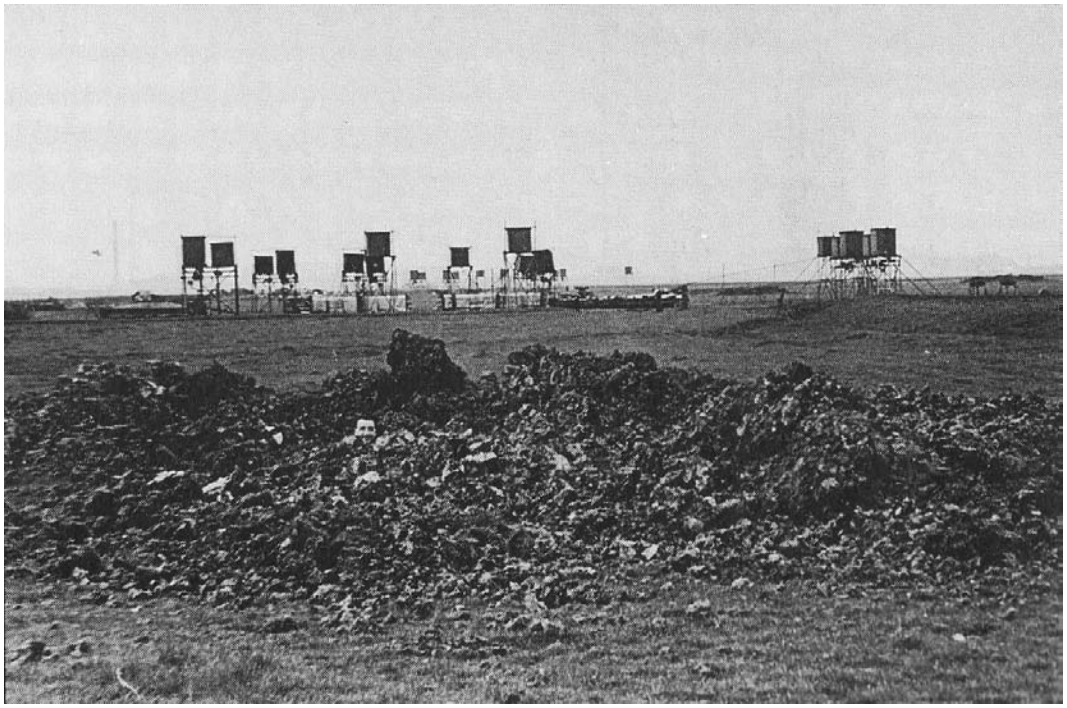
Soldiers do not have to be letter-perfect in this make-up, but simply follow a basic design. ‘On dark skins, light green paint gives the best results.’(WWII information flash cards)

.

Figure 55



Starfish grid fire



Unidentified Starfish tanks for fire apparatus

Chapter 4: The Territory of the Model

Maps, Models and Games

In order to understand the strategies of the terrain model, it is necessary to consider the methodologies of the map, model and war games. The representation of the terrain is an essential consideration in the constructs of war whether in the terrain model, maps or games. (Fig. 56) The nature of the relationship between the representation and the place or thing it represents is a central to an understanding of all three. Robert Harbison in *Eccentric Spaces* writes that 'the first thing to know about maps is what degree of miniaturization they practice... they are all creating little worlds, even worlds within worlds, further ranges of diminishment' (Harbison, 1977: 133). It is a requirement that is also demanded when engaging with models and games where it is equally important to be able to evaluate the extent of abstraction and transformation in the landscape. The combination of miniaturisation, transformation and representation in these event filled sites suggest more than just geographical location. Maps, models and games are all are created from 'rich constructed knowledges of measurement, discernments of differences, and partitionings of the world' (Downton, 2009: 331) but they also have their own territory.

The landscape terrain represented in early war games was an abstract arrangement of grids and squares -a map segmented into squares, as in chess. In the Indian game C*haturanga,* which dates back to the 7th-century AD, pieces representing soldiers, elephants, and chariots, were moved about on a board similar to a modern chessboard. While the playing pieces of subsequent war games took on a wide variety of representational forms, the playing 'field' itself remained a neutrally drawn space ungrounded in any particular location or topography.

The most significant development in the representation of the game terrain came with the publication in 1812 of *Taktisches Kriegs-Spiel oder Anleitung zu einer mechanischen Vorrichtung um taktische Manoeuvres sinnlich darzustellen* (Instructions for the Representation of Tactical Manoeuvres under the Guise of a Wargame) by Lieutenant George Leopold von Reiswitz of the Prussian Army (Reiswitz, 1812).

Reiswitz wanted to create a more realistic terrain. The game field was divided into a grid system and included different pre-cast terrain types used in modular combinations, as well as making use of special gaming pieces and dice. The rules which were modified several times established several conventions for wargaming such as the use of maps and the red and blue colour codes for the opposing armies. Reiswitz's son Georg Heinrich Rudolf von Reiswitz later changed the playing surface from terrain tiles to an actual map. The Reiswitz Kriegsspiel was adopted by the German military as a training exercise and rapidly spread its influence to other countries. By the early twentieth century, almost every major military power used a form of Kriegsspiel as an aid to military analysis and training.

However, when H.G. Wells created his wargame *Little Wars* in 1913 (Fig.57) he considered his game superior to the Kriegsspiel played by the British army which he thought:

> A very dull and unsatisfactory exercise, lacking in realism, in stir and the unexpected[…]and of very doubtful value in waking up the imagination. We believe that the nearer that Kriegsspiel approaches to an actual small model of war, not only in its appearance but in its emotional and intellectual tests, the better it will serve its purpose of trial and education.
>
> (Wells, 1913: Appendix)

He created his game to represent "A Country Prepared for the War Games":

> We set about planning a more realistic country. We cut out and bend and gum together paper and cardboard walls, into which our toy bricks could be packed, and on which we could paint doors and windows, creepers and rain-water pipes, and so forth, to represent houses, castles, and churches and, growing skilful, we made various bridges and so forth of card [...] The game has become in a dozen aspects extraordinarily like a small real battle. The plans are made, the Country hastily surveyed.
>
> (Wells, 1913: 12)

The use of models and the Kriegsspiel tradition of using maps were combined in the Cold War re-enactments of the 1950s, disasters would be acted out on floor maps using a range of moveable pieces that might include miniature ambulances, field hospitals and traffic controls. These maps like both models and war games are dependent on the viewer/participant's willingness to accept their rules of engagement. They all provide the means to speculate about imaginary situations and present a world that is controlled, defined, constructed.

Maps, models and games are metaphorical and speculative devices that make the territory visible. They allow their users/players to rehearse, test out and practise their actions in the hope that they will be able to improve their chances of a satisfactory outcome, i.e. their survival. For Freud 'Thinking is an experimental action carried out with small amounts of energy, in the same way that a general shifts small figures about on a map before setting his large body of troops in motion' (A. Phillips, 2009: 13). Adam Phillips suggests that thinking of the quest for satisfaction is 'a rehearsal; as though one might gain power over the fear by going on imagining the scene [...]in the game the general is playing before the battle, there is one thing he wants to have some sway over, and that is the loss, in both senses, of his troops. The map is a protective device; the ego is in mortal danger from the instinctual impulse (from desire), and the map is empting him, as if to say, if you look at it like this, if we rehearse or go over it, it's not quite so dangerous.' But Phillips continues 'The one thing that Freud, in 1933, and his readers now know is that war is inherently unpredictable; the ego says to itself, what you need is a map, you need to practise (as if to say, practise makes perfect)' (A. Phillips, 2009: 14).

Mimesis, rehearsal and play are essential to models, maps and games. In his 1961 theory of play, Roger Caillois defined mimesis as "playing a part". 'Mimicry is incessant invention. The rule of the game is unique [...] The spectator must lend himself to the illusion without first challenging the décor, mask, or artifice which for a given time he is asked to believe in as more real than reality itself' (Callois, 1961: 22). It is a game that children are perceived to be the most adept at playing. Walter Benjamin believed that children's play was 'everywhere permeated by mimetic modes of behaviour' (Benjamin, 1978: 332). The psychologist Marion Milner has documented the case of an eleven year old patient whom she calls Simon who has lived through part of the blitz. He is obsessed

with enacting a ‘war of the villages’. When he has set his toys out on the playroom floor to represent a village full of people and animals, ‘the boy would then bomb the village by dropping balls of burning paper upon it’. Milner's role as one of the villagers was to try to save the toys. Simon was in sole command of the situation, dictating all the rules and directing the action. Milner saw it as a game as ‘in which the actual process by which the world is created, for all of us, is poetically represented’ (Jacobus, 2005: 25).

It is this imaginative childhood game playing that informs the adult imagination. ‘By adopting childlike processes and modes of representation and symbolism’ make us ‘look at what we humans do, at what we are capable of doing – through the lens of a child's imaginative play’ (Warner, 2005: 14). Winston Churchill’s love of toy theatres is well documented. In a letter to the author A.N Wilson published in 1936 , he wrote how when he was a boy: ‘For three or four years of my life a model theatre was a great amusement to me’ (Wilson, 1932: 26). It provided the stage for the dramatic battle scenes that the young Churchill took great pleasure in realising. In one particularly memorable play *The Miller and his Men* set in a sinister Bohemian landscape of dark forests, crags and ravines, the villain's powder magazine is blown up by soldiers. In the spectacularly lurid closing scenes ‘Mill-stones, spars, and dismembered bodies are seen flying out of the exploding mill, while smoke billows upwards and blazing vermilion flames ignite the buildings nearby’(Wright, 2007: 75).

Churchill found many opportunities in his wartime activities to demonstrate the stagecraft learned from his childhood play and he was by no means exceptional in this. References to memories of children’s games appear with extraordinary frequency throughout the literature on military camouflage and deception. One example is the observation on the basics of camouflage made by Colonel Roy M. Stanley, a wartime intelligence officer. He wrote:

> We have all had the experience during a child's game of hiding ourselves**,** or some object... When played by nations, as in World War II, the game became much more sophisticated and more deadly. To lose the camouflage contest in war was to suffer the loss of some portion of one's capability to fight**.** Still, the basic rules of the child’s game applied. You tried to convince your opponent that nothing of value was in a given place or that you were not going to do something you intended to do.

> Sometimes this was augmented by offering the opponent the suggestion that a target he expected was in some other location, or that you were about to take action different from your actual intentions.
>
> (Stanley II, 1998: 10)

This recognition of the importance of mimetic play in the preservation of self is central to the war game in practice and rehearsal. When H.G. Wells created his game of *Little Wars* he described it as 'A game for boys from twelve years of age to one hundred and fifty and for that more intelligent sort of girl who likes boys' games and books'.

Wells suggested that by playing his wargame, more 'deadly games' could be avoided.

> Here is War, done down to rational proportions, and yet out of the way of mankind […]. You only have to play at Little Wars three or four times to realise just what a blundering thing Great War must be. Great War is at present, I am convinced, not only the most expensive game in the universe, but it is a game out of all proportion. Not only are the masses of men and material and suffering and inconvenience too monstrously big for reason, but – the available heads we have for it are too small.
>
> (Wells, 1913: 99)

A historian of war games, Peter Perla in *The Art of Wargaming* insists that along with the symbolic, partial world created in a game, an exercise must also 'make its players want to suspend their inherent disbelief, and so open their minds to an active learning process' (Perla, 1990: 8). In an illustrated article in *Popular Mechanics* in May 1944, members of Company E of the 66th Infantry at Camp Carson, Colorado, are shown learning 'the correct use of the 60-mm mortar with a miniature village for the target' (Fig. 58). The shells being used are described as marbles inside imitation mortar shells made of wood. When a marble is fired from a spring release, it 'shoots out in an arc similar to that of a real shell. The gun is set just as if live ammunition were being used with the exception of range which is judged on a proportionate basis. After practice, repairs are made with wood and paste' (Anon, 1940: 12).

The soldiers have to imagine themselves on the battlefield by projecting themselves and their ‘weapons’ into the fictional scene. Child’s play and mimetic procedures, allows them to transform marbles into ‘bombshells’ and to rehearse their manoeuvres. Tracy Davis has observed ‘War games foreground mimesis, which has been defined by Paul Ricoeur as the intersection and mediation between a textual (or postulated) world and the real world. This is central to practices of embodied representation and crucial to rehearsals' status for a “deferred event”’ (T. C. Davis, 2007: 85).

The model and map share the methodologies of the game. Rolf Hughes in his introductory essay to *The Book of Models* ‘Second nature: Philosophy & Performance, Metaphors and Models’ describes how model-making activities like performance stress ‘reflection and rehearsal’ (Hughes, 2003: 18). Models like games, maps and children’s toys allow the rehearsal of ideas, the testing out of strategies. For Stewart ‘To toy with something is to manipulate it, to try it out within sets of contexts’ (Stewart, 1993: 57). By her definition, the toy world is ‘a miniaturised real world in which the relationship between materiality and meaning are tested’ (Stewart, 1993: 58). In the catalogue to the *Idea as Model* exhibition, Jaquelin Robertson explains that the model has to be ‘an idea scaffold for the real thing [...] A loaded toy’ (Frampton & Kolbowski, 1981: 60). During World War II, the model as ‘loaded toy’ became more than a mere metaphor. In 1946, an article entitled ‘These Childish Things’ appeared in the American journal *The Military Engineer*, detailing the work of the wartime modelmakers(Chase, 1946). In addition to the terrain models made for camouflage assessment and operations briefings, working models of bridges, tanks, airplanes and landing craft, complete with miniature tanks, trucks and cargo were made for training purposes (Fig. 59). When the US General Omar Bradley first saw the miniature ships and tanks made for camouflage training purposes ‘he jeered at them as “toys”’ (Abrams, 1991: 27). He soon came to see how in practice these ‘toys’ were an integral part of the rehearsals necessary for the performance of war.

Alex Selenitsch observed ‘Testing reinforces and emphasizes that the model is both tangible and intangible, and makes the model’s dissonance of scale, material and craft more acute and more magical’ (Selenitsch, 2007: 8). It is an observation equally applicable to maps and games. They provide the means to speculate about imaginary situations. Each is a world that is controlled, defined, constructed. They are dependent

on the viewer/participant willingness to accept their rules of engagement. Preconceptions about time and space need to be abandoned. Mental adjustments must be made in the temporal and spatial perception. The way time and movement is perceived in the model, game and map reinforces their spatial and durational qualities. We are able to cover large distances in a few movements and our experience of time is accelerated. As Susan Stewart writes in *On Longing* 'the reduction in scale...skews the time and space relations of the everyday lifeworld.' (Stewart, 1993: 65). Stewart describes an experiment that suggested to her that there is a phenomenological correlation between the experience of scale and duration. Subjects were told to imagine themselves at the same scale as scale model rooms and figures and picture themselves engaging in activities in the model living room. They were then asked to tell the researchers when they thought thirty minutes had elapsed. The results showed that temporal duration is relative. It is compressed to the same degree as the scale (Stewart, 1993: 66).

This relationship between time and scale is also addressed in a 1944 article in *Popular Mechanics* on the use of miniatures in wartime training films. It was noted that 'in all miniature work, action, distance, and time must be cut down in scale to match the miniature set. Otherwise the sense of reality is lost' (Anon, 1944c: 61). The article goes on to describe scale also affects speed. 'Before the movie makers film a scene that shows a ship approaching and then rounding a buoy they must first learn the size and speed of the vessel that their miniature represents. Then they can figure the number of frames of film that would be required to show the action in real life' (Anon, 1944c: 61).

In models, maps and games, the scale will determine how we perceive distance. Too small a scale and we will miss the crucial detail, too large a scale and we become unable to take in on the larger picture. For a 'correct' reading, games models and maps depend on an adjustment of position and perspective. As Ortega Y Gasset observed in *Phenomenology and Art,* 'each thing has a "zone of distance" within which it seems most itself' (Gasset, 1975: 114). The manipulation of scale allows generals and artists to act out their strategies. For his miniaturised fiction *A Tale of Two Cities*, (1981) the artist Chris Burden used over 5,000 American, Japanese and European toys to represent two city-states at war and provided spectators with binoculars to study the massive assemblage (Fig.60). Unlike the wartime strategists who sought the aerial overview by observing their terrain models through reversed binoculars, the viewers of *A Tale of Two*

Cities were given binoculars to bridge the gap between them and the horrors of war. The concentration on the details reduces the degree of separation between subject and object. As Bachelard in *The Poetics of Space* tells us that 'the magnifying glass conditions an entry into the world. [It] situates us at a sensitive point of objectivity, at the moment when we have to accept unnoticed detail, and dominate it' (Bachelard, 1994: 155). For Bachelard, the magnifying glass is the 'enlarging eye of the child' that bridges the distance created by generals and artists.

The Model as Spectacle

What follows is a consideration of the model as a strategic spectacle and its use to represent political ideologies, commercial and military interests and utopian visions. Within a historical context, I will examine how the application of new technologies and scopic regimes has expanded the scenographic possibilities of the terrain model.

One of the earliest detailed descriptions of a terrain model appeared in 1665, when John Evelyn provided an account of a terrain model of the Isle of Antibe in the *Philosophical Transactions of the Royal Society*. He wrote:

> I have also seen a new kind of maps in bas relief, or sculpture: For example, the isle of Antibe on a square of about 8 feet made of boards with a frame like a picture. There is represented the sea with ships and their cannons and tackle of wood fixed upon the surface...the rocks about the island exactly formed, as they are in nature; and the island itself with all its inequalities, hills and dales; the town, the fort, the small houses, platform and cannons mounted and even the gardens and platforms of trees with their green leaves standing upright...this new, delightful and most instructive form of map, or wooded country, affords equally a very pleasant object, whether it be viewed horizontally or sidelong.
>
> (Hutton, Shaw, & Pearson, 1809)

Just three years later, in 1668, Louis XIV of France commissioned three-dimensional scale models of eastern border towns (Fig. 61 & 62). These highly detailed wood and silk models are remarkably accurate records of seventeenth-century French towns and even as late as the Second World War, they were considered by the French government

as highly classified military documents (Monmonier, 1996: 114). All aspects of the topography and architecture were reproduced in precise detail. 'There is nothing which represents a place more perfectly than … a model in pewter, plaster or some other solid material', declared the great military theoretician Alain Manesson Mallet in his famous treatise *Les Travaux de Mars ou l'Art de la Guerre*, which was published at the peak of King Louis XIV's reign. (Murray, 2010) These models however were more than military briefing aids, their exquisite detailing was intended to highlight French craftsmanship and the power of France and the monarchy (Fig.61). The spectacular nature of the model was recognised for both its strategic as well as propaganda potential. By the 18th century, its commercial possibilities had also become apparent. During the French Revolution in 1789, at Astley's Amphitheatre in London, a 15 x 26 metre model of Paris was displayed on the floor of the auditorium. According to newspaper advertisements the scale model was 'grounded on authentic facts', and could be inspected at leisure 'by visitors awaiting Astley's stage production based on the storming of the Bastille (Kwint, 2005: 19). The late eighteenth and the early nineteenth century saw the development of spectacles and technologies involving the use of models.

In 1781, Philippe Jacques de Loutherbourg the Swiss painter and theatre designer created in his house in London, a small mechanical theatre, the Eidophusikon in which he made extensive use of scaled models along with spectacular lighting and sound effects.(Kornhaber, 2009) The miniature stage measured 213cms wide by 122cms high by 244cms deep and the scenery was operated by pulleys with atmospheric effects created by blacklighting painted linen scrims (Fig.63). Giuliana Bruno has described the Eidophusikon, as 'a mimetic spectacle that added motion, time, and three-dimensionality to pictures'. (Bruno, 2002: 164) Six years after De Loutherberg opened his miniature theatre, in 1787, the Scotsman Robert Barker invented the painted panorama, which was to take many forms e.g., the Alporama, Europorama, Cosmorama etc. The first subjects of the new panoramas were cityscapes and landscapes, soon followed by battle scenes. The panorama was a specially designed building with a central viewing platform from which the observers surveyed an enormous landscape painting. There was often a *faux terrain* ('false ground') – with real objects and models positioned in the foreground of the painting (Parcell, 1994: 174). The diorama invented in 1822 by Louis-Jacques Mande Daguerre and Charles-Marie Bouton used similar effects. They had perfected the technique of painting on both sides of large pieces of translucent fabric so that images

changed dramatically when illuminated from front and back. Simple animated effects were used to create seasonal and diurnal changes as well as flames and moving shadows (Kamps, 2000: 6). These new technologies of vision combined a variety of scenic techniques with the model.

In *The Shows of London*, Richard D. Altick describes the range of 19th century spectacles that provided the spectator with vicarious experiences of foreign terrains. There were Dubourg's collections of cork models of classical remains (Fig. 64):

> Amphitheatres, temples, mausoleums, catacombs, etc with every decay of time and tint of colour, as the originals, with greatest nicety; A model of the Town of Tivoli, with the grand cascade and surrounding country. Mount Vesuvius at the time of a great Eruption, with the flowing of the Lava-A night view of a Torrent of lava that ran, forming a singular and beautiful Cascade of Fire.
>
> (Altick, 1978: 392)

Catlin's Indian exhibition had a model of Niagara, 'representing in perfect relief, proportion, and colour, every house, tree, bridge, rocks.' At the Polytechnic one could see the Typorama, a scale model of the Undercliff on the Isle of Wight, where the collapse of a long section of precipice had produced the unusual geological phenomenon of a pair of cliffs. The details of the exposed stratification could be studied with the aid of artificial light and magnifying glasses (Altick, 1978: 392).

Like the panoramas and dioramas these models reflected the growing interest in travel and foreign locations. In 1825, there was an exhibit at the Egyptian Hall of 'Switzerland in Piccadilly' an eight by six metre representation of eighteen Swiss cantons. The model, promised the advertisements would make visitors feel 'as though they were actually traversing [Switzerland's] stupendous Mountains, or strolling through its fertile Vallies' (Altick, 1978: 395). The Swiss applied equally high standards and levels of accuracy to their construction of relief models. During the late 18th-century, Hans-Ludwig Pfyffer's (1716-1802) created a vast relief model of Central Switzerland that was completed in 1786 after many years of field work, surveying and making relief models. Napoleon's

Council of War also bought one of Joachim Eugen Moller's (1752-1833) large area reliefs of the Swiss Alps, scale 1:60,000 (Spooner, 1953: 60).

Historical events and military battles were also re-created in model form. A 'Grand Military Spectacle of the Battle of Waterloo' claimed to show 'upwards of 50,000 Figures'. But the most famous of all such productions in the nineteenth century was made by Lieutenant William Siborne, an authority on surveying and topographical modelling. In 1830 the army had commissioned him build a model of Waterloo which was placed on display at the Egyptian Hall in the autumn of 1838. It covered an area of 41 m^2. There were approximately 190,000 metallic figures of soldiers and horses so small that magnifying glasses were provided. Fire and smoke were imitated by tinselled metal and fine wool or flock; and appropriately coloured silk or floss, and brown cassimere were used to represent the different colours of the soil and vegetation. The attention to detail was commented upon by press and public (Altick, 1978: 397).

The public enthusiasm for exhibitions of models continued into the twentieth century and it was satisfied by increasingly ambitious stagings. The 1939 New York World's Fair featured two spectacular models: the Consolidated Edison's City of Light diorama and the Panorama of New York City (Moon, 2005: 71). The historian, Ansgar Oswald points out how the model of the city became both the subject of urban planning and the arena for ideological games of strategy. (Oswald, 2008: 24) In the 1930s, Albert Speer and Hitler adopted innovative modelmaking and cinematic techniques for the representation of their imperial vision for the new Reich capital (Fig. 65). These included the Schufftan process, a technique developed by the architect Eugen Schufftan (1893 – 1977) for director Fritz Lang's film *Metropolis* (1927) where scale models were filmed using mirrors to create the illusion of full size buildings (Oswald, 2008: 23). Another film effect perfected in the 1930s was the use of time-lapse photography. These techniques together with the mobile camerawork of the cinematographer Fritz Terveen were used to animate the full scale model to create what Barbara Schrodl in *Die Geschichte der filmischen Reprasentation von Architectur* has described as 'the impression of a real, monumental architectural situation'[and] 'the illusion of spatial experience' (Oswald, 2008: 23).

In the United States, the potential of the model as the vehicle for ambition and spatial experience was also being explored in daring and speculative ventures. In 1937, the American theatrical and industrial designer Norman Bel Geddes (1893-1958) undertook a challenging modelbuilding project for a Shell Oil promotion. He was required to make a scale model of a future automotive city to promote the new interstate highway systems. *The City of Tomorrow* model was conceived from the start to be seen through the camera lens. It was photographed from a position above the model which would replicate an aerial view. Looking down from the top of a stepladder or high platform, Richard Garrison, a commercial photographer created a series 'of sublime utopian views' using smoke bombs to create 'the illusion of urban haze as well as clouds, which would testify to the camera's supposed airborne position' (Morshed, 2004: 88).

The City of Tomorrow, however, was only a very small scale exercise compared to his spectacular effort for the 1939 World's Fair. General Motors commissioned Bel Geddes to create another futurist environment but this time as an immersive experience. *Futurama* literally conveyed the spectators on an automated system through an animated model of the American landscape (Fig. 66). This impressive model meticulously realised in 'authentic' detail covered over 3,251 square metres and contained "500,000 individually designed houses and buildings, over 1,000,000 trees and shrubs of eighteen species and 50,000 scale model vehicles". (Yannacci, 2007) Just as the *Germania* model was claimed to be a 'first' of its kind (see Oswald, 2008: 25) so the central part of *Futurama* was said to be the largest and most expensive scale model ever constructed. It portrayed the future 'as a one animated model of an American utopia as it might appear in the year 1960 to people travelling in a low-flying airplane' (Morshed, 2004: 74). (Fig. 67)

Futurama was seen as an extension of Bel Geddes's work in the theatre and often reviewed as such in the American press. In 1939, the drama critic for *The Sunday News* Robert Burns Mantle, for example, called Bel Geddes 'the Miracle Man of the Fair' a punning reference to his Broadway production of *The Miracle* (Innes, 2005: 123) while in the same year, John Mason Brown, the drama critic of the *New York Post* declared 'the illusion of reality... in this stupendous model no less breath-taking in its details than was the background for *Dead End*' (Innes, 2005: 139). Just as in the theatre, Bel Geddes immersed the spectator both physically and mentally in the drama. The theatre historian

Christopher Innes recounts how for the stage production of *Dead End,* Bel Geddes had created the appearance of several city blocks on the tiny stage of the Belasco through exaggerated perspective, foreshortening and scenic distortions. He 'heightened the sense of realism through theatricality' (Innes, 2005: 125). It was these practises together with his innovations in stage machinery and sound recording that contributed to the *Futurama's* convincing scenography. Innes describes the visual scenario confronting the spectators seated on a conveyor belt moving through semidarkness on an imaginary airplane flight from one side of the United States to the other. Through a slanting window of continuous glass, they see a 'rolling farmland' in which: 'Trees were reflected in streams, miniscule people and farm animals stood in the fields, and telegraph poles and blinking signal lights marked the roads, with tiny cars and trucks actually moving along them' (Innes, 2005: 132).

Innes gives a full account of the range of theatrical techniques Bel Geddes used to create his illusions.

> Where vistas were shown, gauzes created all impression of distance. Thin wisps of cloud (specially manufactured chemical vapours) cast moving shadows on the landscape as they floated overhead or drifted across the view when they reached a city, apparent haze misted skyscrapers on the horizon. Conventional stage lighting with nine colour filters simulated the different times of day. At night, lines of fluorescent pigment activated by pulses of ultraviolet radiation produced the effect of moving headlights on the highway, and in one town alone there were five hundred miniscule "grain of wheat" bulbs for the street lighting.
>
> (Innes, 2005: 133)

At transition points in the visual narrative, the conveyor belt changed levels to give the impression of an airplane climbing. The airborne journey led past industrial cities and into mountains, with the scale of model increased until as Bel Geddes writes in the prospectus for GM: 'Great spruce trees bank the rocky ledges, tall and proud in the moonlight and for an instant, huge rocks obscure the spectator's view' (Innes, 2005: 135).

Instructions were given by the designer that every detail had to be 'accurate enough to photograph faithfully in a close-up, in spite of the fact that they might only be seen from 20 or 30 feet.' This is a requirement that is made even more astonishing when it is understood that each feature would only be seen briefly on the circuit which only took 15 minutes in total (Innes, 2005: 142).

Bel Geddes's enthusiasm and skill in model building began in the theatre. Christin Yannacci suggests that he preferred to conceptualize his designs through models unlike his New Stagecraft colleagues, like Robert Edmond Jones, Lee Simonson, or Joseph Urban, who worked through scenic renderings, considered better suited for suggesting atmospheric effects. (Yannacci, 2007) The visual techniques that Bel Geddes first experimented with in the theatre and then deployed in his commercial work would subsequently be applied to his wartime projects. Further research needs to be done to understand the full extent of his contribution during World War II. There are, however, a number of designs in his archive including a portable camouflaged tent to serve as an airplane hangar and visual perception techniques for identifying enemy craft (Norman Bel Geddes, 1945). Other commissions listed in his autobiography include a new self-camouflage technique for the US Army engineers and a camouflaged factory for Nash Sikorsky in New Orleans (N. Bel Geddes, 1960: 350). But it is his work for *Life* magazine in 1942 that received the greatest amount of publicity at the time of publication.

For a feature on the Battle of Midway, one of the most important naval battles of the Pacific Campaign in which the U.S. Navy defeated an Imperial Japanese Navy attack against Midway Atoll between the 4 - 7th June, 1942. Bel Geddes was commissioned to produce a number of small scale models as subjects for a series of 'aerial' photographs. Bel Geddes simulated his battle scenes using various materials such as wire, cotton, Epsom salt, etc. to suggest plumes of smoke, paths of torpedoes, and wakes from ships (Fig. 68 & 69). Daytime and night-time effects were produced with theatrical lighting. As with all the photographs in the *Life* series, there is no indication of any casualties. A large enough distance is maintained so that the absence of human figures is not remarkable. Despite the actual heavy loss of 3,057 Japanese and 340 U.S. servicemen, the only damage seen to be inflicted is on the machines of war. Like the players of war games, the viewer is privileged with the strategic overview of the military objectives.

In addition to models of naval operations, *Life* also commissioned Bel Geddes to create a series of relief maps illustrating the geography of different battle regions. Not all his models represented 'real' situations or locations. The photographic essay 'Amphibious War: Geddes Models Explain Land& Sea Attack' featured a series of images set in 'an imaginary land to be invaded somewhere in the South Pacific' (Anon, 1942b: 115). The images were arranged in the magazine sequentially to show the progress of a hypothetical mission to capture an enemy airfield. Unlike the other model photographs, these included miniature figures. These 'toy' soldiers are the least convincing aspect of the representation. Their presence signals to the viewer that they are looking at a simulation (Yannacci, 2007).

The designer later promoted his models to the military as an ideal method for documenting battle. 'Model photographs of a battle' he said, 'in no way conflict with the on-the-spot photographs taken during the battle. Instead, they fill in the gaps and supply the missing links by furnishing a picture of those parts of the action that could not be taken at the time' (N. B. B. Geddes, 1942). Although the military were quick to recognise the propaganda value of Bel Geddes's approach, it does not appear that Bel Geddes was involved directly in the activities of the official camouflage units or the US Engineer Terrain Board who were responsible for making the wartime terrain models. However, his projects provided valuable training for the future camoufleurs. Writing for *Popular Science* in 1944, Jack O'Brine reported how many of the modelmakers who worked on these panoramas and dioramas went on to become the World War II camouflage engineers who would build dioramas and training models to effectively demonstrate camouflage techniques and battle plans to soldiers (O'Brine, 1944: 84).

Bel Geddes scripted design was a carefully conceived theatrical strategy. His selective editing and stage management, innovative scenic effects scripted design and understanding of the dramaturgy of the situation made him along with Speer and Hitler among the supreme dramateurs and scenographers in the 'Theatre of War'. Through the model and camera lens they created the political and scenographic strategies needed to define the ideological terrain. The same visualisation techniques that they perfected would be employed by the camoufleurs to represent the battlefields on which those ideologies would be fought.

The Terrain Model

The model and the camera form a powerful alliance for the testing out of scenarios and rehearsing actions in the Theatre of War. I intend here to examine the military use of the terrain model as a site of experimentation, a visualisation tool and a theatre of landscape. The terrain model has a long history as a method for representing both the ground truth and over view of the war landscape. Descriptions of detailed terrain models of fortified cities appear in ancient Chinese and Roman documents. They are, as U.S. Army Intelligence Officer Captain David Stempien observed, one of the earliest tools used in 'military terrain visualisation'. Like von Clausewitz, Stempien is of the view that 'walking over (ground truth) or directly observing the terrain from a vantage point remains the best method for understanding the terrain'. However, he acknowledges that that approach 'is often impractical given the size of the area or the presence of a threat force'. The second best approach 'is the use of a terrain model which offers the advantage of providing a three-dimensional view of the target area's natural and man-made features' (Stempien, 2002).

The perceived strategic value of the terrain model has ensured its continued use into this century. As C.S. Spooner, who was chief of the Relief Map Division of the U.S. Army Map Service, wrote in 1953: 'the problem of training military personnel to read topographic maps and to comprehend strategic and tactical briefing was both monumental and vital. It became apparent that visualizing landforms on a map required a topographic sense that few possessed' (Spooner, 1953: 60). The terrain model was seen as a solution to this problem. Eduard Imhof, professor of cartography at the Swiss Federal Institute of Technology, Zürich, from 1925 to 1965, suggested that models permit all-directional comprehension of terrain, since the position of the observer, direction of observation, and incidence of light can be varied at will. Also, models if properly designed can eliminate the false impressions of relief obtained when viewing terrain in nature or in stereo pairs of photographs (Spooner, 1953: 60).

Spooner suggests that:

> Three-dimensional maps restore to the map user many terrain features which the map compiler sees and evaluates during his inspection of stereo pairs of photographs, but

> which are frequently lost in conventional map symbolization. The spatial qualities of the model make it possible more clearly to portray details such as rock outcrops, stream gradients, gullies, road cuts and fills, crest lines, and shore lines that are difficult to symbolize. Thus the user is enabled to correlate and understand road gradients in relation to road classification, vegetation patterns in relation to terrain, magnitude and exactness of watersheds, navigation hazards caused by terrain, defilading as affected by terrain, ingress and egress characteristics of landing beaches, parachute drop zones, and the like.
>
> (Spooner, 1953: 61)

During both the First and Second World Wars, three-dimensional terrain models played a significant role. Pearson tells us that 'according to Archibald Clough (1952), the static nature of World War I (1914-1918) demanded relief models of enemy defence positions for planning offensive assault operations' (A. Pearson, 2002: 227).
In 1917, the camoufleur Oliver Percy Bernard became the camouflage officer of the IX Corps in Sir Herbert Plumer's Second Army that was preparing the assault on the Messines-Wijtschate Ridge. The allies had tunnelled through to the German lines and the camoufleurs were able to position disguised periscopes close to the front. Photographs taken from observation balloons and low flying aircraft helped in the creation of a huge scale model of the Ridge and its defences. The model the size of 'two croquet lawns' was surrounded by a scaffolding which provided a viewing platform for the officers (Rankin, 2008: 139).

In the second edition of *A Key to Maps* (1939), Brigadier Harold Winterbotham, former director of the Ordnance Survey, who served in World War I and had experience himself of modelmaking wrote:

> During the Great War a small staff of surveyors laboured unceasingly to provide reliable maps of the theatre of operations. But even when these had reached the printing machine, and copies began to come rolling out, we were aware that our labours had not reached an end. At that moment some exalted person would appear demanding a relief model with the utmost dispatch. And so it has been with the writing of this little boo k on maps. No sooner has the publisher been busy than

> demands arrive for help in the matter of making models. But models are really the most entertaining things to make, and from the very construction thereof comes a quicker and more instinctive appreciation of how water, wind and weather have shaped our surroundings'
>
> (Winterbotham, 1943: 203)

From 1942-1945, the joint British-American V-Section model shop located at the RAF's Central Interpretation Unit at Medmenham, Buckinghamshire constructed scale models of strategic/tactical targets and battlefields (A. Pearson, 2002: 228). Ursula Powys Lybbe was a photographic interpreter stationed at Medmenham and working alongside the modelmakers. She writes how at the beginning:

> Model-making was unknown territory for the authorities, and the Air Ministry had no idea what category the model makers should be included under and as they were dealing with a new 'trade', they were all grouped together under Group V Trade. Thus the RAF was to benefit from the considerable skills of a group of people with quite exceptional talents in their own particular civilian professions, without the necessity of training them.
>
> (Powys-Lybbe, 1983: 60)

The new section was involved in the planning of many of the most famous operations such as those against the Bruneval radar station, Dieppe, the battleship, *Tirpitz* by midget submarines, the famous dams of Mohne and Eder, the V-1 flying bomb sites, the V-2 rocket at Peenemunde and many industrial targets (Powys-Lybbe, 1983: 62). (Fig. 70)

American model-making detachments also worked in France, North Africa and Italy, under the control of the Director of Survey at Allied Forces Headquarters. (Fig. 71) Although the effort focused on the preparation of models for the assault on the south coast of France, a model-making detachment served in Italy with the U.S. Fifth Army, and a model-making section was attached to the Middle East Interpretation Unit in Cairo (A. Pearson, 2002: 229). In the U.S. skilled model makers were recruited from architectural practices and the theatre and film industries. *Variety* reported in 'Talent Manpower Problems' that by July 1942 over 3,000 technicians from the Hollywood

studios were in the armed forces (Anon, 1942a). In another *Variety* article, the chief of special effects at RKO, Vernon Walker remarked that' six of his best artificers went into the army to construct miniatures' (Castle, 1942).

Relief models were used in most theatres of World War II. For example, the Russian model of the Finnish fortifications on the Mannerheim Line and the detailed model of Pearl Harbour by the Japanese played important roles in the planning offensives (Ristow 1964). At the end of the war when a group of American and British model makers made an inspection trip to a German model shop near Munich they reported that the German work displayed a high level of craftsmanship and were more advanced technically. However, according to Leonard Abrams, 'Their actual usage was as traditional as it was stupid; the bulk of their effort seemed to concentrate on strategic work rather than combat models. It served as marvellous stuff for the General Staff, but was seldom seen by the fighting men' (Abrams, 1991: 64).

Wartime manuals for terrain model making list the various scales and types of model and indicate the level of detail appropriate to their function. Models prepared for strategic planning tended to be small scale, with little emphasis on detail. Instead only general characteristics of the topography were indicated, i.e. main roads, railways, towns, wooded areas, and waterways. Models for aerial bombing, however, needed to accommodate reasonably detailed elevations of buildings, including side elevations, to give pilots and navigators a good three-dimensional representation of the target and surrounding terrain. Accurate representation was essential for precision bombing (A. Pearson, 2002: 233). Abrams describes working on the model for Barnes Wallis ingenious bombing strategy for the destruction of the Moehne Dam in North Rhine, Westphalia, Germany. A five-ton bomb had to skip over the water to a precise spot next to the dam where it would sink, exploding deep under the surface (Abrams, 1991: 38). Plans for such a raid had started quite early in the war, when explosive tests were carried out by the Road Research Laboratory on large-scale models built by the Building Research Station (A. Pearson, 2002: 234) (Fig. 72). The aiming point for the bomb's release would be the towers on the Moehne Dam. Because the bombers would come in too low and fast for any existing bombsight to function, Abrams tells us that Bomber Command employed 'a hand-held triangular piece of plywood with a simple peepsight on one point and upright nails on the other two points. As used in this mission, when the

two nails lined up through the peepsight with the towers on the dam the order was to "let 'er go!" The detail on the model allowed the pilot to rehearse the procedure!' (Abrams, 1991: 38).

Abrams also cites a passage from Paul Brickhill's book, *The Dam Busters*, which mentions an account of a meeting between Wing Commander Guy Gibson, DSO, DFC, and Air Vice Marshall, the Honorable Ralph Cochrane.

> Gibson stood looking down at the models that showed not only the dams but the whole countryside in detail for miles around. There were the flat surfaces of the lakes, the hills, the winding rivers, and the mosaic of fields and hedges. And, in the middle, the dams[...]At the briefing of the air crews, Gibson crossed the room to a couple of trestle tables where three dust covers were hiding something, pulled the covers off, revealing the models of the dams. "All of you come over and have a look at these [...] Look at these till you've got every detail photographed in your minds." They were two hours doing that: each crew concentrated on its own target, working out the best ways in... and out... gazing down at the model... "the first thing is to get the final line of attack... There's the spot!"
>
> (Abrams, 1991: 39)

Quoting again from Brickhill, Abrams provides details of the actual operation and the effectiveness at the representation that had briefed the mission:

> After several losses from German flak on the long approach, the planes reached the target...Down below lay the flat sheet of Moehne Lake. It was like looking down on the model, the same dim fields, the same saucer of water, and across the neck of the lake, the same squat rampart hugging the water, crowned by the towers.
>
> (Abrams, 1991: 39)

The famous bouncing bombs had been dropped successfully and Abrams proudly wrote that: 'The magnitude of this victorious attack caused security to be momentarily brushed aside: The models were mentioned in the news!' (Abrams, 1991: 39).

Briefing models were usually prepared at two scales: 1:1,190 and 1:6,250. The smaller-scale model was used to brief aircrews on how to approach and recognize the area of the target. The small scale model needed only to include those details that would make the target route and drop zone an immediately recognizable route for an aircrew flying at high speed and low altitude. The larger-scale model incorporated more specific details of the target itself (A. Pearson, 2002: 235). Similarly models prepared for assault landing included precise information about the topography. The modelmakers created detailed representations of shorelines, beaches, forests, and enemy defences. Models were made of every selected area regarded as a target for operations by land, sea and air. As well as the terrain models, the model makers made models of particular subjects such as ships, aircraft, railway rolling stock, buildings, port facilities and military installations (Powys-Lybbe, 1983: 62). Powys-Lybbe describes how the methods and materials used varied according to scale and the differing requirements of the 'customers' of the section. Scale was calculated from maps, charts, town plans or photogrammetric projection, and then a ground plan to the required scale was produced from a tracing in any photographic or pantographic process, with sufficient control points transferred to the model base. (Fig. 73) Contours were then cut from card or board of appropriate thickness and fixed to the base, providing the structure for the initial modelling of the land form. The next stage of the operation was to assemble the 'skin', consisting of correctly, scaled and rectified vertical photographs. While still wet, these needed to be carefully manoeuvred into the correct position guided by the control points, as there might have been distortion of the photographic image owing to circumferential radial or tilt errors. These errors would become enlarged on the 'skin' to scale with the rest and would need correction (Powys-Lybbe, 1983: 62). Powys-Lybbe points out that the model-makers had to use their own skill in interpretation as well. Sometimes land forms and surface areas had to be re-plotted; this stage was one of the most difficult as whole sections of the 'skin' might have to be discarded or re-drawn. It was now, she wrote, that details such as embankments and excavations could be added and a colour applied over the entire area. ‘Colour was a question of inspired guesswork of course, as they were dealing with monochrome photographs, but some indication could be obtained from surface texture’ (Powys-Lybbe, 1983: 64).

In a report entitled *How to build Terrain Models*, prepared in 1946 for the US Office of Education Washington by the United States Navy, J.W. Studebaker, Commissioner of Education, dealt with this subject of colour. He writes:

> Don't be guided for tone by high altitude photographs. In order to bring out the detail with maximum clarity they are filtered and printed with greatly exaggerated contrasts. The modeler can find the detail from these photographs, and restore the landscape to its true color. To sum up, study the scale of the model carefully before deciding on the tone or hue of the landscape. At 1: 1,000 objects will be nearly their natural color. At 1:40,000 the entire terrain will approach a monotone.
>
> (NAVEXOS, 1946: 27)

Studebaker also advises that only after the terrain had been modelled and colour, should other features be ‘added to the scene’. He recommends that camouflage nets are ‘simulated with silk or nylon hose’. Houses, churches, factory buildings, military installations, bridges etc. should be made from cork-lino and wood and “coloured as close to the original as possible”’ (NAVEXOS, 1946: 27).

The U.S. Engineer Board report on *The Construction of Models for Protective Concealment Purpose* published in 1942, suggests that:

> The painting can make or break a model. In any case, never let the model look painted - be careful of strong colors. Colors must be scaled down in much the same way as dimensions. For example, the black seen on actual buildings will be only a dark grey when seen on the model. A red roof in real life would appear almost pink in a model. Paint all buildings before placing them on the model.
>
> (Engineer Board, 1942: 3)

It was at that point, as Powys-Lybbe explains, that the work had to be checked by the sections who had supplied the intelligence and then it had to be photographed for the 'customer', using ‘all the special lighting effects needed to suggest for example a moonlit or early morning scene’ (Powys-Lybbe, 1983: 64).

The use of terrain models was also a particularly important aspect in the preparation of camouflage schemes. (Fig. 74) In 1942, Robert P. Breckenridge writes;

> Models afforded great flexibility in both use and construction, making them applicable to problems involving topography, cut and fill, approach, vicinity, layout etc. When they are used to supplement the camouflage study of airfields, industrial areas, factories, utilities and other installations, a much greater understanding of the problems involved is possible and many costly mistakes may be avoided.
>
> (Breckenridge, 1942: 229)

The 1942 Engineer Board Report also extols the merits of the terrain model:

> Models are capable of telling a precise story in a universal language. Through the eye, a layman is given a graphic understanding of three dimensional space, form and color, and the camouflage designer is shown the merit or fallacy of his accomplishment. When used to supplement the study of airfields, arsenals, industrial plants, cantonments, and the camouflage of all projects, a much greater understanding of the problems involved are brought to view, and many costly mistakes are often avoided.
>
> (Engineer Board, 1942: 1)

Among the recommendations of the Report is that for modelmaking ‘Men are generally hired in pairs because some excel more in craftsmanship while others do so in art. A combination of both is desired for high class work’ (Engineer Board, 1942: 1). Abrams describes how at Medmenham in the model making workshops staff were rotated to different tasks to stop them getting bored and to use their skills to the best advantage.

> If someone was assigned to buildings you'd request a working panel, along with the appropriate air photos, from the W.A.A.F. [Women’s Auxiliary Air Force] in charge. The road information represented a vital feature of the models and one of the great curses of our existence. Every road, path or track had to be painted in by hand to a precise width and color. Since the roads and fields usually had hedgerow boundaries, we invented a ‘hedging machine,’ a device in which air pressure forced a green paste

> through a small nozzle controlled by a trigger − rather like a mechanized cake decorator. The device was also used to make trees. (Fig.75)
>
> (Abrams, 1991: 57)

Abrams continues:

> With just over 100 men and women, V-Section and the Engineer Model Making Detachment... produced over 300 models for various other operations, while simultaneously producing an incredible 396 panels and copies of these panels for the Normandy Operation. We crated copies as well as master models for shipment to various headquarters with code names such as OMAHA, UTAH, EASY, JUNO, AND SWORD. These models would be rolled out on the decks of the assault ships for the first waves of troops to study. Other panels would go to airfields where gliders waited, or where paratroopers readied their gear.
>
> (Abrams, 1991: 58)

Abrams goes on to explain how the examination of a model at eye level 'enabled the crews to obtain the same oblique view in miniature as if flying over the original', adding, 'the model helped crews recognize the objective and determine aiming points' (Abrams, 1991: 58). (Fig.76)

To test the effectiveness of camouflage and decoys, models were assessed in specially constructed viewing rooms under simulated atmospheric and lighting conditions. (Fig. 77 & 78) Robert Breckenridge advised that:

> Completed models should be viewed in such a manner that actual conditions are simulated. This may involve nothing more than a stepladder and a pair of binoculars held in reverse; or it may mean an elaborate viewing room with observation tower, cyclorama and artificial sun. A haze box, an easily constructed viewing device which duplicates to some extent the haze seen from high altitudes will be helpful in model studies…Critical observation, in any case, should be made from the oblique bomber's angle and at distances which are translated into reasonable bombing altitudes.
>
> (Breckenridge, 1942: 228)

In *The Fortnightly DO*, the camouflage unit newsletter, there was a description of how in 'a vast landscape set out on the ground, in front of a sort of painted cyclorama' models can be seen through viewers which by turning a handle can bring the image from a little pinpoint in the distance nearer and nearer just as a bomber would see it' (TNA/HO199/1632). (Fig.79)

Experiments were made with a range of day and night time lighting effects. Models of the sun and moon would be suspended on adjustable arms which could be set to different altitudes or made to 'revolve in relation to the turntable, so that the designer standing…at a distance from the scale model representing approximately five miles, can imagine himself in an aircraft circling around the target' (Darwin, 1943: TNA/HO 186/1648). These viewing machines required the observer to adopt a predetermined viewing position –demonstrating that tactical decision-making was a matter of point-of view.

The viewing rooms assumed great importance both tactically and politically. Government ministers including Churchill paid frequent visits to watch the staging of operations. The presentations were designed to be informative but also visual spectacles that would convince the watching officials of the military's capabilities and tactical planning skills. In these viewing rooms, strategists and politicians were invited to project themselves into the gun sights of the enemy. The Air Ministry camouflage design section in Adastral House in London had a large studio where models of key points in Britain's industrial infrastructure-factories, power stations, gasworks, oil tanks, water reservoirs, docks, railways etc could be painted and looked at from various angles (Rankin, 2008: 228). There was an adjoining viewing room, in which a balcony was constructed for viewing the models at the angle from which a bomber crew would see them (Hartcup, 1979: 51). At Leamington Spa, experimental camouflage designs were tested in a large hall known as the Rink and again there was a special viewing balcony. Models were constructed so that they appeared as if seen from 20,000feet. A painted cyclorama and lighting effects were used to create a 'realistic' representation of the aerial view of the target as perceived from the German bombsight set up on the viewing platform (Hartcup, 1979: 53).

The models were usually photographed and in a number of cases filmed.

Abrams describes how the success of bombing raids could be attributed to the fact that target models were often photographed from precisely calculated positions. The pictures showed the predicted view at a given moment in an attack, featuring the aiming point and the bomb release point. He goes on to describe how movie cameras were rigged up to fly over models to simulate bomb runs and black puffs of smoke 'flak' added to give a sense of 'grim realism' (Abrams, 1991: 53).

In March 1943, *Popular Mechanics* ran an article entitled 'Playing Hide and Seek', which told readers, that some of the newest effects in this 'architecture of concealment' have been borrowed from the movies. 'For years motion picture artists and set designers concentrated on tricking the eye and camera into seeing things that really aren't there. Today they are doing just the opposite, using the same motion picture technique to trick the eye and camera into not seeing things that really are there' (Anon, 1943: 83).

The article features the work of Harper Goff, a member of one of the movie camouflage units. 'To illustrate the principles of modern camouflage and yet not reveal any details of actual "cam jobs" that are being done, Goff built some table top miniatures industrial area such as would of an imaginary industrial areas as would be an obvious bombing target. On one of these models the factory of a chemical concern can be seen adjacent to a bridge that crosses a river. Obviously, all a bomber pilot needs to do is to follow the river until he gets to the bridge, then bomb the adjoining factory. But when you see the model after it has been camouflaged you begin to wonder. Paint and motion picture technique have removed the industrial area and you can't even find the bridge or the section of the river where it had been.'

The article continues by explaining that Goff had built up the contours of the river with 'log booms' and the masts on the strategically moored barges support canopies of 'garnish' to give the effect of trees. Painted canvas disguises the bridge and the factory has been sprayed with paint patterns. Mention is also made of Goff's experiments with throwing shadows and outlines of trees and shrubbery on a model railroad with the aid of a slide film projector; working with a model of an industrial area, to which infrared paints and canopies have been applied to play 'hide and seek' with the enemy reconnaissance planes; and reversing field glasses in order to obtain a distant view, studying oblong buildings with balconies to break up its outlines (Anon, 1943: 86).

At sea as well as on land, the same detailed attention was given to waterborne representations. During World War I, there had been some isolated examples of simulations using models and lighting effects. A notable example was the 'experimental ocean' designed for the U.S. Navy by Loyd A. Jones an American scientist with the Eastman Kodak Company. This ocean consisted of an observation tank, artificial sun, movable sky, and other components that simulated outdoor viewing conditions. A submarine periscope was used to observe the miniature camouflaged ships. Jones also developed an outdoor observation stage on the shore of Lake Ontario. Painted cut-out silhouettes of camouflaged ships were suspended from a framework, at a height that made the ships appear to be floating on the water (Jones & Skerrett, 1919: 348).

In World War II, the practice of staged viewings had become a regular feature of the camouflage tests. At Leamington in addition to the viewing rooms to test aerial camouflage, there were viewing tanks for naval camouflage (Fig. 80). Again artists and film makers were employed to simulate a range of atmospheric conditions. The theatricality of these presentations is recorded in a description of the viewing room which appeared in *Fortnightly DO* in spring 1942:

> A large shallow tank is arranged with fans to ripple the water, all the most realistically, and a large twenty-foot mirror that reflects the real clouds at the back. Civil servants are hired to blow smoke through their noses and, seen…through a viewer one might just fancy oneself just passing off the North Foreland. Another gigantic peepshow produces a tropical storm by pressing a button.
>
> (Goodden, 2007: 141)

Some of the special effects were taken from early theatrical and cinematic experiments and techniques. From the early days of cinematography, dramatic historical reconstructions had required the use of special effects and models. The French filmmaker Georges Méliès (1861-1938) specialized in reconstructions of newsworthy events such as the sinking of the battleship USS Maine (1898) and the assassination of US President William McKinley (1901). James Chapman in *War and Film* suggests that the first example of a battlefield reconstruction passed off as the real thing was probably the Vitagraph Company's *The Battle of Santiago Bay* (1898). Although the cinematographer, Albert E. Smith, did some filming on location in Cuba, it was

considered not to be dramatic enough. So Smith staged the battle using a water tank, cardboard ships and cigar smoke. The effect when combined the location shots was apparently convincing enough to fool the audience (Chapman, 2008: 36).

The camoufleurs by adopting similar procedures hoped that their results would be equally convincing to a more highly suspicious audience. Among the practices appropriated by the camoufleurs were water tanks, fog machines and the addition of oil to water to reduce the size of bubbles created when by sinking model submarines. 'In using miniatures on water... take care that no bubbles form. They will look about the size of hogsheads compared to the model ship' (Gregory, 1927: 278).

Atmospheric effects were made out of 'household remedies, miracles in candle wax. A typhoon can be a twist of cotton sprinkled with coal dust. Oatmeal can look convincing as snow or lava, depending on whether it is cooked or left as flakes' (Anon, 1982 : 65). 'Burning trestles are usually soft wood saturated with turpentine, which produces a black smoke that photographs well' (Gregory, 1927: 278).

An important cinematic technique used in the camouflage set ups was the use of the Schufftan Process. This was the invention of the German cinematographer Eugen Schufftan, which he developed when working on the film *Metropolis* in 1927 though it had an earlier precedent in stage effects such as Pepper's Ghost. Edward Carrick (1905-98) the British art director and son of Edward Gordon Craig, provides a description of the Schufftan Process as a development of the 'model shot' in his book *Designing for Moving Pictures* published in 1942.

> In front of the camera is placed a thin sheet of optical glass roughly 18 in. by 24 in., the surface of which has been silvered. This mirror is placed at an angle of 45° to the camera, and into it at a right angle to the camera is reflected a model, a photograph or a diapositive (lighted from behind).You can float a model ship in a tank of water and merge it with actual sea and sky, or reflect a model roof on to a ruined castle, thus making it complete ; or, suppose you have a landscape that is perfect except for an offending building which you cannot take down, you just mirror that portion of the glass where the building appears and reflect some trees and bushes in its place, or even another building. It will naturally be seen that any part in front of which action

> takes place has to be built, any part that is not used can be reflected from a model, painting or photograph.
>
> (Carrick, 1941: 64)

The June 1944 issue of *Popular Mechanics* takes us 'behind the scenes' at George Pal Productions in Hollywood to show us how these various cinematic techniques were used in staging battle scenes:

> Movie technicians are using all the tricks of their trade to impart life and realism to their instructional pictures. Actual newsreel combat scenes, specially staged shots of actors on sets, animated drawings, miniatures, and special effects of all kinds are used to drive home convincingly the points that are being taught in the pictures. Such films give men a quick and thorough grasp of what they are being taught and why, and may slash training time by as much as 40 percent.
>
> (Anon, 1944c: 58)

The article goes on to describe and illustrate a sea battle:

> Is being fought on a table top, on an ocean that consists of a sheet of ripple glass. The ships are scaled-down models. The camera takes you up in the air to give you an airplane view of the engagement, then down to the surface to pick up and emphasize a point that is being stressed in training. The same technique is used in filming the tank manoeuvres. Pal compresses 10 square miles of battleground into a miniature set that measures 9 by 14 feet. It duplicates typical country in which tanks might be used, with painted plaster for the ground, twigs and branches for trees, miniatures for buildings, and real pebbles for rocks. Tiny tanks only three-quarters of an inch long but complete down to guns, radio antenna, and insignia, maneuver across this terrain, charge enemy installations, and even fire their guns. For technical reasons the set was tipped at a 50 degree angle for filming and 12 technicians and two cameras were used.
>
> (Anon, 1944c: 58)

The article in *Popular Mechanics* is swift to point out that the completed films did not 'look like pictures of toys that are being moved around to demonstrate how battles are

fought.' In fact, 'On the screen you get the impression that you are actually seeing full sized battleships or tanks at work. Carefully chosen camera angles is one of the ways in which this illusion of reality is created. Some scenes are purposely stylized by eliminating all distracting details' (Anon, 1944c: 59).

The materials used and the reasons for their selection are explained in some detail in the text:

> Plastics, wood, and metal are the materials from which miniatures are made. Cloth, thread, and string are taboo because they are apt to change shape under the hot lights. Glass slides are the secret of how guns can be made to fire in miniature scenes. The first small puff of smoke and flame is painted on a glass slide, a larger puff on a second slide, and the sequence is carried on to show the growing smoke cloud until it dies away in a lingering wisp. These slides, placed one at a time in front of the camera and matched up with the muzzle of the gun, give a realistic effect of firing.

There is also a brief consideration of the effects of scale.

> In all miniature work, action, distance, and time must be cut down in scale to match the miniature set. Otherwise the sense of reality is lost. Before the movie makers film a scene that shows a ship approaching and then rounding a buoy they must first learn the size and speed of the vessel that their miniature represents. Then they can figure the number of frames of film that would be required to show the action in real life. That tells them just how far the miniature ship must be moved ahead between each succeeding exposure. Measurements must be followed precisely to avoid jerky motions in the finished picture.
>
> (Anon, 1944c: 61)

The animation of the ships, we are told, was achieved by stop motion and the effect of waves was created by reflecting light on the rippled surface of a 'glass ocean'. Fog effects were achieved 'by airbrushing fog paint on large glass slides and then moving them gradually in front of the camera across the scene' (Anon, 1944c: 60).

Sound was no less important a consideration in staging authentic representations. The manual on how to construct a *Terrain Model Deluxe*, issued by the U.S. Army Infantry School in 1946, includes instructions on how to create sound effects for a training exercise using a terrain model, fly screen and various other accessories.

> The phonograph used for sound effects (machine-gun, artillery, etc.) is a regular issue phonograph. It is important that the phonograph used have a volume control for the purpose of simulating incoming, outgoing, or overhead artillery shells. For an incoming round, catch the whine of the shell with low volume and increase the volume until the explosion occurs. For an outgoing round, catch the whine of the shell with low volume, increase the volume, and then decrease the volume again prior to the explosion of the shell. The person who operates the smoke which visibly represents the artillery or mortar fire should coordinate his puff, which will appear on the upper surface of the model, with the explosion of the shell heard from the phonograph.
>
> The sound records for machine-gun fire may be handled in much the same way as the sound for the artillery and mortar fire. The volume control in the firing of machine guns serves only to give relative distances of machine guns from the location in which a particular situation is taking place. The person operating the machine guns − that is the flickering of the flashlight bulbs − coordinates this action with the sound of the machine-gun record.
>
> The sound of machine-gun, rifle, mortar and artillery fire can all be recorded on one disc in the proper sequence, simplifying the work of the person operating the phonograph and assuring smoother functioning of all sound effects.
>
> (U. S. Army, 1946)

The manual also provides a script for the action.

> ‘Whenever the instructor hits the cue words of: “The action continues hot and furious in Baker Company's sector.” − *the record man sets the clock at 0630, the sound effects man starts his record on heavy machine-gun and artillery fire, the smoke man smokes the platoon area, and the machine-gun man flickers the light bulbs firing the*

machine guns. The instructor continues with, “Perhaps we should go back there and see if we can help. There is a messenger headed for the company command post in a big hurry.” − *The record man starts his situation record #12*. – “Let's follow him.” Messenger: (Recording via offstage microphone) (Excitedly) – “Where's the executive officer? I have a message for him!” Executive Officer. Company. B: “Over here.” Messenger : “Sir! The captain and the artillery observer got killed just as they got down to our platoon. Lt Rightplat sent me back to tell you he's firing his final protective lines −” *sound effects man pulls final protective lines of machine guns so that they will show on upper surface of terrain model* − “he wants more artillery and some help. We've lost a lot of men, sir. The enemy are right on top of us; they keep on coming − lots of 'em!”

Sound effects, smoke, and flickering of flashlight bulbs continues.
1st Sergeant: “Excuse me, lieutenant, the left platoon just called on the 536. They are being shelled heavily; but not many casualties. They got hit from the front, but broke it up with small arms fire. They want to know what's going on.” (End of record.)

(U. S. Army, 1946)

It is often difficult to reconcile the theatrical methods with the seriousness of the intent. However, the effectiveness of these models was generally acknowledged and the model making units expanded accordingly throughout the duration of the war.
As Breckenridge observes in his influential book *Modern Camouflage* the model gave the layman: ‘a graphic understanding of three-dimensional space, form and color; and the camouflage designer is shown the merits or fallacies of his ideas’ (Breckenridge, 1942: 229). Like stereoscopic vision, the terrain model however, presented a perceptual challenge. What to put in, what to leave out. In the camouflage training manuals and in the camoufleurs’ own accounts it is repeatedly stressed that it was the model maker’s responsibility to decide what to include or exclude. ‘Any creative professional understands these decisions; include that which governs vision, exclude that which is a distraction… Model making, in peace and war, involves a spectrum of art and craft skills, all of which demand infinite number of subtle, personal decisions (Abrams, 1991: 34). Abrams, like many of his fellow model makers and some enlightened military, saw model making as a creative as well as a physical process − an act of imagination. The

makers had to have what Clausewitz called an *Ortsinn* ‘a sense of locality’ a natural mental gift:

> Of quickly forming a correct geometrical idea of any portion of country and consequently of being able to find one’s place in it exactly at any time. A mentally drawn map is formed partly by seeing, partly by the mind, which fills up what is missing with ideas derived from knowledge and experience …all that can only be effected by the mental faculty which we call imagination.
>
> (Clausewitz, 1997: 55)

There was, however, a tension in the camouflage units between the relative importance of objective scientific representation and subjectivity of perception and lived experience. Many camouflage officers sought to distance themselves from the ‘artists’ in their midst and align themselves with the ‘engineers’ and scientists. Claims were made on both sides about the appropriateness and effectiveness of their different methods. Achieving realism was held out as the primary objective but there was disagreement about its interpretation and representation. Reviewing the strategic effectiveness of the terrain model in the war, Harrison Reed, commanding officer of the Engineer Model Makers Detachment from 1943-5 spoke of the value of both realistic and symbolic representations but does not define what he meant by either (P. R. Harrison, 1946: 632).

It was believed by many camoufleurs that too much realistic detail could be distracting and confusing. Leonard Abrams reports how the principal instructor in model making Pilot Officer E.J. Thring had advised them that they:

> Had to be selective to get an effective illusion of realism. To take a single example, suppose one must decide on the degree of detail for a building 1/8th of an inch high. If it borders the outer edge of an air target model it could be represented by a simple block form. If located near the center or at the aiming point, the shape would be refined a bit.

> On the other hand, if the building is facing a beach where a landing is planned, we must be still more exacting, giving the roof a precise silhouette, and perhaps adding the dormer windows. The model maker must try to imagine the scene as the combat infantryman or the bombardier will see it in action.
>
> (Abrams, 1991: 34)

The wartime models of V-Section were mental as well as physical constructs designed to take the viewer on a prescribed journey and instil particular expectations. By studying the model and rehearsing its detail, it would be possible to re-enact the combat scenario. What was needed was the presence of a narrative frame that situated reality in a way that the viewer would be able, firstly, to understand the model's terrain and secondly, to project himself into it through a process of identification. Through the double mechanism of identification and projection, the viewer adopted the position that the considered by the military planners to be tactically correct. If narrativity was lacking, it was because there were flaws in the staging. Modelmakers made their selections based on the strategic goals for the exercise. Where the photograph indiscriminately records everything set before the camera, the modelmaker who creates an image from a photograph can discard the details that are considered irrelevant to the story he wishes to tell. Realism was not only selectively deployed, it was selectively desired by both the planner and the viewer.

In 1942, V-section was given the assignment to make a model of a German radar station on the French Coast at Bruneval. (Fig.81) Working from high quality low oblique aerial photographs, the model makers were asked to produce detailed elevations of the building and 'another drawing of the inside of the house, working from the positions of the doors and windows' (Abrams, 1991: 22). From the drawings, a model was then created. (Fig. 82 & 83)

> The towering cliffs of Cap d'Antifer were given their height and the little valley near Bruneval its gentle slope. Finally the model was painted in the sombre colours of the winter landscape, and the model makers set in place with tweezers the Lilliputian buildings and trees and fences and, of course, 'the Bowl-fire' itself. Anything over three feet high were shown three dimensionally and if you stooped down and looked

> along the surface of the model you could see exactly what the Commandos were going to encounter.
>
> (Babington-Smith, 2004: 151)

George Millar in his story of the raid on Bruneval, gave the following account of the model and its use in briefing:

> The model had been accurately put together from blown-up air photographs and the biggest-scale French maps. The Würzburg was there, the ugly house, trees, fences, gates, German pillboxes, all to scale. Since the raid was to be an operation by moonlight and over complicated and rugged terrain, the lie of the land had to be familiar to every man. Few people can "see" a piece of country by looking at a map. A model is different. They all agreed that the dropping zone, due east of a track running north and south on the model, seemed a good one, and so did the forming-up point by a line of trees nearby.
>
> (Millar, 1974: 157)

When the commandos captured the installation they reported that only one door in the interior house model out of place. The accuracy and realism of this model received wide publicity in the military press and was used as an example of the value the terrain model had in tactical planning Major J.D. Frost wrote: ‘That we arrived just where we wanted to go was in great part due to the excellent air photography and to the model of the country which every man studied so that we all knew exactly what to expect’ (Abrams, 1991: 22). In documentary photographs, the Bruneval model looks at first impression like a child’s doll house - an Alice in Wonderland feature in some unidentified imaginary landscape. The diminutive scale of the model combined with the performative actions required to view it ‘realistically’ created a theatrical scenario that was reversed in the actual raid when the representation was literally entered and the model’s authenticity confirmed.

Real conditions and speculative stratagems were tested through the perceptual skills of the interpreters and model makers in the camouflage units. They had to locate themselves imaginatively in their representations. ‘To gaze with childish imagination at the model or any pictorial image ‘is to be… absorbed by it…it is to dream ourselves into

another place' (Leach, 2006: 30). Powys-Lybbe thought some of the Medmenham models were 'sensational in their realism and beauty'. She recalls one of the first made of the Cherbourg Peninsula which she 'found difficulty in dragging myself away from it – it was so spectacular' (Powys-Lybbe, 1983: 62). Saint Amour has argued that this 'reverie of detection' and the distancing effect caused by changes in scale and effects of stereopsis removed the observer-interpreters from 'the spectrum of violence' (Saint-Amour, 2003: 398). However, the recorded observations of both combatants and camoufleurs, reveal the opposite was the case. They were only too aware of the possible consequences of their handiwork. The young WAAF Mary Harrison, for example, wrote a poem "My Hands" in which she laments her skill at representation. '*Do you know what it is like to have death in your hands?*' (M. Harrison, 1995).

Harrison was one of those responsible for modelling the city of Cologne for a thousand bomber raid.

Furthermore, Abrams points out how 'well-detailed' models influenced decisions about whether bombing raids should take place. He records how a bombing raid on a Luftwaffe research facility at Issy-les-Molineaux, on the edge of Paris was reconsidered because it would imperil many civilians in the adjoining residential neighborhoods.

> History remains silent on the models made for operations that did not take place. After studying a model, the planners might decide to "scrub that one," considering the cost in lives. The model could be said to have had real value because it prevented the bombing from taking place at too great a cost in lives. Successful by this time in a variety of applications, the models certainly provided insight and affected many decisions.
>
> (Abrams, 1991: 38)

The end of the war brought a halt to model making at Medmenham. However, the experiences of World War II had demonstrated the value of terrain models and research continued into methods for their mass production. Mapping authorities, released from operational pressure, agreed on the need for revolutionizing model production for quantity output (Spooner, 1953: 61). The U.S. Army Map Service believed digital techniques could automate the creation of terrain models. By the late 1950s the idea of

scanning a profile and recording slope onto magnetic tape was proposed. A three-dimensional milling machine guided by digital data was to cut successive models from solid wax blocks. During the 1960s and 1970s, work continued on the development of digital terrain models for military applications
(A. Pearson, 2002: 240).

There are many methods of creating models now available at varying levels of detail and scale. Although digital air photographs and GPS mapping, and digital terrain models, are being increasingly used by the military for training and briefing purposes, there is still a demand for physical models. U.S. Army Intelligence Officer Captain David C. Stempien, in his study of terrain models as visualisation tools stressed the models continued value for a number of purposes including training, predictive analysis, planning courses of action (COAs) and supporting operations.(Fig. 84) 'The underlying terrain to some extent restricts any action, either friendly or threat. Thus, understanding the implications of both natural and man-made features can be critical to the mission's success or failure'. Stempien points out that by using the terrain model, intelligence analysts are taught how an adversary might 'block an area and how to prevent such an eventuality; how weather and terrain might affect the operation, establish the importance of mobility corridors, and so on' (Stempien, 2002).

To illustrate how these models work, Stempien provides the example of the Caspian Sea model. He describes how at a scale of one inch to a mile and representing an area of 61,440 square miles (159,129 square kilometres), the model is constructed from metal, plywood and Styrofoam. Measuring 432 square-feet (40 m^2) the model is able to support the weight of people walking on it. A professional exhibits model-maker together with a cartographic and imagery specialist, assisted by three volunteers, was responsible for the model's construction. Though the materials might have changed, the method of making the model would still be familiar to the Allied modelmakers at Medmenham. Images of the region were projected on to sheets of Styrofoam and the lower levels then cut away to match the terrain. Carefully chosen colours were used to define the terrain, delineating land, sea, and mountains. Outlines of cities, towns, and villages were then added as were roads, railroad tracks and airfields. Then, finally, the team wired the model with lights to indicate roadways, railroads, power stations, and other significant features.

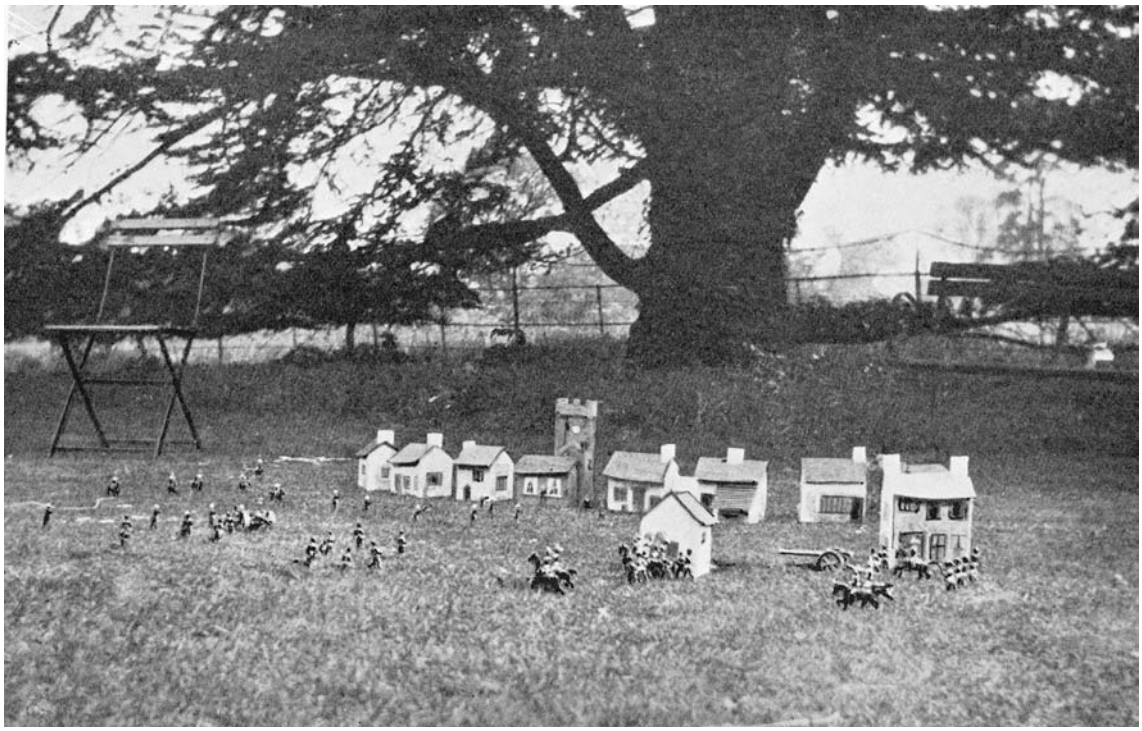
Once completed, the U.S. Army Training and Doctrine Command (TRADOC) System Manager (TSM) for Unmanned Aerial Vehicles and Aerial Common Sensor (UAV/ACS) was employed, as David Stempien tells us 'to support its Extended Range/Multi-Purpose (ER/MP) Tactical UAV Map Exercise (MAPEX) held 19-23 August 2002'. Using performative language, Stempian describes how the MAPEX used the Caspian Sea 'scenario in a series of five vignettes, with the intent to "play" ER/MP TUAV support to forces on the ground and to see what support the UAV did and should provide'. He concludes that the terrain board proved to be 'an invaluable tool, helping to visualize how, where, and when the UAV support helped the ground commander and his troops see first, understand first, act first, and finish decisively' (Stempien, 2002).

The model makers' ability to project themselves into the battlefield, to engage imaginatively with the target enables them to create effective topographical illusions and performative experiences. The motive is tactical; the methodology- theatrical.
Anne Ubersfeld definition of stage space 'as the point of conjunction of the symbolic and the imaginary, of the symbolism that everyone shares and the imaginary of each individual' is particularly relevant to the terrain model. (Ubersfeld, 1999: 100)

Figure 56

WWII German Board Game ‘Adler-Luftwaffenspiel’produced by the magazine ‘Der Adler’, 1941

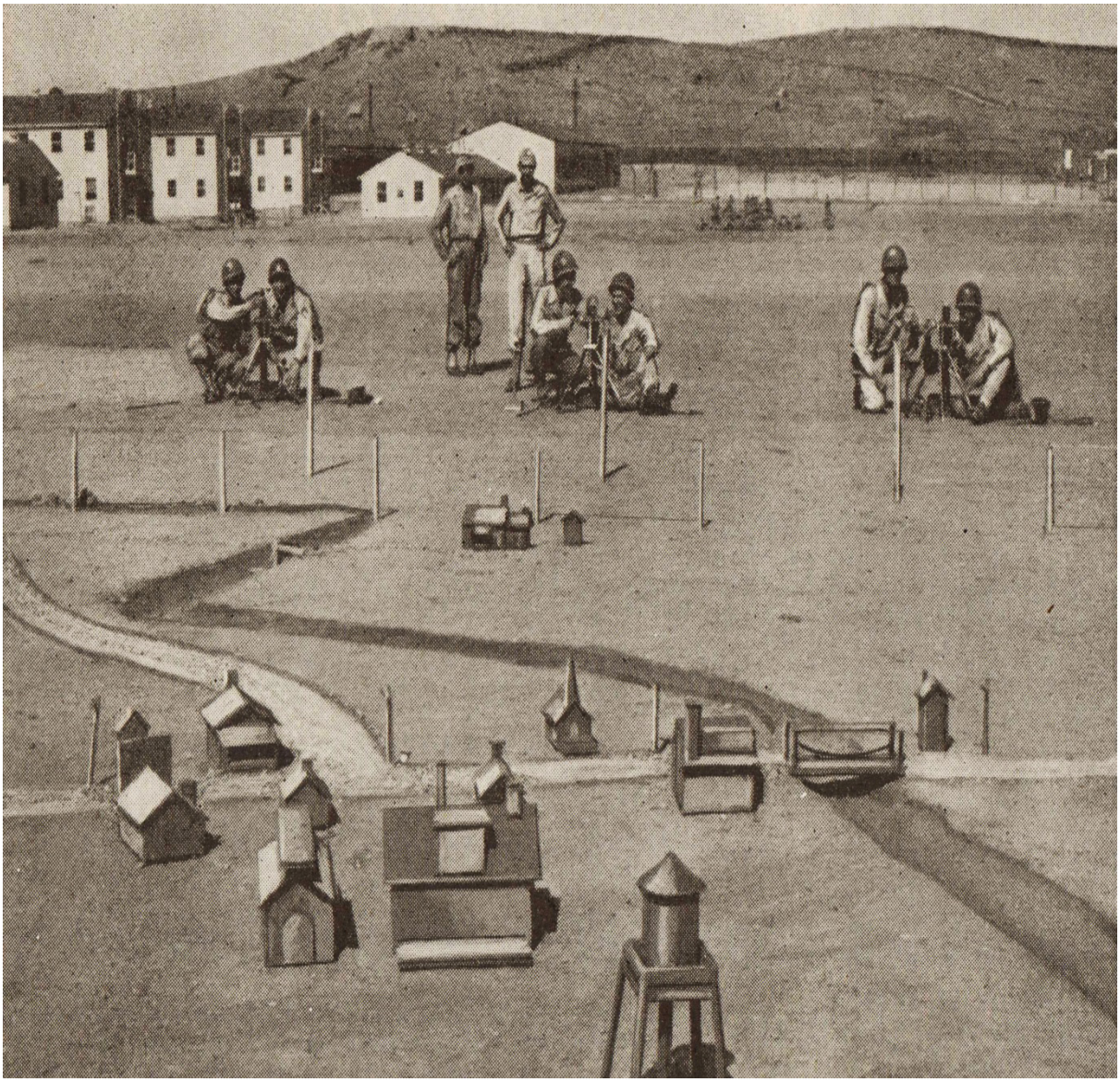
Figure 57



'The War Game in the Open Air'

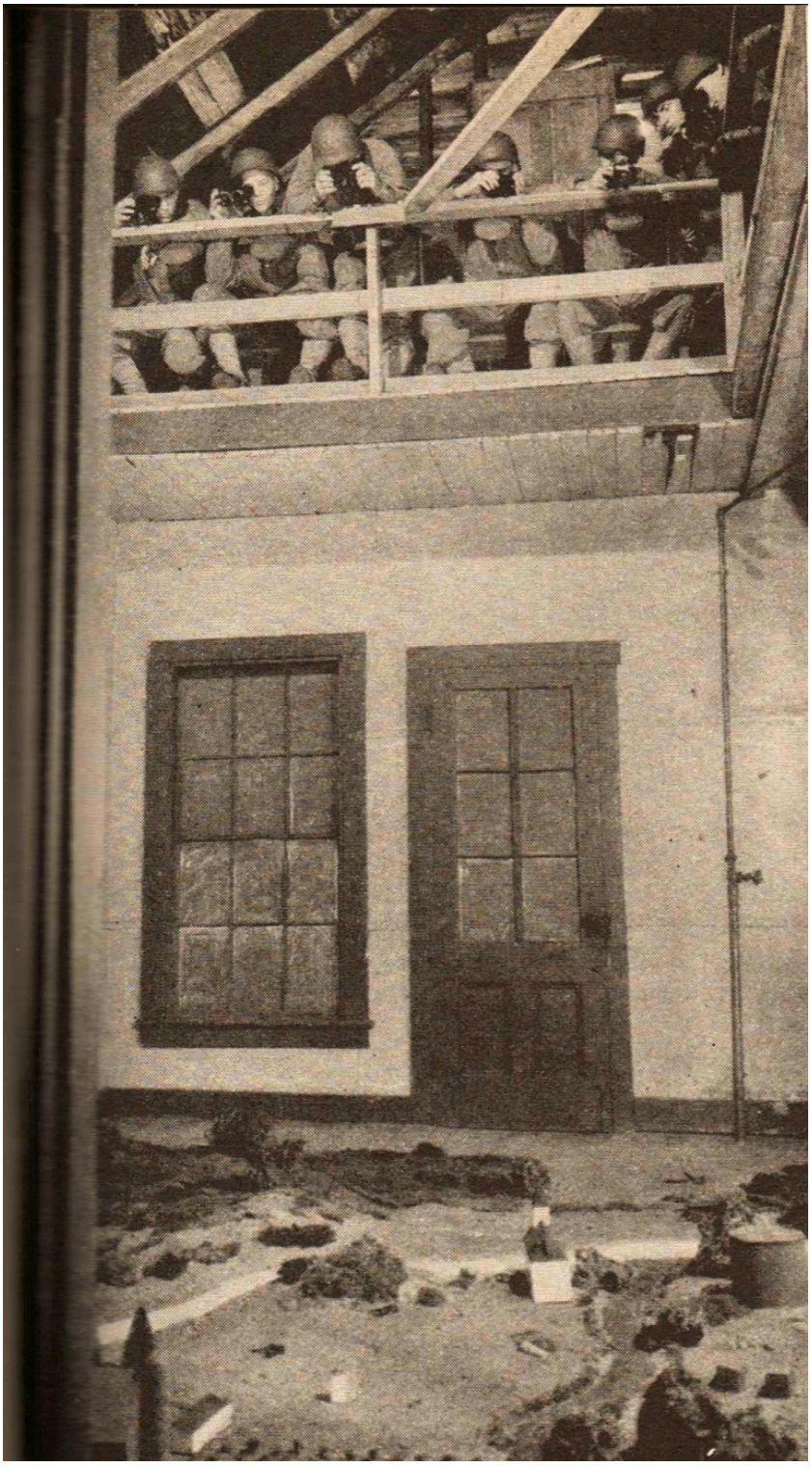
'The soldiers stand quite well on carefully mown grass. The paper houses are loaded with wooden toy bricks as in the indoor game. Twig trees are quite easily stuck into the ground, but none are shown in these pictures. As space is less restricted, one can double the length of the moves and play with a more open country. (H.G. Wells, *Little Wars*)

Figure 58



‘Members of Company E of the 66th Infantry at Camp Carson, Colo.,learn the correct use of the 60-mm. Mortar with a miniture village for the target.’ *Popular Mechanics* May 1944

Figure 59

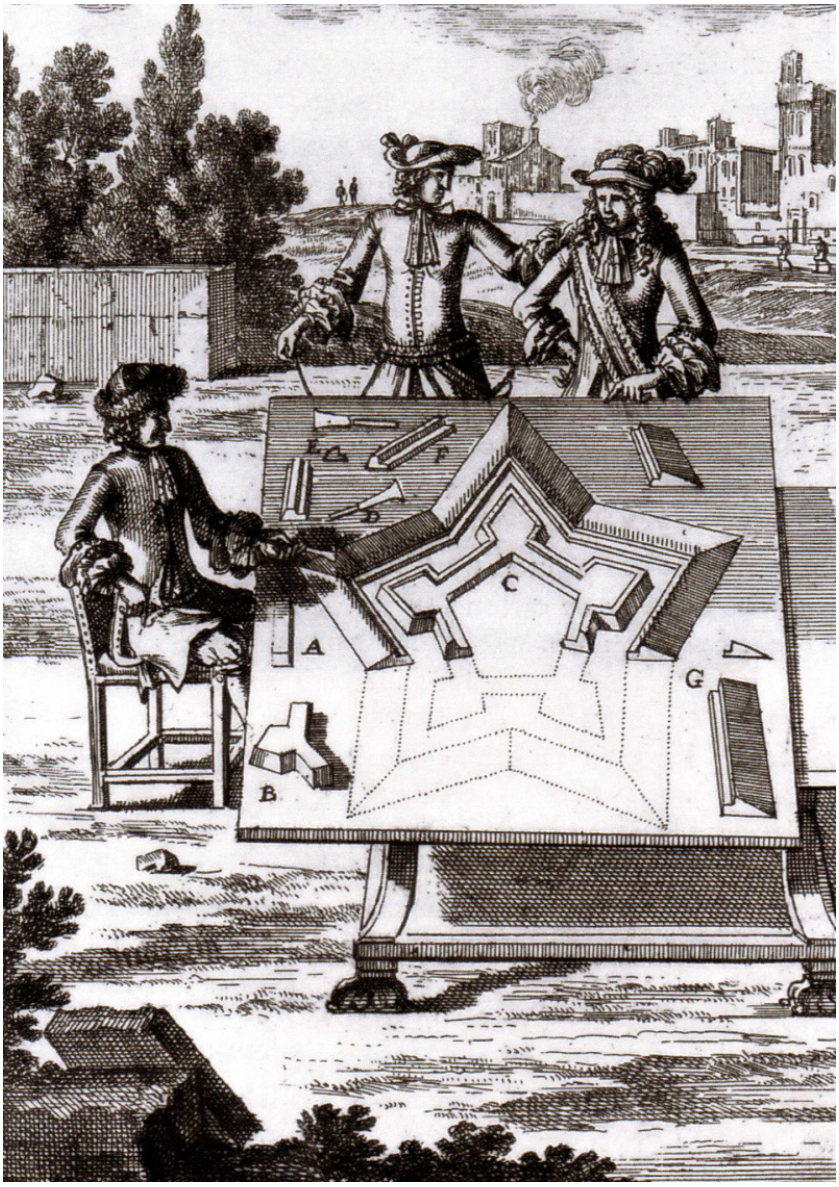


‘Camouflage lesson at West Point military academy. The cadets look at a model village through inverted binoculars; the effect is similar to viewing the earth from an altitude of 3,000 ft’. *Life Magazine* 1944

Figure 60

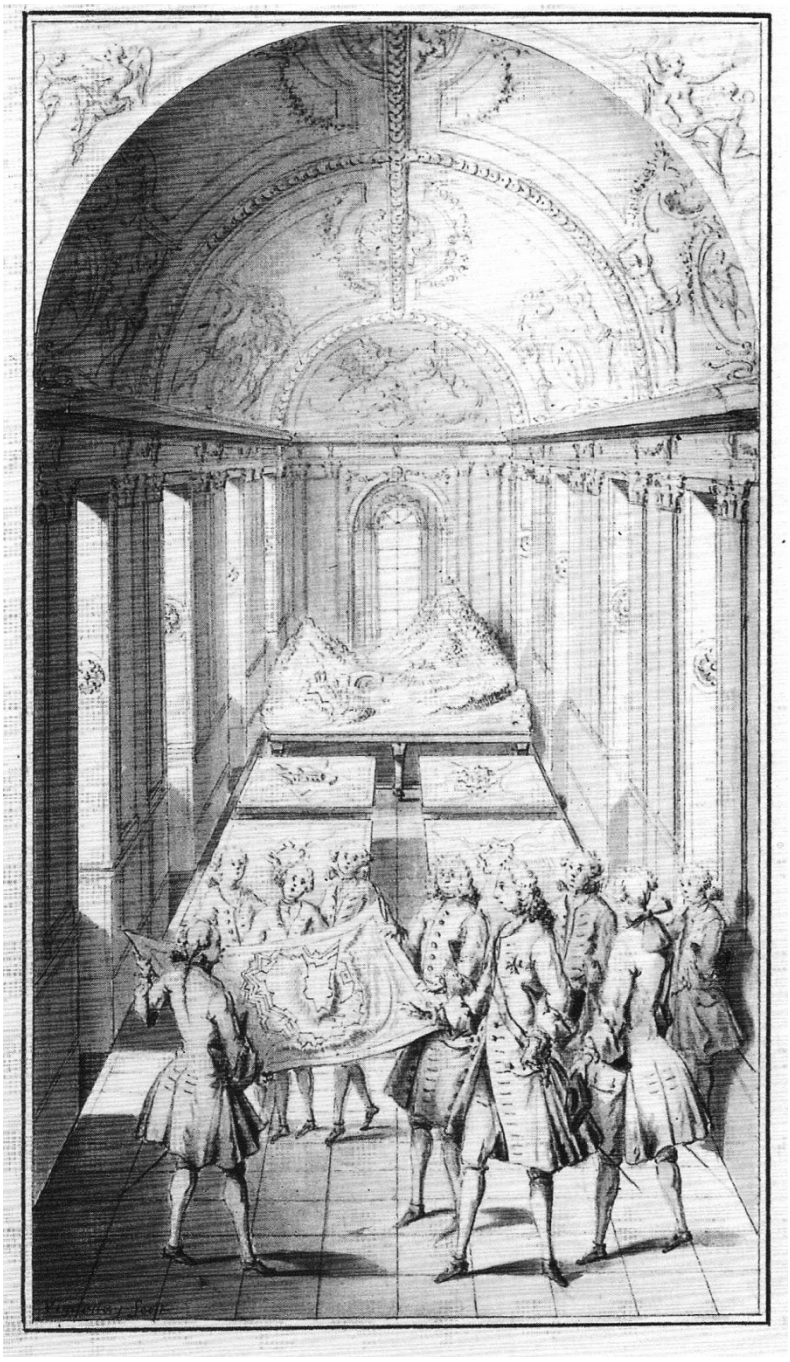
A Tale of Two Cities 1982, Chris Burden

Figure 61



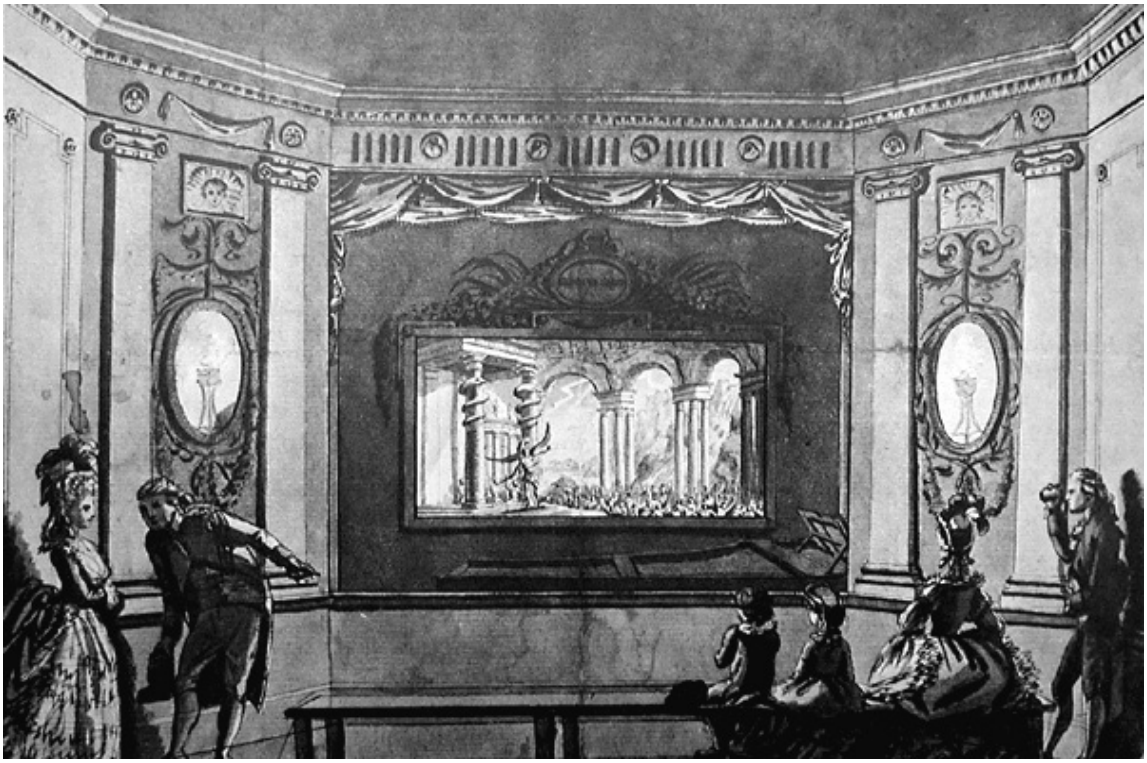
Military model under construction, from Alain Manesson-Mallet's *Les Travaux de Mars, ou l'Art de la Guerre*, Paris 1691.

Fig 62



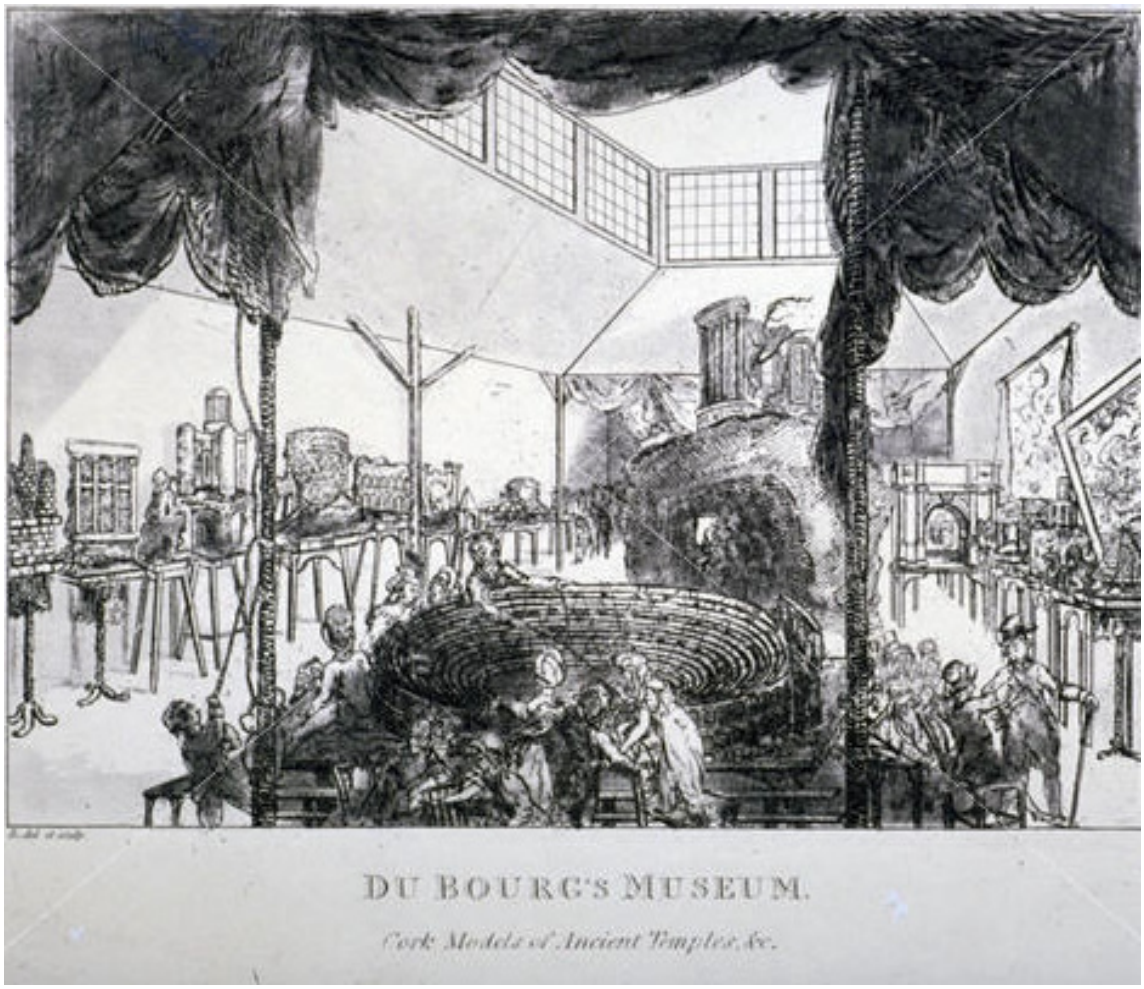
Vigneux drawing. The relief map gallery was installed in the Louvre in Paris in 1749.

Figure 63



The Eidophusikon Showing ‘Satan arraying his Troups on the Banks of a Fiery Lake with the Raising of Pandemonium’ from Milton.’

Figure 64



Dubourg's Museum, Grosvenor Street, Westminster, London, 1818. Interior view showing a display of cork models of ancient temples.

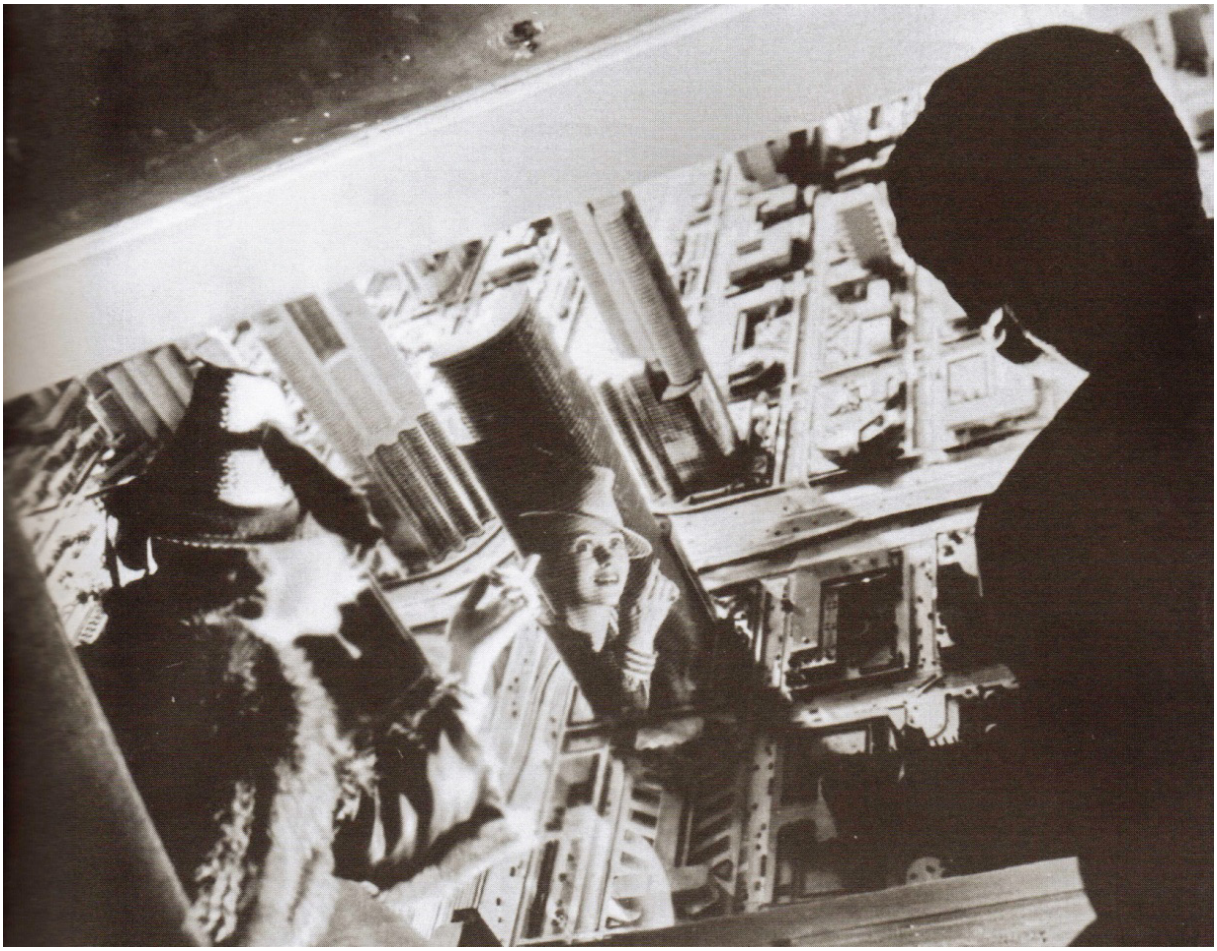
Figure 65

Albert Speer (zweiter von Links) mit Adolf Hitler: Germania-Größenwahn in Berlin

Figure 66

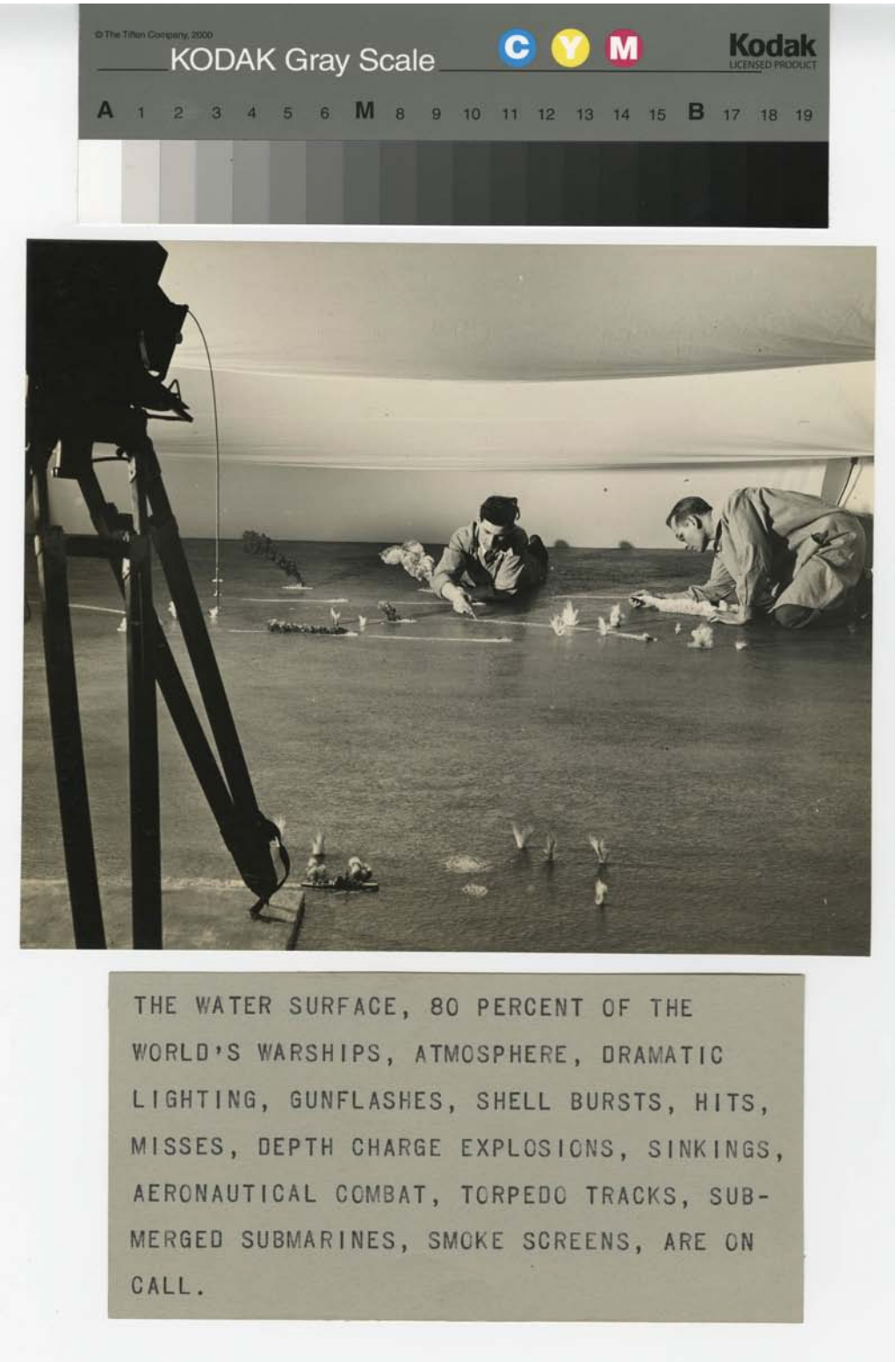
Norman Bel Geddes 'Futurama' 1939-40 World's Fair.

Figure 67



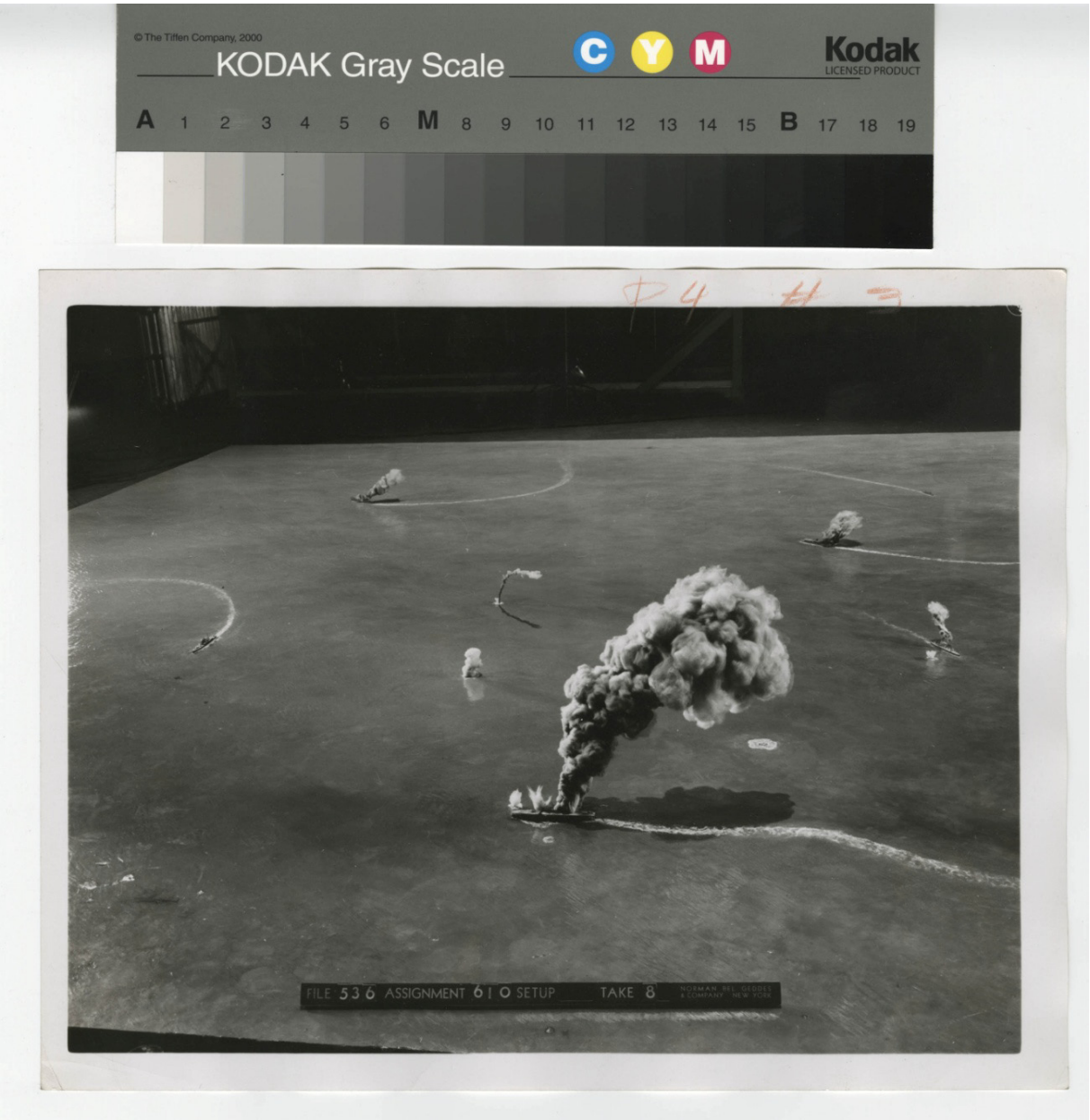
A spectator’s ‘aerial’ view of the ‘1960s City of The Future’ is reflected in a skyscraper in Bel Geddes’s Futurama' 1939-40 World's Fair.

Figure 68



Presentation Book: A new Type of Journalistic Technique: Midway diorama and workers. Norman Bel Geddes studio shot.

Figure 69



The Battle of Midway

4 June 10:25, First bomb explodes in the midst of the plane on deck. Midway battle diorama: Akagi attacked by Yorktown Bombers (Assignment 610). Courtesy of the Harry Ransom Center.

Figure 70

A flight lieutenant points out details on a model of Kiel made by the RAF model making Section at the ACIU Medmenham, Buckinghamshire.

Figure 71

The EMMD workshop in France, showing terrain model in model box.

Figure 72

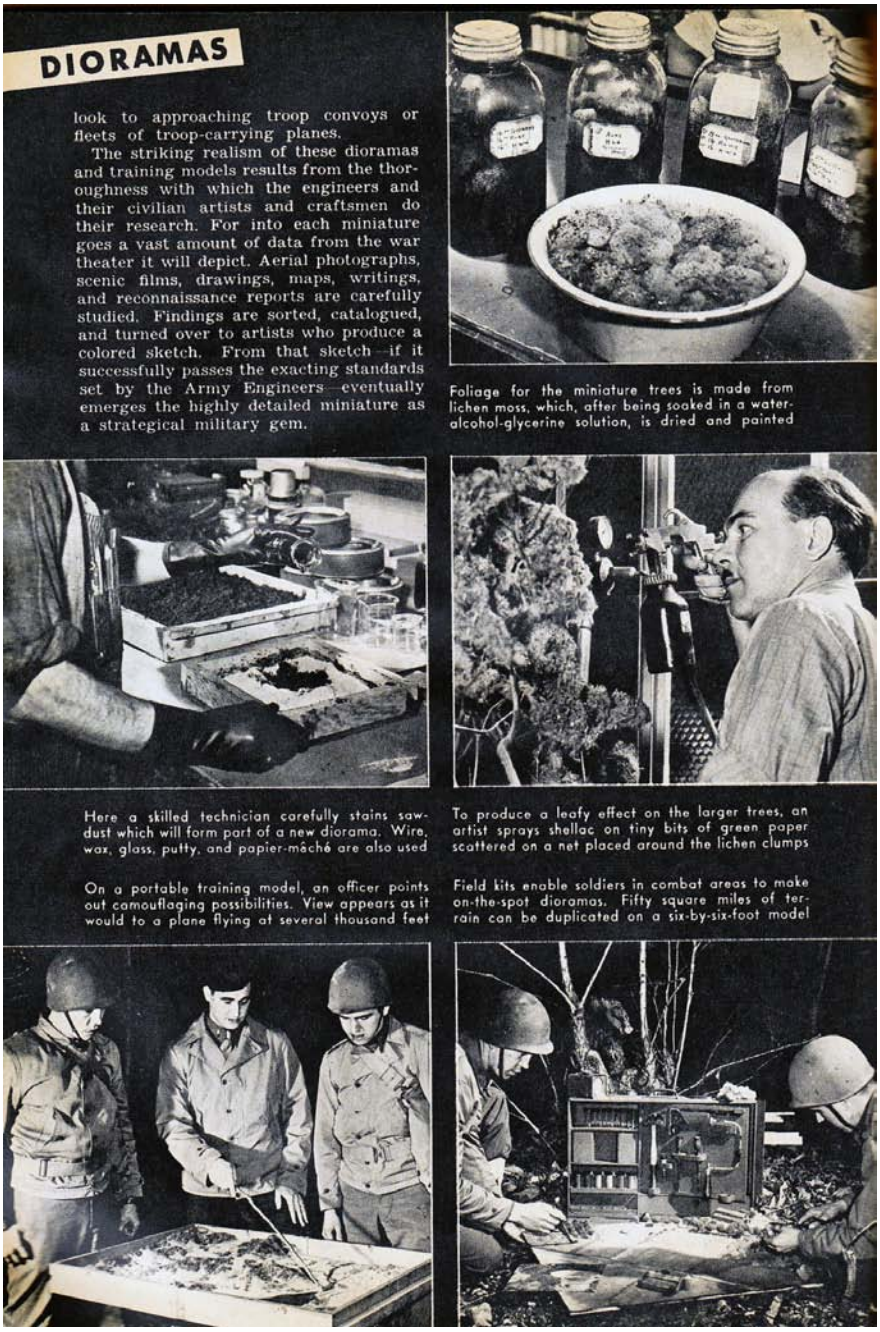
Aerial view of Möehne Dam, Germany. Before and after.

Large scale models of dam wall at
Building Research Station, Hertfordshire.

Figure 73

View of camouflage model shop, Fort Belvoir, Virginia 1942

Figure 74

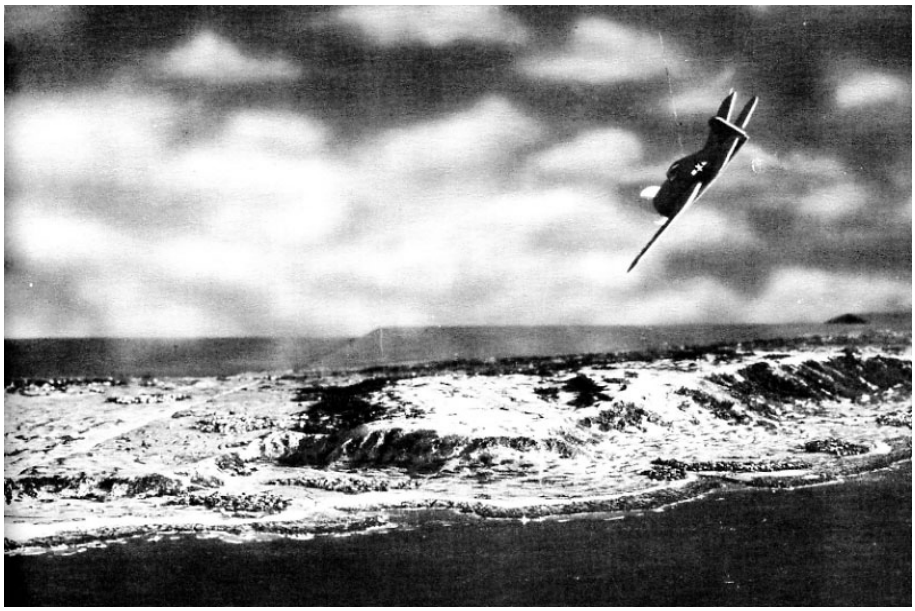


'Dioramas and scale models teach our soldiers how to win when they meet the real thing', Jack O'Brine *Popular Science*, January 1944

Figure 75

Applying hedges to a terrain model using a compressed extrusion gun.

Figure 76



Topographic Model
To show the exact realism of the model, the plane was added to give depth and actuality to the picture.

Figure 77

‘Reversing field glasses to obtain distant view, camoufleur studies oblong building with balconies to break up its outlines.’ *Popular Mechanics* March 1943

Figure 78

Viewing a camouflage model through the haze box.

Figure 79

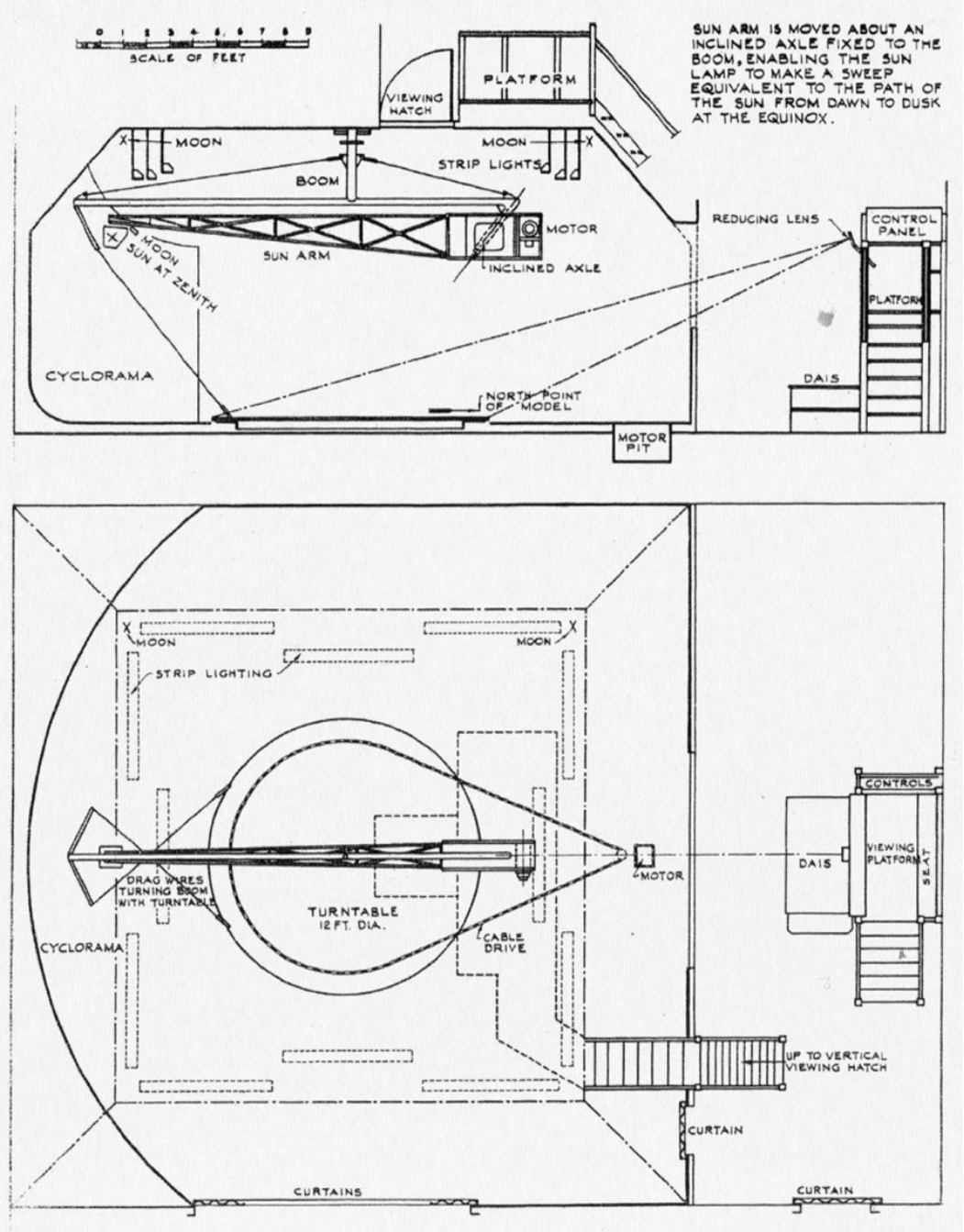


Diagram showing how the ‘viewing room’ at Leamington operated.

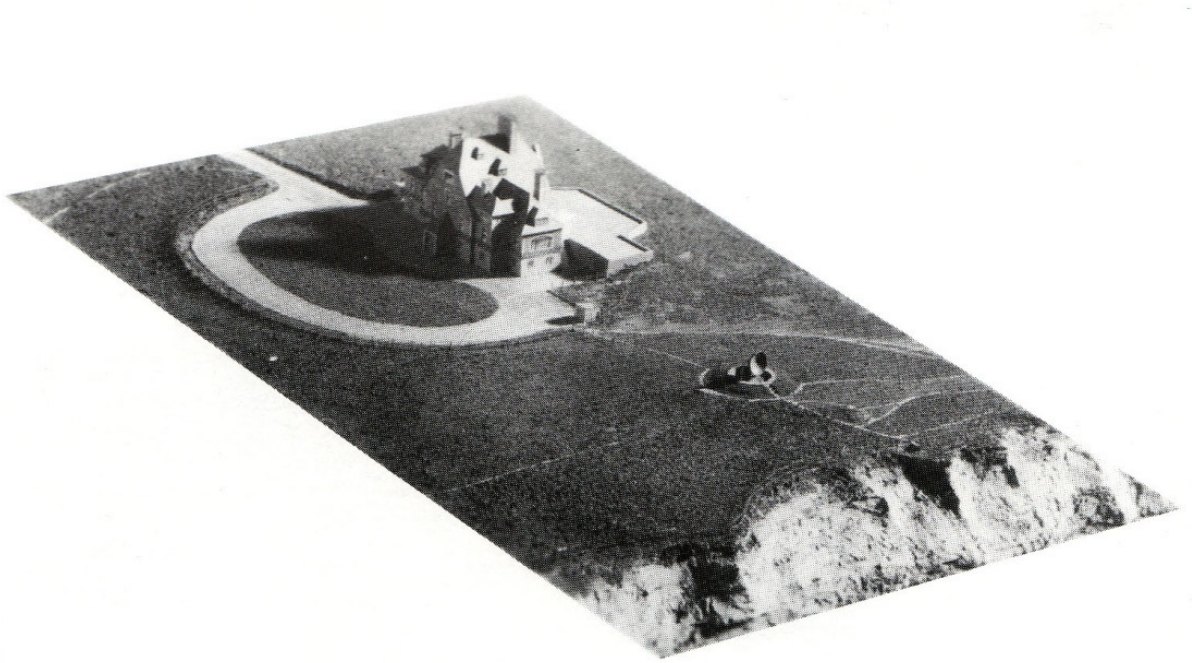
Figure 80

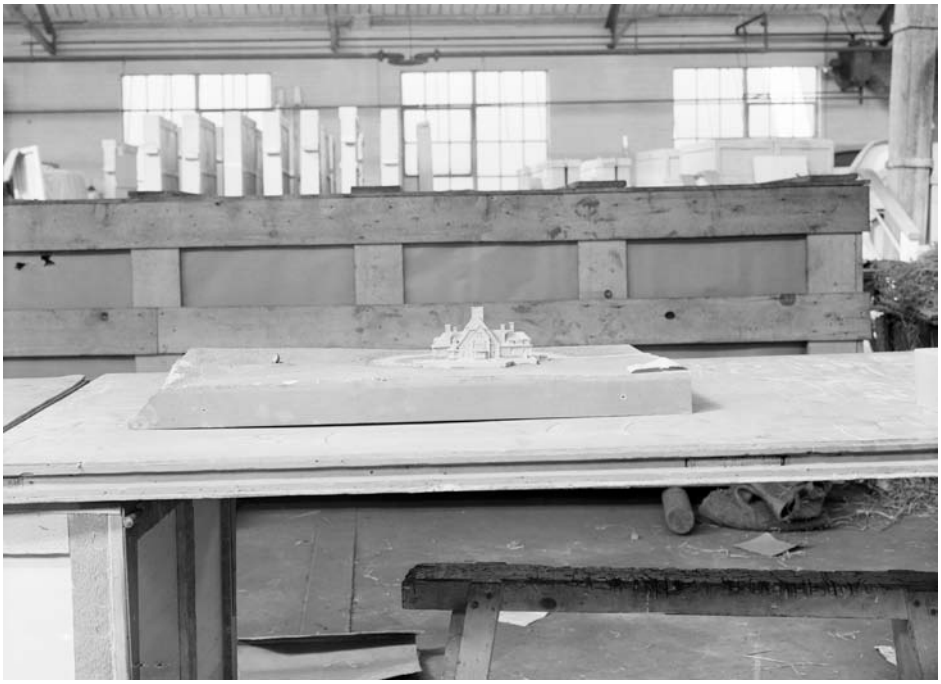
Testing the camouflage of ships at British Naval Research Laboratory at Leamington Spa.

Figure 81

The German Würzburg radar at St Bruneval, near Cap d'Antifer, photographed on 5 December 1941 by Flight Lieutenant A.E. 'Tony' Hill of No 1 Photographic Reconnaissance Unit based at Benson in Oxfordshire, flying Spitfire VD (later designated PR IV) serial R7044.

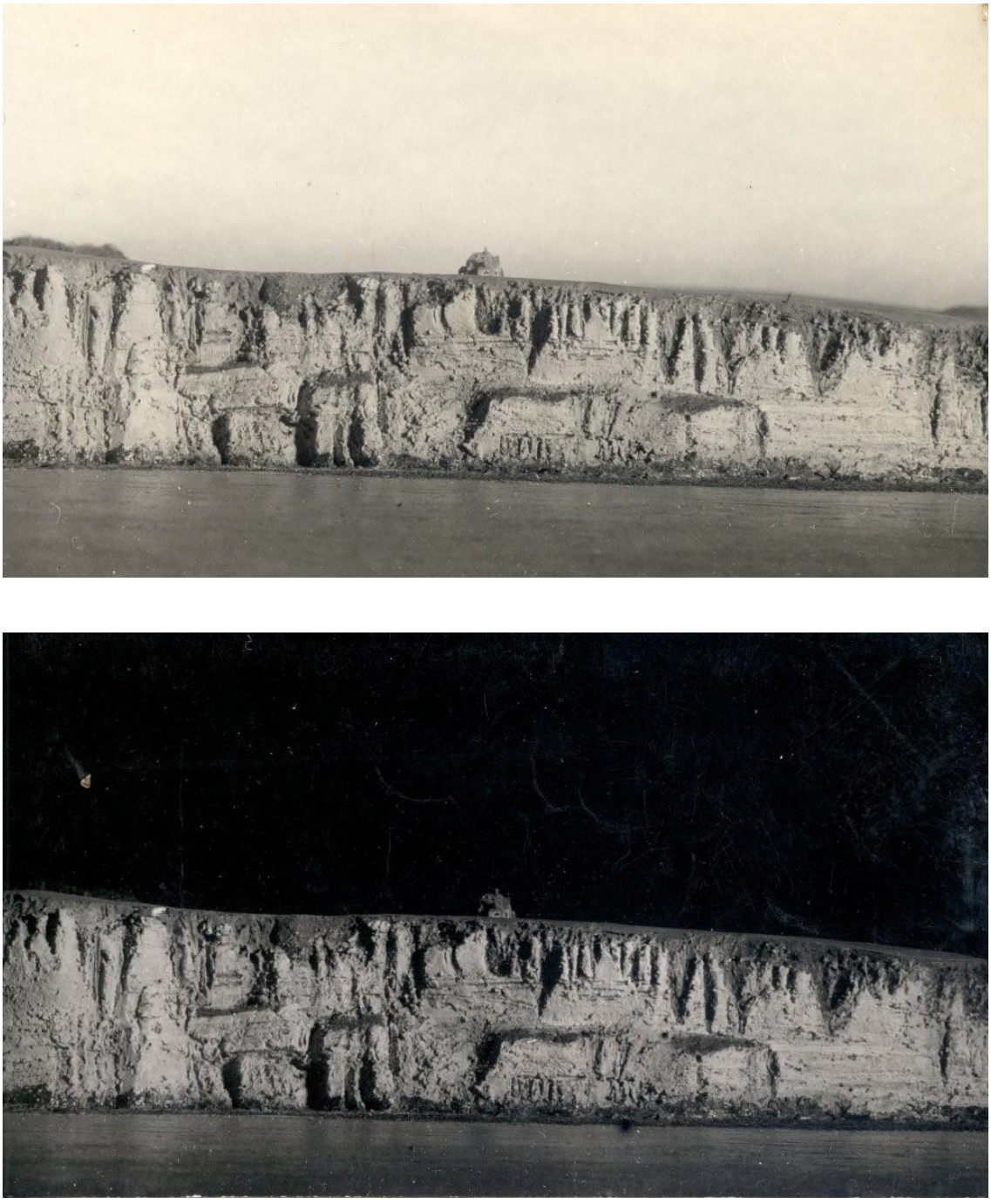
Figure 82





Bruneval Model

Figure 83



Bruneval Model: day/night shots.

Figure 84

‘U.S. Marine prepares a 3D terrain model for Nicaraguan service members during a subject matter expert exchange aboard high speed vessel Swift (HSV-2) June 15, 2010, while off the coast of Corinto, Nicaragua for Southern Partnership Station 2010. SPS is a mission designed to promote information sharing with navies, coast guards, and civilian services throughout the U.S. Southern Command area of responsibility.’

Chapter 5: Artists' Manoeuvres

This chapter is an exploration of the deployment of the camoufleur's scenographic strategies in contemporary artistic practice. The artists whose work I shall be considering are: Katrin Sigurdardottir, Wafa Hourani, Michael Ashkin, Mariele Neudecker, Hans Op de Beeck and Gerry Judah. Drawing on my research into the use of simulation and deception in the target landscapes of modern military conflict, I will discuss how these artists are representing the distortions, disinformation, the cartographic omissions, the 'black worlds', and the silences of erasure and re-location; annihilation and elimination. By addressing the myths and narratives of disclosure, secrecy and invisibility, their projects present a challenge to the ascendancy of military and political procedures and work to reclaim the 'real'.

Artists like military strategists construct complex imaginary topographies and to achieve their desired effects, they have consistently embraced mechanical means such as the camera, film and the stereoscope. These six contemporary artists have adopted theatricality and scenographic procedures as a way of confronting the difficult subjects of war, surveillance and violent destruction. They rehearse through the camera lens and the model, their performances. Playing games, rehearsing operations, they are creating territories which they can control through the overview.

Their projects are full of dissolves and fades, appearances and disappearances, apparitions and conversions. Stage mechanics and optical devices are re invented and redeployed to bring about the transformation and revelation of space. Canvas, gauze, foamboard, paint, pixels, plywood, chemicals, glues and lumens are the artists' scenographic equivalents of the camoufleurs' arsenal. Materials are selected for their performativity and resonance. In the mythological symbolism of Gerry Judah's *The Crusader* and Mariele Neudecker's *Consolidated Liberator;* the imaginary locations of Op de Beeck's *Sea of Tranquillity,* Wafa Hourani's *Qalandia* and Michael Ashkin's *Adjnabistan* and in the staged landscape of Katrin Sigurdardottir *Coulisse,* we see the work of the artist as scenographer. Through their activities space becomes scenically charged.

Wafa Hourani and Michael Ashkin − Nomos

In the late 1830s or early 1840s a model of Palestine, five by three metres went on exhibit in London. A contemporary report contained the following description:

> It is made of cement, and painted of a greenish cast; the sea, lakes, and rivers, are light blue. The eye of the spectator takes in, at one view, the whole of the land of Palestine. The cities are represented by bits of carved cork, and the towns by white circles. The royal cities are signified by Roman letters, the Levitical cities by circles and scrolls, and the cities of refuge by circles and crosses. There are also gilt lines drawn to show the several boundaries of the different cities, and pale lines to mark out the roads.
>
> (Altick, 1978: 394)

This exhibit was the first of many model representations of the Middle Eastern country. On the 19 December, 1846 *The Illustrated London News* announced the public exhibition of Brunetti's thirty-five square metre model of the ancient city of Jerusalem while at the Egyptian Hall, there was a smaller model 'The Jerusalem of Prophecy' depicting the city as it currently was at the time. (Fig. 85) A couple of years later on the 22 January 1948, *The Illustrated London News* reported on the display of small models made by a Reverend Robert Hartshorn's of the tabernacle and the encampment of Israel 'The miniature candlesticks, sacred vessels, are of gold or silver, the pillars are richly gilt. The curtain of the holy place is exquisitely embroidered, and even the water-vessels have been carefully copied from the specimens in the British Museum' (Altick, 1978: 394).

Richard Altick suggests that the proliferation of such models between 1846-1849 in London, could be attributed in part to the popularity of Disraeli's novel *Tancred* (1847) and he gives as an example an advertisement from *The Athenaeum* 17 April 1847 which quoted from directly Disraeli's text: 'The view of Jerusalem is the history of the world-it is more, it is the history of earth and Heaven-where not a spot is visible that is not heroic or sacred, consecrated or memorable; not a rock that is not the cave of Prophets-not a valley which is not the valley of heaven-anointed kings-not a mountain that is not the mountain of God.'

Today this land is once again the focus for scenographic interpretation and representation. The Palestinian artist Wafa Hourani (b.1979) and the American Michael Ashkin (b. 1955) have both chosen the territory to explore the scenic and political strategies for staging the political. Through the optical and metaphorical forms of the model and the diorama the political scene is set and the narratives of appearances and disappearances; inclusion and exclusion; observation and control are told. Their work illustrates the Baudrillard's observation that:

> For something to be meaningful, there has to be a scene, and for there to be a scene, there has to be an illusion, a minimum of the real, which carries you off, seduces or revolts you. Without this properly aesthetic dimension, mythical, ludic, there is not even a political scene where something can happen.
>
> (Baudrillard, 1999: 1)

The cultural historical geographer, Jonathan Smith in his analogy of 'landscape as text' refers to the argument of the rhetorician, Kenneth Burke (Burke, 1969: 3) that symbolic action is a strategic, motivated response to a specific situation, Smith says 'We are always acting with and against scenes. From the scene our act elicits a reaction, and this reaction defines the initial action' (Smith, 1993: 88). The architect and critic, Paul Shepheard defines a course of action in military terms saying that: 'Strategy is the motivation, the overview. Tactics is the positioning of parts ready for the implementation of the strategy. Operations is the carrying through' (Shepheard, 1994: 115). For Shepheard, *Strategus* stands as an analysis of action and is useful in any situation where intention and material have to be combined. Hourani speaking of his mixed media installation *Qalandia 2047* (Fig. 86) which he began in 2007 has said:

> My artworks are politically strategic. I fixed the mirror on the wall from the Palestinian side as a suggestion for a new political party, the Mirror Party that appears in the future in Palestine after Fatah and Hamas. This kind of complex conflict needs long term projects and strategic way of thinking. Each Palestinian needs a mirror so that they can see themselves.
>
> (Hourani, 2009)

Hourani's ambition recalls the description by the 17th century British scholar Robert Burton in *The Anatomy of Melancholy* of the 'strange miracles by glasses, of which Proclus and Bacon writ of old, burning-glasses, multiplying glasses, perspectives, ut unus homo appareat exercitus [which make one man look like an army' (Burton, 1968: 96). The ethnographer John Mack in *The Art of Small Things* (2007) writes: 'the extensive use of mirrors and glass in a divinatory context stresses the privileged sight that diviners possess'. In his description of geographically inspired systems of divination, Mack says how they encompass not only a symbolic landscape but are focused "metaphorical theatres" which contain a condensed world that is activated in divination to detect the origins of endemic problems. 'The client, through the intermediation of the diviner, can gain access to truths otherwise inaccessible about their personal circumstances' (Mack, 2007: 113).

Qalandia (Fig. 87) is the hundred year story of a refugee camp established 1947. It tells how the airport nearby changed from Qalandia airport to a military zone and then there was a checkpoint and then the separation wall. The scale model of the camp distributed over five plinths arranged in 'streets' includes the checkpoint, the airport and the dividing wall. Hourani has used simple materials fabric, wire, toy figures and cars to create his assemblage. Originally working as a documentary filmmaker, Hourani stopped 'filming reality' and began to think how to use the details he had been recording inside the images in another scenario. He decided to make *Qalandia 2047* as a model using the photographic images from the camp. By inserting the 'real images' into the model, (Fig. 88) Hourani created a representation of a world within a world. Hourani's models resemble the both the Schüfftan process the cinematic special effect and the Tanagra Theatres stage illusions popular in the early 20th century. Through an arrangement of plain and concave mirrors, real actors appeared as tiny figures on a miniature stage. The name comes from the figures excavated at Tanagra in the 1890s, which became synonymous with perfect living miniatures (Pringle, 2005: 153). Susan Stewart notes in *On Longing* how in the tableau 'we see the essential theatricality of all miniatures; the miniature becomes a stage on which we project, by means of association or intertextuality, a deliberately framed series of actions' (Stewart, 1993: 54). *Qalandia* demonstrates Stewart's observation:

> That the world of things can open itself to reveal a secret life; this is the daydream of the microscope: the daydream of life inside life, of significance multiplied infinitely within significance. The state of arrested life we see in the tableau[…]always bears the hesitation of a beginning.
>
> (Stewart, 1993: 54)

In Hourani's models, the viewer walks pass the checkpoint and the wall, listening to the sound inside the houses with the antennas on the top, peering into the three colourful future gardens – Fish Garden – Stone Garden – Flower Garden. (Fig. 89 & 90) The city is built from people and real-life situations. The decision about what and when to include a particular feature is carefully considered. 'The mirror came after there was a wall to hang it on … The gardens came after there was no space to build gardens in the refuge camps. The antennas are how they received information' (Hourani, 2009). Hourani incorporated more and more details to be sure that the audience could 'feel' the camp and understand his message to think about the future of this place. It cultivates our empathy and according to the philosopher Robert Vischer, it is through empathy that we have the ability to 'think' oneself into the object, 'when I observe a stationary object, I can without difficulty place myself within its inner structure, at its centre of gravity I can think my way into it, mediate its size with my own, stretch and expand, bend and confine myself to it' (Vischer, 1983 (1994): 92).

Hourani's city resonates with the 'enigmatic situations' the architect Stephen Parcell attributes to the diorama. (Fig. 91) In its metaphoric architecture, Parcell says 'we may imagine our own immersion in these situations: different vital states (coma, paralysis, ecstasy, death), different social situations (imprisonment, quarantine, stardom, freedom), different atmospheric conditions (liquid, gas, intense cold, vacuum), and different temporal conditions (slow motion, ancestry, deja vu)' (Parcell, 1996: 198).

In *Qalandia*, the lights and sounds give a sense of duration and time passing. Unlike other architectural representations which are designed for visual consumption and are inanimate and devoid of haptic experiences, Hourani provides us with the sensual evidence of presence. We study his models closely, exploring with our eyes but also through our ears; seeking out aural and visual details. Hourani employs the strategies of

humour that the philosopher Simon Critchley recommends in dealing with 'tragic fate'. According to Critchley, ‘In the absence of Aristotelian happiness, in a world where happiness has been reduced to the maximum satisfaction of transient inclinations, it is in practices like humour that we find an experience of non-delusory, non-desultory and non-heroic sublimation’ (Critchley, 2007: 82). Through the use of humour Hourani’s models perform an important and powerful critical function. They charm and amuse us with their joyous and exotic depictions of life elsewhere but we go away disturbed by the presence of the ‘other’ and the realisation that there is this place somewhere. These models are not the sophisticated architectural renditions used to promote developers’ or politicians’ ambitions. Unlike Hourani’s examples, these objects, which are usually uninhabited, frequently monochromatic and silent present a utopian vision that is dystopian in their omissions. In contrast, *Qalandia* is a shambolic construct full of colour and presence. As the writer J. B. Jackson noted in *The Necessity of Ruins:*

> This is how we should think of landscapes: not merely how they look, how they conform to an aesthetic ideal, but how they satisfy elementary needs: the need for sharing some of those sensory experiences in a familiar place: popular songs, popular dishes, a special kind of weather supposedly found nowhere else, a special kind of sport or game, played only here in this spot. These things remind us that we belong – or used to belong – to a specific place: a country, a town, a neighbourhood. […]above all a landscape should contain the kind of spatial organization which fosters such experiences and relationships; spaces for coming together, to celebrate, spaces for solitude, spaces that never change and are always as memory depicted them
>
> (Jackson, 1980: 16)

J. B. Jackson was drawing on his experiences in combat intelligence during World War II, and was specifically referring to the military landscape which he felt could provide an example for post-war planning. For Jackson ‘the military landscape revealed two aspects of humanity: Those urgent, unremitting efforts to establish communications, the trailing wires and signs and symbols and coloured lights, foreshadowed our present groping for new kinds of community’ (Jackson, 1980: 17). But he went on to warn that the other aspect – the desire for territory and power would continue to ‘mutilate’ the environment.

Writing twenty years later, the cultural geographer, Denis Cosgrove, found that the modern landscape has already adopted the 'spatial divisions, uniform vision and exclusionary practices' of the military landscape (Cosgrove, 2000: 262). The threat of terrorism and global warfare has extended the combat zone; the garden itself has become strategic as the war of terror is fought in homes and backyards of the enemy. As the human geographer and social scientist, Nigel Thrift observes 'The image of the complete battle separate from the civilian life around it, is antiquated, unreal[…]*elsewheres* increasingly do not exist' (Thrift, 2007: 263).

For the American artist Michael Ashkin (b.1955):

> All space has become militarized and privatized. These terms coincide and together provide the invisible but material ether that pervades the landscape. Everything is simultaneously owned and under threat of coercion and violence. The public has become the private. With the loss of the agora, the extent of our compromise is both complete and inconceivable.
>
> (Ashkin, 2003: 40)

When the military project their desire onto a landscape they introduce violent transformations, changing citizenship into estrangement. The architect and philosopher, Ignasi Solà-Morales Rubio has argued that through the violence of war, the urban landscape becomes a terrain vague and 'the strange, the indescribable, and the uninhabitable are brought to the surface' (Sola-Morales, 1995: 123).

Michael Ashkin's *Adjnabistan* (2005) (Fig. 92) represents an imaginary community 'at the far end of exclusion, a squatter/refugee/concentration camp built from used or abandoned shipping containers, situated in a fringe wasteland' (Ashkin, 2005). As in a real militarised zone, the civic and domestic have become panoptic and carceral. Watch towers become guard towers. Family compounds become prisons. 'The town underwent cycles of overflow and attrition. Populations thrived, perished or set themselves adrift in the surrounding desert' The name *Adjnabistan* is derived from the Arabic/Farsi 'adjnabi' ('foreigner,' 'stranger,' or 'other'). Ashkin describes how the project evolved to reflect what he perceived as the fictitious inhabitants' 'hopes and aspirations; the social,

political, and economic constraints they encountered; and finally, my own conflicting interests and desires' (Ashkin, 2005).

Adjnabistan like *Qalandia* is a geographical symbol that in Carter's definition refers to one thing, while suggesting a connection to something else. He suggests that names like these are: 'attempts to name what cannot be classified. They both mark a presence and its absence; they both order the chaos and admit it'. For Carter, such names should be understood as 'compressed poems' or 'compacted myths'(Carter, 2009: 25). Carl Schmitt wrote in *The Nomos of the Earth* (1953) that 'Who dictates the law of the land, gets to name the land' (Mendieta, 2004: 9). According to the sociologist Mitchell Dean, Schmitt usage of the word *nomos* means more than its usual translation as traditional or customary law.

> The action and process of *nomos* is given by the Greek verb *nemein* meaning to take, to allot and to assign, which in turn is the root of the German words, nehmen and Nahme. Schmitt himself uses the term Landnahme meaning '*land-taking'* or '*land-appropriation'* to capture this primary sense of the term. For Schmitt, *Nomos* is a "fence-word": it creates territory, defines locality, marks places, separates backyards and defines households.
>
> (Dean, 2006: 4)

Dean points out that from Schmitt's perspective, when political thought 'becomes "a-topical", that is, as something whose ideal lies nowhere, or, even more strongly, which is driven by a Utopia, a "notplace", the abstract universal individual is not simply a deterritorialized individual but a disoriented one' (Dean, 2006: 7). It is our position as outsiders excluded from the systems of power and activity that Sola-Morales Rubio claims 'constitutes both a physical expression of our fear and insecurity and our expectation of the other, the alternative, the utopian, the future' (Sola-Morales, 1995: 121). In his project, Michael Ashkin acknowledges and attempts to offset the two related and oppressive qualities of utopian thought: 'first, that the logic of spatial organization is political and is based on exclusion as much as inclusion; second, that utopian projects develop an idealist space at the expense of the material reality' (Ashkin, 2005).

Ashkin and Hourani through their narrative constructions are challenging the militaristic initiatives that attempt to bring about erasure. They demonstrate through the model the scopic conditions of surveillance and resistance.

> Here, one is stalked from afar and will be extinguished from afar. One's survival is due not to the other's inability, but to his distraction. Here, both target and stalker live in a time no longer their own (Ashkin, 2009).

The architect and author, Eyal Weizman observed in *Temporary Facts, Flexible Lines* how during the war of 1948 the land registry maps of the West Bank were used to plan attacks against the Palestinian villages 'they were initially conceived to serve, and helped the process that erased them from the ground only a few years after they were first recorded on paper' (Weizman, 2006: 161). Paul Carter calls this annihilation of space, a 'spatial sleight of hand' a 'geographical conjuring trick', which 'erases from collective memory[…]every trace of elsewhere in either time or space' (Carter, 2009: 17). These are the gaps in representation – the erasures, the blind spots on the maps that Hourani and Ashkin address in their work. They construct a strategic and scenographic response to the militaristic occupation and determination of space by re- imagining the territory. Through their actions – acted out in the staged space, they engage in what Leach describes as the 'transitory and fluid discourse of territorialisation' (Leach, 2006: 181).

> Here, the wind and the water re-stage history for yet one more erasure
> (Ashkin, 2009)

Adjnabistan and *Qalandia* are imaginative demonstrations of the 'politics of desire' and the possibilities of place making. These models project into the future and address what might be. They are discursive and speculative representations of *elsewheres* that are no longer *nowhere.* Ashkin says how '*Adjnabistan* aspires to overcome the limitations of art. Its future lies in the reintegration of art, politics, ethics, philosophy, technology and daily life when the separations implied in its name, *Adjnabistan,* become meaningless and disappear'(Ashkin, 2005).

Gerry Judah − The Crusader

The urban landscapes of the Middle East provide the subject matter for the work of Gerry Judah. Reviving the historical tradition of modelling architectural ruins, Judah opens up a discourse on the aesthetics and representation of destruction. (Fig. 93) Judah (b. 1951) is a Calcutta-born artist and designer based in the U.K. The scale model is central to his work in exhibitions, theatre and film and to his fine art practice where three dimensional structures become 'paintings'. The architectural compositions rotated out of the familiar horizontal landscape format and hung vertically, destabilize the viewer and the representation itself. But Judah's 'paintings' have their own logic and reality. The considered placement of the debris and rubble and painterly manipulation of form, light and shadow are scenographic. 'The rigour of the tectonic form is broken up, and while the wall crumbles and holes and fissures arise, a life quickens which quivers and shimmers over the surface...' (Wolfflin, 1950: 24).

To create a convincing representation of a ruinous building, Judah recognises that the original model prior to his creative demolition must be structurally and organisationally accurate. As William Gilpin wrote '…to peel the facing from the internal structure-to show how correspondent parts have once united; though now the chasm runs wide between them and to scatter heaps of ruin around…are great efforts of art' (Harries, 1994: 68).

Judah also understands that the remains of a modern building which has been demolished look different from an ancient one that has fallen into decay. The physics of demolition produces unique patterns and arrangements of rubble and modern building materials and infrastructures have their own ruinous vocabulary.

Although 'l'architecture c'est ce qui fait les belles ruines' (Britton, 2001: 41) the end result is a painting – a composition woven from paint, card and wire. Threads are drawn out from the folded and crumpled fabric of the wrecked buildings. The fibres of defunct power lines and telecommunication networks bind together the collapsing structures. These former carriers of digital data become a physical calligraphy which inscribes the paintings with a catastrophic narrative. In this 'theatrum mundi' of encrypted landscapes and fractured cities, the spectator experiences the vertigo of the sublime. Temporal and

spatial orientation is illusive. There is no fixed perspective, no horizon. The perceptual shifts in scale and location leave the spectator adrift –without signposts or coordinates. The taxonomy of the disaster-the exact nature or causation of the detritus and devastation is unspecified.

The work exhibits the discontinuous change, hysteresis and divergent processes associated with catastrophe. These crushed and twisted planes occur when systems are pushed from equilibrium. It is the topology of entropy --the collapse of complex organisations and networks. Communication is severed, architecture dismembered, landscapes ruptured, the population displaced. This epidemiology of disaster creates 'a wounded geography-the architectural, bodily and psychic wreckage caused by war' (Goldman, 2005: 58).

When a building is destroyed, there is a corresponding loss of history, memory and identity; both space and truth are concealed beneath the dust of demolition. In Judah's studies of urban erasure, the desolation and emptiness are palpable. The stillness creates an aura of beauty but also uneasiness – we peer into the ruined structures looking for signs of life or evidence of death. The paintings become infected with psychic imaginings.

> What had formerly been the city of Pompeii assumed an entirely changed appearance, but not a living one; it now appeared rather to have become completely petrified in dead immobility. Yet out of it stirred a feeling that death was beginning to talk**…**he, who possessed a desire for [a comprehension with soul, mind and heart] had to stand alone here…in order not to see with physical eyes nor hear with corporeal ears. Then-the dead awoke…
>
> (Jensen, 1993: 40)

We share our desire to awaken the dead with Benjamin's angel of history whose:

> Face is turned toward the past. Where we perceive a chain of events, he sees one single catastrophe which keeps piling wreckage upon wreckage and hurls it in front of his feet. The angel would like to stay, awaken the dead, make whole what has been smashed. But a storm is blowing from Paradise; it has got caught in his wings with

> such violence that the angel can no longer close them. This storm irresistibly propels him into the future to which his back is turned while the pile of debris before him grows skyward. This storm is what we call progress.
>
> (Benjamin, 1973: 259)

In contrast to the angel who wishes to restore the wreckage, Benjamin's 'destructive character' 'sees nothing permanent…but for this very reason, he sees ways everywhere …What exists he reduces to rubble-not for the sake of rubble, but for the way leading through it' (Benjamin, 1999: 542). 'The destructionist' sees new relationships, juxtapositions and possibilities in ruination. Judah's destruction may be a fabrication; an enacted event visited on inert materials but may also be the reality. Violence and its aftermath is recorded and documented-each work a representation of the forces of making and unmaking. Through these paintings we can reflect on the very real conditions of disaster and war while speculating on imaginary situations. These are psychic as well as material and physical constructs; studies in absence, disappearance, the building and unbuilding of space and truth.

It is appropriate therefore that in 2010, Judah was commissioned to create a new piece for the Imperial War Museum North in Manchester. (Fig. 94 & 95) The museum designed by Daniel Libeskind is a dramatic and theatrical structure symbolising a broken globe devastated by war. Three shard-like buildings, the fragments of this broken world represent the three war landscapes: air, earth and water. *The Crusader*, Gerry Judah's seven metre white sculpture which takes the form of a three-dimensional crucifix of war-torn buildings is a response to the building. It is placed high on the wall of the museum's main exhibition space at a diagonal angle which mirrors the position of the exhibit of the Harrier Jet AV-8A. The dramatic juxtaposition of the two iconic symbols presents a theatrical spectacle of the possibilities of destruction.

Mariele Neudecker: Seduction Chaff

Military stealth depends on the iconographic power of the symbol and the ambiguities of the metaphor for its effectiveness. The architectural theorist, Neil Leach has defined camouflage as ‘a mode of symbolization... which encapsulates various visual strategies that have evolved as a knowing manipulation of the use of images’(Leach, 2006: 240). These are the strategies of Mariele Neudecker (b.1965) a German born artist, who lives in the United Kingdom. She works in a wide range of media creating sculptures, video installations, photography, drawings and paintings that operate through the order of seduction. The perceiving subject is drawn in progressively by the slow unfolding of the object of desire. This is the methodology of camouflage. In both art and camouflage, ambiguous, provocative forms are produced through metaphorical manoeuvres; the transformation of one thing into two or two into one and the exploitation of the instability of perception. Merleau-Ponty wrote in “Eye and Mind”:

> When through the water's thickness I see the tiling at the bottom of the pool, I do not see it despite the water and the reflections there; I see it through them and because of them. If there were no distortions, no ripples of sunlight… then I would cease to see it as it is and where it is – which is to say, beyond any identical, specific place. I cannot say that the water itself, the aqueous power, the syrupy and shimmering element – is in space; all this is not somewhere else either, but it is not in the pool. It inhabits it, is materialized there, yet it is not contained there; and if I raise my eyes toward the screen of cypresses where the web of reflections is playing, I cannot gainsay that the water visits it too or at least sends into it, upon it, its active, living essence. This internal animation, this radiation of the visible, is what the painter seeks under the name of depth, space, and colour.
>
> (Merleau-Ponty in Baldwin, 2004: 313)

Merleau-Ponty describes a scenography similar to that created by the wartime camoufleur. Surfaces and forms are broken and refracted. The structure of the optic array is blurred or masked. The spatial and temporal structure of light is distorted or displaced. The design historian, Roy Behrens has observed how in Gestalt theory, the

salience of a figure is largely dependent on two conditions: first the degree of contrast between figure and ground, and second the extent to which the figure is structurally cohesive within its own borders. He says that:

> Camouflage is typically the subversion of one or both of these conditions: by high similarity between figure and ground (blending camouflage), or high difference within the confines of the figure alone (dazzle camouflage). Often, the most effective camouflage is a combined use of blending and dazzle (called coincident disruption).
>
> (Behrens, 2002: 117)

Illusion, distortion and reflection are the optical strategies of art and camouflage. Artists adopt the mirrors, masks and other devices of the camoufleurs to conceal the real through masking, repackaging and dazzling. As Merleau Ponty observed: 'Mirrors are instruments of a universal magic that converts things into spectacle, spectacle into things…Artists have often mused upon mirrors because beneath this "mechanical trick," they recognized...the metamorphosis of seeing (Merleau-Ponty In Baldwin, 2004: 300). The military like the artists exploit all the possibilities of the "mechanical trick" in creating and interpreting reflected information or feedback.

During World War II, aluminium foil 'windows' or chaff were dropped in their thousands on bombing raids over Europe. (Fig. 96) The dense and minute elements functioned in its mass as mirrors. The reflections from the chaff dazzled the radar – covering the aircraft. It was almost impossible to pick out the 'real' aircraft from the echoes from the chaff. Today in electronic warfare, radar reflecting chaff is still used as decoy- to seduce the final attack to close the window of opportunity. 'A seduction chaff cloud is fired after the missile radar has acquired (the target). The chaff cloud causes the radar to switch its tracking lock to the cloud and is then carried away from the (target) by the wind' (Adamy, 2002: 56). The pieces of metal foil falling through the air form a cloud of false echoes, vibrating images, misleading resonances. They create a bright return on a radar scope that masks any activity. The sensor will indicate that something is present but will give no indication of its nature.

It is the cloud of chaff in *The Air Is One Vast Library* that can be taken as our point of departure in the analysis of Mariele Neudecker's work. (Fig. 97) As Hubert Damisch in *A Theory of Cloud* observed:

> If (the psychology of imagination) can only learn from images that are in the process of deformation, it will be agreed that this most amorphous of objects must be one of the most valued oneiric theme (Damisch, 2002: 18). Damisch describes how 'on a conceptual level, a "cloud" 'possesses the powers of a material in which any kind of figure may appear and then vanish.
>
> (Damisch, 2002: 31)

The cloud provides the material for the myth of the magician's cloak. Such a mythical garment surrounds the F-117 Nighthawk stealth fighter plane which in promotional literature, is described as wearing a 'cloak of invisibility'. The surface of the airplane is covered with facets that are arranged so as to scatter radar energy. The F-117 first flew in June 1981 but the Air Force denied the existence of the aircraft until 1988, when a grainy photograph was released to the public. The architectural theorist, Mark Dorrian suggests that the electromagnetic profile of the aircraft which is 'calibrated according to its representation in the mirror, or in this case, upon the radar screen' creates its anamophic form (Dorrian, 2001: 199). Jurgis Baltrusaitis in his key text *Anamorphoses ou Thamumaturgus Opticus* observed that anamorphosis[6]

> Proceeds by means of the inversion of elements and functions. Instead of a progressive reduction to their visible limits, it is a distension, a projection of forms beyond themselves, produced so that, from a determinate point of view, they are corrected: a destruction for restoration, an evasion that implies a return' (Baltrusaitis, 1984: 38). However, Dorrian argues that unlike in traditional catoptric anamorphosis where the form is recovered in the mirror, the contemporary anamorphe disappears

[6] Anamorphosis: a perspective technique used to give a distorted image of the subject represented in a picture when seen from the usual viewpoint, but if viewed from a particular angle, or reflected in a curved mirror, the distortion disappears and the image in the picture appears normal. Derived from the Greek word meaning "to transform," the term anamorphosis was first employed in the 17th century, although this technique had been one of the more curious by-products of the discovery of perspective in the 14th and 15th centuries. Encyclopædia Britannica. 2010.

into the radar screen and although it may seem to have disintegrated it has 'in truth merely been transformed.

(Dorrian, 2001: 201).

The name of the F117 adds to the subterfuge. It is referred to either as a fighter, bomber or 'demonstrator' depending on the symbolic role it is intended to play in the imagination of its user and target. Its description like its form has to be ambiguous. As Virilio points out 'stealth equipment can only function if its existence is clouded with uncertainty'(Virilio, 1989: 4). Bishop and Phillips in their analysis of the connection between radar and infrared detection systems and vision, describe how a 'missile "sees" through its artificial prosthetic sights, a ghostly doppelganger of its target and is fooled into missing it. It may look as though the eye can see the difference between the real target and its doppelganger, while the missile sees only the decoy.' As a result, the guided-missile mistakes the infrared simulacrum for the target and misses its designated objective (Bishop & Phillips, 2010: 163).

The strategies of both the contemporary anamorphe and the cloud operate scenographically through mimesis and fantasia. These conditions of perception and the workings of the imagination have long been the focus of experiment and speculation. The writer and mythographer, Marina Warner tells us how in the 17th century, the scholar, Athanasius Kircher concluded from his studies of physical laws and optics that the conventions of perception were less stable than they appear. In the second book of *Ars Magna,* Kircher suggested that the cause of illusions was 'the material radiation of phantasy, apprehending external things through vehement imagination' (Warner, 2006: 140). The fata morgana[7] was for Kirchner one such illusion. As a scientist and alchemist, he sought to discover both physical and metaphysical explanations for this remarkable phenomenon that had become the subject of myth and legend as well as speculation and experiment. (Warner, 2006: 140) This complex illusion which resembles in many ways the anamorphe is created through the atmospheric conditions of reflection, refraction and inversion but is perceived through the 'radiation of the imagination'.

[7] The fata morgana is a complex illusion which resembles in many ways the anamorphe 'The sun's rays, hitting the surface of the sea and the layers of air turn them into all infinite recession of mirrors, multiplying and inverting reflections; these reflections, turned upside down and superimposed on one another' (Warner, M. 2006. Phantasmagoria: Spirit Visions, Metaphors and Media into the 21st Century. Oxford, Oxford University Press: 97).

In the fog of war, these cloudy spectres haunt the battlefields. In World War 1, numerous accounts were given of strange apparitions that hovered above the trenches. In August 1914, 'The Angels of Mons' appeared in a luminous clouds to veil the soldiers in mist to give them cover, and defend them with bow and arrow against the German. Virilio has described how in the 'derealization' of battle −' ghosts of enemy pilots served to confirm that they had been shot down, and ghostly radar images, voices and echoes came through on the screens, radios and sonars'(Virilio, 1989: 76).

Despite the increased field of vision in contemporary warspace, there is still less visibility and more phantasms, clouds and chaff. The question is what happens to perception when the information is inadequate? James Gibson the psychologist and philosopher, says that it 'seems to be that the perceptual system hunts; it tries to find meaning, to make sense from what little information it can get'(Gibson, 1966: 303). Gibson served in World War II and during his time in the service he directed the U.S. Air Force Research Unit in Aviation Psychology. In the Army, Gibson developed tests used to screen potential pilots and the resulting observation lead to extensive experimental studies of visual perception. His findings showed that when the information is masked or hidden in camouflage, a search is made over the whole array. If detection still fails, the system hunts more widely in space and longer in time. It tests for what remains invariant over time, trying out different perspectives. Gibson says that in the search for meaning, the perceptual system seeks clarity 'the insight that reveals the permanence underlying the change' (Gibson, 1966: 304).

Among the causes of deficient perception that Gibson identifies is the blurring of the optic array. 'The fragile information with which we so confidently get about in the world is wholly at the mercy of atmospheric conditions. The nature of this information is such that it is physically weakened by blur'(Gibson, 1966: 291). The loss of visual structure can occur in varying degrees: in moderate haze, the fine structure or texture of the array is progressively lost with aerial perspective. In a heavier fog, as the projection of linear rays are dispersed and scattered, the coarse structure may disappear. When this occurs, Gibson says the determination of the presence of features in the landscape, their size and distance, become extremely complex which can present difficulties for the measurement of visibility in aviation. 'It is very hard to determine whether or not there is enough structure in the manifold of perspectives in the air mass to enable a pilot to

see what he needs to see.' Gibson continues by suggesting that 'the ultimate degree of blur is found in a homogeneous optic array, that is, one with no structure at all. This is what a fog of the highest density presents to an eye'(Gibson, 1966: 291).

In 1927 on his record breaking flight across the Atlantic in 1927, Charles Lindbergh experienced the visual and mental turbulence presented by the loss of visual structure. 'shut in by the fog, the impression of movement ceases, and I seem to be just hanging in space-unrelated to any point of reference'. He describes being deceived in the 'chargeless, opaque mist' by mirages 'How can it all be fog... how can I distinguish land from air...I see surf on the beaches and trees in the forest, yet my reason tells me it all is fog!' (Lindbergh, 1953: 374).

For the 1929 radio production of Bertholt Brecht's cantata 'The Lindbergh Flight', the stage was divided into two halves: 'The Radio' − the ensemble, chorus and speakers and 'The Listener' − the singer who was the voice of Lindbergh. The aviator's journey was recreated with the chorus singing the parts of the atmospheric conditions; snow, fog, darkness and the Fog sang: 'I am a phantom. Reckon with my presence, you will get to know me, I am the fog. For now the phantom is becoming real I obscure your vision, I am the fog!'(Brecht, 1940).

In an atmospheric or environmental 'whiteout'[8] although energy is present, structure is absent. Gibson shows us that while the undifferentiated light might suggest emptiness to the observer this information is false; the aerial or terrestrial terrain with its potential obstacles still exist although it seems to have vanished. Similarly 'blackout' is another case where nothing is visible. However, blackout unlike 'whiteout' provides no information about the world because energy is absent.(Gibson, 1966: 293) Patrick Deer in his study of British war culture lists the range of associations the 'blackout'[9] acquired in World War II. As well as being an air-raid precaution, it also meant the suppression of

[8] Whiteout – (Also called milky weather.). An atmospheric optical phenomenon in which the observer appears to be engulfed in a uniformly white glow. Neither shadows, horizon, nor clouds are discernible; sense of depth and orientation is lost; only very dark, nearby objects can be seen. This phenomenon is experienced in the air as well as on the ground. Glossary American Meteorological Society, 2000

[9] Blackout. The concealment or extinguishment of lights that might be visible to enemy aircraft during an air raid; The sudden extinguishment of all stage lights in a theatre to indicate the passage of time or to mark the end of an act or scene; A temporary loss of memory or consciousness; A suppression, as of news, by censorship. The American Heritage Dictionary of the English Language, Fourth Edition Houghton Mifflin Company, 2000

information, the loss of radio signals and was commonly used to describe such psychological conditions as the loss of memory. It also came to mean 'the temporary blindness suffered by pilots in sharp turns during the combat, a symptom which German pilots called "the curtain" ' (Deer, 2009: 110).

In the 20th century warfare, the introduction of radar, short wave radio, the extensive use of camouflage and decoys meant that obscuration was widespread. Smoke screens were devised to hide targets from enemy attack as well as from cameras of reconnaissance aircraft. Ursula Powys-Lybbe who was an officer in the Allied Central Interpretation Unit, has described the white smoke as a 'deliquescent substance emitted into the air, due to the condensation of water vapour round a nucleus of this substance'(Powys-Lybbe, 1983: 86). The 'deliquescent substance' of the camouflage was often confused with 'real' meteorological conditions. From the perspective of the pilot and interpreter they might be natural phenomena or deceptive screens raised and lowered in front of the target. In the struggle to see, the pilots and interpreters turned their lens of their cameras and stereoscopes onto the camouflaged forms in an attempt to decipher the hidden secrets and codes. One of the most effective photo-intelligence techniques was the use of comparative photographs which would allow a photo interpreter to detect changes. Colonel Roy Stanley, in his analysis of photo-reconnaissance in World War II, wrote that 'a detailed understanding of what is happening, however, was made more difficult when *signatures*[10] are muddled, covered or obscured by disguise' (Stanley, 1998: 15).

Trying to penetrate the smokescreens the interpreter adopted the point of view of the stereoscope as the only position from which to make sense of the image. However, while the aerial reconnaissance camera and stereoscope appeared to be 'all-seeing', it could not create a field of unlimited visibility and comprehension. The interpreters were transfixed by what was concealed and believed that there existed behind the cloud/the chaff a presence that was somehow more real. This is Baudrillardian seduction. It involves a strategy of appearances; the 'mastery of apparitions and disappearances' (Baudrillard, 1999: 173). Baudrillard believes that 'for something really to appear,

[10]Signature covers the distinctive features of phenomena, equipment, or objects as they are sensed by the reconnaissance instrument(s). The signature is used to recognize the phenomenon, equipment, or object once its distinctive features are detected. Interagency OPSEC Support Staff (IOSS) (May 1996), "Section 2, Intelligence Collection Activities and Disciplines", Operations Security Intelligence Threat Handbook

surging up to the reign of appearances, there must be seduction. For something to really disappear, to resolve into its appearance, there must be a ceremony of metamorphosis' (Baudrillard, 1999: 175).Baudrillard describes it as one of the magician's secrets. Drawing a comparison between magic and camouflage, Roy Behrens has explained how 'In magic performances, a thing appears where nothing was. Or, where something was only a moment ago, there is suddenly nothing; one thing becomes some other thing, or exchanges places with another. That which is solid and heavy becomes insubstantial and weightless. The impenetrable becomes penetrable; the inanimate animate. The mental becomes physical; the physical mental. As long as an attribute can be defined and identified, the opportunity exists for the magic trick, or camouflage strategy to counteract that attribute'(Behrens, 2002: 165).

The Air is One Vast Library is a camoufleur's archive; an inventory of appearances and disappearances; of objects lost and found. Neudecker demonstrates how the seductive illusions of secrecy operate. Her images suggest the occurrence of some unexplained event. Are the planes disintegrating or reforming? The fragments appear to be coalescing or dispersing in a swirl of matter in what might be explosions of chaff. Like the reconnaissance photographs of thermal electro-optical signatures, the frames are crowded with echoes and reflections. The aviators and airplanes appear to have been lost in action leaving behind mysterious traces of data circulating in the ether. Writing of their experiments with GPS geographical positioning systems, Jeremy Hight and Alexander van Dijk suggest that the 'ghost' of a flight trajectory 'hangs in space as a series of plotted points as well as an event'(Hight & Dijk, 2006). The reflecting mirrors of the satellites would track the journeys of missing planes and capture and store the memories of these events for future replay. This event-filled airspace is what the author Salman Rushdie has identified 'as one of the defining locations of the century 'the place of movement and of war, the planet-shrinker and power-vacuum, most insecure and transitory of zones, illusory, discontinuous, metamorphic'(Rushdie, 1988: 5). For Gaston Bachelard, when we are 'faced with this world of changing forms in which the will to see goes beyond passive vision, our imaginary desire is attached to an imaginary form filled with imaginary matter' (Bachelard, 1988: 186).

We long to see. Neudecker however, is a specialist in the aerial imagination. She experiments with matter to create a thick magma – a suspension of cloudy particles. The

scenic dissolves and layers of transformation create an optical subterfuge. The artist as camoufleur practises the particularly creative and strategic art form of ‘maskirovka’. Her grainy photographs and anamorphic forms are radar reflectors, smokescreens. The thick overpainting with Tipp-ex – the literal ‘white out’[11] of the images suggests the censorship of classified military documents. There is a loss of structure and optic array. Neudecker acts on the photographs to destabilize the original representation. Paul Carter in reference to the practice of official whitewash, argues that ‘to erase is to destroy by additional covering [...] and, once the lines condemned to disappear are covered up, there is a space ready for a new text’(Carter, 2009: 39). The artist/camoufleur inscribes the blank ground, the tabula rasa, with fresh unfamiliar signatures. In these newly devised presentations, we imagine encrypted messages and try to comprehend and detect their significance. As the ethnographer John Mack observed:

> The world of the secret is not a world of what is, but of what might be. It has an edge: those who have access to secrets may be privy to ambiguous potentially dangerous knowledge. Those who are not in on particular secrets are forever unsure whether what they do not know is significant.
>
> (Mack, 2007: 117).

In the build up to the war in Iraq in February 2002, Donald H. Rumsfeld then Secretary of the U.S. Department of Defence made the following case for the bombing of civilians: ‘As we know, There are known knowns. There are things we know we know. We also know There are known unknowns. That is to say We know there are some things We do not know. But there are also unknown unknowns, The ones we don't know We don't know’(Rumsfeld, 2002).
To create the illusion of visibility, the military strategist constructs a screen of disinformation, contradiction and confusion.

> To earn our trust, the illusionist patiently and methodically confirms what we think we know; he satisfies our every expectation and dispels our doubts, one by one. As in

[11] White-out noun: a quick-drying fluid, typically white, applied with a small brush to a piece of paper so as to cover typed or written errors and make a blank surface for corrections. Origin: < Wite-Out, a trademark for such fluid, prob. infl. by whiteout; transitive verb: to cover with this fluid. Webster's New World College Dictionary (2010) Wiley Publishing, Inc., Cleveland, Ohio.

> any successful seduction, we the seduced must believe we are in control. We must feel confident that what we see aligns with what we know.
>
> (McKeith, 2006: 26).

But in reality we are denied the strategic view. We find ourselves like the wartime fighter and bomber crews caught in 'a visionless present.' (Deer 2009: 84). Without vision or visibility we cannot determine the coordinates of our position. While Neudecker's interventions suggest the emergence of previously hidden patterns and secret correspondences, it is the work of the camoufleur. Her strategy is to reveal through camouflage the prevailing invisibility of the military world and show us that we are still blinded by chaff.

Katrin Sigurdardottir: Mappings

The work of the Icelandic artist Katrin Sigurdardottir (b. 1967) lies in that Baudrillardian territory found between the real and true, the real and the imaginary. Model landscapes and buildings, places and spaces- are assembled, disassembled and reassembled, games played, illusions created, locations staged. Katrin Sigurdardottir like the military camoufleurs, plays with the viewer's perceptions of space and truth. She controls the experience of looking. Through the manipulation of surface, structure, scale and texture, the real and the scenographic merge in imaginative constructs and locations. The artist has said that she finds it 'interesting to consider Baudrillard's theory that....a place exists between what we term as "real" and "true", as these two are not always one and the same....that she is as interested in falsehood in space as she is in truth...that 'by defining falsehood, you are also putting the question of truth on the table.'(Sigurdardottir, 2008)

We go behind the scenes, we play the scene, we become the scene. Shipping crates, ladders, models and theatrical flats form the visual language of an enigmatic mise-en-scene. The construction of the illusion, however, is always made evident. The rawness and simplicity of the materials and the visibility of the structures create a suggestion of physical truth and the presence of the 'real itself'. (Poster, 1988)
High Plane is a 'series work' and has been installed it in a number of different places and versions since 2001. (Fig. 98) Each time Sigurdardottir has retained the principle

characteristics of the piece but adapted it to the individual setting and exhibition space. When she first exhibited the piece at the Sævar Karl Gallery in 1993 she constructed a large box that almost filled the space and appeared as a smaller version of the enclosing gallery space. The audience entered into the box and from there to the space between it and the existing gallery walls where steps intermittently led up the sides of the box. From here the view onto the top of the box was of a landscape carved from blue insulating foam. Later versions have, however, had only two access points via a ladder up to the level of the landscape.

At the top of the ladder there is only room for the viewer's head to emerge through each opening into a blue-white landscape of miniature islands or mountains. The presence of two viewers' heads isolated in an expansive landscape creates a strange intimacy. Sartre in *Being and Nothingness* states that 'aloneness' is the centre of all lines of sight but when second person enters this changes, the spectator is no longer privileged. The perception of another body is integral to *High Plane*. Two people keep each other in view. The boundaries of the work became the distance between the two people. In her 1986 analysis of the work of Richard Serra Rosalind Krauss wrote: 'Chiasma is a relationship of crossing and exchange. It can be used to describe a spatial transitivity, as in the mutual interaction of seer and seen-their activity as they exchange positions through visual space, each leave a mark on the other' (R. Krauss, [1986] 2000: 133).

The physical act of climbing the ladders to view *High Plane* also reflects the innate desire to 'survey and embrace a particular terrain: the compulsion to map a territory and position oneself within it that led to the climbing of church towers, mountains, and buildings to take in the panorama' (Bruno, 2002: 176). For *Untitled 2007* a site specific installation for Landes Galerie Linz, Austria, three platforms/plinths were constructed with small steps leading up to them. (Fig. 99) On the top of each plinth was a hole for the viewer's head and on the inside ceiling an upside down landscape. This presence of the gaze within the model allows the viewer to see inside the 'box' of the model through a system of mise-en-abyme. Sigurdardottir wants to destroy the spectator's certainty and the usual viewing position, Instead, in a space in which orientation is deliberately abolished, the viewer must be made continually to choose their visual field's coordinates. The viewer's physical actions, such as climbing up and bending down to see works, convey the idea that the art was not for passive contemplation. This is a space directly

linked to the position of the observer. The experience is not passive. The visitor approaches as a passive spectator confronting a stage set but becomes the centre of the action. No longer is critical detachment between the viewer and the object possible. As Merleau-Ponty wrote: ‘I cannot understand the function of the living body except by enacting it myself, and except in so far as I am a body that rises towards the world’ (Merleau-Ponty, [1942]1962: 75).
Historically there have been many attempts at placing the body within a model. In his Great Model of St. Paul's (1673), the architect Christopher Wren removed the floor beneath the dome so that the viewer could enter and, standing waist high, experience the dynamics of the space. A model created for the Versailles Opera (1761-68) appears to have been ‘a real 'room' in which one could stroll about. Franz Alois Mayr, an eighteenth-century German architect, may have been the first to make use of an optical device to avoid either disassembling or enlarging the model. By fitting a mirror into the model's floor, he enabled his client to view the ceiling frescoes (Moon, 2005: 64). On smaller models, a hole was cut in the floor to allow a panoramic view at close range. The model of Friedrich Wilhelm Kraemer's new library building (1961) allowed for the viewer's head to be within the space of the 1:20 scale model (Janke, 1968: 71).

Sigurdardottir’s installations are also in the tradition of the 19th century georama described in its patent document of 1822 as consisting ‘of a sphere of 40 feet in diameter at the centre of which the spectator is positioned on a platform of 10 feet in diameter, from which he discovers all parts of the globe.’ The georama, ‘a geographical machine’ performed an imaginary inversion as the world was turned outside in, exterior was made into interior (Bruno, 2002: 162).

All these works orchestrate perceptual encounters as drama, as spectacle. *Coulisse,* (2008) like many of her previous works, employs concepts, methods and structures borrowed from the world of theatre. Full-size scenographic flats depict an unidentified mountainous landscape. The viewer not only faces the spectacular illusion of the scenic painting, but also the stagecraft that makes the illusion possible. The viewer as performer enters from the back-stage behind the flats to confront the illusionary painted depths of the panels. ‘With trompe l’oeil, whether mirror or painting, we are bewitched by the spell of the missing dimension. It is the latter that establishes the space of seduction and becomes a source of vertigo’ (Baudrillard, 1990: 67).

Clemens Steenbergen and Wouter Reh's analysis of trompe l'oeil, anamorphosis and the coulisse demonstrates how these optical strategies contributed to the increasingly illusionary space of the 17th century landscape and theatre. The conditions for spectatorship were created through these theatricalised formulations of landscape which used the scenic principles of the proscenium stage (Steenbergen & Reh, 1996: 143). Katrin's *Coulisse* also recalls the spectacular theatricality of the painted scenery used by the Swiss military to disguise their mountain bunkers. (Fig. 100)

Untitled 2006 a site specific installation for FRAC Bourgogne, in Dijon, France consisted of two works. (Fig. 101) A photograph from the late 1800s depicting a valley in New Mexico was enlarged and mounted on theatrical scenic 'flats' which were piled over the entrance to the museum space, so it was only possible to see the back of the scenographic panels. In a second room, hidden behind a false wall were two identical sculptures, one a miniature of the other. To enter the piece, visitors had to leave the museum, walk up an alley behind the building and climb through a window in the back wall of the museum. Upon entry, they found themselves inside the large sculpture, with no option of getting "on the right side" of the work, instead they were trapped inside the work and forced to view it only from the inside. The one-way mirrors on the pieces allowed the viewers to look out and see the reflection of the large sculpture, in the mirror of the small piece. The work reflects Merleau-Ponty's observation that:

'To see is to enter a universe of beings which display themselves, and they would not do this if they could not be hidden behind each other or behind me. In other words: to look at an object is to inhabit it, and from this habitation to grasp all things in terms of the aspect which they present to it. But insofar as I see those things too, they remain abodes open to my gaze and being potentially lodged in them, I already perceive from various angles the central object of my present vision. Thus every object is the mirror of all others' (Merleau-Ponty, [1942]1962: 68).

Sigurdardottir's work plays on the way we perceive and understand space and the way we perform in it. In addition to the visual reference to theatre arrangements, the space itself became performative. Laid out in sequences, views require both perceived and physical movement. The eye and body of the spectator are imaginatively and actively engaged. Through movement, the scenic perspectives are constantly being shifted as

visual transitions are made between the space and the body. The action unfolds in front of a landscape read at stage. This is the landscape/theatre that Gertrude Stein proposed; 'a theatre with the structural equivalent of a landscape where the parameters and content may be determined by the artist but the method and organisation of viewing and processing information was largely controlled by the spectator' (Aronson, 2005: 109). This 'site-seeing' is experienced as a series of unfolding relationships. Sigurdardottir has said that her work 'testifies to a nomadic predicament: the centre of one's existence as the transit itself rather than a location arrived at or departed from' (Heisler, 2005: 80). Susan Sontag wrote that:

> The romantics construe the self as essentially a traveller – a questioning, homeless self whose standards derive from, whose citizenship is of, a place that does not exist at all or yet, or no longer exists; one consciously understood as an ideal, opposed to something real. It is understood that the journey is unending, and the destination, therefore, negotiable. To travel becomes the very condition of modern consciousness, of a modern view of the world-the acting out of longing or dismay.
>
> (Sontag, 1984: 699)

Sigurdardottir's physical and corporal mappings provide us with the means for travel. Encased in shipping crates and suitcases, her miniaturized landscapes are tools of navigation through the memories and experiences of locations both real and not real. (Fig. 102) They are in the tradition of the small pocket-sized relief models used in the 19th century as an alternative to the two dimensional maps that many people found difficult to interpret. Particularly before the spread of contour maps, a little model of the terrain could help finding one's way in mountainous regions.

Haul 2005 is a continuous imaginary landscape displayed in small transport crates. (Fig. 103) As they move to different locations, their travel is documented with transit labels and other imprints added to the exteriors of the crates. Visually and conceptually, they recall the crated military terrain models shipped to the commanders at the Front in Europe and in the Pacific. Sigurdardottir's map- making strategies like those of the wartime modelmakers are to construct the real and to activate readings of location. Looking at Sigurdardottir's maps, the imagination is filled with memories of landscapes. Paul Carter has described how the 'poetic geography' of the ancient Greeks, brought

into being inhabitable land or territory employed Vico's faculties of *memoria*, *fantasia*, and *ingegno* (Carter, 2009: 23). Donald Verene has described these "three different aspects" as: memory (memoria) when it "remembers things" (this is parallel to grasping the composition as a whole, i.e. holding the whole work in mind); imagination (fantasia) when it alters or imitates them' (the reader closely follows, but alters into his own mind the connections and sequence of things in the text); and ingenuity (ingegno) when it "gives them a new turn into proper arrangement and relationship"' (Verene, 1991: 198). Sigurdardottir combines the epistemological practises of cartography and imaginative constructs of the scenographer as poetic geographer, to provide us with opportunities for exploration, projection and speculation.

Hans Op de Beeck: St Nazaire

The *Sea of Tranquillity* is a project created in 2010 by the Belgium artist Hans Op de Beeck (b.1969). As in much of his work, Op de Beeck is questioning the relationship between reality and representation, between what we see and what we want to believe. His works are fictional, constructed and staged and like the wartime camoufleurs, he is in control of the level of constructed authenticity.

> With these installations, I try to discover the extent to which you can summon something up by using an artificial environment. They are the mise-en-scène for a non-event in which an action can be conceived of but isn't provided. The viewer becomes the silent protagonist. The result is a kind of "fabrication" of an experience.
>
> (Hans Op de Beeck2005)

For the *Sea of Tranquillity* Op de Beeck found his original inspiration in the French port of St Nazaire a place long associated with dramatic presentations. (Fig. 104) With the largest dry dock of its kind in the world, St Nazaire became the construction site for the extraordinary floating architectural scenographies of the cruise ships like the *Normandie,* and then became home to a massive German submarine base. During the Second World War, both these naval ambitions came into conflict.

In occupied France, the ‘Normandie’ dry dock had become of immense strategic importance to the Germans. It was the only dock large enough for the great German battleship the *Tirpitz*. It also made it a prime target for the Allies. In 1941, a plan of attack began to be formulated. One of the first steps was to create a model of the docks. Powys-Lybbe writes how the preparation of the model for the Combined Operations raid on the port of St Nazaire began eight to nine months before the actual attack on 27th to 28th March 1942. Through stereoscopic examination of oblique and vertical reconnaissance photographs, it was possible to calculate accurate measurements of all the individual buildings and quays (Powys-Lybbe, 1983: 61). The description of the model by one of its makers, Leonard Abrams, reflects the theatrical nature of the exercise: ‘The word was: "It's a small model for a very big show. We want to give them lots of sharp detail, the Old Mole or breakwater, the lock gates, the swing bridge, control posts, the submarine pens, and the old town’ (Abrams, 1991: 22).

In his book *The Greatest Raid of All* which documents the St Nazaire operation, C. E. Lucas Phillips described how the commanding officer used the map and model to point out the targets for Operation Chariot. ‘The main requirement was that they should be able to recognize their proper landing places in the glare of the searchlights. These searchlights Ryder simulated with electric torches placed in the model, while the officers looked at the harbour approaches at eye level’ (C. E. L. Phillips, 1958: 89). Phillips’s account was based on first hand evidence provided by both German British and French sources including evidence from officers who had participated in the planning and execution of the raid. From their personal narratives he was able to conclude that: ‘The model, the air photographs and the maps were burnt into every man's mind, so that each knew exactly where he ought to land, where else he might have to land, the route from that point to his objective’ (C. E. L. Phillips, 1958: 87).
On March 28, 1942, an old destroyer HMS *Cambeltown* packed with explosives and with an escort of small fighting ships entered the port of St Nazaire under darkness and rammed into the dry dock gate exploding and destroying the massive outer gate. Although there were heavy casualties, the raid accomplished its objective of putting an important German naval installation out of action for the duration of the war.

The artist Hans Op de Beeck inspired by the history of the shipyard, the wartime activities and the liners that were and are still being built there, has created a large model

of a ship the *Sea of Tranquillity*. (Fig. 105) Op de Beeck's model is equally impressive in the detail and craftsmanship as the St Nazaire model but more benign in purpose. The name when literally translated in Dutch, becomes 'zee van rust', which is a common saying to express a moment in which one experiences timelessness, peace and silence, an ocean of calm. It is a name that follows in the myth-making tradition of the cruise lines that choose names like *Celebration, Ecstasy, Tropicale, Paradise* to suggest the experience on offer to their passengers. The exhibition based around this fictitious ship is conceived as a small, dark museum that is resonant of the tradition of maritime collections, with their glass vitrines, dioramas, and models. The museum environment is a place out of the ordinary. (Fig. 106) Already a staged environment, it is a cabinet of curiosities, a Wunderkammer, a catoptric theatre, bristling with objects and details, reflections and illusions. Op de Beeck's however does not use any labelling or provide clues through text to the meaning or interpretation of the objects on display. As in the early Wunderkammers, the visitor has to make their own assessments about the relationships between the exhibited objects. In addition to the case containing the large model of the cruise liner, there are glass display cases containing items of the ships fittings and regalia such as a sample of custom made tableware and the captain's uniform. There is also a display of watercolours, plans, designs that illustrate the story of the 'largest cruise liner in the world' and a short wordless film provides a virtual tour of the ship at night. Op de Beeck has curated an enigmatic variation of the familiar didactic displays put on by public and private museums. Models and memorabilia are used to support and create the myths and legends surrounding historic naval events and project a constructed narrative of conquest and continuity by reinforcing the desired political and commercial ideologies. Like the Cunard exhibition from *Liverpool to New York* it contains promotional advertisement for the line and its product.

In Op de Beeck's 'museum', the visitor wanders through a collection of nameless images, objects and impressions dedicated to a fictitious 'legend' and in the darkened projection room, they can make an imaginative embarkation on the illusionary ship. Precedents for this virtual experience can be found in the simulated cruises provided by the *Mareorama* at the Paris Exposition in 1900. The spectators stood between two moving panoramas which created the illusion of being on board ship. This effect was enhanced by the rolling sensation of the mechanically operated 'deck' as the ship was steered on its imaginary course from Marseilles to Constantinople. Like Op de Beeck's,

it was a spatial and temporal voyage, passing through from day to night in which the spectators become the passengers experiencing what Bruno has described as the '(e)motion of travelling by sea' (Bruno, 2002: 183).

The *Mareorma* was one of the many aquatic spectacles that entertained the viewing public from the 17th century onwards. In 1693 Henry Winstanley, the architect of the world's first practical offshore lighthouse on the Eddystone rock, opened the Mathematical Water Theatre in Piccadilly in London. A windmill on the roof was used to pump water for the 'Sea Triumphs' that were staged. On June 20th, 1696, John Evelyn recorded in his diary that he 'saw those ingenious Water works invented by Mr. Winstanley, wherein were some things very surprising and extraordinary'. The productions combined fireworks, perpetual fountains, automata and ingenious mechanisms of all kinds. On July 7, 1712, *The Spectator* announced that; '2 flying Boys are to attend the new Sea Triumph, one with a flaming torch which plays a large sheet of water, and the other with a Neptune Trident'. A year later, on June 30, 1713, *The Guardian* advertised: 'A Tempest of Thunder and Lightning with Fire mingling with many Cascades of Water'.

De Loutherbourg would create even more spectacular and illusionary effects. The Eidophusikon advertised a 'Storm & Shipwreck' together with naval battles. (Fig. 107) Techniques borrowed from theatre included backdrops painted on transparent cloth and mirrors added to some lights to reflect and direct their illumination (Kornhaber, 2009). The spectacular lighting of the show was often accompanied by sound effects, adding a 'picturesque of sound' to the lighting effects of the mechanical action. Another popular entertainment that used similar illusionistic effects was the diorama.
The dioramic model of the 'Battle of the Saints, 12 April 1782' at the National Maritime Museum, Greenwich, London depicts Admiral Rodney's victory at the Battle of the Saints (1782) after an (engraved) 1783 painting by Richard Paton. The model combines false perspective and painting on glass to recreate a dramatic three dimensional representation of the naval battle. (Fig. 108) Both the panorama and the diorama sought to immerse the spectator in the experience to make them feel as though they were present in the scene depicted.

Op de Beeck proposals are similar in their construction of reality and their carefully choreographed and manufactured presentations to these entertainments. He too believes in the: 'authenticity of the "fake"'. He recognises that it is impossible to compete with reality. 'But even though you sense that everything is artificial, that kind of representation still provides a specific kind of intensity that you don't get when you cling stubbornly to the illusion of reality. Surrendering to the literal artificiality can lead to a concentrated, charged version of reality' (Wittock, 2005).

It is an approach that was adopted and its effectiveness proven by many of the camoufleurs and military strategists in both World Wars. As First Lord of the Admiralty in 1914, one of Winston Churchill's first 'Most secret' memos of the war was to issue instructions to build a dummy fleet of ten large merchant ships in wood and canvas to look like far bigger battleships in silhouette. Three of these were sent to the Dardenelles in 1915 to lure the German fleet out into the north Sea (Rankin, 2008: xiii). He also commissioned the Q-ships which were trawlers and cargo ships disguised to look like merchant navy vessels which carried concealed guns 'which by a pantomime trick of trap doors and shutters could suddenly come into action' as Churchill wrote in *World Crisis* (Rankin, 2008: 14). In the Second World War, once again Churchill ordered the construction of dummy ships which were placed about Scarpa Flow the Scottish anchorage of the British Fleet which had already suffered a German attack and the loss of a battleship. The desire was to use all possible scenic effects to construct a convincing deception. Dramatic reconstructions required the use of special effects. Designers and technicians from film and theatre were in great demand to simulate a range of atmospheric conditions. Some of these special effects were taken from early theatrical and cinematic experiments and techniques. Among the practices appropriated by the camoufleurs were water tanks, fog machines and the addition of oil to water to reduce the size of bubbles created when by sinking model submarines. The June 1944 issue of *Popular Mechanics* takes us 'behind the scenes' at George Pal Productions in Hollywood to show us how:

> Movie technicians are using all the tricks of their trade to impart life and realism to their instructional pictures. The article describes and illustrates a sea battle being fought on a table top with ship models, on an ocean of ripple glass. 'On the screen you get the impression that you are actually seeing full sized battleships or tanks at work. Carefully chosen camera angles are one of the ways in which this illusion of

> reality is created. Some scenes are purposely stylized by eliminating all distracting details.' There is also a brief consideration of the effects of scale. 'In all miniature work, action, distance, and time must be cut down in scale to match the miniature set. Otherwise the sense of reality is lost. (Fig. 109)
>
> (Popular Mechanics 1944: 59)

These were all practices used by Norman Bel Geddes in his reconstructions of World War II sea battles. A 1941 issue of *Popular Mechanics* contained photographs of 'a five-ocean navy' made up of more than 1,700 model ships. The accompanying article reported that 'Its admiral is Norman Bel Geddes, industrial and stage designer and streamliner of the circus, who is by way of being a naval tactician of parts and sometimes spends his spare hours in sea battles with American naval officers he numbers among his friends.' There was also a description of the 'ocean' which was 'a 20-foot square table of cement, built at a cost of $1,500, and irregularly raised to simulate mid-ocean conditions, with smooth areas representing inlets and bays' (Popular Mechanics, 1941: 116).

A few years earlier, Bel Geddes had included among the industrial designs published in his 1932 manifesto, *Horizons,* Ocean Liner Number 1 - a streamlined 'ship of the future'. (Fig. 110) Although the decks were fully enclosed with glass, there was a telescopically retractable glass roof over the tiered sun decks, sand beach and swimming pool. This visionary project, however, was never realised though its futuristic ideas inspired the production designers of *The Big Broadcast* a film made in 1938 set almost entirely aboard a fictitious North Atlantic liner that bore a close resemblance to Bel Geddes's design (Votolato, 2010: 214). Three years, after he produced his design for Ocean Liner 1, Bel Geddes had the opportunity to create another aquatic experience. For a production of *Dead End* in 1935, Bel Geddes produced and directed as well as designed the scenery. The stage directions in Sidney Kingsley's script specified that the East River should be placed at the rear of the stage but Bel Geddes reversed this arrangement putting the edge of the wharf so it appeared to disappear into the orchestra pit which created the illusion that the audience was in the river itself. The critic of the New York Times wrote that: 'so real it all seemed, that I, sitting there in mid-river, found myself paddling to keep afloat!' (Innes, 2005: 125).

Bel Geddes's use of scenic illusion, exaggerated perspective and selective detail together with innovative technology enabled him to produce tangibly immersive experiences for the spectator. Both Bel Geddes and Op de Beeck aim to create an authentic experience by means of the mise-en-scène. As Op de Beeck has observed: 'experience can be carefully packaged, conditions may be set, approach paths marked and views purposefully selected'. Op de Beeck has described how he loves 'that moment when, by visualizing things in a certain way, you can make an image tip over into something authentic [...] you stop thinking about the artificial context, the whole thing takes on something authentic and experiential' (Hans Op de Beeck2005).
The artist is deliberately exploiting the perceptual and phenomenological instabilities inherent in the staging of physical objects: 'I want to offer both the illusion and the failure of the illusion on a one-to-one scale'. As well as the complexities of scale, *The Sea of Tranquillity* illustrates Op de Beeck's belief that 'artificial spaces are capable of evoking a credible experience of time'. The real space of the spectator, the fictional space of the ship and the virtual space of the film, all have their own temporal structure but they converge in the installation. Ortega Y Gasset has written that 'what is not real, the unreal…has the strength, the magic potential to make what is real disappear. You might say that reality retires upstage in order to let the unreal pass through it like projected light' (Gasset, 1975: 178).

The melancholy and enigmatic drama of Op de Beeck's production evokes the strange conditions of the cruise ship which makes it the focus and the location of significant events. It provides a stage on which dramatic narratives can unfold. Designers, directors, writers, artists and the military have all been aware of the iconic power of the ship in the public's imagination. In war the ship is the ultimate prize for the enemy. It is a valuable tool for propaganda. Politicians stage their speeches on board ship using the image of the flagship to promote patriotism. This makes it a highly desirable target and as such it has been the focus for elaborate strategies of camouflage; 'Dazzle' and 'Seduction Chaff' are just two of the suggestive terms used to describe the magical disguises adopted.

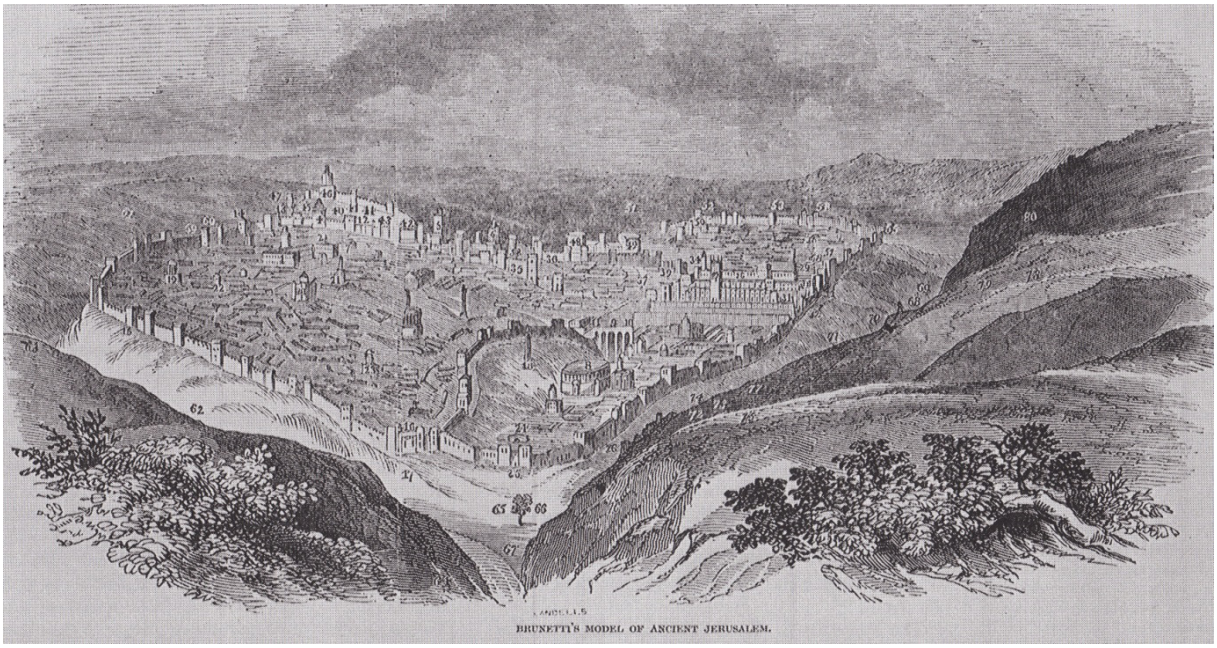
The sea is the domain for mythology what Carl Schmitt has described as the 'elemental surge toward the sea'. *Terra firma* is counterposed to *mare libre*, the free sea, both in modern European law and in Schmitt's mythology. 'On the open sea, there

were no limits, no boundaries, no consecrated sites, no sacred orientations, no law and no property,' states Schmitt (2003 [1950]: 43). It is a sphere of risk, of the pirate, the word derived from *peiran* (Latin) meaning to test, to try, to risk (Dean, 2006: 15).

In October 1985 passengers and crew on the *Achille Lauro* Italian cruise liner were held hostage by four Palestinian (PLF) terrorists, demanding the release of 50 Palestinians then in Israeli prisons. After being refused permission to dock at Tartus, the hijackers killed the wheel chair bound Jewish-American passenger Leon Klinghoffer and then threw his body overboard. It was said that he was thrown overboard in his wheelchair but this is not known to be a fact and may be a myth part of the *Achille Lauro* legend created by the media. After two days of negotiations, the hijackers were offered safe conduct in exchange for leaving the liner and the rest of the hostages unharmed. The events later became the subject for John Adams's opera *The Death of Kinghoffer* first performed in 1991 at the Theatre Royal de la Monnaie in Brussels. The production directed by Peter Sellars with sets by George Tsypin was staged in an abstract shipboard world. Adams said of the production 'you have a constantly shifting scale of closeness and distance...at one moment you feel as though you're right there on deck under the blistering sun with the rest of the passengers, and a moment later you feel like you're reading about it in some ancient text'(Adams, 1991).

It is a description that could apply to the experience of the *Sea of Tranquillity*, the camoufleur's model of St Nazaire and Bel Geddes's naval battles. They all demonstrate the power of the metaphor and the engagement with the audience's imagination. The scenographic strategies and the technical effects combined with the perceptual memories and experiences of the spectators to create the authentic real.

Figure 85



Brunetti’s model of ancient Jerusalem.

Figure 86

Qalandia 2067, Wafa Hourani

Figure 87

Fig. 87-91: Qalandia 2067, Wafa Hourani

Figure 88

Fig 89

Figure 90

Figure 91

Figure 92

Adjnabistan,2005, Michael Ashkin

Figure 93

Angels, 2006 mixed media and acrylic gesso on canvas, Gerry Judah

Figure 94

The Crusader, 2010, Gerry Judah

Figure 95

The Crusader, 2010, Gerry Judah

Figure 96

A Lancaster bomber over Essen dropping chaff to interfere with ground gunners. Courtesy Imperial War Museum.

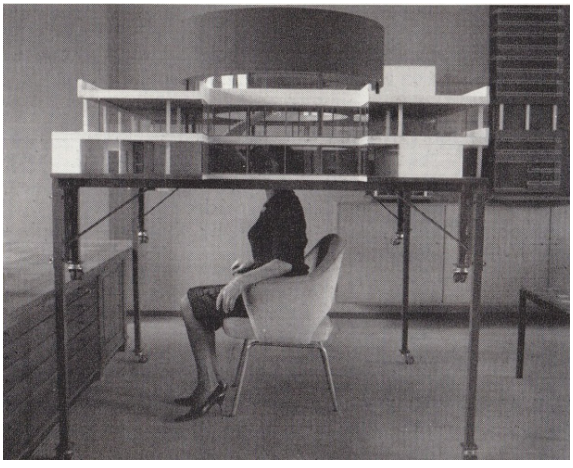
Figure 97

The Air Itself Is One Vast Library, 2010, Mariele Neudecker

Figure 98

High Plane, 2001-2007, Katrin Sigurdardottir

Figure 99



F.W. Kraemer, 1961

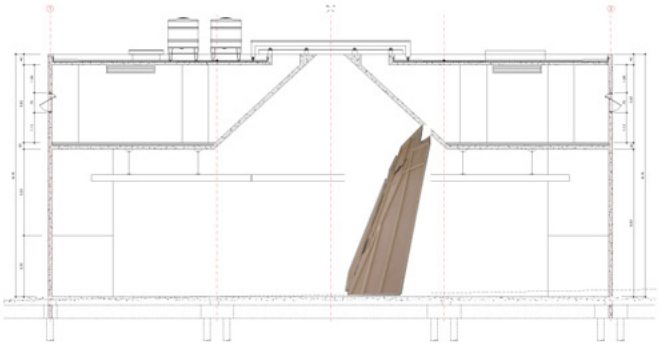
Untitled 2007, Katrin Sigurdadottir
(Above and below right)

Figure 100

Coulisse, 2008, Katrin Sigurdardottir

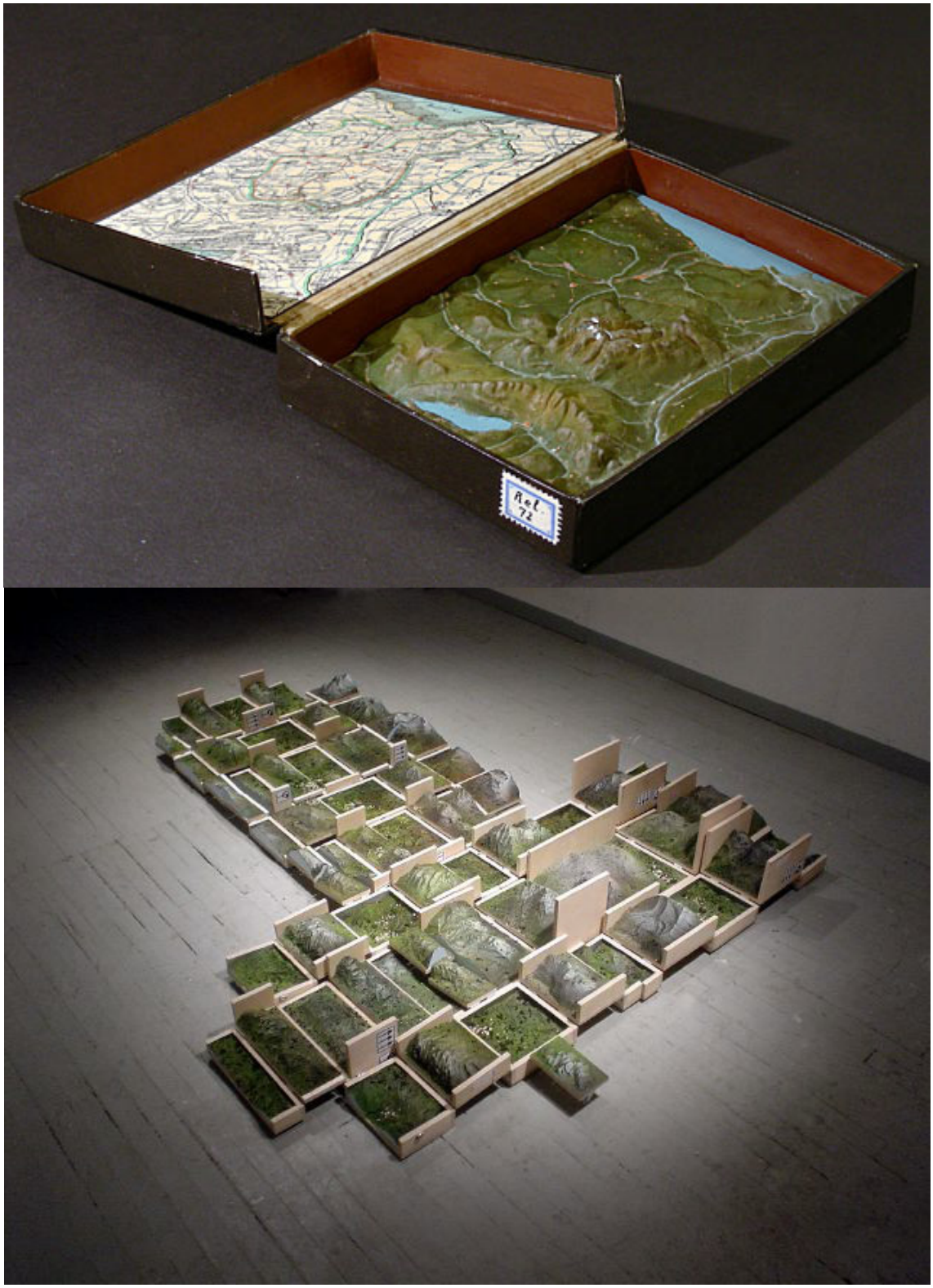
Swiss military bunker site photograph by Robin Ware 2005 (below)

Figure 101



Untitled, 2006, Katrin Sigurdardottir

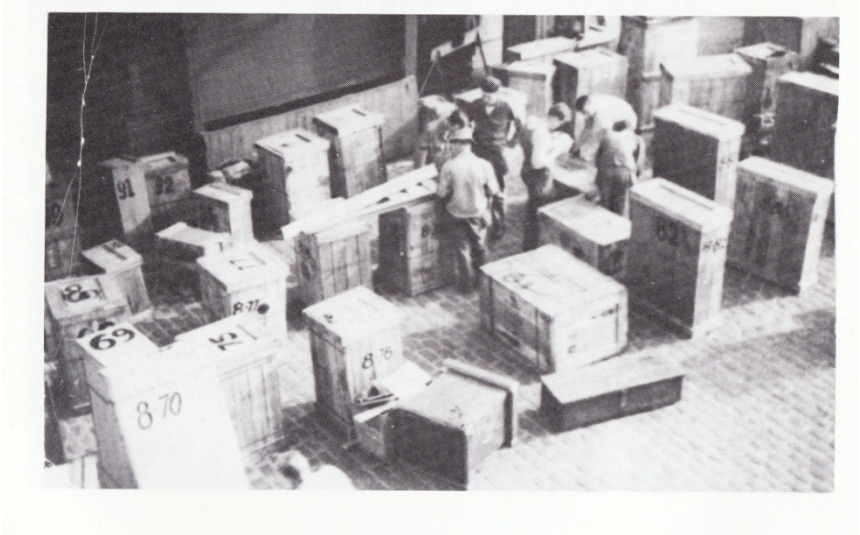
Figure 102



Haul, 2005 – open, Katrin Sigurdardottir

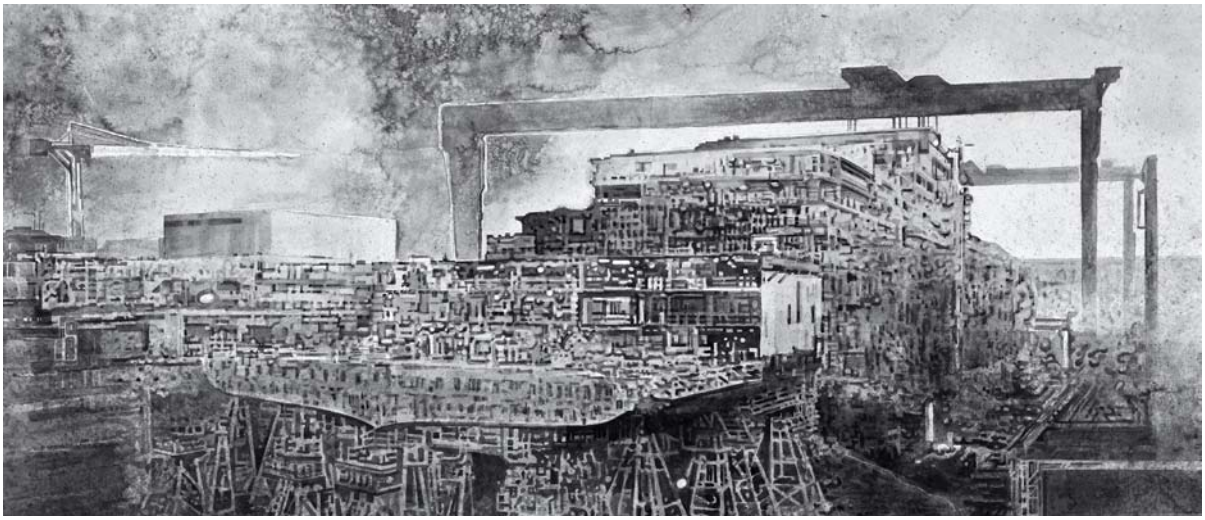
Figure 103

Haul, 2005, Katrin Sigurdardottir



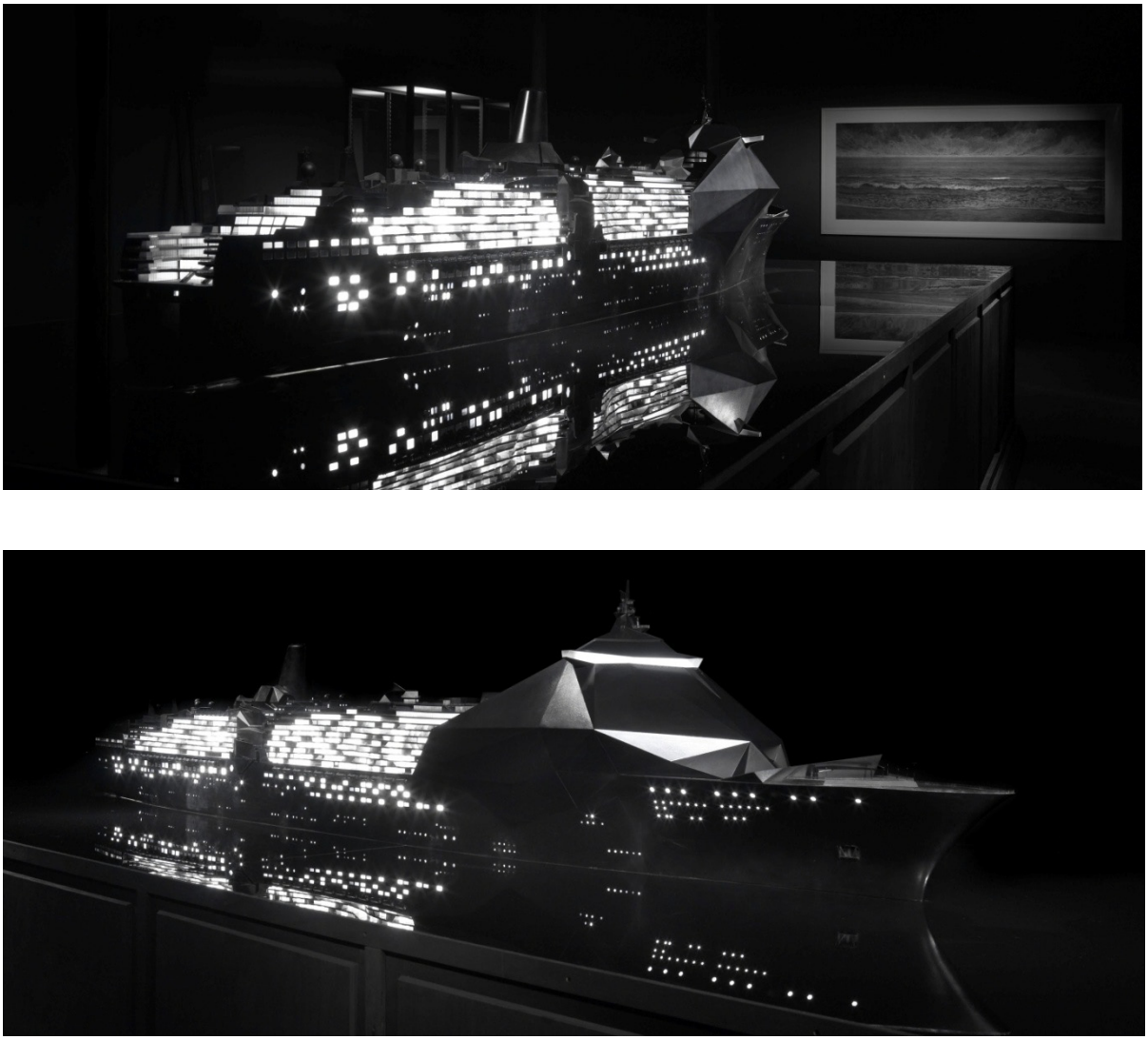
WWII Model making division crates, 1945

Figure 104



Shipyard 2010, (Saint-Nazaire, France), Sea of Tranquillity 2010, Hans Op de Beeck

Figure 105



Sea of Tranquillity, 2010, (Model), Hans Op de Beeck

Figure 106

Sea of Tranquillity, 2010 (Installation view), Hans Op de Beeck

Fig 107

Exhibition Rooms, over Exeter'Change, Strand.

(Sunday excepted) every Day will be preſented at the above Rooms,

A Miſcellaneous Exhibition,

Compriſing a Series of Beautiful Pictures in Stained Glaſs, repreſenting the moſt ſtriking Effects of Nature; the Works of that admired Artiſt Mr. JERVAIS, and purchaſed from him at a very great Expence.

A Collection of Mr. DEAN'S Tranſparent Paintings of Mount Veſuvius, and the Conflagrations in London during the Riots.

And a Variety of novel and pleaſing Optical Effects in STORER'S Delineators and other Inſtruments.

To be opened for public Inſpection from ELEVEN till SIX.

*** Admiſſion One Shilling.

And in the EVENING will be preſented,

That elegant and highly favored SPECTACLE,

The EIDOPHUSIKON,

Invented and Painted by Mr. DE LOUTHERBOURG.

In the courſe of which will be introduced the celebrated Scene of

The STORM & SHIPWRECK.

The other SCENES as uſual.

TO CONCLUDE WITH THE

Grand Scene from Milton.

With the uſual Accompaniments.

Firſt Seats, 3s. Second Seats, 2s.

The Doors to be opened at Seven and the Performance to begin at Half paſt Seven.

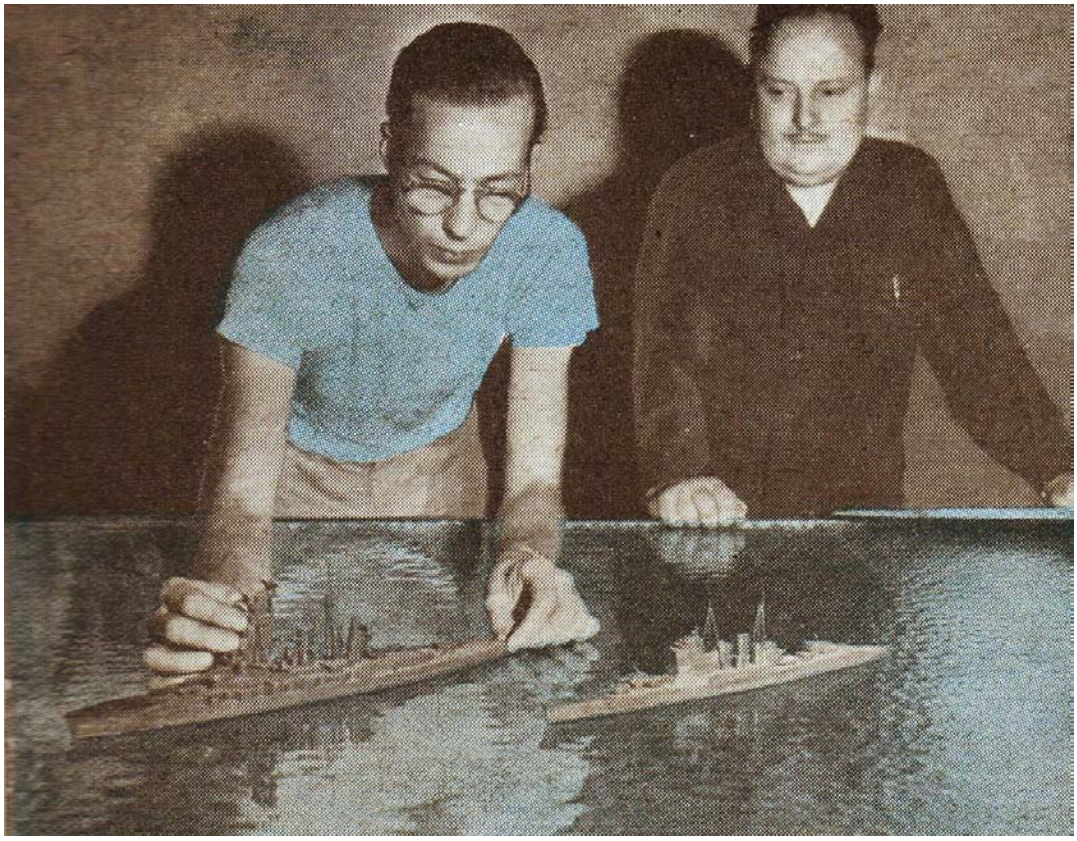
*** The Proprietors have paid the utmoſt Attention to the elegant Accommodations of the Company.

Printed by H. REYNELL, (No. 21,) Piccadilly, near the Hay-Market.

Figure 108

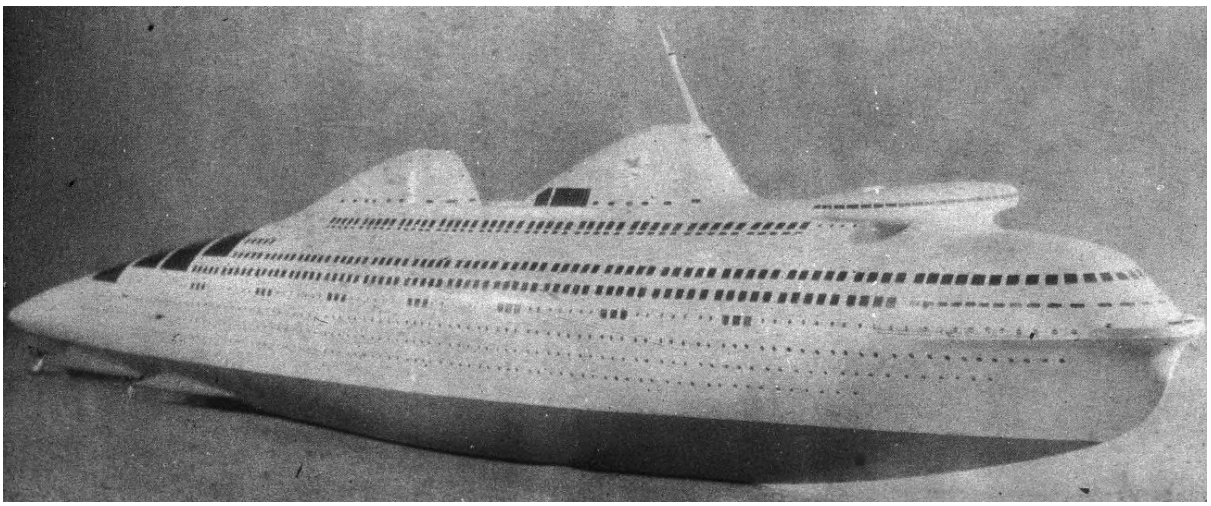
Dioramic model of the ‘Battle of the Saints’ 1783, National Maritime Museum, Greenwich, London

Fig. 109



‘Rehearsing a naval battle on “ocean” of ripple glass’, *Popular Mechanics*, June 1944

Figure 110



Horizons Ocean Liner Number 1, 1932, Norman Bel Geddes

Conclusion

In my dissertation the central question was: how did the scenographer's perspective inform military strategy and interpretation?
What has become apparent, in this study of the scenography of war is the ready adoption of theatrical language by politicians and the military to frame their productions. While modern technologies of violence are central to the vision of war projected by the military authorities, 'strategic fantasy' as Deer observes in *Culture in Camouflage* ' plays a central role in the reimagining of conflict' (Deer, 2009: 4). Theatre with its associations of illusion, magic, artifice, deception and concealment make it particularly well suited for the spectacular narrative presentations staged by the military. The use of scripted scenarios, dramatic descriptions and scenic effects creates a theatrical environment which legitimizes their actions and elevates their fantasies of domination and control to the cultural stage. The modern military landscape is produced by a new level of theatrical presentation. It is war as aerial spectacle. The landscape becomes staged for the airborne observer while the sky provides the performance space for aerial action. In the scopic regime of contemporary aerial warfare, perception and the relationship to landscape have been radically reoriented. Camouflage shifts the focus between the spatiality of the landscape and the aerial spectator and the camoufleur encodes the surface of the landscape with visual and spatial disguises intended to deceive the aerial gaze and the stereoscopic lens.

Although the history of camouflage is widely documented and the role of artists, designers and architects has been examined in some detail, the particular scenographic view has not been explored in any significant way. There is an enormous untapped resource of written material which others have dipped in to but there has been little critical synthesis. I discovered through this reading that I needed to return to the original sources to discover the links and relationships necessary to support an original argument. This dissertation required a close reading of key texts and documents and drew on much original material including recently declassified military documents and archival photographs. A historical overview was taken of the main camouflage strategies and then a more focused examination made of the key scenographic elements.

Similarly, though the use of the terrain model is well known, the dependence of camouflage strategies on the model has never been adequately explained or explored or how the terrain model becomes the stage for rehearsal and re-enactment. An understanding of the mechanism of the terrain models was gained through an analysis of the methodologies of the map, model and games. Mimesis, play, creativity and performativity were essential to the terrain model strategy. The scenographic possibilities of the terrain model were expanded through the application of new technologies and scopic regimes. The stereoscope determined the conditions of perception and created the distancing needed for the strategic interpretation of the landscape. The picture formed from stereoscopic images were constructed within the mind of the viewer through desire and memory for strategic ends. The model makers' ability to project themselves into the battlefield, to engage imaginatively with the target enabled them to create effective topographical illusions and performative experiences. The motive is tactical; the methodology - theatrical. The terrain model was a strategic spectacle used to represent political ideologies, commercial and military interests and utopian visions.

An extraordinary combination of artificial and naturalistic effects were used to create viable and convincing scenographic strategies for the Theatre of War. The camoufleurs in the First and Second World Wars demonstrated inventiveness, persistence, originality and bloody minded determination. Today the artists as camoufleurs show the same commitment and imagination. Artists like camoufleurs are exploiting the transformative power of scenography; the revelatory qualities of light, colour and design to transform bodies, spaces and political agendas. Like military strategists, they construct complex imaginary topographies and to achieve their desired effects, they have consistently embraced mechanical means such as the camera, film and the stereoscope. Artists have adopted theatricality and scenographic procedures as a way of confronting the difficult subjects of war, surveillance and violent destruction. They rehearse through the camera lens and the model, their performances. Playing games, rehearsing operations, they are creating territories which they can control through the overview.
The theatrical practices and the methodologies of the terrain model have been adopted as a means of representing the political and cultural landscape in art, exhibition design and performance as an explanatory and projective experience. For 2011, Pippa Nissen, a British architect and theatre designer has designed a new exhibition 'Once Upon a

Wartime' for the Imperial War Museum, London. She is using models to illustrate the children's war stories: *War Horse, Carrie's War, The Machine Gunners, The Silver Sword; Little Soldier*. The model for *War Horse* is a recreation of WW1 trenches and is based on original documents and archival research. (Fig. 111) The model maker followed the details provided in military construction manual to recreate both German and Allied trenches in a bombed no-man's land. Video imagery of actual World War I battlefields provides the backdrop for the plaster models. It was a deliberate decision to make the models monochrome, so that they would not appear 'doll's housey' and 'the children's imagination could do the rest-making them technicolour'(Pritchard, 2011: 66)

The Dutch theatre ensemble Hotel Modern has also chosen to represent the trench warfare of World War I as a scale model in their performance piece *The Great War*. (Fig. 112) Across this miniature battlefield, actors roam with miniature video cameras recording the detail of miniature tanks and toy soldiers. The war is intended to be seen from the perspective of a soldier. The aspects of children's game playing and performativity are intriguingly persistent elements in recent artistic representations of war. This is reflected in the Michael Elmgreen and Ingar Dragset's proposal which was selected for the Fourth Plinth in Trafalgar Square in London for 2012 the Olympic year. *Powerless Structures* portrays a boy his arm held aloft in a triumphant gesture astride a rocking horse. (Fig. 113) Drawing on the symbolism of traditional war monuments and military equestrian statures, it is intended to celebrate the heroism of growing up and symbolise change and expectation. It seems an unusual choice to have been made by both the artists and selectors. Its toy like kitschness seems a simplistic response to the military engagements that are producing a worldwide death toll that increases daily. However if we see this work in the context of other significant artistic representations we see that the motifs and metaphors of childhood, play, games, models are repeatedly used to address the violence that permeates our imagination. It is a theatrical response however that deals in artifice and illusion and can distance us from the realities of the war on the ground; the ground truth.

It is an approach that stands in contrast to the more scenographic proposal made for the same plinth in 2008 when Jeremy Deller proposed to place the wreckage of a car bomb from Iraq on the plinth. (Fig. 114) *The Spoils of War* as it was then called, was rejected

in a well publicised vote in favour of Yinka Shonibare's *Nelson's Ship in a Bottle*, which used both the model and the magic trick to create another 'more playful' military reference to an event in the distant past. This ironically was at a time when there was huge public anger and protest about the war in Iraq. It seems that war can only be addressed through illusion and artifice. However, the Imperial War Museum who has commissioned war art since the early 20th century, then decided to put Deller's installation of a vehicle destroyed by a fatal truck bomb in Baghdad in 2007 among the display of tanks and missiles in its imposing central hall. There the piece entitled *Baghdad, 5 March 2007* became part of the dramatic scenographic strategy of this institution's Theatre of War. (Fig. 115)

It is my intention to explore further the representation of war by contemporary artists within the context of a project that will develop into an exhibition and publication on the scenography of war. I intend to submit a proposal for an exhibition on 'The Theatre of War' to the Imperial War Museum. This will feature a new project by Mariele Neudecker that she had undertaken in the summer of 2010 at the Nike Missile Site in California when she had an artist's residency at the Headlands Centre for the Arts, San Francisco.

It is the work of artists and writers that provide the most compelling powerful examples to support my proposition that theatrical metaphors and scenographic practices permeate all aspects of the military and cultural landscape of war. They are addressing the myths and narratives of disclosure, secrecy and invisibility and presenting a challenge to the ascendancy of military procedures.

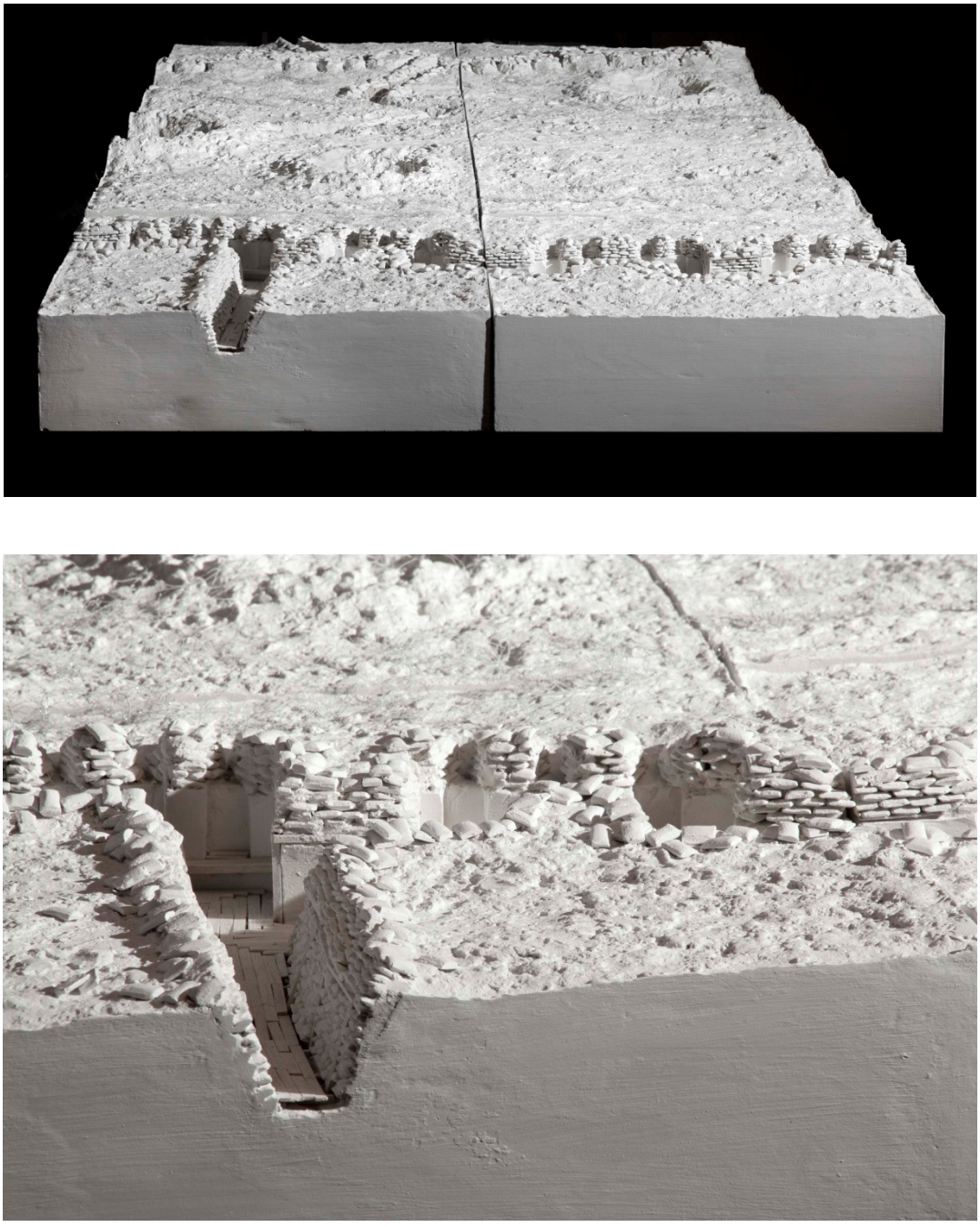
In future research I would also like to examine in greater detail the effects of the camouflage work on theatre design. This is an area yet unexplored and the designers themselves in their published memoirs and interviews did not address this or suggest any significant alterations in the way they worked. It is interesting however that Liam Doona in an essay on the scenographic practices of the American designer and former camoufleur Jo Mielziner writes that in Mielziner's approach to Tennessee Williams's *The Glass Menagerie* in 1945, 'reality as external and quantifiable matter is brought into question as character and scenography encounter and explore mutable perception'(Doona, 2010: 183). Doona goes on to say that 'Mielziner is able to

demonstrate scenography as the expression of a psychological construct which, whilst quoting extant architectural forms, renders those forms mutable and ambiguous. He presents permanence and solidity as temporary and illusionistic, as unstable and changeable' (Doona, 2010: 183) This could equally be a description of the scenic effects of the camoufleurs.

Perhaps less surprisingly many of the scenic technologies developed during the war for the decoys and deceptions were put into commercial applications. For example, Bell Laboratories developed the Harold Burris-Meyer's wire recorders used as decoys in the Second World War These predecessors of the tape recorder revolutionized the commercial sound industry and lead to more advanced reproduction of sound effects in the theatre.

There is still much German material to be uncovered, including information about Oskar Schlemmer's camouflage activities. Although a book has recently been published by Melissa Trimingham *The Theatre of the Bauhaus: The Modern and Postmodern Stage of Oskar Schlemmer* (2010) it did not contain any new information about Schlemmer's camouflage work. Trimingham when interviewed said she believes the material possibly exists in the family archives but this has proven difficult to access. There is also more to be found out about Bel Geddes's contribution as material becomes unclassified. Other areas of research will be on the 'staged' body, the spatiality of the body that is the landscape and the aerial body. This will be published in a planned book on costume.

Figure 111



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Appendix

Biography

GREER ANNE CRAWLEY

BA (Hons) Fine Art, AMA/Diploma of the Museums Association,
Postgraduate Diploma in Landscape Studies

Greer Crawley is Senior Lecturer in Spatial Design and Pathway Leader: Design for Performance and Exhibition Design, Buckinghamshire New University, UK. Visiting lecturer, MA Scenography, Central School of Speech and Drama, London. A practising landscape designer, curator and researcher.
2006 – 2011 Doctorate Programme Scenography at Zurich University of the Arts and the University of Vienna. A member of the Thinking through Performance Research Group, London College of Fashion, University of the Arts, London. Editor for *Blue Pages* the quarterly journal of The Society of British Theatre Designers. Member of exhibition co-ordination committee and editor for *Transformation & Revelation*: UK Design for Performance 2007–2011, The Royal Welsh College of Music & Drama, January/February 2011; the Prague Quadrennial June 2011; and the V&A and Touring exhibition from April 2012.

CONFERENCE PAPERS

2011 ‘Accidental Static’ TaPRA symposium ‘Writing Scenography’ 8 January

2011 ‘Landscaping the Body’ Thinking Through Performance Symposium 7 January

2010 ‘The Art of Staging’, PQ (Prague Quadrennial) Symposium Scenography Expanding 3 ‘On Curators and Curating’ Evora, Portugal September 2010

2010 ‘Choreographed spaces’, International Festival of Scenic Arts, V&A and The Scenographer London Design Festival September 2010

2010 ‘The Ungrounding of the Body’ Thinking Through Performance: Body, Space, Movement, Visuality and Dress London College of Fashion Conference, V&A June 2010

2010 ‘Staging Presence/Transformation’ Narrative Space Conference University of Leicester April

2010 ‘Staging Silence –Hans Op de Beeck’ PQ Symposium Scenography Expanding 2 ‘On Artists/Authors, Belgrade July 2010

2010: ‘Staging the Interior: Theatricality and Scenographic Spaces in the Contemporary Interior’, Victoria and Albert Museum, February 2010

2009: ‘Strategic Scenographies: Constructing Alternative Terrains’ AHRC Living Landscapes Conference, Aberystwyth June 18-21.

2009: ‘Elsewhere’ and ‘Fatal Strategies’-paper presentations; Chair of two session panels; plenary spokesman at Space and Desire Conference, Zurich University of the arts

2008: ‘Constructed Spaces: Imagined Truths’ Monitoring Scenography2: Space and Truth Conference, Zurich University of the Arts. Paper presentation; Session Chair; plenary spokesman

2008: ‘A Roomy Room’: a scenographic reading of the model CETT Theatre Materials conference

2007: Strategic Scenography, constructing alternative terrains TaPRA annual conference

2007: Aerial Scenography -The trajectories of flight in performance. Scenography International Transliteracy Research Conference, Prague Quadrenniale

2007: Co-chair of Physicality and Virtuality session at Monitoring Scenography symposium, University of Art and Design Zurich

2005: Performing Modernism, Theatre Museum/V&A

2005: Pageant and Performance, Heart of England Conference, V&A/BCUC, July 2005

2005: Spectacle Style Lounge Theatre Museum/V&A

2003: Mirrors and Martinis-The Garden as Theatre V&A Art Deco conference and exhibition

PUBLICATIONS

2011 Catalogue essay *Transformation and Revelation* UK Design for Performance 2007-2011

2009: ‘Acting Out-Illusion and Representation in the Wartime Landscape’; ‘Frontiers’− the work of Gerry Judah; Dis(locations)-Katrin Sigurdardottir; Three Essays in *Monitoring Scenography 2 -Space and Truth*, Zurich University of the Arts ZHdK

2008: Photographic essay on Roy Mehta, for *The Hotspur*

2008: ‘Dubailand’ in *Monitoring Scenography1*: Space and Power, Zurich University of the Arts

2007: ‘A landscape of possibilities’ in *Collaborators UK Design for Performance* 2003-7

2006- Editor of Blue Pages, Journal of the Society of British Set Designers

2006: ‘Tea for Two’ Mo-billy designers catalogue, Milan Furniture Fair

2004: Introduction to Mo-billy catalogue, Milan Furniture Fair

PUBLICATIONS IN PREPARATION

'Fatal Strategies in the work of Wafa Hourani' and 'Seduction Chaff in The Air is One Vast Library by Mariele Neudecker': Two essays for Space and Desire Monitoring Scenography 3, Zurich University of the Arts ZHdK (2011)

'Staging Presence/ Transformations' in *Museum Making: Narratives, Architectures, Exhibitions* Suzanne Macleod et al. London: Routledge (2011)

Design for Performance: From Lady Gaga to Gormley (provisional title) co-editor with Kate Bailey, curator V&A Theatre Collections, V&A publication 2012

Performing Costume co-editor with Donatella Barbieri, V&A/LCF Research fellow in costume V&A publication 2013

MEMBERSHIPS OF PROFESSIONAL BODIES

Director of the Society of British Theatre Designers

International Federation for Theatre Research

Member of The Architectural Association

Associate of The Museums Association

Association of Courses in Theatre Design

Member of the Art and Cartography Group, International Cartographic Association

Member of The British Cartographic Society

Abstract

STRATEGIC SCENOGRAPHY – Staging the Landscape of War

This dissertation is concerned with the construction of ‘theatres of war’ in the target landscapes of 20th century military conflict in Europe and America. In this study of the scenography of war, I examine the notion of the staged landscape and the adoption of theatrical language and methodologies by the military. This is a multi-disciplinary perspective informed by a wide range of literature concerning perception, the aerial view, camouflage and the terrain model. It draws on much original material including declassified military documents and archival photographs. The emphasis is on the visualisation of landscape and the scenographic strategies used to create, visualise and rehearse narratives of disguise and exposure. Landscape representation was constructed through the study of aerial photographs and imaginative projection. The perceptual shifts in scale and stereoscopic effects created new optical and spatial ‘truths’. Central to this analysis is the place of the model as strategic spectacle, as stage for rehearsal and re-enactment through performance and play. This research forms the context for an exploration of the extension and translation of similar scenographic strategies in contemporary visual art practice. Five case studies demonstrate how the artist as scenographer is representing the political and cultural landscape.

STRATEGISCHE SZENOGRAFIE − Die Inszenierung der Landschaft des Krieges

Diese Dissertation befasst sich mit der Konstruktion von „Kriegsschauplätzen/Bühnen des Krieges“ in den Ziel-Landschaften europäischer und amerikanischer militärischer Konflikte im 20. Jahrhundert. In dieser Studie der Szenografie des Krieges untersuche ich den Begriff der inszenierten Landschaft und die Adaption theatralischer Bildsprachen und Methodologien durch das Militär. Diese multidisziplinäre Betrachtung verwendet ein breites Spektrum an Literatur zu den Themen Wahrnehmung, Perspektive, Camouflage, Gelände und Modell. Die Studie schöpft aus historischen Quellen inklusive jüngst freigegebenen militärischen Dokumenten des 2. Weltkrieges sowie fotografischem Archivmaterial aus Europa und den US. Der Fokus liegt auf der Visualisierung von Landschaft und szenografischen Strategien zur Konstruktion, Visualisierung und Erprobung von Narrativen der Tarnung und Enthüllung. Die

Repräsentation von Landschaft wurde durch die Interpretation von Luftaufnahmen und imaginativer Vorstellung konstruiert. Der perspektivische Wechsel in Massstab und stereoskopische Effekten brachte neue optische und räumliche «Wahrheiten» hervor. Zentral in dieser Analyse ist das Modell als strategisches Spektakel, als Probebühne und Werkzeug taktischer Analyse. Die Untersuchung stellt den Kontext für eine Betrachtung von szenografischer Strategien in zeitgenössischer künstlerischer Praxis. Fünf Fallbeispiele zeigen, wie KünstlerInnen als SzenografInnen politische und kulturelle Landschaften repräsentieren.