# The development and use of the zoom lens in American film and television: 1946-1974

**Submitted by Nick Hall to the University of Exeter as a thesis**

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

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# Abstract

This dissertation documents two aspects of the development and use of zoom lenses in American film and television from 1946 to 1974. It contributes a detailed account of the impact of Zoomar lenses on early postwar American television, and of the later role of 'TV Generation' creative figures who started their careers in television before becoming feature directors.

Chapter 1 introduces the study and defines key terms used throughout. Chapter 2 includes a comprehensive literature review of existing critical and historical approaches to the zoom lens. Chapter 3 outlines methodologies for source selection and analysis. Chapter 4 accounts for the development and technological heritage of the Zoomar lens. Inventive efforts and methods used by its primary inventor, Frank Back, are discussed. Chapter 5 outlines the means by which Back and his business partners marketed the lens. In Chapter 6, the extent to which the lens was used in the American television industry between 1946 and 1956 is demonstrated.

Chapter 7 discusses the American market entry of the Pan Cinor zoom lens, and attempts by Zoomar to use patent law to block it. Chapter 8 discusses the way in which zoom lenses were used in television during the later 1950s and early 1960s, with a particular focus on some of the 'TV Generation' directors. Chapter 9 discusses developments in zoom lens technology and in industrial attitudes towards the use of such technology. Chapter 10 discusses the use of the zoom by TV Generation directors in their later feature film work.

The final chapter compares discussions of Robert Altman's use of the zoom in the early 1970s with the problematizing example of contemporaneous television style. Significant findings are summarized, and areas for future investigation suggested. Specifically, the dissertation demonstrates that early postwar American television is a rich untapped area for future investigations of the roots of film technology, and that from 1946 to 1974 zoom lens development was more gradual, incremental and complex than previously suggested.

# Acknowledgements

I am deeply grateful to:

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# List of Illustrations

Note: Digital frame enlargements have been obtained using the 'snapshot' feature of VLC Media Player. The frames were saved in JPEG or PNG format and resized in Microsoft Word. Their purpose is purely illustrative.

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# 1. Introduction

There has been no detailed account of the development of the zoom lens in American

film and television. Although the majority of general textbooks on film history and film

studies make at least some mention of the history and use of the zoom lens, these are

usually limited to passing observations in chapters that predominantly deal with other

topics. These accounts reflect a critical consensus that emerged in film studies during

the 1970s and 1980s, and that has not been significantly revised since then. The reliance

of general textbooks on the approach taken by these early scholarly works has led to a

particularly restricted view of the zoom lens. This resulted largely from the adoption of

a methodological framework which arranges arguments around a 'use and abuse'

dichotomy, pitting restrained and motivated uses of the zoom shot against stylish,

manneristic, and excessive 'abuses'. This point of view has been heavily influenced by

the industrial discourses of the 1960s and 1970s – including advertisements for zoom

technologies and interviews with directors and cinematographers. This study partially

reconstructs the history of the zoom lens in American film and television between 1946

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and 1974. It focuses on the development of the Zoomar television zoom lens, the role of the 'TV Generation' directors of the 1950s and 1960s, and the role of industrial personnel in shaping and influencing ways of using the technology.

Few documents better illustrate confusion about the development and use of the zoom lens in film and television than an article published in *Daily Variety* in March 1990. Written by the film historian Joseph McBride, it recounts a disagreement between the Academy of Motion Picture Arts and Sciences and the daughter of the cinematographer Joseph B. Walker. The Academy had announced its intention to give an award to the French lens designer Pierre Angénieux for "[designing] the first practical zoom lens". Marjorie Walker, on learning of the citation's wording, protested that "her father's much earlier work on the zoom was being slighted". As a result, just prior to the broadcast of the ceremony the Academy deleted the word 'first' from Isabelle Huppert's announcement of the award. However, they stood by their original claim on the basis that earlier lenses had been 'impractical'. ("Sawyer Award Kicks…" 6).

McBride's article attempted to unpick the mess. Who had invented the first zoom lens depended on which historian or industry veteran he consulted. Perhaps a practical zoom lens had been invented before Walker's; perhaps, as Marjorie Walker argued, her father's was the first; perhaps zoom lenses were of little use until other technologies, such as reflex viewfinders, had been perfected (a suggestion made by Ed DiGiulio, president of a company well-known for adding such devices to cameras). And what about medium? Should television innovations be considered on the same level as cinema innovations? Furthermore, DiGiulio asked, how should 'practicality' be defined if practicality was the operative word in the Angénieux award citation? (22)

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These issues of novelty, practicality, medium-specificity, industrial recognition, practice and preference, are negotiated throughout the following study. In the context of television, zoom technologies have been historicised as a novelty device which enabled frivolous spectacle or were used when all other technologies would be inadequate. Erik Barnouw accounts for the zoom lens in early American television as follows:

> That summer [1947] the Zoomar lens got into action in a CBS telecast of a baseball game between the Brooklyn Dodgers and the Cincinnati Reds. Its ability to leap from a full-field long shot to a close-up of the pitcher working his wad of chewing tobacco caused a stir. (*Tube Of Plenty* 102)

In scholarship specifically addressing the zoom, the development of the zoom in television has merely been gestured towards. John Belton, for example, supplies a brief account which progresses rapidly from the zoom's introduction in the 1940s to its continuing use in American television in the 1970s ("The Bionic Eye" 24-5). Belton describes the zoom lens as:

> Ideal for live coverage of sports and news events because they could be filmed [...] without interruption for changing to other lenses, the zoom became associated with live television and continues to be used today in sports films [...] and simulated TV interviews in features. It remains a staple of television features like *Marcus Welby, MD*. (25)

The relationship between television style in the 1950s and developments in film style in the 1960s is described in a similarly perfunctory manner:

> The zoom, in the Fifties, was more of a box office liability than a draw because it reminded audiences of television (baseball, news, and commercials). The rise of the use of the zoom can be linked to the influx of TV directors into Hollywood. Robert Altman, Blake Edwards, John Frankenheimer, Andrew McLaglen, Robert Mulligan, and Sydney Pollack – to name only a few – brought the zoom with them from New

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York to Hollywood. Soon, even James Wong Howe, in *Outrage* (1964) reconciled himself to the zoom. (25)

Ideally it would be possible to refer to more recent scholarship, in which the interaction between television style and film style might be treated as a highly nuanced transaction involving creators and audiences. The significance of the zoom lens has been emphasised in a few, relatively obscure accounts, such as Dicky Howett's (58). Overall, however, scholarship on the zoom has progressed little since the first steps taken by critics and historians in the 1970s and 1980s. Although textbooks and occasional articles in scholarly journals and quasi-scholarly magazines have touched upon the topic, there has been no systematic historical account of the zoom. Scholars have discussed and tested theoretical approaches to the meaning of the zoom, but these have been poorer for the lack of underlying historical evidence. With more recent critical and historical techniques, and in conjunction with a substantial increase in the availability of source texts, it is possible to re-examine the technological and aesthetic circumstances surrounding the zoom's development in television and its subsequent interaction with film style. Belton's condensed account might then be expanded, and some of his assertions questioned. For example, can evidence be found to support the claim that audiences reacted badly to the zoom? To what extent were the 'TV directors' homogeneous in their use of the device? And what happened *after* James Wong Howe 'reconciled himself to the zoom' in 1964?

Before addressing these questions, this chapter provides a basic technical definition of the zoom lens and discusses some of the challenges posed when distinguishing between zoom lens technology and the zoom shot technique. This establishes the context for discussions about the invention, innovation and diffusion of zoom lenses, and is followed by a literature review which considers approaches to the

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zoom found in general film history textbooks. Early critical approaches are examined and the limitations of the technologically deterministic 'use and abuse' framework established in the 1970s and 1980s are discussed. The literature review concludes with a consideration of approaches to the zoom in more recent scholarship on the psychology, phenomenology and philosophy of film texts. The introduction concludes with a consideration of research methodologies and addresses questions of historiography. Methodologies for tracing the history of technology are assessed, and some of the limitations posed by the availability of sources are considered. Finally, the approach taken for the analysis of film and television texts is briefly considered.

## Technological Definitions

To begin, it is necessary to define the term zoom lens, starting with the less specific term, *lens*. In the context of photography, a lens is a device designed to focus rays of light on a strip of film, scanning tube, or digital sensor. The lens will consist of one or more elements of a light-transmissive material – commonly glass or polymer – arranged along an axis. One or both sides of each element may be either concave or convex, to refract light rays in a manner beneficial to the capacity of the lens to focus light on the capturing surface. A single such element can constitute a simple lens, but higher quality lenses are obtained by combining numerous elements, each designed to refract light in harmony with the others, as determined by complex calculations.

If a lens is composed of elements that are generally fixed in position along its axis, then it will have a fixed focal length. Focal length, expressed in millimetres,[1] determines field of view. If the image is being projected onto the same recording medium – for example 35mm film – a lens with a focal length of 25mm will capture

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[1] And in inches, until the late 1960s.

more of the scene in front of it then a lens of similar construction with a longer focal length of, for example, 75mm. Such a lens may be slightly adjustable to account for the proximity of the objects being filmed, but such an adjustment of focus will change the focal length fractionally, if at all. Lenses with shorter focal lengths are said to be 'wider' than those with longer lengths, which are said simply to be 'longer'.

The current study is primarily concerned with the development, use, and effects of variable focal length lenses: "in which the focal length can be continuously varied by moving one of more of the lens elements along the axis" (Kingslake, *A History Of...* 153). These are commonly referred to as zoom lenses, and will generally be referred to as such in this study. Though the term 'zoom lens' has been in wide usage for many decades, its exact meaning is somewhat contentious, rendering it rather imprecise. Significantly, the zoom lens is not an invention belonging exclusively to the cinema: as discussed in chapter 4, the ability to vary the focal length of a lens existed long before motion pictures. Furthermore, even when considering variable focal length lenses developed for use in the cinema, historians have placed constraints on the use of the term. Rudolf Kingslake, for example, maintains that a 'true' zoom lens is one that holds focus as its focal length is adjusted (133-4). It is true that such a function would be very useful to a filmmaker, but even without this focus-holding capacity, it would still be possible to make a zoom shot. Therefore, while such precision might be helpful for the historian studying the physical properties of lenses or technical aspects of their manufacture, it is not necessarily helpful to be so specific when analysing film texts. In this study, 'zoom lens' is used in its broadest sense, encompassing all lenses with a continuously variable focal length.

Not only was a form of zoom lens developed before cinema, but cinema and pre-cinematic moving image entertainment appears to have developed a form of zoom shot

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long before the cinematic use of the zoom lens. Early forms of zoom shot have been

noted in lantern shows as early as 1790 (Webster 65). In the context of the cinema

proper, David Bordwell notes that "it seems that before the zoom lens came into wide

use, the word 'zoom' was used for a fast tracking shot forward" (Bordwell *On The*

*History…* 313). It is evident, then, that zoom lenses existed in the earliest days of

cinema. However, they were not necessarily called zoom lenses, and not always used

for filmmaking. Subsequently, zoom shots *could* be seen in films, but they may not have

been made using a variable focal length lens. And there are still further complications.

While a zoom lens can be used to create a 'zoom shot' wherein the subject appears to

become progressively larger or smaller, such a lens can equally be adjusted to whatever

focal length is desired and used as if it were a fixed focal length (or 'prime') lens. It is

often impossible to tell, from footage alone, whether or not a zoom lens has been used

in this way. Conversely, since the early days of cinema it has been possible to add a

zoom-in or zoom-out by means of post-production image processing. Such an effect

was historically made using an optical printer (and more recently through computer-

generated imagery), and is often described as an *optical zoom*.[2] Such shots can often be

distinguished from a zoom shot made at the time of filming because, when zooming in

on developed film, an increase in the visibility of 'film grain' may be noticeable (Salt

"Film Style and Technology" 48). Yet whether or not a viewer notices an increase in

grain, the overwhelming visual impression will still be of an image that appears to be

expanding or contracting, becoming closer or further away. Despite the technological

distinction, an optical zoom is still a form of zoom shot. However, because such a zoom

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[2] An unhelpful term – such a zoom is no more or less optically-produced than with a zoom lens. In this study such zooms are described as having been *added in post-production*. This can also encompass zooms effected through CGI.

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is a form of special effect added to film after it has been shot, such zooms are not discussed in detail in this study.

The zoom, then, can be thought of in terms of technology (the lens itself) and aesthetics (the zoom shot). But a third level of understanding is also needed, because the zoom is also a concept. At its most basic, it is the concept of the (often rapid) movement towards or away from an object. At its most involved, 'zoom' can be a complex metaphor for the endlessly variable terms of reference of the human mind and experience. A zoom can make close inspections from a distance, or can make objects appear to be close before showing their actual distance. As the image draws closer or recedes further, whatever deception may have been practiced is revealed. The zoom may simulate or stimulate the brain's ability to concentrate selectively on subsets of available stimuli, paradoxically performing this mimicry of perception through a visual form that operates in a way that the eyes cannot. Perhaps it is because of this complexity of potential meaning that the concept of the zoom has not been confined to the study and criticism of the cinema. A number of literary scholars discuss the manner in which poets and authors can be seen to 'zoom in and out' of their subject matter (Price; Tingey; Mohler). Some neuropsychologists have referred to a 'zoom lens model' of cognition (Eriksen and St James), and when, in 2010, astronomers from the European Space Agency wished to provide an accessible way of referring to the gravitational lensing effect of black holes, they chose to describe the phenomenon as a "natural zoom lens" ("Hubble Looks Through…"). In film studies, too, the zoom has been used as an analogy for non-optical modes of perception: Jay Beck, for example, refers to the "construction of an 'audio-zoom' that increases the sounds in volume to match the changing shot scale" (159) in *The Conversation* (Francis Ford-Coppola, 1974).

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**Terminology**

A few notes on technical terms. In this study, the terms 'zoom shot', 'zoom in' and 'zoom out' are used exclusively to denote shots that have been made by altering the focal length of a lens whilst the camera runs. Neither term is in any way interchangeable with any of the terms that denote physical movement of the camera (such as the tracking or dolly shot). The term 'zooming' is used to denote a camera in the process of making a zoom-in or zoom-out. If shots described here as a 'zoom in/out' are found on closer inspection to have been made otherwise, then the application of the term reflects a misperception or misunderstanding on the part of the author or cited source, and not an attempt to stretch the term.

The visual appearance of a zoom shot is partially determined by two modifying factors: the change in focal length relative to the starting focal length, and the speed at which that change occurs. The former quality can be described in terms of *ratio*: so a high-ratio zoom shot is one that moves relatively further from the original focal length than a low-ratio zoom shot. For example, a movement of 17-85mm (1:5) would be a lower ratio zoom shot than one from 12-120mm (1:10) – but note that a transition from, for example, 120-320mm (1:2.6) would be the lowest ratio of all, despite travelling the 'furthest' in terms of absolute focal length. The *speed* of a zoom shot is referred to in terms of fast/slow, faster/slower: these terms relating to how relatively quickly or slowly the transition is made between the starting and finishing focal lengths. 'Fast' and 'slow' are also used to refer to the extent to which lenses transmit light, fast lenses transmitting less than slow lenses. This is a relevant factor in accounts of zoom lens development and marketing. The use of 'fast' and 'slow' in this sense should be clear from the context.

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As discussed below, accounts of the zoom have for many years been laden with subjective language which has reflected the prejudices and preferences of critics and industrial personnel. The melodious cliché 'use and abuse' appears frequently in journalistic and academic writing, and the zoom has often been characterised – with implicit disapproval – as a 'special effect'. Conversely, directors who made more limited or subtle use of the zoom have often been praised for their 'restraint', suggesting judgement and professional intent not always in evidence. It is not the task of this study to make subjective judgements about the quality of the zoom shot in any of its applications: the aim is to observe, account for, and compare such appearances. 'Abuse' is not an antonym of 'use', and as a purely subjective term it has no place here. Similarly, instead of 'restrained', this study refers to more or less 'limited' uses of the zoom lens.

The aim of this study is to account for the development of television zoom lenses and their effects on film style, and thereby to advance existing critical accounts of such developments. With the key terms for analysis fixed, the next chapter thoroughly reviews the existing critical literature on the zoom shot, and introduce some of the methodological considerations that underpin this study.

## 2. Literature Review

Scarcely any critical literature was published on the zoom shot prior to 1970, though there are numerous discussions of the topic in the trade press, the earliest of which dates to the 1930s. This chapter is concerned with academic criticism since the 1970s, while earlier, industrial accounts are discussed in chapter four. Significant gaps are revealed by this survey – the present study aims to fill some of them. This literature review accounts first for the groundwork laid during the 1970s and early 1980s. It then addresses the positions held by the editors of textbooks and academic surveys of film history and criticism. Finally, more recent phenomenological and philosophical approaches are addressed. The literature review demonstrates that a re-examination of the texts and industrial contexts around the use of the zoom lens is necessary in order to produce an effective and open-ended approach to the history of the zoom.

### 'Use and Abuse'

The groundwork for a great many later textbook accounts can be traced to two articles written at the beginning of the 1970s – one by Paul Joannides and one by Stuart

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Kaminsky. Joannides expresses key characteristics of the zoom lens taken as axiomatic by many early critics: that the zoom is unique amongst camera 'movements'; it denies perspective, and it 'flattens' the photographed object. In common with a number of other critics (Belton "Bionic Eye" 21), he conflates the effects of the zoom and telephoto lens:

> The latter could be called a 'frozen' zoom, and a stopped-out zoom is often used instead of separate telephoto lens. They are, in essence, the mobile and static halves of the same process, and the aesthetic problems which arise from their use merge naturally into each other. (40) [3]

However, Joannides acknowledges that "despite their basic affinity, zoom and telephoto lenses tend to be used differently" (40). Aside from the fact that one is dynamic and the other static, the zoom:

> has an emphatic quality, demonstrating points in a context rather than combining those points in a new whole; it is less often used to create a new composition, that being more easily achieved by a cut to a different set-up. (40)

Furthermore:

> The zoom is distinctive in that it is the only form of 'camera' movement […] which is internal to the camera rather than external. All other movements approximate, apart from framing, to what a man would see were he placed in the same position as the camera. The zoom operates in a different dimension from the rest of the camera's repertoire. It can never, or almost never, be mistaken for a track: even a short zoom is

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[3] This is a contentious statement. As a correspondent remarked in a subsequent edition of *Sight & Sound*: "the above 'transformations' of the visual world are very *different* from each other. The only similarity is that a zoom lens set at a focal length identical to any particular telelens makes the same picture as the telelens […] A telelens cannot therefore be called a 'frozen' zoom as such, as this might just as well apply to a wide-angle lens. They are thus not 'the mobile and static halves of the same process'" (Falchenberg 112). Joannides responded that he had been misunderstood and "intended to emphasise […] that both deny the third dimension" ("Zoom Lens…" 171).

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physically different. Unlike a tracking shot a zoom represents a denial of perspective. The effect is not one of moving *through* space, but of space warping towards or away from the camera. It annihilates the third dimension which all other camera movements respect, and it flattens the photographed object. (41)

Joannides sees the zoom as a "dangerous tool" which "jars the audience and unless it is very necessary, as in a long distance shot, it usually looks out of place in a filmed context" (41). Giving the example of a fast zoom designed to frighten horror audiences, Joannides argues that the zoom is "essentially false because the eye cannot zoom, whereas a cut to a different angle or a fast track […] can approximate more truthfully to the frightened person's perception" (41). In addition to its 'falseness', Joannides also claims that the zoom shot is an intrinsically self-conscious device:

> Zoom and telephoto shots call attention to themselves by their very nature. They are arbitrary insertions in the conventions of 'normal' cinema, and more importantly, 'normal' vision. The fact that they are often used lazily as substitution devices, and that they can have a very genuine use and expressive purpose within the conventions of 'normal' cinema, has tended to blind audiences to their real significance: that they can eliminate the third dimension […] Ultimately they are not a device, they are a style. (41)

Nevertheless, Joannides sees some potential for the zoom, along with the telephoto lens, to open new possibilities in filmmaking, in which "the camera will play a more passive role dramatically, but a more potent one visually" (42). However, this applies only to certain sorts of film:

> In a film whose visual premises are different from those of the three-dimensional world as we see it, directorial freedom will be much greater. This offers marvellous opportunities for symbolic montage *á la* Eisenstein – sequences of images based on formal or intellectual

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progression – not on an esoteric or solipsistic basis as in so many underground films but as a logical consequence of the inherent possibilities of the medium. (42)

Because the zoom is one of a number of techniques which Joannides argues can "[allow] a freer flow of life through the frame", he concludes that:

Ultimately there is no need for alarm about the new possibilities of expression created by zoom and telephoto shooting. […] There is little danger of film ceasing to be a popular art form through any move towards absolute abstraction. That is rather the realm of the colour-box and the light-show. (42)

Joannides' critique proved influential, and has been cited in numerous subsequent discussions of the zoom. In one of the first such responses, Kaminsky develops a somewhat more nuanced critical approach to the zoom. He imagines an alternative history of cinema in which tracking was impossible, and the zoom shot was the only way to 'move' the camera:

Cinematic grammar would then accept the zoom as the proper medium for tracking. If at that point someone then discovered the possibility of tracking, it would clearly be opposed on the grounds that the track was being used as an elaborate substitute for the more simple and natural device of the zoom. Even the flattening of the image caused by the zoom would almost certainly be accepted in such a situation as part of the cinematic vocabulary. After all, the flattening of the image at the extreme of a zoom is no less inherently jarring than the cut from a medium shot of a couple talking to a close-up of the two people about to scream. (20)

Kaminsky draws a parallel between the use of the zoom and the use of informal words and phrases in English speech and writing, arguing that:

the repeated use of the zoom to 'track' will become aesthetically acceptable if it continues to be used – just as new words, phrases, and

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> grammatical constructions become accepted through usage though they
>
> are initially considered vulgar. (20) [4]

However:

> The problem of the zoom lens is not *whether* it should be used, but *when*
>
> it should be used. The use of swear words to occasionally emphasize an
>
> idea can be very effective. The constant use of swear words to substitute
>
> for most adjectives and adverbs (and often nouns) ceases to have any
>
> effect and finally fails to communicate. Words must retain their meaning
>
> and context to communicate by their use. This is true, too, of the zoom
>
> lens. (21)

This confusion is representative of both Joannides and Kaminsky's difficulties in

containing the zoom within their understanding of filmmaking. Kaminsky maintains

that the zoom is little used and disapproved-of merely because of its unfamiliarity, yet

when placing it within the established grammar of filmmaking, he chooses to compare it

with profanity, which would suggest entirely different reasons behind its unpopularity.

Kaminsky pledges support for directors whose films stand as exceptions to general

rules, but he seems to disapprove of the essential creative impulse that would allow such

creative independence to flourish. He maintains that the zoom is popular because:

> it allows the camera operator to insert his personality on that which he is
>
> shooting. Personality is probably too affirmative a word; 'presence' is
>
> more in keeping with the impetus. (21)

Kaminsky's ultimate solution to the problem of the zoom is to contain its use within

certain categories, its appropriateness deriving in part from what is familiar: "the way in

which the zoom is used in the non-fiction film, primarily in news photography and

cinema verite" (21). Thus:

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[4] Dick draws a similar parallel, between the zoom and "italics [misused] by inexperienced writers" (51);
see below at page 30.

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the zoom can be used to duplicate an atmosphere of verite and to move into a close up to avoid the loss of immediacy of performance and expression […] to search out figures in a broad space […] for sudden dramatic emphasis […] to express a psychological reaction through the eyes of a character […] excellent for moving into freeze frames […] for special effects […] to replace other lenses. (22-3)

Kaminsky is cautious to hedge his argument, concluding: "there are many other ways to use the zoom lens. These happen to be the ones I have considered and which indicate certain problems and esthetic [*sic*] solutions" (23). But this catalogue of potential uses for the zoom lens is useful, not least because it offers a ready-made language in which to describe how zooms are used in the sample of television and film texts discussed below. Clearly there is no reason to define from first principles the circumstances under which a zoom might be useful, or how its uses might be described.

Joannides and Kaminsky were not the only critics making efforts to explain the meaning and history of the zoom shot during the early 1970s. Donald Skoller discusses the zoom in the context of "aspects of cinematic consciousness" (41). Skoller's analysis differs significantly from Joannides' and Kaminsky's in its emphasis on an experimental approach to the study of film reception. Skoller describes an experiment in which a 16mm camera, fitted with a zoom lens, was used to film a bowl of soup. The footage began with a close-up of the soup, then slowly zoomed out to show the soup bubbling within the pan, then zoomed further out to show a man stirring the soup: in other words, from extreme close up, to close up, to medium shot. Skoller showed the footage to a test audience and observed their reaction. He notes that:

When the zoom [out] begins to reveal the sides of the pot, there is a radical change in the kind of consciousness filling the screening room. The slight lightening of mood becomes almost gaiety, and there is usually chuckling and 'the shock of recognition' more along the lines of

the viewer having experienced a quick cut that has juxtaposed two

disparate images that set each other off in some unique way. But there

hasn't been a cut at all and the viewer knows this and it tones his

response. (46)

In contrast to this quotidian example, Skoller uses *Wavelength* (Michael Snow, 1968) –

one of the most discussed and most 'artistic' of films to use a prominent zoom shot – to

unpick the workings of the zoom.[5] He finds that:

> As the zoom lens increases its focal length and compresses and flattens
>
> the field as viewed on the screen […] a 'dramatically' different realm is
>
> entered. It is filled with ironies accessible only through *visceral*
>
> *discernment*. As the zoom slowly progresses, it reduces the degree of
>
> illusionistic depth of field presented to the viewer. […] There is a
>
> liberation of illusioned energy, a release from willing suspension of
>
> perceptual disbelief occurring to the viewer's consciousness as depth-
>
> illusion itself is reduced. (51)

Skoller, then, finds two clearly distinct uses for zooms: to play with an audience's

expectations for a short-term narrative advantage, and to effect a more fundamental and

long-lasting change in their artistic interpretation. Like Joannides and Kaminsky,

Skoller argues that the zoom has interesting effects at either end of this spectrum. But

he avoids the 'use and abuse' dynamic seen in those earliest critical accounts of the

zoom – a problematic frame of reference in which to discuss the zoom, which relies in

part upon judgements of artistic quality or value, implicitly limiting discussion to texts

in which artistry is the more important factor. This approach also holds the zoom shot to

a standard not generally applied to other techniques of representation and narration: it is

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[5] *Wavelength* is returned to repeatedly by film theorists whose task is to discuss the zoom lens. This may

simply be because the film consists of one long zoom shot. What is surprising is that there also exist

discussions of *Wavelength* that make no mention of the film's zoom. Noel Burch, for example, refers only

to "the advance of the camera" (258) complicating yet again the common declaration that the zoom is

instantly distinguishable, and therefore different, from the track. See also Wees, discussed at page 44.

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far rarer to see more commonplace camera movements, such as panning, tilting, and tracking, discussed in terms of 'use' and 'abuse', and more common for a spectrum of skill, quality, or inspiration to be invoked. The result is that the critical approach to the zoom shot has been technologically deterministic: a certain critical frame of reference has been applied only because a certain technology has been used to produce the text.

In an essay offering an 'historical overview' of cinema and technology, Peter Wollen sheds some light on the critical thought processes behind the use/abuse concept. Wollen criticises avant-garde cinema for its "mis-use of existing technology", identifying among other examples "the hyperbolic use of the zoom lens (as in *Wavelength*)" and concluding that:

> In all these areas, I think, there is an ambivalence between contravening legitimate codes and practices (a negative act) and exploring possibilities deliberately overlooked within the industry, or tightly contextualised (in contrast, a positive act). (20)

Without overstating the influence or significance of Wollen's brief essay, it is worth considering how representative this statement is of the priorities that lie beneath much of the scholarship summarised here. Encapsulated in Wollen's pronouncement is a strong sense of the film critic and historian as cultural arbiter, positioned not as one who makes sense of a text by describing its history, effects, and interactions, but as one who sorts cultural products and artistic techniques into negative/positive, use/abuse, hyperbole/self-effacement. Rhetorical strategies such as Wollen's appear many times in relation to the zoom lens. The zoom is frequently considered along with other, supposedly cognate, devices. Bernard F. Dick considers 'zooms and freezes' together on the basis that the freeze-frame is the 'opposite' of the zoom. Dick adopts the metaphor of a balance sheet. On the credit side:

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there are occasions when a zoom is useful: to single someone out in a crowd […] On the debit side, zooming flattens the image and creates an unreal sense of depth […] The zoom and the freeze are similar in that they can call attention to details more dramatically than other devices. Because of their strong underscoring power, they are as easily misused as italics are by inexperienced writers. (51)

The use/abuse framework reveals not only a certain critical arrogance, but also a sense that critics feel personally offended by the effect that the zooming technique has upon them. In 1970s and 1980s film criticism, negative attitudes towards the zoom often take the form of an objection against the way in which the device seems to enable filmmakers to do that which is contrary to the desires of the audience. Describing camera movements, Robert Edmonds argues that:

changes in camera position can be comfortable or uncomfortable. If the change is from a position far from the subject to one that is closer, we must also move to a different angle as well. If this did not happen, if we were to see one shot of a person followed by another shot of the same person, seen from the same axis but much closer, we would feel that someone had grasped us by the back of the neck and pushed us into the person. […] Such movements can be somewhat smoothly accomplished if we dolly in or dolly out, or if we zoom in or zoom out. The dollying movement is more tolerable because it occurs more slowly, most of the time, than the zoom. At the usual speed of zooms, we get the feeling of insistence, that we *must* move in or out, instead of being *drawn* in or out because of interest. (17-8)

The zoom inhabits a privileged position in the sort of critical language that ascribes physical reactions and sensations to psychological perception. Zooms can be 'jarring' (Kaminsky 20), or – according to a 1964 advertisement – 'neck-snapping' (General Camera Corporation). The zoom's link to synaesthesia, elucidated by Jennifer M. Barker and discussed below, is also part of this equation. Edmonds, above, goes one

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step further to suggest that cinema can diminish viewers' agency, somehow reducing

their ability to consent to filmic experience. The zoom, at a certain speed, is seen as

insisting upon creating a relationship between audience and film that seems more

'physical' than other techniques. Consequently, because much early (and some

contemporary) critical writing on the cinema describes a personal relationship between

filmmaker/director and individual audience member, the abuse of the zoom lens

manifests itself as a breach of social convention. It moves in a few rhetorical steps from

being a technique that falls foul of an individual critic's personal preference, and

becomes a social error as grave as the invasion of personal space.

There are positive and constructive elements of all of the above accounts of

zoom lens development and use, and it is not necessary to abandon all existing

approaches. However, it is clear that the critical context in which the zoom has been

considered is not conducive to a constructive and open-ended reflection upon the

zoom's potential to make meaning. Rather too often, narrow definitions of cinema

exclude both art and artistic endeavour from considerations as to why and how a zoom

shot might be used to achieve a certain affect. Audiences on whose behalf critics claim

to speak are defined in similarly narrow terms – as invisible, imaginary, abstract, averse

to sudden physical movements and intellectually unprepared to engage with artistic

experiment in mainstream cinema. Siegel, discussing conceptions of spatial

representation in the cinema, describes an analogous and closely related critical

problem:

> Since the 1960s a considerable body of literature has focused on film as
> an art form and as a component of popular culture. Unfortunately, the
> discourses that have circumscribed this anatomization of the cinema have
> tended more toward analysis of filmic reality as a 'fetishized abstract
> space' as opposed to cinema as a social space with accompanying

strategic and ideological implications. It is not the intensity or depth of these theoretical categories that is at issue here nor even the precision of a particular perspective, but rather an insularity that has dulled their critical edge. As a result, these discourses have proved to be inadequate tools for working in a media environment that is multi-dimensional and in which codes and signs of communication constantly overlap, intersect, and mutate as they pass through urbanized global nodes of cultural and commercial activity. (142)

Approaches to the physical spatial environment in which the cinema lives and on which it relies for source material are germane to questions of the zoom lens – especially if it is conceived as a technology with an unusually strong tendency to interact quasi-physically with audience members. Questions of space – who controls it, who is aware of it – are central. In a footnote, Allan Siegel elaborates his quotation from Lefebvre, for whom "'fetishized abstract space' implies 'users' who cannot recognize themselves within it, and a thought which cannot conceive of adopting a critical stance toward it" (157). These 'users' are rather like the voiceless, spoken-on-behalf-of, audiences referred to by some of the film theorists whose work is referenced above.

Finally, because the use/abuse framework implies a personal contract between film-maker and film-viewer, such an approach tends to magnify the role of the director in the creative production of film texts. Much of what has been written on the zoom lens derives from auteurist critical accounts written by those who have noticed that certain directors seem to have a special preference for the zoom. But this approach has also inhibited some accounts of the zoom. Amid an account of various prominent uses of the zoom lens in the 1960s and 1970s, David A. Cook (1990) offers the following explanation of why, regardless of technological developments, the zoom technique *could not* have been adopted sooner:

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> It has […] been suggested that [D. W.] Griffith would not have developed the syntax of narrative editing if zoom lenses had been available to him when he made his pioneering masterworks. This seems unlikely, since editing of some sort will always be an essential component of cinematic expression and since Griffith was too innovative a genius not to have recognized the fact; but in principle, at least, the suggestion is a valid one. (645) [6]

Cook has powerful arguments to make about the potential of the zoom as an expressive tool, and he credits the zoom with "[making] possible the new cinema of subjective involvement and psychological effect – a cinema of *mise-en-scène*, whose surface is often as abstractly expressionistic as it is realistic" (646). But his comment about Griffith undermines this by overlooking the complex technological, industrial, and legal contexts that surround the development of the zoom. The only purpose served by this counter-factuality, especially when it is performed without regard to any historical factor other than the talent of Griffith, is to elevate the role of the director at the expense of all other factors.

This study demonstrates that such critical attitudes were developed by film critics out of the well-embedded attitudes of film and television production personnel. As the historical account below demonstrates, personnel went to great lengths to emphasise the artistic quality of their works. The use/abuse dichotomy can be found in *American Cinematographer*, and other trade periodicals, throughout the 1960s and 1970s. Yet whereas film critics have sought to establish distinctions between artistic and mainstream, the trade personnel whose perspectives they developed had been seeking to unite art and commerce. In the process, they sought to frame the zoom shot within their own film-making philosophy. In some cases, they appear simply to find excuses for the

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[6] "It has […] been suggested…" – Cook is probably referring here to Kaminsky (20).

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use of a convenient but widely disliked technique. As a result, trade accounts of film style, especially concerning the manner in which zoom shots were used within those films, were frequently at odds with the contents of the films themselves. For these reasons, early criticism of the zoom shot was constructed on shaky foundations, which have not been strengthened by the next generation of critical addresses to the zoom: those that appear in film textbooks and broad academic surveys of film history.

## General Histories

The accounts described above provide the critical basis for later discussions of zoom lens development found in textbooks and surveys. This part of the literature review discusses approaches to the zoom shot found in a selection of the most widespread and influential general film histories.[7] These accounts build on the basic conceptual framework laid down in the 1970s and 1980s, but add further details about technologies and techniques. As a result they tend to discuss the zoom shot within a broader historical context. However, they generally retain the use and abuse framework described above.

David Bordwell is one of the most influential voices in formalist Western film criticism, and his work – along with that of Kristin Thompson and Janet Staiger – has special significance by virtue of its foundational role in many university film studies programs. Therefore this part of the literature review starts with a survey of the

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[7] John Belton and Barry Salt produced the first historical accounts of the development of the zoom lens. Both summarise developments in zoom technology in each of the decades from the 1920s to the 1960s, and both construct their historical narratives from evidence found in trade periodicals. As a result, the emphasis is on successfully innovated devices and techniques. Salt's account is split decade-by-decade and is at times rather discontinuous, tending to give the impression that zoom lens developments came in fits and starts, rather than as a continuous process of development and diffusion across the period. The substance of the accounts given by Salt, Belton, and others are summarized in chapter 4.

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contributions of Bordwell and Thompson as they relate to the zoom, before discussing other textbook accounts. Writing in *Film Art*, which James Naremore has described as "the most influential textbook in film studies" (18), Bordwell and Thompson state: "[since the 1950s] the zoom has been used to substitute for moving the camera forward or backward" (241). However, their discussion of specific film texts is limited to *The Conversation* (Francis Ford Coppola, 1974), *Barravento* (Glauber Rocha, 1962), the 'abstract experimental film' *Serene Velocity* (Ernie Gehr, 1970) (240-2) and especially Michael Snow's 1967 film *Wavelength* (281-3). These examples are linked by their artistically motivated, and often extreme, uses of the zoom (the opening of *The Conversation*, for example, is not representative of American mainstream cinema's approach to the zoom).

Bordwell summarizes the history of the zoom lens in more detail in *On The History of Film Style*, writing that:

> The zoom lens was available in rudimentary form at the end of the 1920s, and over the next two decades, directors occasionally zoomed during filming, often to enlarge a detail for a shock effect. In the 1940s the lens was improved for television and used for covering sports events. As filmmakers began to shoot on location more frequently during the 1950s and 1960s, the zoom proved very handy. By setting the lens at the extreme telephoto range, cinematographers could shoot from a great distance, allowing actors to mingle with crowds while still keeping attention on the main figure via centering, frontality, and focus. That cliché of television news – the telephoto shot of citizens on the street, jammed together and stalking to and from the camera – has its source in early 1960s films aiming at greater naturalism (246-7)

This account, like a number of others, underplays the zoom's use in television and as a result it does not fully account for the technology's intermedial relationships. The zoom

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lens was used by television far more widely than just for 'sports events'. It may be the case that the particular type of shot identified by Bordwell as a "cliché of television news" has its source in the cinema. However, it can be argued that – given the ubiquity of the zoom lens in the American television industry by the mid-1950s – any 'televisual' cliché of 1960s Hollywood has its source firmly in television news, and perhaps also in some of the attempts by television drama directors to ape news styles when required by the plot. Bordwell further describes how:

> Many directors began covering scenes in long takes structured by panning and zooming. From a wide-angle view of the setting the filmmaker might zoom in and pan with the actors as they played out the scene; still tighter zooms would be reserved for moments of crucial drama. This 'searching and revealing' approach, allowing the camera to scan the action and overtly pick out key details, became a significant norm of the 1960s and 1970s. (249)

Bordwell follows Joannides in conflating the zoom lens with its telephoto function. Indeed, careful examination of Bordwell's argument in the section 'On Staging in Depth' reveals reference to the zoom to be something of a non-sequitur. Bordwell writes:

> Comolli argued that the long lens yields a 'non-Renaissance' perspectival code, but he never explained why such a lens became a commonplace in Hollywood, bastion of bourgeois ideology. (247)

Yet having established that the *long* lens is the topic of discussion, Bordwell gives three examples of striking *zoom* shots:

> An early example in John Frankenheimer's *The Train* (1964), with its audacious 10-to-1 zooms. Francis Ford Coppola's *The Conversation* (1974) opens with a relentless and oddly untargeted zoom shot, while

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Antonioni's *The Passenger* (1975) concludes with an elaborate zoom

during which the camera passes through a barred window. (247) [8]

After this diversion, Bordwell closes the paragraph by returning the reader to the long

lens:

> After *Kane*, most directors assumed that the *plan séquence* would be a
> wide angle shot in aggressive depth […] By 1967, though, a single-take
> scene in *Bonnie and Clyde* used a 400mm lens to squash its figures into
> drifting apparitions. (247)

There is no doubt that Bordwell knows the difference between a zoom lens and a long

lens. But there is a question as to whether all of his readers do, and the conflation of the

two devices, strongly implied here, means that neither are given the critical

consideration that they deserve.

In describing the gradual stylistic shifts catalysed in part by the availability of

the zoom lens, Bordwell avoids the use/abuse cliché seen in many other critical

accounts. Instead he comments: "although the pan-and-zoom approach sometimes

became identified with low-budget shooting, it offered some fresh staging

opportunities" (250). Most recently, in *The Way Hollywood Tells It*, Bordwell links the

zoom with the "prowling camera" (135), and credits it with "enhancing the tendency" of

directors to close in upon their subjects by the 1960s, underscoring through filmic

examples the close relationship between the physical push-in and the optical zoom-in:

> We don't lack examples of marked zoom-ins [during the 1960s] (*Nikki,*
> *Wild Dog of the North, 1961; Send Me No Flowers, 1964*). Major twists
> in the plot of *Seven Days in May* (1964) are signaled by ominous dollies

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[8] While the zoom shot may be an element of the movement in *The Passenger*, the majority of movement during this scene is physical, via tracking and crane elevation. Chatman describes it as a "long slow track" (184).

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up to faces. George's revelatory 'act 3' monologue in *Who's Afraid of Virginia Woolf?* (1966) is treated in a slow push-in. (144)

Bordwell and Thompson's historical accounts and critical approaches have been influential, hence the prominence of their perspectives in this literature review. However, it is essential to consider other general histories and critical texts, and to note that many of them include simplistic and clichéd descriptions of the zoom technique. In *How To Read A Film*, James Monaco asserts:

> in the zoom, since the camera does not move, the relationships among objects in different planes remain the same; there is no sense of entering into the scene; our perspective remains constant, even if the image is enlarged […] Although the zoom is often an inexpensive alternative to the tracking shot, its effect is strangely distancing: we seem to move closer without getting any nearer, and this is disorienting, since we have no such experience in real life for comparison. (201)

Monaco's statements here are difficult to reconcile with the diversity of film texts in which the zoom makes an appearance. There is no doubt that in certain situations, the zoom provides for an enlargement of the pro-filmic whilst maintaining detachment from the scene it surveys. The opening shot of *The Conversation* is a case in point, though here the sense of visual detachment is enhanced by sound distortion and a deliberately oblique establishing shot, so that the audience is both visually and audibly distant from the pro-filmic – as well as distant from an understanding of the narrative. Yet that scene can be contrasted with the sensitive, personal camerawork of Robert Mulligan in *Summer of '42* (1971) and in particular the zoom shot which, just prior to the film's emotional climax, advances the audience towards a "killed in action" telegram resting

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on a table.[9] Mulligan's use of the zoom-in accords with Bordwell's comparison to the push-in, and indicates that the "distancing" zoom is but a single mode of the device, and not its defining form.

Monaco's interest in the cost of the zoom is also problematic. In contrast to the 'inexpensive alternative', he highlights the expense of the striking zoom-reverse-track shot in Hitchcock's *Vertigo*, noting that the manoeuvre cost the production "$19,000 for a few seconds of film" (*How To Read…* 82). The cost of that moment is an interesting article of trivia, though critically insignificant. But in characterising the zoom as an 'inexpensive alternative' Monaco makes a clear ideological statement. He draws a link that does not truly exist between the cost of a technology or technique and its quality onscreen. It is well known that film production often depends upon inexpensive alternatives, often conspicuous in their infidelity to 'real life': back-projection in order to simulate a vehicle in motion is a case in point. But in Monaco's account, while other such cost-cutting measures are accepted, the zoom comes in for special treatment: some directly criticise its cheapness while others, including Monaco, restrain themselves to the innuendo of phrases like 'inexpensive alternative' and 'corner cutting'.

David A. Cook also discusses the zoom in the context of 1970s Hollywood cinema. He makes passing reference to the zoom's history in television, in addition to its more familiar positioning in relation to the European New Waves. Cook's assessment, like others, is explicitly framed by the concept of 'use and abuse' and conceptualizes the zoom as an alternative to other, more primary, techniques. Cook asserts:

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[9] Belton observes Mulligan's use of the zoom in *Summer of '42*, arguing that the primary motivation is to establish distance (1980, 25).

> The use (and abuse) of the zoom lens is an unmistakeable hallmark of
> late 1960s' and early 1970s' film style in the United States and Europe.
> Most historians attribute this to the influence of television, whose
> cameras had been equipped with permanently mounted zoom lenses
> since the 1940s. During the 1950s and 1960s, as more and more films
> came to be shot on location, television production techniques were
> adapted to feature filmmaking for their flexibility and economy. *(Lost
> Illusions* 361)

Cook compares television-influenced American directors unfavourably with their

European colleagues:

> The European new-wave cinemas employed the lens expressively to
> create pictorial abstraction […] or to structure scenic space by hovering
> and focusing selectively within it […], but when American directors
> embraced the zoom in the late 1960s they initially used it to isolate detail
> within the frame, following the practice of television. In fact, many of
> them were veterans of television […] and some indulged in orgies of
> self-conscious zooming in otherwise worthy films. (362)

Cook focuses on two directors, Robert Altman and Stanley Kubrick, whom he argues

use the zoom in especially striking ways. His analysis makes only passing reference to

other directors and to more mainstream cinema, and concludes:

> Of course, for every calculated aesthetic use of the zoom during the
> decade, there were many more abuses of it to create specious interest
> where none inhered in character or plot, or to cut corners on camera
> movement, lighting, editing, and, at worst, actors' rehearsals. (366)

A similar approach can be found in Geoffrey Nowell-Smith's account of New

Wave and avant-garde world cinemas (2008), which finds the subject of the zoom

'worthy of brief mention':

> Now a staple of television and of home video, the first truly viable zoom
> lens for professional film-making was introduced by the Angénieux

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company in 1963, just too late for the early new waves […] Most film-
makers at the time chose to ignore the new technology entirely and it was
not until the 1970s that its use became widespread. Two film-makers,
however, took it up with enthusiasm, though for very different purposes.
[…] Rossellini in fact jumped the gun, using an early Pancinor zoom lens
in *Viva l'Italia!* In 1960 and *Vanina Vanini* in 1961. (98-9)

This passage concisely exemplifies some of the crucial problems with existing history

and criticism on the zoom lens. Nowell-Smith's approach to the zoom is easy to

understand, but tough to defend. A number of these key facts are in the wrong order,

and seem twisted to fit a pre-existing narrative that treats art cinema as its *telos*. As this

study demonstrates, the zoom shot was a 'staple of television and of home video' before

it became commonplace in feature filmmaking.[10] The idea that Rossellini 'jumped the

gun' with regard to using the zoom lens is a particularly unproductive way of

historicising such a stylistic development. There was no starting gun – Rossellini was

simply an early adopter of a technology that had been relatively unexploited by the

industrial context in which he operated. Nor was he an early adopter of the Pan Cinor

when he used it in the early 1960s: Pan Cinor lenses were introduced from the early

1950s. If this is recognised, then Nowell-Smith's claim that the Angénieux 10× lens was

'the first truly viable zoom lens for professional film-making' is unsupportable. Insofar

as they were developed and used, zoom lenses were viable in professional film-making

as early as the late 1920s – and possible much earlier. The Pan Cinor lens, too, was

'viable', not only in Hollywood, but also in Europe: as Nowell-Smith himself states,

Rossellini used it.[11]

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[10] In the context of the 1950s 'home cinematography' takes the place of 'home video', but zoom lenses
were definitely available for 8mm cameras by the late 1950s ("The New Pan…").

[11] A similar lack of technological precision can be found in Drew Casper's recent survey, *Hollywood Film
1963-1976*. Casper suggests: "besides handing director more compositional control, the reflex camera

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The above are a selection of relatively recent approaches to the zoom shot, found in those general film histories which are often used as core texts on university film studies courses, and which are often the first destination for students and scholars seeking an initial understanding of a new or unfamiliar concept. There are, of course, many other such textbooks. The sample above reflects the limited terms in which the zoom has been discussed, and the lack of progress between the early 1970s and the late 2000s. See, for example, how Nowell-Smith concludes his discussion of the zoom:

> In the early 1970s use of the zoom became part of the general armoury of film-makers just about everywhere […] The presence of the zoom – sometimes motivated, sometimes stylish, but often simply mannered – can even be seen as a marker of the period, like flared jeans or sideburns. […] Its use does not form a substantial part of the legacy of the new cinemas of the 1960s. (99)

Stripped of its bibliographic information, a reader might be forgiven for confusing Nowell-Smith's approach – one of the most recent pieces of writing on the zoom shot in English – with that of Joannides, who wrote his account 38 years earlier. There is clearly scope for progress.

## Beyond 'Use and Abuse'

Textbooks and neo-formalist critics take a relatively limited approach to the zoom shot, often seeking to contain it within certain categories of film, or to pronounce judgements on its success, failure, or appropriateness. Somewhat more recently, scholars approaching film studies from more purely philosophical and phenomenological directions have attempted to explain the significance and meaning of the zoom shot. These accounts almost always focus upon exceptionally 'showy' or artistic uses of the

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made the zoom lens possible" (75). As the evidence shows, this gives too much credit to reflex technology.

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zoom. In place of direct formal analysis, inflected with technological and authorial determinism, such accounts speculate more adventurously on what the zoom shot may *mean* to audiences, and how its use can be linked to other forms of cinematic address. At the same time, the term 'zoom' has been adopted by scholars in other disciplines and by journalists in the wider media landscape, as a flexible metaphor for concepts including magnification, bending, and the focusing of attention upon a subset within a whole. In film and visual studies, such metaphorical uses of the term can be seen looping back upon themselves, and it is clear that those who have substantially addressed the zoom have chosen to do so with reference to visual techniques which are 'zooms' in only the metaphorical sense. In this phase of analysis, the zoom has become much more than an optical technique. Whether or not this has advanced understanding is unclear, but the few discussions which directly confront the zoom shot do not move the debate decisively forward.

William C. Wees offers one of the earliest critical attempts to understand *how* zooms make meaning. Taking *Wavelength* as his central text, Wees lays out his central questions:

> What, then, *is* the visual event created by the zoom in *Wavelength?* How does it come about? How is it perceived? What, in a word, *happens* during a viewing of that forty-five minute zoom? And what does it mean? (79)

In attempting to answer these questions, Wees pays particularly close attention to the manner in which the zoom simultaneously is and is not 'movement'. He argues:

> The first thing to remember is that, unlike a tracking shot, a zoom shot is not based on 'forward movement.' In fact, it is a commonplace of technical manuals, as well as more general texts on film techniques, to point out that a zoom shot, which creates its effects through the optics of

the zoom lens, should not be confused with a tracking shot, which

depends for its effects on actual movement of the camera forward (or

backward) in space […] The fact that so many people refer to

'movement' in describing their perception of *Wavelength* suggests that,

despite what I have just been saying, the zoom does provide visual cues

for movement. If I actually walk toward a photograph pinned on a wall, I

find that the photograph does, indeed, get larger in my visual field, and

that things around it slip out of view at the peripheries of my vision. The

zoom produces equivalent effects, hence the tendency to describe it as

'moving forward.' But I am really imitating a tracking shot, not a zoom.

[…] I think it is safe to say that no perceptual experience in the every-

day world can prepare us for the kind of vision produced by the zoom.

(79-80)

Wees theorizes that the mental processes of the viewer cause him or her to make a 'best

guess' about what the optical alteration brought about by the zoom equates to. In the

context of *Wavelength*, therefore, the zoom is seen by the viewer as a 'functional

equivalent' of camera movement, even if in production and in a variety of optical

characteristics, it differs significantly.[12]

At times, though the language used by critics is more complex, the message

conveyed is not hugely developed beyond some of the arguments advanced during the

1970s. Vivian Sobchack is a case in point:

As we all know (whether consciously or pre-consciously), there is a

radical difference between the movement of a 'zoom-in' on an object and

a 'forward track' toward it. In the former, the film's 'viewing view' is

*compelled by* the object; in the latter, the film's material 'body' and its

'viewing view' literally *move toward* the object. The one is an

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[12] Totaro, 'revisiting' *Wavelength* in 2002, states that the zoom in the film has a 'teleological purpose': "where is it heading"? He further states that "Snow's own description that the film was a 'summation of … religious inklings' supports a reading of the zoom's trajectory […] as a transcendental journey where the spectator is 'carried' from one space/time to another" (Totaro).

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intrasubjective visual gesture, experienced only introceptively as *impressive*. The other, while also experienced intrasubjectively and introceptively, is intersubjectively available as visible gesture, as *expressive*. (25)

This is worth comparison with Joannides and Kaminsky, both of whom outline arguments about the 'psychological' properties of the zoom lens, and both of whom maintain that there is a difference, of some sort, between the zoom and track-in. Sobchack continues:

> In optical movement, it is the film's 'viewing view', not its material 'body', that changes its address and situation in the world; that viewing view traverses worldly space without materially inhabiting the distance between itself and the object which compels its attention. That is, from its initiation, the 'zooming' gaze locates itself in its object, and literally *transcends* the space between the film's situation as an embodied viewing subject and the situation of the viewed object. Thus, the *grounded* relationship between the viewing subject and object does not change with the visible movement. Since both material bodies 'hold their ground', their mutual relations to their background do not shift. As an essential function of bodily movement, depth is not inscribed by the 'zooming' gaze as it in a tracking shot. Rather, the visible relations between the viewed object and its background are relatively flattened – as a function of an attention which collapses or transcends the *bodily* meaning of distance. (25-6)

Here again, Sobchack describes in great detail a phenomenon more concisely noted by numerous critics and practitioners since the earliest days of the zoom: that zooming in or out does not result in a change in the relative positions of various items ranged in depth in the mise-en-scene. Despite Sobchack's apparent restatement of earlier arguments, these interventions are worth considering because although they are

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restatements of much earlier observations, they form a key reference point for scholars who make philosophical and phenomenological approaches to the zoom shot.

Sobchack's influence is particularly evident in discussions of the 'cosmic zoom', which is, as Jennifer Barker describes its appearance in *Moulin Rouge!* (Baz Luhrman, 2001), "a digitally effected camera movement that races over [Paris] rooftops at dizzying speed towards the legendary nightclub" (311). In *Sweeney Todd* (Tim Burton, 2007) the effect "hurls us into the city ahead of [Todd], with speed and agility that only a digital effect can produce" (312). Barker adapts the term 'cosmic zoom' from Garrett Stewart, who describes:

> a technique of digital rhetoric capable of drastic shifts in scale – as when plummeting from a satellite-range scan to a facial close-up, or lifting back out again – that also appears lately, in muted variants, for such radical shifts (in temporal rather than spatial orientation) as a precipitous tunnelling from present into biographical past. (283)

The definition of the 'cosmic zoom' is, on this basis, confused. For Stewart, it is a downward plunge or a sudden upward flight covering an effective focal length many times greater than any 'real' zoom lens. For Barker, the cosmic zoom's trajectory is primarily horizontal: it produces the effect of a spectator surging through the mise-en-scene, which surrounds the viewer from start to finish. All that Barker and Stewart agree upon is that the movement must be 'digitally effected'.

Barker does not conceal such difficulties of definition: "The cosmic zoom," she writes, "is ontologically puzzling: neither a 'zoom' nor a 'travelling' or 'tracking' shot in the conventional senses of those terms, it exists somewhere in between the two" (312). After brief recourse to Sobchack, Barker attempts to solve the puzzle:

> As the cosmic zoom plummets, swerves, tunnels, and swoops through
> space and time, it clearly does not 'travel' the same way a tracking shot

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travels, but it *does travel*, as the conventional zoom does not. Its digital

aspects allow it to exceed the laws of physics by tunnelling through solid

objects and moving at speeds no tracking camera could achieve.

However, the part(s) of a cosmic zoom that involve an actual camera

moving through sets or models are kinetic in a way the optical zoom can

ever [*sic*] be; hence the cosmic zoom's ability to swerve around corners

as the zoom cannot. […] Faced with a well-executed cosmic zoom, the

viewer is hard-pressed to tell the difference between physical movement

and optical movement; the difference is rendered obsolete. (312)

Such confusion only re-establishes the flexibility of the term zoom, both in

etymological and conceptual terms. It is evident that the 'cosmic zoom' as defined by

Stewart and Barker is a *form* of zoom shot: it involves an apparent onrush of the

camera, quickly closing in on an aspect of the frame. However, this approach shares the

same limitation found in a number of other critical accounts. Discussions of visually

exceptional techniques such as the cosmic zoom, Snow's creeping zoom-in in

*Wavelength*, and the zoom-in track-out combination described as the '*Vertigo* zoom'

can be useful.[13] However, they also highlight the fact that close formal attention has not

been paid to the more commonplace types of zoom shot used in American film and

television from the mid-1940s onwards.

It is not difficult to understand why such films have repeatedly caught the

attention of critics and scholars. The unfamiliar can be easier to write about than the

everyday, and can fit more easily with existing norms and approaches in film criticism.

*Wavelength* (Michael Snow, 1967), a film without camera movement except for a long,

slow zoom in throughout its length, is an avant-garde film and therefore, perhaps,

---

[13] This technique has numerous names, including "dolly zoom" (Choi 22), "Hitchcock zoom" (Foote

224), "*Vertigo* effect" (Spiegel 381), "trombone shot", "contra-zoom" (Berger 28), "*Jaws* shot"

("Obituary: Roy Schneider").

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makes an obvious candidate for aesthetic analysis. The *Vertigo*-zoom, finally, is so strange in appearance that it is nearly always used to describe some specific and visceral psychological or physiological condition, such as the condition of vertigo in the eponymous film. Addressing the *Vertigo*-zoom, Sobchack writes:

> The difference between optical movement as a movement of the film's attention which transcends space and camera movement as a movement of the film's material 'body' through space is nowhere so marked as in Alfred Hitchcock's *Vertigo*. Indeed, Hitchcock constitutes vertigo as the dizziness which emerges when the *attention of consciousness* and the *intention of the body* are at odds with each other […] Hitchcock makes Scotty's illness visible and intelligible through the simultaneous combination of optical movement (a forward zoom) and camera movement (a track out) – each opposed to the other in their immediate project. (27)

This raises a further important question: is there a psychological basis for treating the zoom differently to other forms of editing or camera movement? It would appear that there has been little direct investigation of this matter, but there have been limited comparative studies of the effect of zoom shots upon video viewers. Colleen Birchett showed two groups of college students "videotaped paintings". One group saw a 'slide treatment' of the paintings, in which the camera cut directly from one image to the next, while the other group saw images in which "the videotape camera zoomed into details". Hong examined the cognitive styles of viewers of different categories of television programming, including a class of programming which was thought to contain "longer zooms and more moderate levels of action". Both studies concluded that there was some suggestion of difference in the responses of test groups shown footage featuring zoom shots when compared to those shown footage without (or with fewer) zooms, though both studies also noted numerous confounding factors and called for further research.

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These questions are not investigated by the current project, but its presence must be noted. Even if the zoom can be essentially equivalent to other forms of editing and movement, as Kaminsky suggests, the possibility that it can provide meaning and potential beyond other techniques needs to be considered.

This summary of critical literature on the zoom shot exposes some clear gaps in scholarship, in addition to some fruitful starting points for analysis. Joannides draws attention to the zoom's relationship with the telephoto and close-up shot, while Kaminsky's catalogue of uses for the zoom provides a useful paradigm for formal analysis, and Belton and Salt represent an early mapping of the historical territory. But these approaches are, in themselves, of limited value to the historian of film technology. Their approach is neither sufficiently detailed nor sufficiently grounded in rigorous historical methodology to make a meaningful contribution to the history of the zoom lens. This study provides a more detailed account of some of the historical developments described by Belton and Salt – especially the Zoomar lens, the history and significance of which has not been fully accounted for. Formalist accounts such as Bordwell's indicate some further significant gaps in knowledge. They, too, gesture towards a necessary but untold history of zoom technology in the television context. In addition, their focus on artistically motivated New Wave and European examples – and their frequent insistence upon the zoom as either a 'special effect' or an 'cheap alternative' – suggest a neglected corpus of mainstream American films requiring further investigation. Examining such films, especially those produced during the 1960s, enables the present study to assess the frequent, but unproven, claim that 'TV Generation' directors were key players in encouraging the use of the zoom shot in the American feature film.

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# 3. Research Methodology

> Beyond the cinema's *discontinuous* history, marked by recognizable
> break points, which are like easily memorized dates of major battles,
> there lies a *continuous* history, made up of more progressive changes that
> are more difficult to detect. This is the history that interests me.
>
> (Chion 142)

## Social Histories of Technology

This study constructs a detailed account of the development and use of zoom lens

technology in American film and television from 1946 to 1974. The aim is to consider

not only the means by which new zoom lenses were developed and distributed, but also

how they were used by directors, cinematographers, and other creative personnel.

Existing accounts have isolated successfully innovated devices without fully assessing

the extent to which each affected the development and use of others. Furthermore, they

have focused almost exclusively on outcomes – the appearance of the zoom shot on the

screen – without accounting for the means by which such devices were developed. This

study aims to avoid these limitations by combining elements of two methodologies. It

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adopts techniques practiced recently by historians of technology, especially those who emphasise the 'social construction' of technology. In addition, it uses analytical techniques practiced by film critics and theorists, with a particular emphasis on the neoformalist approach described by Thompson. Such a combined methodology has been tested in a number of recent studies of other aspects of film technology. Notable examples include Scott Higgins and Patrick Keating, whose accounts of the development of Technicolor and of Hollywood lighting conventions overlap somewhat with the present study, both in terms of their subject matter and the historical periods and geographical areas that they address.

Methodologies for the construction of socially-shaped histories of technology have been mapped in substantial detail, both in general terms and with specific reference to film studies enquiries. Overall, as the excellent survey by Robin Williams and David Edge demonstrates, such approaches emphasise the complexity and non-linearity of technological development. Historians are encouraged to consider how the personal circumstances of inventors, and the social and professional circles in which they move, impact upon what they invent (866). Furthermore, social histories of technology stress the important role of users, who shape technology by feeding into the decision-making process of invention and innovation, through their demands and their purchasing choices (873-4).

Approaches specific to film studies generally concur with those identified by Williams and Edge. An important text in this regard is Allen and Gomery, which outlines an approach to technological development that has been used by many historians of technology. Robert C. Allen and Douglas Gomery map this model as follows:

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> Economist Edwin Mansfield has defined an invention as 'a prescription
> for a new product or process that was not obvious to one skilled in the
> relevant art at the time the idea was generated'. Usually the invention is
> not a single idea, but rather a system of concepts linked together. […]
> Once the system of inventions is initially adopted for practical use, it
> becomes an innovation. The innovation stage of technological change
> involves a firm altering its past methods of production, distribution,
> and/or marketing because it has determined that the adoption of the
> invention will result in greater long-term profits. […] The process of
> diffusion begins once the technology begins to receive widespread use
> within an industry. (114-5)

Whatever limitations this model may present, it has become standard practice for

enquiries of this sort. Yet, cautioning against the 'great man' and technologically

deterministic approaches practised by some film historians, Allen and Gomery draw

attention to a number of 'complicating factors' which need to be addressed by historians

considering technological change. They observe that financial profitability is not the

*sine qua non* of successful innovation, noting that "some technological change

originates in institutions for which profitability (in a strictly economic sense) is not a

motivation; the primary modern example being the state" (124). As an example, Allen

and Gomery offer the proposition that "certain pieces of technology necessary for what

was to become cinema verité filmmaking resulted from certain military needs during

and immediately following World War II" (124-5). The evidence below demonstrates

the direct relevance of this point to the intra- and post-war development of the Zoomar

lens.

       Social systems represent a further significant factor. As Allen and Gomery

remark:

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> Economic decision making does not occur in a vacuum; corporations
> operate within societies, and are subject to accepted norms and values
> when making any decision, including those having to do with
> technological change. […] Some would argue that technological change
> in capitalist economies is not only a response to a perceived social need,
> but is also the manufacture of a perceived need through advertising,
> which can then be conveniently 'met' by the new product or service.
> (125)

One common feature of recent histories of film technology has been an appreciation of

the complexity and non-linearity of the course of history. Allen and Gomery follow

Jean-Louis Commoli, who (they write) viewed:

> technological film history (indeed all types of film history) [as]
> dialectical in form. Rather than a single linear progression, history is a
> plural series with neither origin nor end. An ongoing process, history has
> a plurality of beginnings, a series of points which may even be
> contradictory. It is not possible to single out one event or one 'invention'
> (126)

Similarly, introducing a study of widescreen cinema, Belton argues for:

> a stratified, uneven – that is, nonlinear – determination in which events
> are viewed as the product of a complex array of socioeconomic, cultural,
> technological, ideological, and other determinants and in which each
> determinant is itself multiply determined. (6)

In applying such methods to their own projects, Higgins and Keating

demonstrate the productivity of these approaches. Discussing the history of Technicolor

and its aesthetic consequences in 1930s Hollywood cinema, Higgins establishes a

number of key questions:

> What functions did color serve during the classical era and how did these
> functions develop? How did commercial imperatives, stylistic norms,
> and technological constraints shape filmmakers' options for designing in

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color? How does color work, generally and specifically, to guide the story? (1-2)

Within this framework Higgins considers the complex network of industrial and technological factors relevant to the development of colour technologies: factors such as cost of manufacture and processing, interaction with other filmmaking technologies, competition between colour methods, industrial organisation, and patent protection. Alongside these technological and industrial concerns, Higgins seeks to examine and understand the aesthetic functions of Technicolor, situating his analysis within the neoformalist framework proposed by Kristen Thompson. This approach necessitates a return to questions of industrial operations – especially with regard to questions of how colour might be 'justified' in some cases but not in others (6). Higgins elegantly articulates the way in which technological developments and aesthetic strategies endlessly feed into one another through the filmmaking efforts of directors, cinematographers, and other personnel, and through responses from audiences:

> Developments in technology and in Technicolor's market position conditioned the functions with which color was entrusted. Further, filmmakers were engaged in a historically bounded program of trial and error in which functions and motivations were tested and abandoned or revised according to reigning aesthetic norms. (6)

Higgins' technological history is supported by analysis of specific moments in specific films, obtained through case studies. He argues:

> While film scholars have provided technological surveys and broad-spectrum discussions of style, we have generally shied away from the problems of how color is handled moment by moment, what specific duties it serves with respect to narrative, and how it helps shape visual perception. Only case studies, supported by extensive background viewing, can afford the opportunity to examine precise details of color

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style and to consider how color develops across films in their entirety.

(19)

Like Higgins, Keating draws upon "trade publications like *American Cinematographer*" (3) in order to establish an understanding of the development and nature of lighting conventions during the period at hand. Keating shows great sensitivity to the complexity of discourses found in trade periodicals. Of *American Cinematographer* he observes that:

> this journal demonstrates both the normative and the functional quality of Hollywood lighting. On the one hand, the journal standardizes the Hollywood style by disseminating the various guidelines. Its discourse helps create norms. On the other hand, the journal does not enforce convention by fiat. Rather, it encourages the widespread adoption of a particular convention by reminding filmmakers of its functional benefits. (4)

Keating also notes the particular priorities of the group of personnel whose interests are represented by *American Cinematographer*:

> In addition to being storytellers, Hollywood cinematographers thought of themselves as image-makers. As such, they consistently aspired to certain ideals of pictorial quality, above and beyond the needs of the particular story. While many cinematographers believed that conspicuous beauty was distracting, even the most unobtrusively oriented cinematographers agreed that all images had to meet certain minimum standards of balance and proportion. (5)

Keating usefully elaborates further questions relating to the social construction of film technologies. In addition to his observations on the priorities of cinematographers and the related function of their trade journal, he also highlights James Lastra's interpretation of Hollywood as "not a single institution [but] composed of several different institutions that were simultaneously competing and overlapping" (8). Keating

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suggests that "it might be useful to imagine the Hollywood institutions as a set of loosely overlapping circles" – with a mixture of shared and competing interests (9-10).

Histories of technology cover a broad range of industries and contexts, and several recent studies beyond film history are relevant to the present enquiry. Eric S. Hintz, documenting the history of portable batteries, discusses the development of an (essentially auxiliary) technology by an inventor working largely outside of the research and development of large scale companies, at the behest of the Signal Corps (55) – circumstances similar to those accompanying the innovation of the Zoomar lens. Some of the micro-level similarities between Hintz's account of battery developments and Back's development of the Zoomar lens are discussed below. But Hintz also draws a conclusion of broader significance, remarking upon:

> the continued viability of independent inventors as a source of innovations during the twentieth century […] while the postwar era has often been described as a golden age of corporate industrial research, this case demonstrates the continuing contributions of independent inventors during the twentieth century, and the variety of ways that firms organized themselves for innovation. (55)

Hintz's analysis underlines the significance of the wider industrial, economic and cultural contexts surrounding the development of any technological artefact – while recent work in innovation theory prompts further questions as to the nature of zoom lens developments at various points between 1946 and the early 1970s.

One such question is to what extent zoom lenses have ever been a 'disruptive' technology in the context of American film and television production. Some of the characteristics of disruptive technologies are described by Joseph L. Bower and Clayton M. Christensen. In seeking to explain why large companies often fail to maintain their dominance at the top of their market, Bower and Christensen argue that across various

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industrial sectors it is often left to smaller companies or innovative units to produce new devices which are significantly different to ones which already exist in the market. They posit that:

> most well-managed, established companies are consistently ahead of their industries in developing and commercializing new technologies – from incremental improvements to radically new approaches – as long as those technologies address the next-generation performance needs of their customers. However, these same companies are rarely in the forefront of commercializing new technologies that don't initially meet the needs of mainstream customers and appeal only to small or emerging markets. (44)

Bower and Christensen argue that disruptive innovations need not be "radically new or difficult from a technological point of view" but can simply present "a different package of performance attributes – ones that, at least at the outset – are not valued by existing customers". It is then up to the developers of the disruptive product to make up lost ground in the performance attributes which customers expect, in order for their product to "invade […] established markets" (44). Bower and Christensen introduce the concept of 'performance trajectories' as a form of metric which can be used to assess whether innovations should be judged as 'disruptive' or 'sustaining':

> To explain the differences in the impact of certain kinds of technological innovations on a given industry, the concept of *performance trajectories* – the rate at which the performance of a product has improved, and is expected to improve, over time – can be helpful. Almost every industry has a critical performance trajectory. In mechanical excavators, the critical trajectory is the annual improvement in cubic yards of earth moved per minute. In photocopiers, an important performance trajectory is improvement in number of copies per minute. In disk drives, one crucial measure of performance is storage capacity, which has advanced 50% each year on average for a given size of drive. (45)

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In the context of zoom lenses, two of the most significant performance variables are extent and usefulness of the range of focal lengths. A lens that could range from 30mm to 120mm ('normal' to telephoto) would have a zoom range of 4×, while a different model with a range from 90mm to 900mm (telephoto to super telephoto) would have a 10× range. But the focal lengths covered by the 4× zoom lens would probably make it most useful to ordinary cinematographers, whereas the 10× zoom lens would only appeal to those who specifically needed a zoom lens limited to telephoto and super-telephoto functions. Other performance variables are shared with optical systems in general. These include speed (the amount of light transmitted through the lens: the less light lost, the better), optical quality (higher quality lenses show fewer signs of optical distortion), and practical considerations such as size, weight, durability, build quality, ease of operation, and similarity to existing products in the industry.

Sustaining and disruptive technologies are defined by Bower and Christensen in relation to their response to performance trajectories, thus:

> Different types of technological innovations affect performance trajectories in different ways. On the one hand, *sustaining* technologies tend to maintain a rate of improvement; that is, they give customers something more or better in the attributes they already value. […] On the other hand, *disruptive* technologies introduce a very different package of attributes from the one mainstream customers historically value, and they often perform far worse along one or two dimensions that are particularly important to those customers. As a rule, mainstream customers are unwilling to use a disruptive product in applications they know and understand. At first, then, disruptive technologies tend to be used and valued only in new markets or new applications; in fact, they generally make possible the emergence of new markets. (45)

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To an extent, the market for zoom lenses has, since at least the 1920s, been in a state of constant cyclical disruption connected with the oscillation between the two principle means of compensation (optical and mechanical).[14] In the course of its consideration of the impact of the Zoomar lens and its use in American television, this study assesses the extent to which the Zoomar specifically was a 'disruptive' technology. Although performance variables and trajectories may be somewhat harder to account for than in the case of disk drives and mechanical excavators, there is nevertheless sufficient information in trade periodicals to build a picture of the industry's expectations (often expressed in terms of aspirations) for developments in zoom lens technology. Many aspects of the invention and innovation of the Zoomar lens reflect Bower and Christensen's characteristics of disruptive innovations – with some important exceptions. This helps to recontextualise the development of the Angénieux 10× lenses in the early 1960s – a development which has been historicised as a radical progression in zoom lens technology.[15] It has already been argued that Angénieux 10× lens was, in fact, an incremental development (Hall). Demonstrating that the Zoomar lens may have been the disruptive innovation in this chronology helps to further explain why this was so.

The accounts described above suggest proven frameworks which consider not only technological advantages and limitations but also the impact of social networks. This is a particularly important concern to this study. As Keating reminds us, broad

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[14] As Kingslake explains: "The component of a zoom that is used to vary the focal length is often called the variator, while some other component that is cam-operated to maintain a fixed image position is known as the compensator. Some zoom lenses made in the early 1950s embodied two separate components that were coupled together so as to move as a unit with a fixed component situated between them. This arrangement is known as optical compensation and no cam is needed" (*A History Of...* 154).

[15] See, for example, Salt (258), Monaco (70), and Nowell-Smith (98).

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categories – such as 'Hollywood cinema' or 'American television' – must be broken down, and the multiplicity of personnel and industrial bodies that interact within and around them must be acknowledged (8-10). Trevor J. Pinch and Wiebe E. Bijker raise a number of related issues that need to be considered carefully when addressing histories of technology. Of particular significance is the interaction of 'social groups', however defined, with the 'problems' caused and solved by certain technologies (29-30). Pinch and Bijker caution, however, that:

> We need to address […] whether a provisionally defined social group is homogeneous with respect to the meanings given to the artefact – or is it more effective to describe the developmental process by dividing a rather heterogeneous group into several different social groups? (32-4)

This study encounters numerous apparently homogenous groupings, emerging from broad concepts such as 'Hollywood', industrial groupings such as 'television', and communities represented by certain trade journals. Within the group described as (for example) "cinematographers", there are likely to be many different opinions, and those opinions have many different sources. As a result, a more accurate historical narrative can be developed by paying attention to these many different voices.

The availability of archival sources, however, places limitations upon the accessibility of historical voices. Directors are often well-represented by press interviews, biographies and autobiographies. The views and preferences of cinematographers can be found in trade journals, especially *American Cinematographer*. The voices of senior technicians, as well as independent and company-based inventors, can be found in technical trade periodicals such as the *Journal of the SMPTE*, as well as in the patent record. However, where information exists it frequently comes with significant caveats. Accounts of the production of films

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are given at a late stage in the film's production, if not after its completion and release. In *American Cinematographer*, they tend to be self-serving: when failings and stylistic errors are discussed, they are often highlighted in the work of unnamed others, or excused as the inevitable consequences of compromise. Some articles, such as Ford's account of *Kukla Fran and Ollie* – discussed below – appear in *American Cinematographer* under the guise of 'editorial' material written by the magazine's staff. However, other evidence strongly implies that they were supplied by interested companies and effectively constituted advertising. Furthermore, despite this multiplicity of voices and sources, there are significant gaps in the historical narrative. Accounts of abortive attempts at invention, and failures to innovate, are scarce. Also missing are the voices of more junior executives and technicians: those who, as the discussion in chapter five of NBC's purchase of Zoomar lenses suggests, often make and shape business decisions. It must be emphasised that the account constructed here is to a substantial extent filtered through the limitations of the available material. While many of these limitations cannot easily be overcome, they can at least be described in detail, in order to make clear the sources used in the enquiry.

**Source Selection**

In tracing the technological development of various zoom lens technologies this study relies upon articles and advertisements published in trade periodicals, and the recollections of filmmakers and television personnel, published in various places. In accounting for the early development of the Zoomar lens, evidence has largely been drawn from papers published in professional journals. Some evidence has also been extracted from court documents relating to the case of *Zoomar vs. Paillard*. This tends to skew the evidence towards successful versions of innovations: those that were

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brought to light and marketed. Access to the darker corners of the innovative process – missteps and failures – has been more difficult. It has not been possible to interview anybody who was directly connected to the development of the Zoomar lens in the 1940s. Oral history has been taken from Bill Pegler, who worked for the Television Zoomar Corporation and who is the son of key zoom lens innovator Frank Back's business partner Jack Pegler. Bill Pegler's recollections have provided useful support for statements found elsewhere.

On the innovation and marketing of the Zoomar lens, in addition to the trade and popular press, a substantial amount of contemporaneous evidence is to be found in the archives of NBC Television held at the Wisconsin Center for Film and Theater Research. These take the form of memos, telegrams, and handwritten notes. Most of these are internal memos written in a relatively casual style. Few were intended for contemporaneous external consumption and are therefore of special value. The pertinent parts of the NBC collection document some aspects of the process by which Zoomar's investors negotiated with executives in NBC's technical department during the earliest days of the network's use of the Zoomar lens. They give evidence of some early problems with the lens, though they are limited to adjustments made to an essentially working product, rather than the earliest trial-and-error stage of invention. These papers, therefore, do not entirely remove the evidential skew towards success. Furthermore, there are many gaps in the collection – some evident, some not – where communications have taken place by telephone, personal meeting, or by some other non-archivable means.

Further evidence about the development and use of the Zoomar lens up to February 1957 can be found in the transcript from the main hearing in *Zoomar vs. Paillard*, in which Zoomar accused Paillard Products of patent infringement. The papers

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of federal judge Irving R. Kaufman, who presided over the case, include over 600 pages of stenographic transcripts. The bulk of the transcripts consist of densely detailed technical arguments about the precise construction, and originality, of aspects of the Zoomar lens. Because they are extremely technically specialised, and well-summarised in Kaufman's later judgement on the case, these arguments are of limited use. However, testimony given by witnesses for both sides provides valuable evidence about some pertinent aspects of the development of the Zoomar lens. While the recollections of these witness are not contemporaneous, they are given less than 15 years after the event, and their value is somewhat increased by their delivery under oath. On the other hand, it must be remembered that witnesses were called to give evidence on behalf of either the plaintiff or the defendant, and the transcripts show some witnesses as markedly more co-operative and forthcoming with their own counsel than with opposing counsel. In addition, and as with the NBC evidence, there are gaps: the transcript indicates occasional conversations off-the-record, and there are references to pre-trial hearings for which neither notes nor transcripts were available. In the absence of other means of gaining evidence of this sort, testimony from the case has been included below. In all cases the source is clearly marked, and any clear contradictions with other sources are noted.

In addition to the historical account of zoom lens development and marketing, this study considers how the zoom lens was used in film and television. These assessments are qualitative, not quantitative. This study does not seek to produce an exhaustive chronicle of every appearance of a zoom shot. Nor, in most cases, has an *absence* of zoom shots been considered worthy of attention. The majority of sources have been selected based on their identification, in trade periodicals and/or existing scholarship, as texts featuring uses of the zoom shot. Most of the television texts under

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consideration were signposted by the trade press: this is the case for *Kukla, Fran and Ollie*, *Night Court USA*, *I Spy*, *Marcus Welby MD*, and *Owen Marshall Counselor-at-Law*. Notable exceptions are the television drama serial episodes directed by 'television generation' directors (John Frankenheimer, Robert Mulligan, Sydney Pollack and Robert Altman). As detailed above, the significance of their television work has been identified, though not fully explored, by Salt, Belton, and others.

In the past, such television texts would have been relatively difficult to access. However, in recent years a considerable number of television series once confined to archives have been released on DVD or made available via the internet. Episodes of the series listed in the paragraph above were all viewed on DVD.[16] Archival copies of a sample of episodes of 1950s and early 1960s television drama episodes were also accessible via a traditional physical archive, as were copies of newsreel and network television coverage of sports and political conventions. In some cases, and where access to a formal archive was impractical, websites such as YouTube and the online archive of the Museum of Broadcast Communications have been a valuable source of archival material – albeit posing special challenges to the researcher. Using material found on such websites can be problematic. The original source and integrity of uploaded video are frequently difficult to ascertain, and because material is often uploaded in breach of intellectual property law, such material is often deleted. The first consideration, however, is not unique to the internet, and applies equally to off-air recordings (often cut for television in an undocumented fashion, presented in modified aspect ratio or

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[16] Reversing the traditional fidelity problem: whereas Higgins points out the inability of VHS viewed on a cathode-ray tube television to reproduce the definition and dynamic range of a projected Technicolor film (11-13), here the opposite applies. Kinescoped episodes of *Kukla Fran and Ollie*, transferred to DVD, were viewed on a high definition television. This produced a significantly higher-quality viewing experience than that experienced by audiences in the 1940s and 1950s.

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pan-and-scan format, and so on). The second problem can be overcome by retrieving

and storing video material from the original website and noting all accompanying

bibliographic material. This permits further examination of the material if required, and

may be of some use in tracing the material to its source. Though challenging, this

problem is of a similar nature to that posed by the multiple release prints of films in

archives, or by the former practice of exchanging VHS tapes of scarce films and

television episode.

In the majority of cases, however, the television series and episodes referred to

in trade press articles were made available for analysis, and the same has proved true of

the theatrical features assessed here. While most of these are prominent mainstream

releases that have been commercially available for many years, the study has also

benefited from relatively easy access to some less well-known releases: *–30–* (Jack

Webb, 1959) is a case in point. The result is that this study has been able to consider a

far wider range of moving image texts than would have been available ten or twenty

years ago.

In places this study crosses paths with previous work on film style and

technology. Most of the *American Cinematographer* and *Journal of the Society of*

*Motion Picture Engineers* (*JSMPE*) referenced here are also referred to by Salt in *Film*

*Style and Technology*.[17] Their inclusion in detail is necessary in order to establish the

context for the surrounding discussion of film style. However, it is hoped that these

passages are also of scholarly value because, in contrast to Barry Salt, precise

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[17] The first edition of *Film Style and Technology* was published in 1983. Subsequent editions, in 1992 and 2009, though updated in other respects, do not advance Salt's account of zoom development. Except where otherwise stated, references here are to the second (1992) edition.

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bibliographic references are given in the present study. In the Afterword to the third

(2009) edition of *Film Style and Technology*, Salt claims:

> nothing is to be gained by giving precise references to the line in a trade
> journal where I picked up an isolated scrap of information from which I
> then made a set of deductions about availability and use, by combining
> this information with other scraps of information, and then taking all this
> in conjunction with my knowledge of the film equipment of more recent
> times. (400)

Salt is correct to note that "isolated scraps of information" from trade journals do not

reveal the full history of a certain device or technology. However, there is much to be

gained by referencing the source of such information: in particular, it can help future

scholars to avoid duplication of earlier work. A significant proportion of the

examination of trade periodicals in this study has necessarily duplicated Salt's research

efforts. In addition to avoiding such labour, adhering to the academic convention of

citing sources would make it easier to determine where Salt's sources can be traced and

independently assessed, and where his assertions are drawn from the less verifiable

store of personal memory, experience, or hearsay.[18]

## Aesthetic Criticism

In addition to the interpretation and presentation of historical documents, this study

analyses a range of film and television texts, in order to assess the nature of the

interaction between technological developments and film and television style. To this

end, a neoformalist approach is adopted. The approach to be followed here is closely

aligned with that proposed by Kristen Thompson in the opening chapter of *Breaking*

*The Glass Armor*. It is not necessary to restate here the substance of Thompson's sound

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[18] This point is well-made by Ernest Callenbach (49).

and well-tested approach, nor to rebut the criticisms that have emerged since its publication. What may be useful, however, is to draw attention to a number of specific aspects of this approach where they have a particular bearing on this study.

The aim is to describe the nature of relevant formal elements (usually focusing on the zoom, or lack thereof), and to identify any patterns, echoes, foreshadowings or progressions which may appear. Where it seems illuminating, the motivation behind the zoom may be suggested. By means of this analysis, each text may be more securely situated within its context. However, there are some significant exclusions to this approach. There is no speculation as to audience perception of zooms, as there is no evidence (beyond surmise) to support such speculation. Furthermore, while this study engages with a number of television texts, which would in some cases necessitate a substantial consideration of approaches specific to that medium, television texts are examined simply as moving image texts – the mode of their reception is not considered in a detail. This is not, of course, to exclude the possibility of further lines of enquiry relating to the zoom's role within television style specifically, but the diversity of television examples here – and necessity to compare them with film texts – does not accommodate such an analysis.[19]

In the formalist paradigm, on the most basic level, the zoom is a 'device': a "single element of structure that plays a role in the artwork". Thompson explains: "For the neoformalist, all devices of the medium and of formal organization are equal in their potential for […] being used to build up a filmic system". Central to Thompson's concept of any device is the multitude of meanings that it can be used to communicate, both within and between films: "any given device serves different functions according

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[19] There is substantial discussion of the zoom as it appears in contemporary television texts – especially American soap opera – in Butler (2010).

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to their context within the work, and this gives rise to the concept of functional equivalents" (15). This is a crucial concept for the present investigation, because the zoom is so often discussed in terms of what it mimics or substitutes for. As Kaminsky persuasively argues, the meaning of a zoom shot is substantially contingent upon the context of its use:

> Any cinematic tool or technique – zoom, close-up, slow motion, pan – carries a particular meaning or meanings in shifting contexts. The use of the appropriate technique for what one wishes to communicate is an essential of film communication. (21)

So, a zoom out at the end of a scene can indicate a broader context for the action taking place, but at the end of a film – especially when combined with a musical flourish, and/or a crane-up – it can indicate conclusion, resolution and the audience's impending departure from the diegesis. Sharp zooms-in or -out can be used to provide or reflect a shock, but the same movement, when combined with diegetic or non-diegetic music, and especially when placed in proximity to edits (see, for example, Frankenheimer's *Seconds*) can connote frenzy. Abrupt zooms towards persons or objects in the frame, when repeated at different points within the narrative, can constitute a version of what Bordwell has described as "the classical aesthetic of 'planting' and foreshadowing, of tagging traits and objects for future use, […] laying out objects to be recalled later in the cause-effect logic of the film" ("The Classical Hollywood…" 44). The zoom is also frequently used in the construction of point-of-view shots, which can be described using the same language – of 'point' and 'glance' – found in Edward Branigan.

Motivation is a further important term, as much for its frequent and derisive use by critics and historians as for its use in the present analysis. Higgins, summarising the concept via Bordwell, Staiger and Thompson, explains:

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Neoformalism uses the concept of motivation to explain how works justify their devices. In a Hollywood movie, motivation tends to cover over the arbitrariness of devices, providing the viewer a rationale for accepting the formal choices. Roughly, an element within a classical Hollywood film can be motivated as necessary to the development of the story (compositional motivation), as plausible for the story world (realistic motivation), or as conventional for a particular genre (transtextual motivation). Neoformalism also allows room for devices that do not appear so easily justified, that call out as displays of technical virtuosity or spectacle. In this case, we may conclude that the element helps draw attention to the artfulness of the work (artistic motivation). (6)

The claim most frequently used by those who complain of the 'abuse' of the zoom lens (arising, perhaps, from its 'unrestrained' use) is that the zoom has a tendency to draw attention to itself, ignoring established conventions of self-effacing cinematography, and being therefore purely artistically motivated (or, as many of these critics will not permit artistic motivation, simply 'unmotivated'). One of the aims of this study is to consider some of the industrial and critical discourses which have explained and shaped the use of the zoom lens. *Motivation* is used here as a tool for analysis, rather than as a means of implying approval or disapproval.

A detailed consideration of possible transtextual motivations behind the zoom shot are beyond the scope of this enquiry which, as stated below, does not aim to address a sufficiently broad selection of texts to justify such broad commentary. A similar limitation must be placed on the capacity of this study to consider the background of the texts considered here, though some attention is paid to how the evidence, in aggregate, suggests that American film audiences were by the 1960s probably more familiar with the zoom shot than existing analyses allow. In addition,

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while this study does not make a substantial engagement with narrative theory, it is necessary to consider the implications of the zoom shot on the communicativeness and self-consciousness of the zoom. Particularly in its 'tagging' function, the zoom can be highly communicative; the extent to which it is intrinsically self-conscious is a more complex question.

The analysis presented below does not purport to be a comprehensive survey of zoom shots as used in film and television between 1946 and 1970. The aim has been to construct an historical narrative based on accounts in the trade press and the popular and academic critical press. It would be impossible to be comprehensive, and therefore numerous significant films (especially art and avant-garde films) and television series in which zooms appear go unmentioned. This is particularly the case with regard to the years 1965 to 1970. As is discussed in the conclusion below, there is a great deal of work still to be done in order to advance our understanding of postwar American television style. This study analyses only those texts included in the bibliography, and it does not extend that analysis to unseen or undiscussed films and television series.

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# 4. Inventing the Zoomar Lens

> Mary Warga read the Board a note she had received from a man named
> Frank G. Back at a small company named Zoomar. Back was unhappy
> that he had been an [Optical Society of America] member for many
> years, but had never received any recognition, even though he was the
> inventor of the zoom lens!
>
> A quick check with Rudy Kingslake verified that Back was indeed an
> inventor of the zoom lens (although perhaps not the only inventor), and
> he was elevated to Fellow immediately. Back's work is what makes it
> possible, when watching a football game on television, to zoom right into
> the huddle, even at the far end of the field!
>
> (Howard 19)

The next four chapters have two central aims: to describe the development of zoom lens

technology in American film and television after 1945, and to account for the impact of

such technology on film and television style. This chapter details the 'state of the art' of

zooms lenses by 1945, and offers a detailed account of the process by which Frank

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Back and his associates drew upon technology and expertise developed during the Second World War in order to 'invent' the Zoomar lens after 1945.[20] Chapter 5 examines the means by which the new lens was marketed, initially to newsreel companies, and then to broadcasting networks and their local affiliate stations. Chapter 6 discusses case studies of two contrasting examples of television: the highly popular and long-running scripted family entertainment offered by the NBC (later ABC) puppet show *Kukla, Fran and Ollie*, and the unscripted current affairs spectacles of the Republican and Democratic National Conventions during the 1948 and 1952 presidential election campaigns. These case studies examine how zoom lenses contributed to the success of each show, and establish the context for the next significant change to the zoom lens market: the introduction of Pan Cinor lens during the mid-1950s, and Zoomar's legal challenge to those lenses – discussed in chapter 7.

**Context for Invention: Zoom Technology To 1940**

Historical accounts have highlighted a few key moments in the development of the zoom lens in American film and television, briefly mentioning innovations of the 1920s, touching momentarily upon the Zoomar lens in television, and settling upon the contributions of the Angénieux firm in the 1960s as the key moment in zoom lens development. However, historical documentation shows that the development of zoom lens technology is a longer and more continuous story than has been suggested. This study largely relies on sources in the English language, but Priska Morrissey, contributing to *Positif*'s 2008 'dossier' on the zoom, rightly observes that "many anglo-saxon historians have contributed to the technical and technological history of [the

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[20] Frank Back's background and education are fully described at page 86.

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zoom lens], but the facts remain scattered and sometimes contradictory" (88).[21] Though it adds a few facts not found elsewhere, Morrissey's history is largely constructed from the same primary sources referred here, and so she is cited here only when her account adds something which is missing from the key sources in English.

The evidence shows that motion picture zoom lenses were under development continuously from the early 1920s onwards, with a still longer history in the fields of optics and entertainment. The earliest 'zoom effect' documented by historians appeared in at least one lantern show during the late 18th century. According to Chris Webster:

> [Robertson] took his very spectacular lantern show, Phantasmagoria, across Europe, thrilling audiences with a display of macabre sensationalism. […] The simple magic lantern show was soon improved upon with the introduction of dual lenses, triple lenses and devices to achieve zooms, fades and mixes and even very basic forms of animation and special effects. (65)

Robertson recalled in his memoirs, translated by Robinson, a sequence in which:

> at a great distance a point of light appeared; a figure could be made out, at first very small, but then approaching with slow steps, and at each step seeming to grow; soon, now of immense size, the phantom advanced under the eyes of the spectator and, at the moment when the latter let out a cry, disappeared with unimaginable suddenness. (Robinson, quoted in Heard 97)

Heard explains that Robertson's projector was mounted on rails in order that it could be moved forwards and backwards, and that "to enable the lens to be always in focus, a rackwork mechanism was added, so that the image could be kept sharply defined throughout the advancing and retreating process of the machine" (99).

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[21] "Plusieurs historiens anglo-saxons ont contribué à retracer l'histoire technique et esthétique de cet objectif, mais les informations restent dispersées, parfois contradictoires" (88).

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This suggests a level of audience and industrial familiarity with 'zooms' over a hundred years before the dawn of cinema. The relationship between Robertson's 'zooms' and later televisual and cinematic effects is purely conceptual, however, and it is not until the 19th century that there is evidence of optical means of varying focal length. Variable focal length telescopes were developed during the 19th century. According to Morrissey, the "British physicist and mathematician Peter Barlow" presented such a device to the Royal Society in 1834, and the Italian photographer Ignazio: "after designing a new zoom lens for the telescope and wishing to study a solar eclipse in 1851, adapted the lens for photography" (89).[22] Optical designers were evidently developing variable focal length lenses during most of the 19th century, and this history may not be complete.

By the early 1890s, optical science was sufficiently advanced to support research and development into variable focal length lens systems, and optical engineers were able to build working versions of such systems. Rudolf Kingslake writes:

> In October 1891, T. R. Dallmeyer […] applied for a British patent on a telephoto lens that he had designed. It consisted of a cemented doublet in front and a cemented triplet behind, the two components being mounted with a variable separation so that the focal length could be changed in a continuous manner. However, this cannot be regarded as a zoom lens because the bellows extension of the camera had to be altered to suit the particular lens separation that was being used. The relative aperture also varied with the lens extension. Such a variable-focal-length system was often referred to as Pancratic. (*A History Of…* 133-4)

Although Kingslake argues against referring to Dallmeyer's device as a 'zoom lens', it was nevertheless a lens with variable focal length. In its own right, Dallmeyer's

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[22] "Ignazio Porro […] après avoir conçu un nouvel objectif à focale variable pour télescope et souhaitant étudier une éclipse du soleil en 1851, adapte cet objectif à la photographie" (Morrissey 89).

invention would have further familiarised engineers with the associated optical

principles, and it would have rehearsed some of the technical challenges surrounding

the construction of such a lens. Furthermore, the granting of a patent added the

telescope to published literature which could be consulted by future lens designers and

engineers. Dallmeyer's device is significant, therefore, as a demonstration that

inventions enabling variation of focal length were under active development prior to the

birth of cinema. Kingslake's description of a variable focal length patented by Clile C.

Allen in 1901 also shows that technological developments in this area continued in

parallel with early developments in motion picture technology (155). In a retrospective

article on the development of the Zoomar lens, Frank Back mentioned the "Busch *Vario

Glaukar*, the Rodenstock *Variogon*, and the *Astro Transfokator*" as "first attempts at

bringing [the zoom lens] to fruition" ("Zoom Lenses - Their…"). He gives no details

about these lenses, but his background and their names would suggest that they were

Austrian or German developments. Elsewhere, there is a hint that a zoom of some

nature may have been used in the production of *The Second In Command* (William

Bowman, 1915), but most accounts agree that it was almost three decades before the

zoom lens began to affect film style.[23]

    A significant gap exists in the historical record between the introduction of

Allen's zoom and the first recorded instances of the zoom shot in motion pictures.

Belton finds an early example in the 1929 Paramount release *Four Feathers* ("The

Bionic Eye" 24). Barry Salt finds still earlier examples of the zoom shot:

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[23] "[Cinematographer William F.] Adler, by means which have defied all expert analysis or explanation,
improvised some mysterious device which enabled his camera to follow action, to truck, dolly and zoom
with a sophisticated facility that seems often quite out of the reach of many a present-day studio […]
equipped with tracks, trucks, cranes and lenses of variable focal length" (Card 40).

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>The first experimental models of what was to be called the 'zoom' lens
>appeared [during the second half of the 1920s]. These had a number of
>shortcomings, in particular that their maximum aperture was only about
>f11, which made them difficult to use for studio work, or even for
>exterior shooting under poor light. As well as that, their focus had to be
>adjusted at the same time as the focal length was changed with the
>'zoom' control. Although these experimental zoom lenses were not taken
>up for general film-making, there are a number of American films from
>1926 onwards which contain one or two zoom shots. (185)

Salt further states that 'nearly all' films featuring zoom shots at this point, including *The Grand Duchess and the Waiter* (Malcolm St. Clair, 1926) and *It* (Clarence G. Badger, 1927), were produced by Paramount. Where the zoom is seen in a contemporaneous MGM production – *After Midnight* (Monta Bell, 1927) – Salt suggests it was probably used as a result of some form of cooperation with Paramount (186). Willemen identifies three further Paramount films in which zooms have been noted: *Wings* (William Wellman, 1927), *The Silent Enemy* (H P Carver, 1930) and *Love Me Tonight* (Rouben Mamoulian, 1932).[24]

Accounts suggest that the cinematographer Joseph B. Walker was instrumental in the development of the zoom lens during the 1920s. Walker recalled in his autobiography that experiments took place, in a trial-and-error fashion, from 1922. He implies that he worked alone: "I turned to one of my experimental lenses […] It seemed a good time to explore an optical effect that had long tantalized me" (Walker and Walker 266). Eliminating the focussing problems caused by varying the position of the

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[24] Willemen does not give sources for this information. Sheldon Hall and Steve Neale discuss the use of the Magnascope, which was used to "increase the size of the image of the screen" during projection (60-1), but this was not a zoom lens in the sense considered by this study.

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two lenses was a challenge, but Walker found a solution by changing the way in which

the lens's optical elements moved relative to one another:

> It became evident that I'd have to move at least one of the elements by
> means of a cam. I traced the shape of the cam; it had a rather strange
> path, very difficult to make in circular form. I resorted to making the cam
> from a flat piece of phosphor bronze, cutting the edge to the required
> shape. It worked well; the lens stayed in focus while it moved from wide
> angle to telephoto. The image appeared to travel through space, therefore
> I called it the 'Traveling Telephoto' lens. In February, 1929, I applied for
> a patent. (266-7)

Kingslake also discusses Walker's inventive work (A History Of… 300), though neither

source discusses the extent to which Walker cooperated with other personnel, or

whether he received any development support from any studios. However, two years

before Walker filed his patent, a Paramount employee named Rolla T Flora filed a

patent which described:

> the provision of picture-taking means having a movable lens system
> controllable by a single operation to have relatively short-focal, telephoto
> or any intermediate focal characteristics with respect to a given focal
> plane […] accomplished generally by the provision of a pair of lenses
> movable with relation to each other to vary the resultant focal length and
> movable together to and from the focal plane in a movement which is a
> function of the distance between them. (Flora col.1)

In other words, a zoom lens. The patent – filed in March 1927 by Flora and Paramount,

and granted in January 1931 – gives some of the earliest evidence for film studios'

comprehension of the potential power and utility of zoom lenses. Flora describes

potential uses for his device, pointing out that it could save time and money by

eliminating the need to move cameras around the studio or set in order to obtain

different shots:

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> Assume, for instance, that it be desired to take a relatively 'long shot' of
> a landscape and then take a close-up of some detail thereof. The usual
> method of accomplishing this would involve either two camera settings
> […] or else the mounting of the camera on a car […] Both of these
> operations call for laborious preparations and are necessarily costly. In
> contradistinction to this, the same situation may be handled by my device
> but with a single setting of the camera. The camera is set up to take the
> long shot and while the film is being exposed the lenses are moved as
> described above to cause the gradual magnification or increase of linear
> dimensions of the image on the film, thus giving the effect of a gradual
> change from a long shot to a close-up. (Flora col. 1-2)

Alternatively, Flora added, the operator might stop the film, change the focal length,
and restart the film. Walker's patent – filed in September 1929 and granted in February
1933 – describes similar techniques in similar terms.

Zoom shots appeared in at least two later films, *Dirigible* (1931) and *American
Madness* (1932) – both directed by Frank Capra. Walker served as director of
photography on both films. According to Joseph McBride, Capra later claimed to have
assisted Walker with aspects of the invention, though Walker denied that Capra played
any role whatsoever (190-1).[25] It is not clear whether Walker continued to use the zoom
lens of his own invention. If not, he may have transferred his understanding of the zoom
shot to the newer 'Varo' lens, developed by Arthur Warmisham, which became
available during the early 1930s (Kingslake 156; Belton "The Bionic Eye" 24). An early
advertisement for the lens in *International Photographer* in January 1932 informed
cinematographers that:

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[25] McBride adds that the two men enjoyed a close relationship through the 1930s and 1940s, and it is
conceivable that Capra played some role in adapting Walker's zoom lens for television use in the late
1940s. The Electra-Zoom, discussed below at page 126, is relatively poorly documented and as a result it
possibly occupies a smaller space in this study than it deserves.

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This totally different lens opens up a wide range of new possibilities and spectacular effects. It makes it possible to 'swoop' or 'zoom' down on a subject and to recede from it *without moving camera or scene*. 'Close-ups' can be taken in sound photography work without danger of extraneous noise. 'Zooming' scenes from far back to close-up can be taken of actors on a cliff or other inaccessible locations. The new effects that skilful camera men will work out with it are many. ("The B&H Cooke…")

According to Salt, the Varo:

was an improvement over earlier experimental zoom lenses in that only the focal length control had to be adjusted while zooming, it had occasional limited use for a few years. […] Apart from the rather small maximum aperture, which still precluded its use under the standard studio interior lighting set-ups of the time, the other drawback to this lens was that the focus was fixed at the hyperfocal distance, and closer objects had to be focussed by putting supplementary lenses in front of the front element. (*Film Style and Technology* 207)

This procedure, Salt adds, involved opening the lens and adjusting its internal workings. Salt suggests that, because of the Varo's limitations "these lenses seem to have passed into the hands of the special effects departments of the studios, where they were occasionally used to get shots in montage sequences" (207). This agrees with Belton's account, which cites few filmic examples of zoom shots after the cluster of films released between 1926 and 1932, but proceeds directly to the discussion of the use of zooms on optical printers during the 1930s, 1940s and 1950s. Belton identifies examples of such shots in *Silver River* (1948), *Colorado Territory* (1949), and *The Big Sky* (1952).

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Despite limitations and limited use, evidence indicates that zoom lenses had made some impact on industrial practices by late 1932. In October of that year an article reprinted in *JSMPE* announced:

> National standards for all phases of the technical equipment and operation of the motion picture industry, from the lighting and acoustics of studios to the projectors and screens of picture houses, have been requested by the Society of Motion Picture Engineers. ("SMPE Requests National…" 393) [26]

It was felt that technical terms were used in an inconsistent manner:

> The terminology of the motion picture field is confused at present. Such terms as 'blimp,' 'zoom,' 'pan,' 'tilt,' 'projection angle,' 'wow,' or 'flutter,' and the like, are used without official recognition. This situation requires correction so far as is feasible. (393) [27]

This reflects the extent to which, by the early 1930s, the term 'zoom' had become embedded in industrial discourse surrounding film. Though the term which may have originally referred to "a fast tracking movement forward" (Bordwell *On The History…* 313), it was now becoming a more specific reference to an apparent movement made by optical means. Furthermore, as early as the mid-1930s, some filmmakers already chafed at the limitations of existing zoom lenses. The SMPE president, A. N. Goldsmith, remarked in a 1934 edition of the society's *Journal* that:

> Some workers are prepared to accept the theory that the optics of photographic lenses are not capable of basic improvement, but if some way to diminish the large number of lenses that are required in the studio for close-ups, medium, and long shots could be contrived, it would be a

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[26] According to the *JSMPE* the article originally appeared in the American Standards Association periodical *Industrial Standardization* 3.9 (1932): 247.

[27] This use of the word 'zoom' in the photographic context predates the OED's first reference by two years.

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step forward. *Zooming by more convenient and automatic means is desirable*. (352)

The following year, the SMPE progress committee reported:

> zoom lenses have made great advances during the past year and, although not yet perfected, a zoom lens can be expected in the near future that will operate at an $f$/2.3 speed from a 35-mm. angle to a 150mm. angle, making possible a single lens doing the work of at least six lenses of the present type. ("Progess In The…" 6)

If zoom shots were only occasionally used in filming in the mid-1930s, as Salt claims, it is nevertheless possible that they were more often used in training films, documentaries, and newsreels. Describing the training films of the US Army for *JSMPE* in February 1936, one account states:

> All the various camera, optical printer, and sound tricks can be called upon to assist in improving the effectiveness of the training film. Zoom shots from long views to close-ups and the opposite are effective in maintaining orientation and at the same time provide opportunities for examining minute details. (Gillette 182)

While this may be a reference to zooms created in post-production with the aid of an optical printer, it nevertheless shows that the zoom as a concept and technique remained current during the 1930s. Furthermore, Bell & Howell continued to market the Varo as a tool for dynamic filmmaking well into the 1930s: a 1935 advertisement for the technology promised 'drama at the touch of a lever' and proclaimed that the Varo was a lens:

> holding within its amazingly precise complexity a thousand possibilities for the kind of a scene that stirs the emotions of millions. An artist breathing life into a daring composition, the cameraman moves a crank and creates a masterpiece. ("Drama at the…")

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So, while (as Salt and Belton suggest) it may have been more common to use a zoom lens as a post-production technology, it is clear that zoom lens manufacturers and distributors remained keen to show the expressive potential of the device during initial filming. There is some evidence that filmmakers responded: Belton identifies an early use of the zoom lens as a subjective device in *Private Worlds* (Gregory LaCava, 1935).

Zoom lens innovation continued throughout the 1930s and 1940s, despite some claims to the contrary. Kingslake states that "because of the great Depression that raged during the 1930s, no further development of zoom lenses was undertaken until after World War II" (Kingslake *A History Of…* 156). This is mistaken: the patent record shows that a number of inventors and groups of inventors continued to carry out research into zoom lens technologies throughout the 1930s and during the War. Zoom lens development work continued, for example, at Paramount. In June 1936, Lewis Mellor and Arthur Zaugg filed a patent on behalf of the studio describing an invention:

> to provide a variable equivalent focal length objective characterized by large relative aperture, as substantially $f$/2.7, throughout a range of magnification substantially as great as 1 to 3½, and which is corrected to an extent requisite for motion picture purposes throughout each range of use. (Mellor and Zaugg col. 1)

Zoom lens research also took place in New York, where in September 1934 Lodewyk Holst, William Mayer, and Harry Menefee of the C-Lens Corporation filed a patent (granted in September 1938) for a lens system in which:

> By simultaneous displacements of the first two constituents relatively to one another and in accord with their respective motions relative to the third constituent (which remains in fixed relation to the focal plane of the system) the equivalent focal length of the system is variable without changing the back focal distance of the system, which is maintained

constant by the action of the third constituent. (Holst, Mayer and
Menefee col. 2)

The inventors claimed that this would "produce optical results hitherto unattainable"
and specified "high speed photographic work, such as the taking of motion pictures"
(Lens System col. 1) as one of the areas of work to which their invention might be
applied. Two years later, in July 1936, Kodak researchers John Capstaff and Oran
Miller filed a patent outlining a type of optical system:

> of continuously variable focal length particularly adapted for use as a
> photographic objective so that the pictures taken therewith may be made
> to appear to have been taken from different distances or continuously
> changing distances from the subject, without the necessity of altering the
> distance between the camera and the subject (col. 1).

There seems to be little doubt, on the basis of this evidence, that Kingslake's assertion
that no zoom lens development was undertaken between the early 1930s and the end of
the Second World War is incorrect. However, what is not clear from the available
evidence is the extent to which devices invented during this period were marketed
and/or successfully innovated.

The brief history outlined above raises a number of questions beyond the scope
of the current enquiry. While patents and other historical documents provide us with
information about who worked on variable focal length and zoom lens technology, and
when key steps – such as patent filings – were taken, a great deal of qualitative
information is missing. It is not known how many people contributed to these
development efforts, nor the extent to which film producers and the manufacturers of
allied technologies invested in such efforts. The evidence strongly implies a sustained
commitment on the part of Paramount, but there is little information about whether
other studios attempted to develop similar technologies. Furthermore, there is an almost

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complete lack of historical documentation to explain why zoom shots did not become a commonplace of film style in the 1920s and 1930s. Concerns about the image quality and light transmission of early zoom lenses have been offered as possible reasons for the failure to innovate zoom lenses during this period (Salt, *Film Style and Technology* 207; Belton "The Bionic Eye…" 24). These are credible possibilities, but it is also possible that studio managers and/or production personnel had other, more stylistically-based concerns. The archives of various studios and manufacturers may shed some light on this murky area, but for now such sources remain untapped.

What is certain is that by 1939, when Frank Back began developing devices that would later contribute towards the Zoomar lens, he was doing so as part of an active research community that had been altered, rather than halted, by economic depression and global conflict. He was not, as Kingslake's account would imply, reviving a field of research that had lain dormant for a decade. The Allied war effort provided the immediate impetus – and, crucially, the source of funding – for Back's first zoom lens developments. But it is likely that that by the time Back came to file a patent for a new type of zoom lens, he was well aware of his situation within a professional community which had been continuously researching improvements in the area of motion picture zoom lenses for over twenty years. The most striking difference between earlier zoom lenses and Back's Zoomar is that the latter was fully and successfully innovated, and subsequently diffused throughout the industry. The salient factors in the successful innovation of the device were numerous, and more complex than straightforward technological superiority.

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**Frank Back and the Zoomar Lens**

Franz Gerhard Back was born in Vienna in 1902. He gained a bachelor's degree in

mechanical and electrical engineering from the Technische Hochschule (Technical

University) in Vienna, followed by a doctorate in technical science ("Register of

Frank…"). According to testimony given in *Zoomar vs. Paillard*,[28] Back studied optics

"as a side line" from the outset of his academic career (Kaufman 22). Back next worked

as a consultant for the Berlin endoscope manufacturer Georg Wolf, and sold two patents

to the firm (23). He first came to the United States on business in 1928, where

according to a letter of recommendation "his occupation was the establishment and

supervision of our mechanical works overhere [sic] for the manufacturing of mechanical

apparatus and other devises [sic] of high precision" (Photor Corporation). Back

remained connected to the optical business in that country from that point forward (24).

As a profile in the *New Yorker* later noted, Back's major pre-war innovation was:

> a camera capable of taking pictures of the interior of the stomach *from*
> the interior of the stomach […] made in this country since 1928, in
> which year Dr. Back visited the United States for the first time. (Klaw
> and Gill 30)

After a brief stay in Paris in 1938, Back emigrated permanently to the United States in

1939. There, he was employed by "the Gastro Photo-Laboratories, the General Power

Plant Corporation, and the Helix Gage Works, all of New York" ("Personalia"). In

addition, Back "designed and manufactured a number of optical devices for the armed

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[28] Parts of this chapter, and those which follow, draw on evidence from the trial transcript in the case of *Zoomar, Inc vs Paillard Products, Inc.* The *Zoomar vs. Paillard* transcript consists of 616 continuously-numbered pages divided between four folders in two storage boxes at the Library of Congress in Washington DC: box 8 folders 5 and 6 (covering pp. 1-148a and 149-292a of the transcript) and box 9 folders 1 and 2 (pp. 293-454 and 455-616). The judgement was published in the *Federal Supplement* and is referenced as 152 F. Supp. 328. For clarity and convenience, this study takes the trial judge, Kaufman, as the 'author' of the transcript.

forces, including one called the Peritelengiscope, which […] was used by the Navy in its Link trainers" (Klaw and Gill 30).

Back won praise from two branches of the US military for his wartime work. In September 1944, following the completion of a contract to deliver the Peritelengiscope, L. D. Wallick of the Navy Department's Bureau of Aeronautics wrote to Back:

> You may be interested to know that previous to entering into a contractual agreement with you on this project, a number of other sources had been considered, but upon presentation of the optical problem, the concurrence of opinion seemed to be that the problem was very nearly impossible of solution. The self-correcting optical system with a minimum number of moving parts, which you devised, has met with the exacting requirements of this problem. That you and your associations have handled this difficult problem so expeditiously, and that you met an early delivery date that hitherto had been regarded with scepticism, is sincerely appreciated. Your ingenuity and cooperation have been a real contribution to the war effort. (Wallick)

Back's other military project, which was to produce a variable focal length viewfinder for the camera operators of the United States Signal Corps, resulted in a similar letter of appreciation in May 1945:

> A number of Optical Engineering firms had abandoned this problem before you undertook this development, which lends emphasis to the speed with which you arrived at a satisfactory optical solution. Prior to preliminary design, this laboratory found your cooperation in the matter of mechanical revisions necessary to conform with the requirements of field service was prompt and wholehearted, and the resulting instrument should give excellent service under field conditions. We hope to be able to call upon you for the solution of similar problems in the future, with full confidence in your ability to satisfactorily comply with [the] optical and mechanical requirements of the Signal Corps. (L. T. Goldsmith)

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In the final years of the war, Back began to promote his optical achievements at meetings of professional societies. In May 1945, at an SMPE Technical Conference in Hollywood, California, Back described his invention of "a positive vari-focal view-finder for motion picture cameras". The essential principles of a working zoom lens are encapsulated within this invention, which Back claimed made it possible to vary to magnification of the image within the viewfinder while maintaining the size of the image. This compared favourably with earlier viewfinders, which had simulated different focal lengths either by mechanically altering the size of the field of view, or by utilising arrangements of lenses which could perform a zoom-like operation, but had the disadvantages of not maintaining steady framing of the image and sometimes altering the size of the image relayed (466).[29] As with later Zoomar lenses, the front and rear elements in the system remained stationary while a linear movement of a pair of internal elements between them provided for the alteration of focal length (468).

Back's second innovation, the 'peritelengiscope' designed to improve the Navy's Link trainer flight simulators, was unveiled at an SMPE meeting in New York on 15 October 1945. Back described a "Nonintermittent Motion Picture Projector With Variable Magnification", stating that "in the course of the Navy aviation training program, a projector had to be designed to study the image of a target vessel on a curved cyclorama screen" ("Nonintermittent Motion Picture…" 248). It is unclear what proportion of the projector Back had himself designed, though it seems to have some of its roots in an earlier non-intermittent projector developed in collaboration with the Austrian physicist Felix Ehrenhaft and presented to a conference of the SMPE in late

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[29] The viewfinder Back describes was used on Bell & Howell Eyemo cameras used by military cameramen working for the United States Signal Corps (Mackenzie AR23). This innovation was patented under the name of Back's supervisor, Edward Kaprelian.

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1939 (Ehrenhaft and Back). Given the variety of different operations performed and technologies employed, it seems unlikely that he was responsible for all of it. In light of what is known of Back's other research interests, however, it seems likely that he was at least closely connected to the development of the simulator's optical technology. Like the viewfinder described above, the projector made use of a variable focal length lens in order to change the size of the image projected. Unlike the viewfinder, the lens appears to have been compensated on a non-linear basis:

> It was found after plotting the necessary movements of the two lenses against the range, to which the required image size is co-ordinated, that one lens movement is linear, while the other movement follows an irregular curve of the fourth order. (248)

Aside from employing a different means of image compensation, Back also emphasises that "this special optic allows the change of magnification […] without impairing the optical quality of the image" (249), which had not been a noteworthy consideration in the case of the viewfinder.

From this evidence it is clear that between emigrating to the United States and beginning to market television and film camera zoom lens in the mid-1940s, Frank Back engaged in substantial research in the field of variable focal length optics. Furthermore, Wallick's reference to "you and your associations" also suggests that Back had begun to build a circle of professional partners in order to strengthen his capacity to research and develop optical devices, placing him in a good position to capitalise upon his innovations when the war ended.

The end of the Second World War brought significant changes to American industry, and consequently to the country's entertainment industries. Barnouw writes:

> As peace came, it was possible to discern an explosive set of circumstances. Electronic assembly lines, freed from production of

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electronic war matériel, were ready to turn out picture tubes and television sets. Consumers, long confronted by wartime shortages and rationing, had accumulated savings and were ready to buy. Manufacturers of many kinds, ready to switch from armaments back to consumer goods, were eager to advertise. (99)

More favourable economic conditions precipitated the return of a vigorous consumer economy, providing new opportunities for entrepreneurs. Service personnel returned from active duty to bank accounts holding substantial unspent wages, and benefited from educational opportunities resulting from the Serviceman's Readjustment Act, known as the G.I. Bill (Mooney and Bown 7) – including access to educational courses in disciplines related to filmmaking ("Kuklapolitan Cameraman").[30] Some – like Back – had been active in the development of new technologies and processes urgently in need of declassification and adaptation for civilian use ("Review of the…" 414; Mooney and Bown 5). By 1946 rising living costs, food shortages and strikes were symptoms of an economy "badly askew" (Goldman 25-6), but the American film and television industries were well-positioned to benefit from an unprecedented injection of technological innovation, and from the invigorating effect of new competition. As Woods notes:

> The war […] contributed to consolidation in industry and labor: fewer corporations produced more goods more efficiently and employed more people. […] New industries, such as those manufacturing synthetic rubber and, later in the war, jet aircraft engines, sprang up, and American

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[30] Further research may determine whether examples of postwar expansion such as the establishment of "Bell & Howell's School of Optical Manufacturing" ("B&H Offers Employees…" 103), or the establishment of an optical printing firm by "David Manashaw, recently released from the Navy where he was associate with the training film and motion picture branches as a Lt. Commander" ("New Optical Printing…" 185), were partly consequent of GI Bill funding.

chemical and electronic enterprises led the world in productivity and
technological innovation. (2)

Throughout 1945 and into 1946, *American Cinematographer* examined the activities of
camera operators returning from wartime duties, and considered the post-war future of
the industry – with special regard to television activities. A May 1945 interview
declares that:

> James Wong Howe […] is not a man to live in the past. He is already
> looking ahead to the post-war era of motion picture production, and is of
> the opinion that it will largely by predicated upon new and more
> perfected methods of camerawork. (Goodman 160)

It is clear that the conclusion of the war, and the return of economic and social
conditions more conducive to open-market entrepreneurship and innovation, spurred
developments in many areas of filmmaking. Technologies developed during wartime
were of direct influence to the postwar film and television industry. In December 1945,
*American Cinematographer* noted that:

> it's interesting to observe the gradual release of information on secret
> photographic equipment which the Army and Navy used to excellent
> effect during the war. There is no doubt that many of these cameras or
> tools will eventually be adapted by the manufacturers for professional
> and civilian use. ("Review of the…" 414)

Accordingly, Back's innovations became candidates for conversion to civilian
peacetime applications. The next innovation to be publicised by Back, at an SMPE
technical conference in New York in May 1946, was the first version of the Zoomar
lens.[31] Back explicitly linked the lens to his earlier, wartime, innovations. He indicated,

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[31] As stated in the previous chapter, the term 'zoom' was well-established in the filmmaking industry by
1946. The term 'zoom' did not follow from the trade name 'Zoomar', as some accounts incorrectly
suggest.

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in an article printed in *American Cinematographer*, that some of the technology needed for the lens had been developed for the viewfinder and flight training devices described above:

> Though the Zoomar is a result of long and painstaking research, the final development has been greatly speeded up by the recent war. By developing various instruments for the armed forces, which in one way or another involved varifocal optical systems, valuable experience was gained. The Varifocal Viewfinder PH-532/UF for example, [was] designed for the combat cameras of the U.S.A. Signal Corps. ("The Zoomar Lens" 87)

The process by which Back carried out the initial development of what became the 'Field Zoomar' model is not comprehensively documented. Back's extant papers include little material from this period, and it is not clear whether he maintained an 'inventor's notebook'. According to Bill Pegler, the son of early Zoomar investor Jack Pegler, Back designed the zoom lens on a comptometer in a New York City loft factory, probably located at 381 Fourth Avenue in Brooklyn.[32] The factory's position, directly above a subway line, caused vibrations which made the lenses difficult to test.[33] In 1957, Back recalled that he spent "two or three years" developing the lenses in a trial-

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[32] There is little evidence for the calculation and computation tools used by Back and his associates. It is clear, however, that early office computers were a factor in the design and development of Zoomar lenses. For example, several undated and uncaptioned photographs show Herbert Lowen using a Burroughs E101 office computer (Back Papers, 5/4). In somewhat more general terms, Kingslake details the practicalities of designing optical lenses before the availability of modern computers: "The period from 1920 to 1960 covered the years during which all lenses were designed by hand using a desk calculator and a book of tables. Prior to about 1926 calculations were made using logarithms, and since about 1956 electronic computers have taken over. From 1920 to 1960, lens design consisted mainly of eternal raytracing, with occasional time out to plot a graph, or take a couple of aspirins while you decided on the next change to be tried" ("Lens Design By…" 3).

[33] In late 1952 or early 1953, Zoomar moved to new headquarters at 55 Sea Cliff Avenue in the town of Glen Cove on Long Island ("Zoomar To Mark…"; "This Firm Wants…").

and-error fashion, during which he "computed lenses, […] made models, […] tested all these models, tried them out, and evaluated the results" (Kaufman 38). Back worked with "two of my assistants, Herbert Lowen and Leonard Bergstein" (Back "Zoom Lenses - Their…"). Another account of the Zoomar's development suggested that perfecting the image it produced was as challenging a task as the initial design of the lens, because:

> the complicated optical system of the Zoomar was basically afflicted with many aberrations. Correction of these aberrations was one of the major tasks in designing the Zoomar. Ordinary correction methods of optical design broke down and [other] ways had to be devised. (Back "The Physical Properties…" 59-60)

Back's development work was not, however, confined to the laboratory. During the invention process, he collaborated with at least one working camera operator in order to test the prototype Field Zoomar lens. A New York cameraman and film producer named Raymond B. Gamble recalled using "an experimental lens […] Produced by Dr Back […] before it was put on the market […] I used it to see for myself the operation of the lens. I was interested in the Zoomar; I had heard about it" (Kaufman 309). Gamble recalled:

> The first shots I made with the Zoomar lens was [*sic*] in either 1945 or 1946 at the Museum of Natural History, of the [dioramas]. At that time I was producing a television show for Alexander Smith entitled *The Magic Carpet*, and I think the first film that was put on TV as far as I know, we shot at the Bronx Zoo and that went out on Channel 5 either in 1945 or 1946. […] It was a prototype lens, and I know the first time I ever used it was at the Museum of Natural History. That was prior to the time that I went on the air with show, and at that time we photographed the [dioramas] up there, the displays of the various animals. (Kaufman 307, 309)

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According to Zoomar salesman Walter Steuer's testimony in *Zoomar vs. Paillard*, the first Field Zoomar lens was sold in "July 1946 […] To Hartley Productions […] a movie company" at a cost of "$1400 plus $210 excise tax" (Kaufman 318). Steuer's testimony is confirmed by a 1947 edition of *Business Screen*, which describes how:

> The Zoomar has been tested in the field by various commercial producers during the past year. Hartley Productions' Irving Hartley reported excellent results last summer in shooting scenes of aircraft zooming over an airport. ("Jerry Fairbanks Zoomar…")

Therefore, although Paramount Newsreel is suggested by most sources as the first company to use the Field Zoomar lens, other people and companies received prototypes, and it can be surmised that their feedback contributed to an on-going development process.

Around the time of the sale of the first Zoomar lens to Hartley Productions, Back filed a patent to protect the device's design.[34] The patent includes one of the earliest descriptions of the Zoomar lens, and makes clear the anticipated utility of the invention:

> It is a conventional practice in the moving picture industry to provide zoom effects by the simple device of moving the camera towards or away from the object. To eliminate the need for such camera movement, varifocal lenses have been invented. These lenses provide different focal lengths to adapt the camera to the different and changing requirements of zooming. These varifocal lenses have been very unsatisfactory both from the point of view of manufacture and use. (col.1)

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[34] US Pat. 2,454,686, hereafter referred to 'patent 686'. In the 1950s a court found this patent and a subsequent similar patent invalid, following a legal challenge from the equipment distributor Paillard. Zoomar unsuccessfully appealed the judgement in 1958. This is discussed below. Back also applied for, and was granted, a trademark on a specific design of the word 'Zoomar'. In his application, Back asserted that he had been using the Zoomar trade name since April of 1946 (US Registered Trademark 432534).

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Back's patent also describes the mechanical challenges posed by existing zoom lenses:

> It is virtually impossible to obtain an accurately focused image over the whole focal range. The spacing of the several component parts of these varifocal lenses is so critical that even a minute deviation throws the image entirely out of focus. Normal wear in the moving parts suffices to throw the system out of focus. (col.1)

The patent makes a number of important claims about his new zoom lens, which it described as having a focal length of 17 to 51mm: most notably, that the system would hold focus throughout its zooming range, that it could be adapted to any existing model of camera, and that it contained only one moving part within the lens mechanism itself. Although potential applications for television cameras are not detailed in the opening paragraphs of the patent, in the later section listing claims, Back is cautious to describe zoom lenses as suitable for both motion picture and television cameras (col.6).

Back gave further information about the background to the development of the Zoomar lens in two articles in the trade press – one published in *American Cinematographer* in March 1947, the other in *JSMPE* a few months later. These trade press articles represent the beginning of the marketing of the Zoomar lens: by this time, Back had found business partners who possessed skills and connections necessary to reach the motion picture industries – the industrial film producer Jerry Fairbanks and former advertising executive Jack Pegler, whose contributions are discussed below. In *American Cinematographer*, Back was specific about the intended practical applications of his invention: the priority was economical filming. He explained:

> any scene of a dialogue between two or more persons, in which the cameraman plans to start with a total view of the situation and then concentrate on one of the persons, can be produced with greater speed and less expense by using the Zoomar lens […] In many cases the use of two or more cameras can be eliminated and an effect similar to cross-

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cutting can be achieved with the Zoomar lens without the costly loss of valuable studio time by alternating telescopic view and wide-angle shots. ("The Zoomar Lens" 87)

Back's article suggests a comprehensive understanding of constraints and requirements of studio and newsreel filming. It describes:

the difficulties of a cameraman covering a session of the United Nations Assembly, or any other formal meeting, from the press and film gallery. Very often, long sequences of one speaker are required and only one camera available, the exchange of lenses on a turret camera is not rapid enough to assure an uninterrupted flow of pictures of the speaker. A variable focus lens fitted to the camera will guarantee an absolutely continuous picture flow and achieve the vividness and variety of closer and wider shots which up to now were only a cameraman's dream. (109)

In later years, zoom lenses would often be marketed as alternatives to a battery of prime (fixed focal length) lenses. However, this was not Back's stated intention when initially marketing the Zoomar. He stresses: "In spite of its versatility the Zoomar was by no means designed to replace the other camera lenses now in use. Its main purpose is to serve in situations where other lenses or other technical means would fail". The final area of greatest potential for the zoom, as Back saw it, was in:

nearly unlimited possibilities in the field of trick-shots and special effects. A rapid zoom taken from a high roof top with a camera tilted downward gives the impression as if the cameraman were falling from great heights, an effect which can hardly be achieved otherwise. (109)

For Back, the zoom could justifiably break:

one of the basic rules of orthodox camera technique, namely, that every camera movement has to be slow and steady […] the unorthodox, rapid, even hasty zoom itself is a powerful tool to express dynamic definite emotions like fear, terror, anxiety, etc., especially in the field of the modern artistic films. (109)

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Back concludes the article by mentioning that television filming was confronted by many of the same issues, and that "a varifocal lens similar to the motion picture Zoomar but adapted to the special needs and conditions of television work is now in preparation" (109). In a *JSMPE* article based on a paper presented to the Society's convention on 25 October 1946, Back made many of the same claims for the Zoomar. The article, which has a slightly more technical focus, documents the advantages in image quality of the lens, including charts showing levels of 'spherical aberration', 'coma', 'astigmatism', and general 'distortion'. Despite the technical focus, the article also includes a strong aesthetic argument in favour of the zoom shot. Back suggests:

> it is no exaggeration if we say that the close-up, this powerful means of expression given to the motion picture art by D. W. Griffith, has really come into its own by the introduction of the zoom shot. The Zoomar lens eliminates the difficulties which up to now have complicated the use of this technique. ("The Physical Properties…" 63)

It is evident that, in developing the Zoomar lens, there was no 'eureka moment' for Back: the invention process was one of trial, error, modification, and further trial, which resulted in the production of a zoom lens of sufficient quality that it could be sold to newsreel production companies such as Paramount and Hearst. The Zoomar lens did not revolutionise feature film production practices, and was used only occasionally in such productions.[35] The significance of this earliest version of the Zoomar lens is that it represented a consolidation – and peacetime application – of earlier technologies developed for military use. The first Zoomar lens raised valuable working capital and gave Back and his fellow investors commercial momentum. However, the bigger influence on television working practices and moving image style was made by later

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[35] It may have found more immediate popularity in the commercial filming industry: *American Cinematographer* describes one such application as early as 1948 ("Insurance Company Produces" 241).

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television versions of the lens. The next chapter demonstrates how Back, Pegler, and Fairbanks persuaded first newsreel, and then television networks and broadcasters, to buy Zoomar lenses – and the subsequent chapters discuss how the technology affected television style in the following years.

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# 5. Marketing the Zoomar Lens

Take me out to the ball game,

Turn the volume up load.

With 'Zoomar' lens and TV snack,

I don't care if I never come back.

(Maddocks 14)

**Paramount Newsreel**

By 1946, the fundamental work of developing the Zoomar lens was complete, and

initial marketing – in the form of Frank Back's patent and communications to trade

personnel – was underway. Neither the variable focal length lens nor the zoom shot

were entirely new concepts for moving image production personnel. But the availability

and use of such techniques was sufficiently limited to make the Zoomar lens a novelty.

This is indicated by the advertising material used to promote it to film and television

producers and exhibitors, as well as by the recollections of industry personnel – a

number of whom testified to the novelty of the lens during the *Zoomar vs. Paillard*

court hearing in 1957. Edward Kaprelian, at the time chief of the photographic branch

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of the Signal Corps Engineering Laboratory based at Fort Monmouth, New Jersey

(Kaufman 210), recalled:

> Initially there was great curiosity about an optical system that could
> achieve [zooming] by purely optical means, and as people learn [*sic*]
> more about how it was operated it was accepted generally as an
> important advance. (231)

Testifying in the same case, Raymond Gamble, who was one of the first working

camera operators to use a Zoomar lens, remembered that it was "very new in the

industry, very revolutionary, something we had never seen before" (312). Another

witness, Lou Hutt, then Paramount Newsreel's chief camera operator, recalled that

when the Zoomar was introduced:

> It was an entirely new thing to us. In fact, it was so different that
> everyone wanted to get one right away, and we had an exclusive because
> we had an arrangement with Dr Back if we bought one we would have a
> six months' clearance over the other companies. (305)

The novelty of the Zoomar lens may have been a significant factor in its

successful innovation, but the historical record reflects more complex marketing and

promotion strategies. In order to innovate the device, Back called upon the

entrepreneurial and marketing abilities of Jerry Fairbanks – a producer of industrial

films – and Jack Pegler, a New York advertising executive, who worked at the time for

Fairbanks. There is little evidence to indicate how the three businessmen began their

association, though Bill Pegler suggests that Jack Pegler had "noodled around to attract

products" and became acquainted with Back in this manner. Investigation of this

question is hampered by a lack of clarity about exactly which company was financially

responsible for Zoomar lenses at this point. Kingslake's brief biography of Back

indicates that "after the war he established the Viewfinder Corporation in New York

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City, where he designed the first Zoomar lens" (201), yet the articles from *JSMPE*

referred to above all identify Back as being attached to an organisation called Research

and Development Laboratory, which is known to be Back's own company ("Register of

Frank…"). Some trade press articles suggest that Jerry Fairbanks Productions was the

company doing the promotion and making the sales ("Songwriter to Make…" 64), and

one early account of the Zoomar lens described it as the "Jerry Fairbanks Television

Zoomar Lens" ("Jerry Fairbanks Zoomar…"). In 1991 Fairbanks appears to have

recalled in an interview that he "was responsible for finding Frank Back […] and

financing his work", but regretted that he never bought the patent rights to the invention

(Krampner "Three times better…" 20).[36] In late 1948, well after significant numbers of

Zoomar television lenses had already been sold, Back, Pegler and Fairbanks

incorporated the Television Zoomar Corporation, to "handle manufacture and sale of

Zoomar television and motion picture camera lenses" ("Hollywood Bulletin Board"

368). Bill Pegler recalled that a separate company, Zoomar Corporation, was also

incorporated to handle manufacture and development. Furthermore, Jack Pegler

remained employed by Jerry Fairbanks International until May 1949, when he left to

become "sales chief of the Zoomar Corp" ("Fairbanks Firm Shifts…"). The best sense

that can be made of this confusing picture is that Back, Fairbanks and Pegler were all

heavily and mutually involved in the Zoomar lens. The formal organisation of the

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[36] Though more prominent in the industry than Pegler or Back, Fairbanks proves to be the most enigmatic of the three as far as the Zoomar story is concerned. Krampner is one of the few journalists to have spoken to him about his involvement with Zoomar. Notes from the interview are not extant and, in an email to the author, Krampner could not recall anything further than Fairbanks' recollections as quoted here (Krampner "Your Facebook Note…"). Fairbanks' involvement in the Zoomar firms was in any case relatively short-lived: in November 1952, *Variety* reported that he had sold his share in the company to Back and Fairbanks ("Television Chatter" 36).

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companies is probably less significant to this study than the general nature of their

working relationship.

Although an early prototype Zoomar lens had been sold to Hartley Productions

in 1946, the first sale to a major customer – to Paramount in October 1947 – was much

more significant. The *New York Times* reported that the studio's newsreel division had

purchased a Zoomar lens to be used when covering the World Series baseball games

between the New York Yankees and the Brooklyn Dodgers. The newspaper reported

Paramount's claim that the use of the Zoomar amounted to "history […] being made".

The report, probably quoting a Paramount press release, explained that the Zoomar:

> makes it possible to take close-ups of every play and player on the field
> with uninterrupted continuity. With a flick of the wrist the Paramount
> camera man, equipped with the Zoomar lens, follows the ball from
> pitcher to batter and from the batter to the depths of any part of the field,
> keeping the entire action in perfect focus. (Weiler X5)

Back worked closely with Paramount to ensure that the Zoomar lens performed as well

as possible. He later recalled: "I participated during the baseball game. I was there to

almost every take [*sic*] because I was helping the newsreel men with that lens"

(Kaufman 29). Paramount's newsreel dated October 8, 1947 was the first to include

shots made the with the Zoomar lens ("'Zoomar' in Action" 47). Bill Pegler recalled

that a business deal secured a large order of lenses from Paramount by stipulating that if

Paramount used *any* footage which had been shot with the Zoomar, they were obliged to

purchase seven of the lenses. In exchange, the evidence suggests that Paramount

received exclusive use of the lens for a period of several months.[37] The lens captured a

crucial, series-winning outfield catch – forcing Paramount to use the footage, and

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[37] This exclusivity appears to have applied only to the newsreel market, as by this stage negotiations with
NBC over the purchase and delivery of a Zoomar lens (discussed below) were well advanced.

committing them to buy the lenses (B. Pegler). This provided Zoomar with a substantial order, leading, it is likely, to a significant injection of working capital.

Zoomar's windfall was Paramount's investment, and the newsreel division's commitment to the lens was evident in their marketing material. An advertisement in *Broadcasting-Telecasting* described the Zoomar lens as the "most important innovation in screen reporting since sound" and claimed that it made:

> news more dramatic than ever. Now from the local ball park to the international conference table, *any* shot can be made a vivid, thrilling close-up… since this new magic eye has been added to the Eyes and Ears of the World. ("Paramount News")

Publicity material distributed to cinema managers included rave reviews of Zoomar-augmented baseball coverage ("Zoomar Promotional Materials"). The material quoted a company agent in New Orleans who remarked: "everything that has been said about Zoomar Lens is more than true. One exhibitor shook his head and said he didn't see how it was possible". An agent from Connecticut said: "Our major accounts are advertising Zoomar in the newspapers, and featuring it in the lobby". The publicity material also included laudatory (and undated) press clippings. *Variety* reported: "Paramount Newsreel threw the house into a feverish parallel of the ballpark. Focus is so sharp players' expressions become public knowledge". The Washington DC *Evening Star* commented:

> Zoomar audiences are close enough to touch Johnny Lujack when he drops back for a pass. Spectator gets the feeling he might be spiked or trampled. [*sic*] Just about impossible to beat for excitement.

Paramount's own promotion was unequivocal. A poster proclaimed: "It's New! It's Amazing! It's Boxoffice Magic! And Paramount News Has It First!". Sid Hix drew a satirical cartoon for the trade magazine *Broadcasting-Telecasting* in which a director

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remarks that a camera operator "[has] been panning dames instead of the game ever since we got that Zoomer [*sic*] lense" ("Sid's Been Panning…").[38] Pegler and Fairbanks proudly distributed copies of the cartoon to potential customers.

Self-serving promotional accounts such as those distributed by Paramount cannot be verified, but the evidence suggests that the Zoomar remained an important tool for Paramount's newsreel camera operators for at least a decade after its introduction. During testimony to *Zoomar vs. Paillard* in 1957, Paramount chief cameraman Lou Hutt claimed the Zoomar lens had generated "many thousands of bookings plus many thousands of dollars in return" for the company (Kaufman 304). According to Hutt, the device retained its appeal because:

> There are various types of shot that we perfect with the use of the zoom lens, in some instance like a football game or a baseball game, why, we want a wide angle, and pencil down with an individual shot or follow-through shot. For instance, in baseball you can take the entire diamond in from the front of the balcony in the baseball field, and as soon as the batters [*sic*] hit the ball, we will say, to center field, or a home run, why, we zoom right straight out and follow the ball into where it lands, giving you a terrific effect. (302)

The Hearst Newsreel company was another early adopter of the Zoomar lens, and examination of Hearst footage made with Zoomar lenses demonstrates the significance of the device – but also highlights limitations not mentioned in Paramount's promotional material. A Hearst *News of the Day* account of an American football game between the Cleveland Browns and the New York Yankees ("Pro football championship…" - release date 15 December 1947) – which opens with a shot of a zoom lens in operation – includes shots which start at wide angles, then zoom in to

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[38] A later Hix cartoon portrayed a camera operator following a firefighter up a ladder towards a burning building. The cartoon's caption reads: "I forgot my Zoomar lens!".

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provide a closer view of the action. This sort of shot is repeated several times, but only to zoom in. The range of the Zoomar lens is suggested by the footage to be somewhat limited: at its widest setting it is able to provide a view of most of the width of the football pitch, the team management benches beyond, and crowds in the stands above. However, when zoomed in, the lens provides only a somewhat closer view of the action on the pitch. It is not able to zoom far enough to capture, for example, the expressions on the faces of the players, or the finer nuances of their physical action as they run the pitch and compete for the ball. It is also evident that the quality of the Zoomar lens was substantially inferior to the fixed focal length lenses used on other Hearst cameras documenting the same event. On Zoomar shots, there is significant distortion all around the edge of the frame, which at times is so significant that it would be more accurate to describe a circle of clarity in the centre of the frame.[39] Such distortion is not visible in static shots made of the crowd, which are of a much higher visual quality.

Hearst footage of the series-ending meeting between the Cleveland Indians and the Boston Braves during the 1948 World Series ("Cleveland wins World…" - release date 11 October 1948), show the Zoomar's capabilities baseball, which – though following a predictable pattern – requires faster and less predictable adjustments of angle and focal length. Here the zoom is used to track down and lock onto the ball as it lands, or is caught by a fielder. The newsreel also shows how camera operators used the zoom's flexible focal length to depict various elements of the sporting action without the need to use footage from multiple cameras. One such sequence begins with a high-angle long shot showing the home plate and pitching mound. The pitcher throws the ball and the batter hits it, whereupon the camera pans, tilts, and zooms in to capture a fielder

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[39] NBC engineers, on receiving their first Zoomar lens for testing, complained of similar flaws. See page 116.

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who attempts to catch the ball. When he fails to do so, the camera – remaining at its zoomed-in focal length – pans to show the line between third base and the home plate, where a player is running to safety. As might be expected, the camerawork is rough, ready, and improvised, yet effectively captures two connected aspects of the baseball game without the necessity for editing, and without compromising spatial or temporal continuity. And, as the evidence below suggests, similar patterns of camera work and zoom technique were adopted by television stations as they began to cover baseball.

Sales of Zoomar lenses to Paramount and Hearst proved that the new lens could work in practice. The Zoomar lens gained an initial foothold in the industry, and early sales provided a substantial quantity of capital with which to produce further lenses – as well as generating important publicity. After their success selling to the relatively small newsreel market, the Zoomar investors turned their attention to the newborn but fast-growing television industry.

## Network Television: NBC and the Zoomar Lens

As the hostilities of the Second World War formally concluded, attempts to launch commercial television resumed, following earlier attempts in the 1920s and 1930s and an enforced lull during the war years (Spigel 31). Home television set ownership rates rose from 0.02 per cent in 1946 to 65 per cent by 1955 (32), posing a direct challenge to the cinema's status as America's preferred visual entertainment. Historians generally agree that commercial television was a well-planned and well-rehearsed venture by the time of its post-war relaunch. William Boddy, for example, states: "the development of commercial television was not technologically determined in the sense of awaiting a specific technical invention or innovation" (16). However, even if "the years in which the broadest social choices about TV's application were determined […] were the 1930s

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and 1940s" (15), it was not until the late 1940s and into the 1950s that broadcasters had a substantial number of station-hours to fill with programming and a mass audience to entertain. Broad regulatory decisions about television, such as those described by Boddy, may have been essentially set before television became ubiquitous. However, more specific aspects of the medium – including the stylistic and practical implications of the availability of zoom lenses – continued to play out experimentally and organically during the later period. This is evidenced by the variety of post-war predictions and opinions about how television would develop, as exemplified by Richard Hubbell's claim that:

> this is the first time in history that man has had the opportunity to take a highly developed but completely unexploited science and out of it create a new industry – an industry which is being built from the ground up. (4-5)

It is important, therefore, that the analysis in this chapter avoids the impression that almost *everything* about television had been decided before its post-war ascendancy. A mixture of aesthetic, technological, and economic factors would determine the overall success of commercial network television. The same factors would also determine the outcome of competitions between live and filmed entertainment, and between the East and West Coast industries. Zoom lenses increased the flexibility and economic viability of television production companies, and helped to determine the aesthetic qualities of at least the earliest network television programming. As television began to mature, zoom lenses brought viewers 'closer to the action' at live events, during news programming offered by local stations, and during national coverage of the nominating conventions during presidential election campaigns – among other significant news stories.

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Back, Fairbanks and Pegler approached NBC with their new device early in the

process of marketing the Zoomar lens, sometime between selling a prototype to Hartley

Productions and selling the much-publicised "first" lens to Paramount Newsreel.

Although the evidence does not reveal who approached NBC or exactly when, memos

between John F. Royal and Noran 'Nick' E. Kersta suggest that network executives

began discussing the lens in late 1946.[40] On 23 December 1946 Kersta, referring to an

earlier conversation "regarding the Zoom Lens, [Jerry] Fairbanks, etc", asks whether

there is a deal between NBC and "the Zoom organisation", and whether "we have

something regarding this matter on which I might start a file?" Royal responds that

there is nothing on which to start a file, and that he is "awaiting conference with Mr

[O.B.] Hanson to decide our next move" ("Memo to John…").

By mid-March 1947, agreements had been made to begin on-air Zoomar

experiments on the NBC and DuMont networks ("NBC and Du Mont…").[41] *Billboard*

reported that in April 1947, Fairbanks travelled to NBC's headquarters in New York for

the first demonstration of the lens, which took place at NBC's Studio 3H at Rockefeller

Plaza. Zoomar lenses mounted on "two image orthicon cameras, one mounted on a

moveable dolly, the other stationary" captured footage of a singer, a ventriloquist and a

pair of singers ("New Tele Lens…" 17).[42] *Billboard* predicted that the "major use of the

lens probably will be for outdoor and sports events, where dolly and boom cannot be

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[40] The correspondence does not indicate precise job titles for these individuals. A report in *Billboard* in
September 1947 described Royal as "NBC [vice-president] for video" and Kersta as "manager of WNBT,
the NBC TV station in New York" ("Mullen To Head…"). It seems that Kersta's role expanded with
NBC's television interests.

[41] This source also indicates that Back shared a platform with NBC executive Edward Sobol at a recent
American Television Society meeting in New York. A similar meeting may have offered Back initial
access to NBC.

[42] 'Image orthicon' refers to a particular type of a video camera scanning tube "used in [American]
television from 1946 until about 1965 or 1970" (Edgerton 71).

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used" ("New Tele Lens…" 15). *Boxoffice*'s report of the demonstration also suggested that the Zoomar "can, in certain cases, substitute for 'dolly' shots in which cameras are in constant motion and studio noise is difficult to prevent". It quoted O. B. Hanson, an NBC vice president and the network's chief engineer, who predicted that "ultimately, the Fairbanks Zoomar lens will become standard equipment in all television cameras, just as the Image Orthicons have become standard equipment for outdoor programs" ("New Lens for…" 53). According to a memo sent on 15 May 1947, in addition to the demonstration, NBC's engineering department also conducted tests on the new lens (Kersta "Memo to John…"). These events are not covered in detail by the internal NBC correspondence seen for this study.

The NBC correspondence picks up on 13 May 1947, when Kersta informs Royal of a meeting with Jack Pegler. Kersta understands that Pegler "wants to lease lenses for one year to all television operators" (Kersta "Memo to John…").[43] Kersta's notes from his meeting with Pegler, dated 15 May, report frustration on Pegler's part at NBC's failure to make firm commitments to the Zoomar lens. Kersta writes:

> [Pegler] and Jerry Fairbanks have waited for some time to see whether NBC was going to participate in the development of the Zoomar Lens […] NBC apparently did not commit itself; consequently, Mr Pegler then approached RCA, who showed other interest, particularly to purchasing a given number of the lenses but not necessarily to participating in the development of the basic project. […] As a result of this waiting, he felt forced to approach other broadcasters in the field, and he indicated that CBS and Dumont, General Electric, WWJ-Detroit and Jack Hartley in Cleveland have all made semi-definite commitments to take lenses. (Kersta "Memo to John…" 1)

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[43] Original emphasis.

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During the meeting, Kersta reports, Pegler urged NBC to lease three lenses at a cost of $100 per week. At the same time, Pegler warned that because of interest from other broadcasters, he "could not cooperate with us on […] a trial basis".[44] Kersta, however, held the view that:

> the most important thing is that the lense [*sic*] be used on actual television operations in the field or on as many different types of shows as we can do within a one-month or two-month period. This is the only way I feel we could appraise the value of this lens.

Kersta reported that his senior colleague O. B. Hanson did not approve of a lease deal either and was insistent on field tests before any purchase was to be made. Kersta concludes his memo to Royal with the recommendation that NBC:

> press Fairbanks and Pegler for the free use of this lens for a one-month period [or] if they are not agreeable to this, we should make arrangements to purchase one of the lenses on an outright basis.

Yet he tempers any urgency by noting the viability of a third option:

> Let Columbia and DuMont go ahead with the lens, and we will watch their results. We have had the jump promotion-wise and publicity-wise anyway, and nobody can claim 'firsts'. The pillars of television will not crumble if we do not have one of these lenses.

By early July 1947, further discussions appear to have taken place within NBC regarding the trial of a Zoomar lens. On 8 July, John T. Williams wrote to J. H. Macdonald conveying a request from Royal for a one-year lease of a Zoomar lens, at a cost of $5,000 (Williams). Yet at this point NBC appear to have been far from a deal on purchasing the lens, and in a memo sent from an unspecified airport at 6am on July 11, Royal asks Frank Mullen:

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[44] Kersta noted later that the rental deal would also have forbidden NBC to "[use] the lens in any other city", and that on top of this "there were other limitations" (Kersta, Memo to John H MacDonald).

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In view of the fact that we have called off the demonstration and the publicity, should we go through with the leasing of a lens and not have Jerry think we have let him down entirely on everything, or should we just let the whole thing drop as it is? (Royal)

Finally, a handwritten note on a copy of the memo instructs: "Lease the lens and use it if satisfactory".

It seems unlikely that a lease agreement was quickly made following this message, because a fortnight later Pegler and Fairbanks resumed their marketing efforts towards NBC. On July 25, Pegler sent Kersta clippings from *Popular Science* magazine and *Variety*. Pegler points out that when *Variety* describes the lens as "the best thing that's happened to television sports since the invention of the RCA image orthicon tube" ("Clipping from Variety"),[45] it is quoting "the great" NBC executive O. B. Hanson.[46] Pegler signs off, apparently in sarcasm, "all this just in case you haven't heard about Zoomar! See you next week." ("Letter to Noran…") The previous day, NBC executive George H. Sandefer, based in Washington DC, asks Kersta:

We have heard a great deal about the Zoomar Lens and would like to know if you plan a demonstration or program using it in the near future. We were unable to make arrangements for the CBS showing to be fed us, and of course your first scheduled showing was cancelled. (Sandefer)

Kersta responds: "We will let you know if and when" (Kersta, Memo to George H Sandefer). Pegler also secured coverage of CBS tests of the lens in *Broadcasting-Telecasting*, reiterating its benefits and potential uses, and telling the magazine's July 28 edition that "video engineers who have made private experiments with the Zoomar

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[45] The clipping is of an article headed "Zoomar Zooms Tele Along" in the 23 July 1947 edition of Variety. The page number is not indicated.

[46] For Hanson's comment see page 108.

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lens are uniformly enthusiastic about its possibilities and want to get lenses for regular use" ("Fairbanks Reports Favorable…").

Apparently having recaptured the attention of NBC with this marketing effort, Fairbanks met network executive Sydney Strotz in Los Angeles and informed Strotz that the price for the Zoomar lenses had increased. Strotz relayed the news to Kersta on August 4:

> [Pegler] states because of extremely high cost of tooling up large scale production […] he would be willing if we give him order for sixteen lenses to be delivered over period two years [*sic*] to sell said lenses to us at $5000 each. If we could not see our way clear to give him large order as above then will deliver lenses in single amounts as we want them at $10,000 each. He states this is best he can do. I suggest you discuss matter with Mullen and see if we are willing to give firm order with a definite schedule of delivery dates over two year period. (Strotz "Cable to Noran…") [47]

This was an aggressive negotiating position: only a few weeks earlier, Kersta had struggled to muster support from more senior executives for the purchase of a single test lens. A letter from senior NBC engineer R. E. Shelby to O. B. Hanson gives an account of the events that followed. With Fairbanks demanding a bulk order to secure the agreed price, Kersta's next move was to ask NBC technicians to investigate alternatives. In particular, Kersta wanted to know about "the feasibility of demonstrating a zoom effect by all-electronic means in the television camera". Technicians had told Kersta about their "early use of this principle and recent consideration of it for the Image Orthicon camera". Two NBC technicians, referred to by Shelby as "Mr Goodale and Mr Wade",

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[47] Some of the gaps in the NBC papers on Zoomar may be accounted for by the opening line of Strotz's cable: "Tried you reach you by phone on matter discussions with Fairbanks…" (Strotz, Cable to Noran E Kersta).

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carried out laboratory tests and reported some significant problems. Of greatest concern was the discovery that:

> When scanning is operated at reduced values for even a few seconds and then increased to normal, a rectangular pattern corresponding to the smaller scanned area is seen in the picture background for some minutes.

Shelby reported that Goodale and Wade also discovered "serious geometric distortion of the picture" caused by electronic zooming, necessitating various other adjustments to the equipment. With these problems in mind, they reported to Kersta that

> it would require perhaps a minimum of 6 or 8 man weeks to prepare for any sort of demonstration and even then the overall results would probably be somewhat inferior to results now being shown by use of the Zoomar lens.

Shelby reported that, on hearing of this result, Kersta "concurred that we should not proceed with preparation for such a demonstration at this time, pending further developments in the negotiations with Mr Fairbanks" – though Kersta also suggested that Mullen should see a demonstration of the electronic zooming for himself (Shelby "Letter to O. B. Hanson").

With Goodale and Wade's tests unpromising, price negotiations with Fairbanks and Pegler moved to their final stage. On 7 August, Kersta cabled Sydney Strotz in Hollywood with an instruction to tell Fairbanks that the NBC offer of $10,000 for two lenses was "based on discussion with [senior executive] Mullen" (Kersta "Cable to Sidney Strotz"). On 11 August Strotz responded, reporting that Fairbanks was holding firm on his price offer, but that "if RCA wishes to buy him out of Zoomar proposition he will be delighted to sell" (Strotz "Cable to N. E. Kersta"). A week later, after taking up negotiations with Pegler, Kersta and Fairbanks met halfway. Kersta issued a purchase requisition for two Zoomar lenses at the compromise price of $7,500 each

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(Kersta "Purchase Requisition"). In light of his capitulation, Kersta wrote to Pegler, stipulating:

> This is an outright purchase and there is no restriction of the use to which we put these Zoomar Lenses. We would […] like to get the use of the pilot model which you now have until such a time as you can deliver our first lens […] I am especially interested in getting the use of this pilot for possible use at the World Series and our football games. (Kersta "Letter to Jack…")

Kersta's enthusiasm to have the lenses delivered as quickly as possibly was reflected in internal correspondence. Kersta wrote to MacDonald:

> I realise this takes Board approval, but is there anything I can do to get Fairbanks busy making the lenses and to get the order firm with them (purchase requisition, etc) so that I can get the use of the pilot model Zoomar Lens in the interim? (Kersta "Memo to John…")

Underscoring Kersta's hurry to get the lenses in hand, it can be noted that the dates of the purchase requisition – 13 August – and the memo to MacDonald – 14 August – suggest that this action may already have been taken. However, in a letter to a colleague early the following week, Kersta was somewhat more circumspect, omitting the pressing deadline of the World Series and explaining simply:

> The reason we want this Zoomar lens is that tests with it showed good promise that better production techniques, particularly on sporting and other outdoor events, are possible. Also, there has been some analysis indicating that operating expenses for certain types of pickups may be reduced. (Kersta "Memo to Henry…")

On October 3, Jack Pegler and NBC signed a sales agreement promising the delivery of two Zoomar lenses within eight weeks.[48] The agreement returned football coverage and

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[48] Meanwhile, Pegler corresponded with NBC executives and the United States Bureau of Internal Revenue (BIR) concerning the tax status of Zoomar television lenses. NBC recommended: "A lens should

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the impending World Series to the foreground. Among other points, Jerry Fairbanks,

Inc, agreed to:

> make every reasonable effort to deliver [a] pilot model to [NBC] so that
> we will have the use of it in broadcasting by means of television as many
> of the games of the 1947 baseball World Series and as many of the early
> football games as possible ("Letter of Agreement" 1)

The agreement noted that the two zoom lenses had focal lengths of 3-9 inches (3×) and

4-13.5 inches (3.3×) respectively. It further stated NBC's understanding that a zoom

lens with a longer range was in development, and that when perfected two copies of the

newer lens would be purchased at a price of $7,500 each ("Letter of Agreement" 2).

Jerry Fairbanks, Inc, immediately added the NBC purchase to their promotion of the

Zoomar lens, and an article in the 8 October edition of *Radio Daily* – copied to NBC as

part of Zoomar's marketing efforts – noted that CBS and three local stations had also

bought versions of the lens. This publicity coincided precisely with that which

surrounded Paramount Newsreel's adoption of the lens, and though Frank Back had

scarcely been mentioned in correspondence between Fairbanks, Pegler, and NBC, in the

*Radio Daily* article he is prominent, not only as the inventor of the lens but also as the

artisan responsible for its assembly: "Because of the complexity of construction and

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not be held subject to the excise tax unless it is especially designed, or suitable, for use with a camera
which produces images capable of being preserved in permanent form. [A representative] of the [BIR] at
Washington D.C. has informally advised us that regardless of weight a television camera is not taxable,
since it will not produce such an image" (Letter to Jack Pegler). This decision was subsequently
confirmed by the BIR. It is beyond the scope of this investigation to discuss in further detail the tax
treatment of Zoomar lenses. However, the impact of such tax treatment on technological innovation in the
context of post-war American television may be worthy of further examination.

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design of the Zoomar, the first 12 models will be hand made by Dr Back" ("Clipping

from Radio…").[49]

The archive suggests a short lull in communications between NBC and Jerry

Fairbanks, Inc., while the lenses were being readied for delivery in late November. On

delivery, a Zoomar representative (referred to in correspondence as "Mr Straube of the

Research and Development lab" – Back's company) "instructed a group of field

engineers in the operation of the lenses" (Wilbur). But the lenses were far from perfect,

and engineers immediately pointed out a "lack of resolution" in one. The same

correspondence indicates that the faulty lens was immediately replaced, yet over a

longer course of testing, the lenses were not immediately successful. Replying to a

request from Kersta, Noel Jordan gave an account of testing the lens at a football game.

Jordan stated that the lens was slower than promised – by his estimation, $f$/6.3 as

opposed to the claimed $f$/4.5. Furthermore, Jordan noted:

> when opened all the way, it is fuzzy around the edges and tends to blur at
> both maximum and minimum angles. […] Shortly after the game was
> underway, we became increasingly aware that the Zoomar picture was
> considerably below the standard of our regular lens. […] At the end of
> the first quarter, we took it off and put on our regular lens. By contrast,
> the picture was many times better, and I think it is safe to say that on
> cloudy days the Zoomar should not be used. Its faults diminish, however,
> the more it is stopped down, and on sunny days it may be that we can get
> a really good picture with it. (Jordan)

Picture problems aside, Jordan noted that substantial challenges also lay in the

unfamiliar nature of the lens:

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[49] The article concerned, "Fairbanks In Production For Zoomar Tele Lens", appeared in the 8 October
1947 edition of *Radio Daily*; the page on which it appeared is not indicated.

We have much to learn about the technique of using the Zoomar. I think skillful use can only come with experience, but assuming we can get a good picture and get our cameramen and directors used to it, I feel it can add tremendously to our coverage on field pick-ups. (Jordan)

News of NBC's concerns quickly reached Jerry Fairbanks, who cabled Pegler the following day to ask: "Are you sure these lenses were properly assembled and tested before delivery? A little of this kind of publicity can do the Zoomar alot [*sic*] of harm" (J. A. Pegler "Letter to N. E. Kersta"). Pegler, relaying the message to Kersta by letter after attempting several times to reach him by telephone, reassured NBC that "if there is anything wrong with the lenses we are most anxious to make necessary adjustments". Zoomar engineers worked with NBC over the following three weeks, and payment appears to have been withheld by NBC until December 19 (R. E. Shelby "Cable to S. N. Strotz"). NBC paid for the lenses only after a meeting between network executives and Back and Pegler, in which the Zoomar representatives:

stated that they expect to make improvements in the lenses which will increase the resolution, that these changes would be of such a nature that they could be incorporated in the existing units now in our hands and that these changes would be put into our lenses as soon as possible at no extra charge to us. They were very cooperative and emphasised their desire to have us satisfied with the performance of the lenses. (Shelby "Memo to N. E. Kersta" 2)

Despite this agreement, the network remained unhappy with the performance of the lens. In addition to the problems with resolution and distortion noted the previous month, with further use, television field supervisor F. C. Wilbur noted in a letter to R. B. Shelby, it was apparent that:

during operation, the lens elements seem to shift around and become out of line so that when the lens is restored to a wide angle position, it

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becomes out of focus. Also, during a zoom, the lenses go in and out of focus. During mechanical operation, it is pretty hard to pan the camera and zoom smoothly at the same time and also focus at times. It would be quite a help if the zoomar [*sic*] lens was motor-operated. It would be smoother. (Wilbur)

Nevertheless, NBC engineers remained optimistic about the potential of the Zoomar lens. Wilbur noted:

So far, the best use of the Zoomar lens was made on the Macy's Thanksgiving Day programs where the coverage was from ten blocks away to two blocks away. I believe the lens has great possibilities and can be improved upon. (Wilbur)

The evidence above gives a clear indication of how Zoomar's three business partners worked together, and how they used their respective skills to successfully sell the Zoomar lens to NBC. Following an introductory meeting attended by Fairbanks, the majority of dialogue and negotiation was carried out by Jack Pegler, who communicated directly with Kersta. Fairbanks, it can be surmised, was located for most of this time in Hollywood. Despite his geographical distance, he remained in the background as a senior figure able to accept or deny deals negotiated between Kersta and Pegler. O.B. Hanson fulfilled a similar role at NBC. Although there is little evidence to suggest that Back played a personal role in the marketing and negotiations, he too remained in the background as the inventor responsible for the technology. However, when it was time for the network to physically test the lens, Back became closely involved, personally supervising the experiment and showing engineers how best to use it. Though tiny compared to NBC, the Zoomar company adopted the larger company's management structure of executive, middle-management, and research and development division. This mimicry of large-corporation structure, in addition to the benefits of Fairbanks'

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industrial renown and Pegler's advertising expertise, seems to have helped them to appear credible in the face of NBC's size advantage. Furthermore, it provided them with compatible structures through which they were able to communicate.

On a corporate level, NBC's actions and priorities are also significant. The zoom lens has often been described as a cost-saving technology. However, this does not equate to an inexpensive one. Fairbanks, Pegler, and Back demanded a high price for Zoomar lenses in 1947, even though the device's potential was largely untested and there were few people working in the television or film industry who were familiar with it. Therefore an investment in zoom lens technology would by no means have been certain to deliver a return, and the documents discussed above confirm that NBC executives were aware of the risk. But the network's priorities appear to have been split. On the one hand, their executives negotiated to obtain the technology for as little money, and with as few restrictions, as possible. They investigated in-house alternatives to the Zoomar lens, and were cool-headed in the face of some of Fairbanks' tougher negotiating positions. With its superior size and strength, NBC successfully negotiated lower prices for the zoom, and once agreement had been reached they placed pressure upon Zoomar to make quick deliveries. Yet despite these tough positions, NBC appears to have been a supportive and constructive partner to Zoomar. Overall, NBC executives saw the potential of Zoomar lenses over and above their deficiencies. Network executives used the results of tests to demand modifications to failing or unsatisfactory aspects of the lens. There can be little doubt that by engaging with Zoomar rather than simply finding the lenses inadequate and rejecting them, NBC contributed to the later success of the technology. At the same time, by adopting a (literally) hands-on approach, Frank Back was able to influence the network's use of the zoom lens. This was a strategy that Back, Pegler, and Fairbanks used with success as they worked to

market the Zoomar lens to the numerous other television stations which were

established across the United States in the late 1940s and early 1950s.

## Local Stations and Other Networks

Because of the decentralized nature of the early postwar American television industry, it

was necessary for Zoomar's marketing efforts to go well beyond the head offices of the

major television networks. In the autumn of 1947, while Pegler negotiated with NBC

over Zoomar specifications and delivery schedules, Fairbanks embarked upon a "two-

week tour of Eastern and Midwestern television stations, during which he supervised

the installation of Zoomar television lenses in several video stations" ("Jerry Fairbanks

Group…" 49), while Back travelled to California to meet prospective customers there

("Technical" 60). This was the beginning of a personal sales and promotion effort which

lasted several years and saw the pair visit new television stations from coast to coast.

Compared with their approach to NBC, Zoomar's marketing strategy towards local

television stations was different – especially in its greater informality. Visits to local

stations involved a meal, meetings with the key personnel, and a hands-on

demonstration of the technology. Unlike the protracted negotiations and multiple tests

demanded by NBC, sales discussions took place relatively quickly at the level of local

stations. Bill Pegler recalled:

> New tv station[s] were opening up like popcorn – Pegler and Back would
> show up for the openings and bring the zoom lens. Many of the new
> stations were wealthy radio stations and their staff couldn't barely "spell
> television" – so when word got out that Back/Pegler actually [knew] how
> to set up a tv camera – they became very popular. However, finesse was
> needed – didn't want to make the radio engineers look like "dummies" –
> so – they would arrive in the AM – put the lens on a camera – then it
> would be lunch time – so Pegler invited everyone to a fancy lunch – and

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just after the soup, Back excused himself – [drove] back to the station –
and set up the electronics for the big demo after lunch. As there was no
interconnect – each station had to program everything. The
easiest/cheapest activity of interest was sports – which made a pretty
boring show without a zoom lens. (B. Pegler)

By November 1947, Jerry Fairbanks Productions reported that orders had been received
for Zoomar lenses from seven television stations in Los Angeles, New York,
Philadelphia, Washington DC, Chicago and Baltimore ("Songwriter to Make…" 64).
Commercial momentum can only have been boosted by a Television Broadcasters
Association award made to Frank Back in December 1947 ("Poppele Calls
Audience…" 16). By this point the Zoomar Corporation was struggling to fill orders on
time: *Broadcasting-Telecasting* reported that the company was forced to rush a
demonstration lens to KTLA in Los Angeles in order that it could be used on coverage
of that year's Rose Bowl football game, as "one on order […] will not be finished in
time" ("Zoomar in Rose…").[50] Back continued to visit television stations that purchased
Zoomar lenses well into 1949: he was pictured in *Broadcasting-Telecasting* in July of
that year examining such a lens installed by the Detroit station WXYZ-TV ("Examining
the new…"). |

Installing a Zoomar lens was not necessarily a trivial matter, as a manual from
around the late 1940s indicates.[51] The manual describes the work required to make it
compatible with RCA Image Orthicon cameras:

These modifications are necessary for smooth zooming, and require the
use of an 'F' drill at least five inches long. […] 1. The cover screw in the
camera rear covering the turret shaft end, located in the center of the

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[50] KLTA finally received its Zoomar lens in March 1948, becoming the first West Coast station to own
one ("Zoomar for KTLA").

[51] The booklet's foreword is dated May 1951, but the booklet carries a copyright date of 1949.

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turret handle, is to be removed. 2. The hole in the shaft end is to be enlarged with the 'F' drill as deep as it will go. 3. The hole in the front nut which holds the turret in place is also to be enlarged with the 'F' drill. The Television Zoomar can now be mounted on the camera. (*Television Zoomar Manual* 6)

In addition to technical installation directions, the 22-page manual includes suggestions as to how the Zoomar lens might be used:

The unique pictorial effects made possible with the Television Zoomar are gained by a single 'push-pull' lever operating directly through the turret shaft of the camera. By means of this lever the operator can vary the area being televised, smoothly, almost imperceptibly, so that the viewer is not conscious of any change of scene as he looks at the Television screen. Or so swiftly and abruptly that the impression on the screen is that of swift flight through space either toward or away from the subject, stopping, if desired, in the middle of the 'flight' and seemingly hovering in mid-air to observe a tense moment in a drama or game. For example, in sports the operator can Zoom from a wide area at a hockey, basketball, football or baseball game, to the action centering around a few players or a single base. He can follow the play ranging across the field away from the television camera and back again, or he can follow a player scooting across the field with the ball or puck, keeping him always the same size, sharply pictured on the television screen.

The Television Zoomar infinitely extends the television horizons. It enables the television director greatly to increase the scope of his pictorial and dramatic planning and direction. Close-ups, three-quarter views, full scene or full set views are easily, smoothly, undiscernibly possible with the Television Zoomar, all without moving the camera or changing the lens, merely by a simple movement of the camera operator's fingers and wrist. And without the loss of a single clear viewing moment. (1-2)

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The manual also suggests the precise operating conditions under which the camera operator might use the zoom lens. Under the heading 'sports', the manual suggested:

> where there is a great deal of movement, follow the action in the regular manner by panning the camera, manipulating the Zoom action slowly and ONLY WHEN NECESSARY. Too much zooming will defeat its purpose and distract from the game being televised. A smooth Zoom action can be attained by grasping the control lever in a normal relaxed manner and squeezing, not pushing, the control backward and forward. Apply this pressure slowly so that the beginning of the Zoom is hardly perceptible. Unless the action of the game specifically calls for zooming, trying to underzoom: the effect will be all the greater. If a visual impact designed to startle the audience is desired, a fast zoom is permissible. However, it should not be attempted too often. It is very important to start and end the zoom slowly and gradually. A sudden starting or ending zoom gives an unnatural effect and should be avoided. (15)

Using the Zoomar lens inside the studio was also anticipated, necessitating special warnings about ensuring sufficient illumination:

> In the studio where short distances are the rule, it is important that the depth of field of the Television Zoomar be taken into consideration. The Television Zoomar set for the studio in its Teleposition (13 inches) has a small depth of field which can be increased by stopping the lens down. This requires good illumination and a sensitive Orthicon tube.
>
> In handling the Television Zoomar at close distances while zooming away from a close-up to the wide angle position of an individual, it will be necessary to closely coordinate the zoom with the panning. The face of a person centered at close range will also be centered on the screen in the wide angle position, leaving far too much headroom. Panning should therefore be carefully co-ordinated with the zoom, panning slowly downward in keeping with the action of the zoom. (16)

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Robert J. Roth and Norman Preston, who worked for WAVE-TV in Kentucky in the late 1940s, were present during Frank Back's visit to Louisville to set up the station's zoom lens, which was to be loaned for coverage of the Kentucky Derby and an associated race. Preston, a radio and television engineer, recalled:

> [Back] was a soft-spoken person, didn't get excited, he just went through it: do this, and do that. And made sure we had it mounted right. And things like that; he was just an easy-going person. (Preston)

This was the first occasion on which Preston and his colleagues had seen a zoom lens:

> There were two cameras. One with four fixed lenses, and the Zoomar. Bob Roth had the Zoomar and I had the four fixed lens. It was a two-camera deal which was unheard of today, they can't do anything without a dozen. We set up and tried it out and then we went for the Derby and did it and it worked fine, it was a little odd getting used to the focus, where you first focus at the extreme, and then the near, or vice-versa, I don't remember which, and then it would pretty well track all through the range. And we used it quite a bit after that, but that was our first experience, we had no problems with it, physical problems. It took a little getting used to. (Preston)

Similarly, camera operator Robert J. Roth recalled:

> It was very stressful, because we practised all afternoon before the Derby, and the Zoomar lens had a rod [coming] out from the centre of it that you pulled to zoom it. And you had, with your one hand keep [*sic*] the camera trained at the proper spot, and then you would zoom in and zoom out to get the picture that you wanted. It worked well, [but] we couldn't use the full close-up position because the picture would get fuzzy on the edges, so [Back] put a stop on the rod so that you could only zoom to a certain point. (Roth)

Preston recalled that while WAVE-TV had to return the lens after the Derby, the station later acquired a Zoomar of its own:

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We ended up with one, I don't remember exactly how, and we used it until we got rid of those cameras, the old black-and-white cameras, and got new colour cameras. […] If I'm not mistaken we had at that time five stations, and I think they leant it out to the other stations, if they had a special or event. (Preston)

Roth recalled:

We did a lot of sports, football, and ice hockey, basketball, and of course then we had studio shows that they did use it on. […] The most important thing was [that] before, we had a turret with four lenses on it, you had to rack between lens, and sometimes that didn't work out too well because you'd be racking when you were on the air which was bad. But with the Zoomar you didn't have to rack, it was right there all the time. (Roth)

By the end of the decade, at least 31 television stations had purchased Zoomar lenses ("Zoomar Lens - Six…"). As a result of his work to innovate the Zoomar lens, Back received a higher level of industrial support. In 1948 his work on the Zoomar lens gained an Academy Award nomination in the Scientific and Technical category ("List New Techniques…" 52). In February 1949, he was granted access to "facilities of ABC's television center […] in the interest of establishing new standards for television lighting, lenses, and utilization of camera equipment". In exchange, it was agreed that "any devices developed as a result of the cooperative research by Dr Back and ABC, will be made available first to that network" ("ABC TV Center…") – but there is little evidence as to the role that this move played in Back's later innovations. In addition to support from ABC, Back continued to carry out research and development work for the defence establishment of the United States. In 1949, in a report on the installation of Zoomar lenses at the television station WCTN in Minneapolis, a local newspaper remarked that Back "designed a long line of special equipment for the atom bomb tests

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and V2 rocket experiments, some of them still high military scientific secrets" ("Lens Expert to…"). Aside from his continued role within the Zoomar companies, Back remained associated with the defence establishment of the United States well into the 1950s. He continued to use his professional knowledge in support of military requirements: during the *Zoomar vs. Paillard* hearing, Back's testifies in the present tense that "we are doing a lot of research work mainly for our Armed Forces" (Kaufman 24) and that "I am optical consultant [sic] of bacteriological warfare" (195). In 1957, the *Los Angeles Times* reported Back's contribution to a meeting of the Society of Photo-optical Instrumentation Engineers (SPIE): "Dr Back told of a 150-inch focal length lens that can make a newspaper headline readable at one mile. He was asked about photo equipment for the proposed international 'open sky' aerial inspection program and said camera systems are available, with development still going on. He declined to discuss the use of infrared and ultraviolet in these systems. 'I'm afraid that is classified,' he said" ("Great Photo Research…").

**Sports, News, and Light Entertainment**

As Barnouw, Sarris, Belton, and Salt have noted, one of the most significant early uses for Zoomar lenses was in the televising of baseball games. An examination of industrial responses to these uses of the zoom, as printed in trade periodicals such as *Billboard* – and in the wider popular press – provides important information about how the zoom lens was used to enhance sporting coverage in its earliest days.[52] A significant proportion of *Billboard*'s reviews of televised baseball coverage make detailed reference to zoom lenses, starting in 1948 with a generally negative article that devotes almost half of its space to discussing the merits of the Zoomar lenses used in the

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[52] For a useful history of early televised baseball in general, see Walker and Bellamy.

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coverage (Wagner "Tele's Baseball Coverage" 15). For the reviewer, although the device had its advantages:

> It was apparent that even the Zoomar is not the entire answer to video baseball coverage. At one time the lens was used in an attempt to follow the ball from the batter out to the field where it was played and then back to the infield after it had been thrown by the outfielder. This attempt failed; the play was just too fast for the Zoomar to follow. […] Also the Zoomar is okay when used to increase size of players – when the lens 'zooms' forward, in other words, but when it 'zooms' backward so that size of players on screen is reduced, the effect was disappointing and made the viewer feel as if he had been taken away from the activity. (Wagner 15)

Further technical limitations are evident in a review of the 1949 Rose Bowl Game, which noted that "[dark] sky permitted KTTV to use its Zoomar lens only during the first ten minutes of the game" (Zhito 8): further proof of the practical limitations of the notable light-hungry Zoomar.

By 1950, Zoomar lenses were still a novelty at many television stations. In some cases, it was hoped that they would improve coverage of baseball and other sports. In April that year *Variety* reported that "while there was some criticism on [*sic*] WNAC-TV's coverage last season, the station has recently installed the Zoomar lens, which WBZ-TV used last year, and should result in Hub fans getting slick coverage" ("Hub Ballcasts Like…"). In September 1950, it was reported that WPTZ had increased its contingent of cameras from two to four, and "also brought in another innovation – the Zoomar lens, which is attached to the new camera on the photographers' platform along the third base line" ("Threat to WPTZ…" 34). Despite these innovations, *Billboard*'s review of television coverage of the early games of the 1950 season was little more complementary than in the previous year. The magazine noted "a striking lack of

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unified standards of lensing" in individual stations' coverage of games ("TV Baseball Rough…" 6). By now, although there was a good deal of variation in filming styles and strategies, the use of Zoomar lenses appears to have been common to many broadcasters. WWJ-TV Detroit placed the Zoomar behind a transparent section of the backstop screen – "a position believed to be unique in big league parks" (Reves 6), and *Billboard* praised the resulting coverage:

> Camera follow-thru on the ball was very good by second telecast, and nearly all the real action was caught; the Zoomar is already broken in for swift work in special plays in most parts of the field as well as fouls into the stands. (Reves 10)

WCPO-TV placed their Zoomar lens at first base (Sachs 6), as did WNAC and WBC (Riley 6). In New York, WPIX placed the zoom lens behind the plate (Chase "Baseball Puts…" 6) – somewhat calling into question WWJ's claim to unique camera positioning. WGN-TV of Chicago used the "usual lenses, including Zoomar" (Wagner "Chi Baseball TV…" 6). By 1952, television coverage of baseball appeared to be settling into what *Variety* called a 'fixed formula':

> For the last couple of years there has been no significant changes in technique [*sic*] and the current season isn't producing any innovations either […] Such positive advances as the invention of the Zoomar lens, now basic equipment for all the outlets, and the most strategic spotting of the cameras, are now being utilized for maximum results within a fixed formula. (Herm "Tele Still On…" 23)

The fixed formula, however, left room for adjustments. For games carrying particular prestige, broadcasters began to add additional Zoomar lenses to their cameras. WOR-TV used "a couple of Zoomar lenses" in its pool coverage of the 1951 World Series (Herm "TV's Slick Performance…" 24). Both WOR-TV and WPIX, providing simulcast coverage of the 1952 World Series, repeated the previous year's double-

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Zoomar strategy ("Series Coverage Down…" 23). For reasons that are not entirely

clear, it seems that no Zoomar lenses were used during the 1953 World Series ("TV

Turns in…" 47), but they appear to have returned during the following year (Mark

"World Series" 36).

One context in which Zoomar lenses did not prove immediately successful was

early colour television trials. Once again, it seems that the 'slow' speed of the lens was

to blame. In a report on CBS coverage of horseracing in July 1951, a reviewer

complained:

> color pictures were not quite sharp enough. It was learned, however, that
> a Zoomar lens had been used for many of the shots. This type of lens is
> traditionally best for a soft, rather than sharp effect, and in future remotes
> of this type CBS will either readjust the Zoomar lens or use other
> equipment. (Ackerman 3)

*Variety*'s account of the same broadcast added:

> CBS claims the trouble originated with the equipment at Monmouth.
> Cameras were hauled to the track from their N.Y. studio the night
> preceding the event, which gave the engineers too little time for field
> testing. In addition, the Zoomar lens used, which has always been noted
> for its 'softness', was too soft for the color cameras. (Stal "Color TV
> Review" 30)

It seems that CBS responded to this criticism – and to technical problems which must

have been obvious to network executives – by removing Zoomar lenses from

experimental colour coverage of sport. Reviewing CBS colour coverage of a baseball

match between the Brooklyn Dodgers and the Boston Braves, *Variety* remarked:

> CBS used no Zoomar lens for this event, so that a ball hit to the outfield
> was often lost via the cameramen's inability to rotate their lenses fast
> enough […] Coverage echoed the early days when CBS was covering the
> Dodgers in black-and-white. While plays around the infield were

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handled okay, too often the cameras lost the action on long balls hit to

the outfield. (Stal "Dodgers-Braves Baseball" 31)

The same reviewer, however, also noted with surprise the manner in which, despite the

lack of a Zoomar lens "the sharp contrast of the white ball against the green infield grass

furnished an amazingly clear picture of the path travelled by the ball from the pitcher to

the catcher".

As a result of Zoomar executives' marketing efforts and stations' desire to

improve the standard of television programming in general, Zoomar lenses were used

for a much wider range of sporting and general on-location ('remote') filming

situations. One of the earliest noted uses was for the broadcast, in December 1947, of a

boxing match between Joe Louis and Joe Walcott. The fight was transmitted on four

local stations in Washington DC, Philadelphia, New York, and Schenectady. A review

in *Billboard* declared that "television as a medium for sports coverage again proved

itself potent". The article describes how "use of the Zoomar lens was effective in

moving from remote shots, embracing the entire ring, to close-ups of the battle" (Chase

and Franken 16). In the same month, on the other hand, a report on CBS's filming of a

hockey game noted problems caused by the *lack* of a zoom lens. Noting that CBS used

two cameras to cover the games, "one for long shots, the other for close-ups", the

reviewer complained that "here is one case where lack of Zoomar lenses halves the

effective coverage, inasmuch as both cameras follow approximately the same action;

one Zoomar-equipped camera could do the work of both CBS cameras" (Chase

"Hockey Games" 16). Other notable uses for the Zoomar lens included WAVE-TV's

use of a Zoomar lens of coverage of the 1949 Kentucky Derby ("Derby Telecast"), as

recalled by Roth and Preston above, and later that year, a local station's filming of the

Gold Cup boat race in Detroit ("WXYZ-TV Sells 5-Hour…" 15). In 1950 Zoomar

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lenses were used at the US Open golf championship ("WPTZ at US…") and were suggested as a means to make live coverage of polo more visually appealing, on which subject *Variety* remarked:

> Live polo pickups, which had a short run on NBC television some years ago, may return this spring on CBS-TV [… CBS] are counting on new technical developments, such as the Zoomar lens, to compensate for the faults of the NBC coverage ("TVing of Polo…" 31)

Reviewing coverage of a Detroit tugboat race in May 1951, *Billboard* complained of "static video coverage" but mentioned that "[s]killful handling of the zoomar and cameras for the last third went far to make up for this" (Reves "Tugboat Race" 6).[53]

By the early 1950s, Zoomar lenses were used widely for sports coverage, and were recognised in the industry as one means to provide higher quality and more engaging sports television.[54] But their impact went well beyond sports stadiums and

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[53] At this time the Zoomar Corporation introduced a fixed focal length telephoto lens known as the Reflectar ("Telefile: WFBM-TV" 50). On occasion this was described simply as a 'Zoomar lens', meaning that references to Zoomar lenses in the trade press at this time do not necessarily refer to variable focal length (zoom) lenses. However, it is usually clear from the context which is being referred to, and other sources – such as a trade advertisement for the outside broadcast facilities of WMAR-TV ("WMAR-TV Baltimore…") – distinguish between the two types.

[54] After the introduction of the Zoomar lens, Joseph Walker created a heavily modified version of the zoom lens which he had developed for use in the late 1920s for use with television cameras (see page 78). Walker redeveloped the lens on behalf of the Don Lee Broadcasting System ("Don Lee Announces…"). Renamed the 'Electra-Zoom', the lens featured a motor which enabled the operator to zoom in or out smoothly. As *American Cinematographer* reported in May 1950: "The beauty of the end-result is a picture which is entirely devoid of any eye-arresting irregularities in zoom rate or picture centering. The viewing audience is therefore drawn to or carried away from the center of interest quite unaware of the mechanics or optics involved" (Smith "Pushbutton Zoom lens…"). The same article then summarized a number of possible applications for the Electra-Zoom, many of which had previously been suggested for the Zoomar. RCA sales brochures indicate that the Electra-Zoom was marketed to television stations within and beyond the USA, but its actual impact is hard to gauge, as there are relatively few references to it in trade periodicals or more recent literature. As suggested at footnote 53, it may be the case that on some occasions, trade journal references to the 'Zoomar' lens refer generically to the ElectraZoom.

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racetracks. In addition to sports telecasting, the zoom lens offered a new solution to the challenges of news, current affairs, and live entertainment filming. Such evidence is comparatively scarce when compared to that relating to baseball and other sports. It appears that only the most unusual, high-profile, and arresting non-sporting events garnered the attention of trade periodical reviewers. Nevertheless, reviews of high profile events give us some insight into how zoom lenses were used in early post-war news coverage. In most cases, Zoomar lenses drew attention when used to support coverage of local events of particular note – NBC's early tests during the Macy's Thanksgiving Day parade in November 1947 are an early example.[55] As television stations increased their hours of operation, they also began to cover a greater number of local news events, and Zoomar lenses were central to such coverage.

In November 1948, *Broadcasting-Telecasting* noted that a Zoomar lens enabled Chicago station WBKB to mount "the simplest remote in video history", by pointing a zoom-equipped camera in the station's headquarters, towards the nearby State Street Bridge, which was to be lowered for the first time ("Simple TV Remote"). Broadcasters also began to find innovative ways to use Zoomar lenses in planned programming. In January 1950, the producers of *Super Circus*, an entertainment show originated by the Chicago station WENR and broadcast across the ABC network (Hollis 100) began to use Zoomar lenses to obtain close-ups of trapeze artists, and by March of the same year the lenses were used 'consistently' for that purpose (Pinkerton 49). In a review of the televising of the return from Japan in 1951 of General Douglas Macarthur, *Billboard* highlighted the "particularly impressive […] Zoomar views of the general during the parade" (Bundy 3). Similar coverage brought viewers close to the inauguration of President Dwight D. Eisenhower in January 1953. *Variety* commented:

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[55] See page 117.

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> There was no shortage of good vantage points for the image orthicons.
> Considering the security measures involved, the mobile TV crews had
> full freedom of movement. And where they couldn't get within point-
> blank range, telescopic and Zoomar lenses bridged the gap. (Briller 33)

Coverage of major international events also highlighted the importance of Zoomar

lenses. Reporting on the coronation of Elizabeth II in 1953, *Variety* remarked:

> It's obvious that the magic of television gave the American public – and
> the world – a better picture of the Coronation than the many who
> journeyed to London […] As befits the function of this truly electronic
> wonder of post-midcentury the magic carpet of the zoomar lens and the
> image orthicon has made kings and commoners kin ("C-Day on TV" 2)

In Cincinnati, Zoomar lenses were used by WCPO during a series of live broadcasts

from a fairground in 1952 ("Remote Telecasting"). In June of the following year,

WCCO in Minneapolis used "two cameras, one with Zoomar lense [*sic*], atop a building

adjacent to its studio" to provide coverage of a major parade (Rees 34). And a few

months later, *Variety* described how Chicago station WBBM broke into scheduled

programming:

> and gave the viewers a look at an attempted suicide. A woman was
> perched on a ledge outside a window on the 20th floor of Tribune Tower,
> threatening to jump […] The Zoomar equipped cameras were over a half
> mile away from the scene, but the coverage and pictures were excellent,
> catching all of the raw drama of a priest talking with the woman, other
> persons passing coffee to her as she deliberated, until the final moment
> when a fire marshal grabbed her and pulled her to safety. (Don 34)

When NBC took its topical daily magazine show *Home* on the road in 1955, *Variety*

praised:

> the unit's unique handling of the zoomar. Using the top of the NBC
> Building as its line of vision, cameramen were able to zoom onto the
> subject of discussion and use it as a backdrop. For example, when Bob

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Feller talked about the Cleveland Indians, the Stadium was graphically picked up over Feller's shoulder. (Mark "Television Followup Comment" 30)

In 1958, Zoomar lenses helped to capture a meteorological drama, when:

[For p]robably the first time in the history of the fifth estate, tv was in a position to bring viewers a first-hand picture of an approaching and terrifying tornado […] The tornado struck at 5:42 p.m. with the funnels hitting the ground less than 100 yards from the live cameras. The Zoomar lens of the tv cameras had them in perfect detail on live tv. ("TV Zooms In…" 35)

It is difficult to assess the extent to which Zoomar lenses were used in everyday coverage: trade periodicals skew to the exceptional and the spectacular. But the recollections of Preston and Roth, advice in the Zoomar operating manual relating to studio use, and *American Cinematographer*'s account of the lens's use on *Kukla Fran and Ollie* (see below), all point towards regular studio-based use. Based on this evidence, it seems likely that having made an investment in a Zoomar lens, stations would have used it regularly. What is clear is that between sports, news and current events, the Zoomar lens was established by the mid-1950s as an important tool for television production.

Television stations and networks seized upon the Zoomar lens as a means to provide more engaging and more human coverage of sports and live news events. As increasing numbers of television stations and networks bought Zoomar lenses, zoom shots became an important part of the visual language of television. Historical accounts which have briefly described the uses for zoom lenses in early postwar television have tended to mention dramatic but unrepresentative instances, vaguely referring to 'sports' or 'news' or describing, as in Barnouw, close-ups of the 'pitcher chewing his wad'. The

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lack of any specific case studies has created the sense that developments in zoom shots were incidental at this point, and not significant to broader trends and developments in moving image entertainment. However, through an examination of two examples of influential and widely-watched programming in which zoom lenses were of fundamental stylistic importance, this notion can be revised. The following case studies demonstrate the significance of the zoom lens in *Kukla, Fran and Ollie* and in television coverage of political conventions during the 1950s. In the case of *Kukla*, a family entertainment show, the Zoomar lens helped to define the fundamental visual style of the show, centred on a uniquely flexible yet highly economical performance space which allowed a mediation between puppets and human performers. In the development of convention coverage, zoom technology helped television to provide more animated and engaging coverage of political procedure, and in doing so, demonstrated its power as a significant journalistic medium.

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# 6. From Puppets to Presidents: Case Studies

> The television people now have a new secret weapon, a camera with a
> zoomar lens, which at long distance can focus a close-up shot. This
> means that a delegate, at any time and with no warning, can be shown in
> a close-up shot on millions of television screens across the country, and I
> suspect this also means the men will have to watch their shaves and the
> women their lipstick a bit more closely this year.
>
> *India Edwards,* Highlights Of Previous National Conventions*, 21 June*
> *1952*

## *Kukla, Fran, and Ollie*

A staple of NBC's television schedule from 1948 to 1952, *Kukla* has been described as
"the first television show to be equally popular with children and adults" (Gibberman
1289). The format was simple, consisting of a presenter (Fran Allison) and a number of
puppets – most prominently the clown-like 'Kukla', and 'Ollie', a dragon – operated,
along with other puppets, by Burr Tillstrom. Gibberman describes the rapid popularity
of the show:

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>The first episodes were aired daily from 4:00 to 5:00pm on local Chicago television station WBKB, which was later acquired by NBC. When the network completed its New York–Chicago transmission lines in 1948, *Kukla, Fran and Ollie* began to air nationwide. By its second season, the growing adult audience prompted the network to move the show to a 7:00pm half-hour time slot. By its third season, the show had 6 million viewers. In 1951 NBC cut the half-hour format to 15 minutes, which, ironically, caused the ratings to soar even higher because audiences craved more of their favourite characters, and NBC was deluged with letters of outrage from fans. (1289)

In 1949 *Life* magazine described *Kukla* as "one of the most popular of all TV programs" and claimed "[its] audience is about 60% adult" ("Kukla, Fran and Ollie" 160). In December 1951 *Life* recalled the minor scandal caused by NBC's decision to reduce the show's slot to 15 minutes:

>In one week 3,000 letters protesting the truncation of the show poured into the network. The New York *Times* [sic] ran letters full of spluttering rage. […] Playwright Robert E. Sherwood protested to NBC […] Other fans offered start a public sponsorship fund to preserve the half-hour format. ("The Special Case…" 71)

One of the reasons for the significance of *Kukla* is that the show occupied an exceptionally stable and long-lasting position in early television line-ups. It was an anchor in the schedule from the 1948/9 season to the 1951/2 season: a rare example of a television regular that remained in the same slot for a number of years. By comparison, during the same seasons on ABC and CBS, schedules were frequently changing. Gianakos (1980) shows that ABC's 7pm, Monday to Friday, timeslot was occupied by nine different programs between 1948 and 1951, and from the 1951 season onwards, ABC moved the start of networked programming back to 7:30pm, leaving 7pm viewers

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at the mercy of further variation from their local stations.[56] CBS schedules were even more variable, with 16 different shows occupying the same slots during the same seasons, though the network retained 7pm as the starting time for network programming. Even when NBC halved *Kukla*'s slot at the start of the 1951-2 season, the show retained its 7pm start every weekday. As a result, for every day of the week during the television seasons between 1948 and 1952, viewers could expect to tune to an NBC station at 7pm and see *Kukla*.[57]

Many television shows of the 1940s and early 1950s were not kinescoped,[58] and many which were have not survived. *Kukla, Fran and Ollie* is one notable exception. The show is relevant to this enquiry because it is one of the few extant examples of early postwar television programming which undoubtedly used zoom lenses, and for which there is meaningful evidence of the show's production practices. These are described in some detail in a 1949 *American Cinematographer* article. The article was essentially promotion for Back and the Zoomar, illustrated with a photo showing Frank Back in the *Kukla* studio with Burr Tillstrom and a camera with Zoomar lens mounted. Although the zoom lens was not an entirely new invention, the article goes into considerable detail about the Zoomar's design and characteristics, to the extent of explaining that when the zoom lens is operated:

> an apparent change in the proximity of the viewer of the film or of the television screen takes place. In other words, if the change is from the minimum focal length to the maximum, it appears to the viewer that he has started way back from his subject and has been carried up close for a better view, without the customary cuts from long to medium to closeups

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[56] Times given here refer to the prevailing East Coast timezone.

[57] Gianakos does not give an account of the schedules of the DuMont network.

[58] A television recording technique which involves capturing live transmissions on film.

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shots [*sic*] which is general practice in movie-making. All this, of course,

without the camera's physical position being altered. (Ford 202)

The article confirms that from autumn 1948 onwards, the Zoomar was the sole lens used

on the show's primary camera.[59] A second camera was used for cutaways to commercial

messages and later occasionally for cutaway shots to other parts of the studio. WBKB's

chief cameraman, Harry Birch, explains that the Zoomar:

[enables] us to do away with a dolly and a dolly pusher. We feel that the

show is 'tops' from a photographic and technical standpoint and that the

Zoomar has added more interest to it. (214)

However, the article also indicates that efficiency was not the sole reason for WBKB's

adoption of the Zoomar, which had also been used from at least May 1948 by the station

during their baseball coverage ("New Baseball TV…"). Birch explains that after buying

new Image-Orthicon studio cameras it became difficult to find a matching pair of

scanning tubes. Because of the mismatch:

using the two Image-Orthicons gave […] the result of different looking

characters every time they switched from one camera to another. Birch

suggested using the Zoomar and doing the entire show with one camera

and the Zoomar lens. (214) [60]

The slow photographic speed of the Zoomar lens was again a problem: much later,

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[59] The Zoomar lens was itself showcased during the episode "Salute to Television" (5 December 1949). Kukla and Ollie, alongside a crude model of a television, demonstrate panning. As the camera operator zooms in, he explains that the device mounted on it "is called a Zoomar lens. A special lens which has enabled you to go in and out of the picture very […] quickly" (see Figure 1). Kukla then removes the lens cap and a spring 'snake' flies out. "Well," says Ollie, "that explains the principles of the Zoomar lens".

[60] Birch's remarks, which appear in *American Cinematographer* as if resulting from an interview, appear word-for-word on an Zoomar promotional poster, in the form of a letter from Birch to Jack Pegler, dated 7 March 1949 – three months before Ford's article appeared in *American Cinematographer* (Frank Back Papers, 282-07). Posters were also produced to reflect testimonials from Don McClure of the New York City advertising agency N. W. Ayer & Son (dated January 1950) and *Kukla* producer Beulah Zachary (February 1950).

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camera operator Bruce Berquist recalled that the Zoomar lens "was meant be to be used out of doors, and required a lot of light – they had to throw 500 foot-candles of light on the *Kukla* stage to get any resolution at all". Berquist also recalled frantic action on the set, the coverage of which was made possible by the new lens. "I had to think as fast as Burr sometimes to figure out what the heck he was going to do next! A dolly camera wouldn't have cut it" ("Kuklapolitan Cameraman"). Director Lewis Gomavitz recalled that "when we first started, the main camera had a Zoomar lens on it, which I could get close-ups with, and wide shots, and I got so that I knew all the movements of the puppets, I knew when Kukla was going to reach out for something, I knew when if I had to have a close-up, I'd tell my cameraman to give me a close-up immediately, which he did" (Gomavitz).

Many of the advantages of the zoom lens, and some of the stylistic consequences of its use on *Kukla*, can be seen in "Lemonade" (17 August 1949), one of the earliest extant episodes. What follows is an analysis of the style of the opening scenes of "Lemonade", with a particular focus on the uses and consequences of the zoom shot. The episode exemplifies the uncomplicated style, which remained a feature of the show well into the 1950s. It also shows the use and value of the zoom lens in the context of this production. The episode was broadcast live and, between opening titles and the closing commercial, consists of 25 unbroken minutes of action in front of a single, Zoomar equipped camera.[61] In common with most episodes of *Kukla*, "Lemonade" features a cast of characters voiced and operated by Burr Tillstrom, who remains hidden throughout. They perform behind a miniature version of a traditional playhouse proscenium arch. The sole human actor, Fran Allison, occasionally appears

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[61] The live episodes were kinescoped. It is these recordings, transferred to DVD in 2010, which survive for analysis.

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in front of the stage, and is thus visually and physically separate from the puppet characters. Through dialogue with the puppets, Tillstrom makes characters out of members of the crew and house musicians. In later episodes, an additional camera is used occasionally to cut to other areas of the studio in order to show both sides of these discussions. In this early episode, however, the crew is audible but unseen.

The opening shot establishes the setting; an empty proscenium arch of uncertain scale. The puppet Kukla appears from beneath the stage, holding a white object, which is revealed to be a lemon. The instant that Kukla appears, the camera zooms in, resting on a shot which excludes the top and sides of the proscenium arch, but leaves the patterned front of the stage visible. Though there has been no dialogue, the shot is close enough to give viewers a better opportunity to determine that the white object is a lemon (see Figure 2). This becomes somewhat clearer as another puppet appears to hold the lemon, while Kukla uses a knife to slice it in half. Kukla produces a glass citrus squeezer, which he places on the stage, somewhat right of centre, and begins to squeeze the lemon halves. As he does so the camera pans to the right and zooms in further, and Kukla fills the screen (see Figure 3). The stylised stage front is still visible, but to a lesser extent, and it is clearer still, to the viewer, that the white object introduced at the outset is a lemon. Having squeezed half of the lemon, Kukla again disappears beneath the stage. The camera zooms out and pans to resume its earlier position, before returning to a close-up on Kukla as he squeezes the second lemon half. After several minutes of further action, during which Kukla pours the squeezed lemon juice into a jug and adds water and other ingredients, he finally clears the props away and sets up a lemonade stand, with a jug and glasses on a tablecloth, and a cash register to one side. The camera zooms out and the sides of stage return to the frame. At this point, approximately eight minutes into the episode, Kukla utters the first line of dialogue,

calling out to potential customers, before singing a song about lemonade. As he sings, the camera slowly zooms in on him. Tillstrom operates Kukla in such a way as to produce an emotive performance, lampooning opera. Given the scale of Kukla – a hand-puppet – a close-up is necessary in order for Tillstrom to use his limited avenues for physical performance for full effect.

Up to this point, the only characters shown are puppets: Kukla, Madame Oglepuss, Fletcher Rabbit, and Ollie. After 12 minutes spent making, and failing to sell, lemonade, Kukla and Ollie decide to ask Fran if *she* will buy some. The introduction of the human character precipitates a change in framing, to a composition slightly different to that used when only puppets are in front of the camera. As Fran appears, the camera zooms out slightly and pans to the right, so that the bottom of the stage and one of the stage walls become visible. Fran appears from the right, and is positioned in the frame so that her head and shoulders are visible (see Figure 4). Fran suggests that advertising is the cure to Kukla's lemonade selling problems. She leaves the frame and Kukla and Ollie discuss the matter, with Ollie playing the role of an advertising executive. The camera once again zooms in closer upon the puppets, excluding most of the stage prop. Later, as part of the skit, Fran returns as Ollie's secretary 'Miss Olsen', and the camera returns to the stage-corner framing seen slightly earlier. The framing remains consistent while the trio try out a number of jaunty 'jingles' for the lemonade product, none of which seem to work. The episode ends with a reprise of 'Lemonade', sung as a duet by Fran and Kukla. The creeping zoom-ins used when Kukla sang the song alone reappear. The song proves effective, encouraging 'a line stretching out of the door', imagined off screen, to appear in search of Kukla's lemonade.

This early episode of *Kukla* shows the importance, versatility, and deceptive subtlety of the zoom. Despite the lack of fast zooms, shock zooms, or subjective zooms,

to a great extent the technology determines the visual style of the show. The natural inclination of the producers would have been to use multiple cameras to shoot *Kukla*. However, the zoom – necessitated by limitations in camera pick-up tube technology, and by the "tiny" dimensions of the studio – enabled them to cover the show with a single camera, and this in turn led to the uninterrupted single shot (Wilk 232). This structure, though not a purely creative choice, nevertheless emphasises the integrity of the live performance, and seems to increase the sense that the action taking place is of a somewhat natural and unrehearsed fashion.

Technical characteristics of the Zoomar lens prescribe further aspects of *Kukla*'s visual appearance. "Lemonade" plays out entirely in a setting of minimal depth. The camera is positioned almost straight-on against the players, and it is quite clear from the positioning of both Tillstrom's puppet characters and Fran Allison that the lens offers a relatively shallow depth-of-field. Panning is limited to perhaps 20 degrees to the left or right, and the camera makes no other perceptible movements, neither tracking nor craning. Props are minimal: limited to a stylized proscenium arch and an unseen stage surface onto which necessary items can be placed. Upon this limited canvas, *Kukla* creates two distinct but physically related environments, corresponding with the show's distinct but related (child and adult) audiences.[62] One environment is that which exists within the frame of the stage and its arch: an environment inhabited solely by puppets operated by Tillstrom. Outside of the presence of the adult players, the puppets appear to operate within their own diegetic world: while preparing lemonade in the absence of the humans, Kukla does not talk to the audience, nor to himself. Instead he goes about

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[62] The puppets are not 'children', but are represented as characters who have jobs and homes and various other adult concerns. Kukla acts, speaks, and behaves in a childlike fashion, but these aspects of his performance clash somewhat with the puppet's male pattern baldness.

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his business alone, the silence broken only by his whistling, or dialogue with other puppets.

The other environment is that which includes human characters: in "Lemonade", Fran Allison alone, joined occasionally in other episodes by other members of the crew. This environment is differently constituted, more self-referential than the puppet diegesis, and more directly addressed to the audience. (It is important to note that the puppets are not entirely contained within their own diegesis: they, too, break the "fourth wall" to address the audience, the crew, and their own situation as television performers. But their address to the audience is less direct.) A good example of the different address of the adult environment is offered within the episode by the gentle comic irony displayed when Fran Allison tastes Kukla's lemonade. She tells Kukla that the drink is "quite *good*", but turns to the camera to show viewers at home that her real view is different.

Later episodes of *Kukla* retain similar visual characteristics, though there is a tendency to become somewhat more adventurous both with props and with the use of additional cameras. In "Puppetry Festival" (28 June 1950), the technique of zooming in to exclude the proscenium arch is developed by the introduction of a prop resembling the rear of a car, which is placed in front of the stage (see Figure 5).[63] The car prop is also briefly zoomed into a further close-up, so that when Kukla and Ollie begin to 'drive', a comparatively rapid zoom-out simulates acceleration. In "The Mikado Dress Rehearsal" (21 February 1954), there are a number of cutaway shots to trio of musicians representing an orchestra, but the Zoomar-equipped main camera maintains a style

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[63] The slippery boundary between the diegetic and non-diegetic puppet world is again tested in this episode, which was sponsored by the Ford Motor Company: the car prop, depicting a Ford station wagon, motivates a lengthy discussion between Kukla and Ollie concerning the merits of the vehicle.

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familiar from "Lemonade" – zooming slowly into close-ups during puppet-only 'scenes', and reversing the movement for the parts of the performance involving Fran.

It is in the flexibility of transition between these two performance spaces that the zoom proves useful to *Kukla, Fran and Ollie*. Zoom shots in the show are generally smooth, slow, and steady. As a result they might go unnoticed by the casual viewer, but it is in this visual subtlety that part of their power lies. By gradually zooming between closer shots which contain only the puppet characters and exclude the sides of the stage, the *Kukla* camera operator excludes almost entirely the 'adult world'. Though the set is sparsely furnished, the viewer might be transported into the world of the puppets. But when a human character appears, the zooming/panning camera gradually alters the setting, reintroducing the physical bounds of the puppet performance space, and accommodating the physically larger human character. Rather than breaking the physical space, the transition between the two is smoothly accomplished in a manner barely perceptible to the audience. Crucially for a show which intentionally appeals to a dual audience, both the child-friendly puppets and the more adult-targeted Fran are kept constantly in the frame together, enabling moments such as Fran's disgust at the taste of the lemonade.

A final aspect of the zoom in the context of *Kukla*, and one that is hinted at by Gomavitz above, is in its specific ability to make the action appear unrehearsed.[64] In common with other uses of the zoom lens, both in dramatic programming and in news and current affairs, the panning and zooming technique provides a means of live image editing which reacts to action without consequently losing too much of it. As

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[64] Most sources agree that *Kukla* was largely unrehearsed, and the shows themselves would seem to confirm this. However, it has not been possibly to judge how much of the 'confusion' sometimes seen in the show was genuine.

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Tillstrom's hand puppets dart about the stage, the camera operator can make progressive adjustments to keep them within the frame, yet still appear to be 'following' unrehearsed action. By contrast, multiple camera methods of following the same action are more likely to result in missed action – or leave the viewer with the impression that cameras are following cues. Importantly, it demonstrates that when later films and television programmes use zooms to simulate television coverage, they are doing more than simple mimicry, but are sharing a specific property of the meaning of a zoom shot.

## Political Conventions

The whimsical family entertainment offered by *Kukla* and other similar shows was a significant element of the attraction of early postwar American television. But networks also had more serious ambitions, particularly with regard to their aspirations to rival radio, newsreel and newspapers as a journalistic medium.[65] Coverage of political conventions during the run-up to the 1952 presidential election was a significant moment in this evolution. The conventions promised to be a combination of intricately planned and carefully staged action, with unpredictable moments of political drama. Zoom lenses offered a particular advantage to the networks when planning coverage of the conventions – especially when it became necessary to overcome limitations placed upon them by politicians sceptical of unfamiliar television cameras. Their use provoked significant remark in newspapers and magazines at the time, and archival footage, combined with contemporaneous critical accounts, enable analysis of how they were used and the impact that they made.

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[65] The chapters "Here comes television: Remaking American Life – 1948-1954" and "Television and the Presidency: Eisenhower and Kennedy" in Edgerton (2007) offer a useful introduction to these aspects of early postwar American television history.

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1952 was not the first year in which the conventions were televised. Before considering the impact of the zooms on the 1952 Convention, it is therefore useful to consider the terms in which the conventions of the preceding election year, 1948, were discussed. The *New York Times* approached convention coverage in guardedly positive terms. A leader article looking ahead to television coverage of the event warns:

> since convention speeches were broadcast for the first time in 1924 keynoters have had to consider their voices; now that television has come they will have to consider their double chins and their wilted collars. ("Television At Philadelphia" E8)

If there were limitations to coverage, a lack of close-up detail and seeming proximity was not among them. For the *New York Times* reviewer "the concerted effort of the video industry reflected thoroughness in preparation and alertness in coverage". Viewers were "rewarded with television's characteristically intimate view […] The searching lenses of five cameras blanketed the auditorium and its entrance, keeping abreast of the action as interest shifted from point to point" (R. W. Stewart X9). Zoomar lenses may have been used to a limited extent: writing in *Billboard*, a Connecticut television station manager observed that during television coverage of the 1948 Republican convention in Philadelphia:

> I did notice that on Governor Green's keynote address that they were evidently using a Zoomar lens, which brought not only the speaker into focus but also background for 20 to 30 feet behind him. All during his talk there was a constant stream of people going and coming which was very disconcerting to the viewer. I noticed that this was avoided on subsequent pick-ups. Evidently someone noticed the error. (Milne 12)

The *New York Times* was in no doubt as to the civic significance of the coverage, claiming that "television, all at once, was bringing a new political consciousness to a sizable portion of the population, while it promised to exercise a revisional influence on

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the convention scene" (R. W. Stewart). At the conclusion of the Democratic convention, the paper's radio reviewer Jack Gould declared that NBC's camera work was the best of all the broadcasters, "particularly in the use of full and sustained close-ups" (Gould "Television and Politics").

Despite the evident significance of television coverage of the 1948 conventions, 1952 was to be a breakthrough year, promising improved technology and – for the first time – a mass audience. As Watson writes:

> Although television had covered both of the party nominating conventions in 1948, the 1952 Republican Convention in Chicago was the first at which television news possessed the technical resources and attracted a large-enough scale audiences to have significant political impact. […] The introduction of zoom lenses and handheld cameras called 'Creepie Peepies' gave coverage much greater range and mobility. (Watson 209-10)

The sense of a greater audience and therefore a potentially magnified role for television was well-anticipated by the television networks and their major sponsors. As one sponsor remarked in January 1952:

> Philco welcomes the opportunity to bring to the American public these history-making events in 1952. So rapidly has television grown that this year it is estimated that 18,000,000 homes will be equipped with television receivers by election day, with an estimated 70,000,000 to 75,000,000 persons seeing and hearing the candidates in action. ("NBC Set To…")

Prior to the convention, television had already been earning a reputation as an effective conveyor of civic drama. In March 1952, in a "report on the good and the bad of TV's six years – and a look to the future", Jack Gould highlighted the effectiveness of television in depicting sporting events, but added:

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> In the realm of the more serious news event, television unquestionably is a major stimulus to a better informed public opinion. The telecasts of Jacob [*sic*] Malik at the United Nations constituted a vivid primer in the deviousness of communism; for all its hippodroming overtones the Senate crime inquiry left an indelible impression of the scope of organized crime. This year is going to see television bring the full weight of its influence on the Presidential campaign, with the probable result that the public as a whole is going to be more intimately acquainted with the candidates than ever before. (Gould "TV at the…")

A *New York Times* editorial in June 1952 remarked:

> The TV audience is now nation-wide for the first time in a national campaign, and the camera is also newly ubiquitous. Television will watch the political conventions in Chicago. It will examine the spellbinders. It makes a goldfish bowl out of every rostrum. It applies the litmus test to shenanigans, phonies and plain bores. It separates the men from the boys. ("TV As A…")

The significance of the Republican convention was highlighted by *Life* magazine, which opened its account of the broadcasting of the event by stating:

> Television made the Republican convention the most widely-viewed event in history. Its astonishing zoomar lens, operating from high in the cavernous amphitheatre, sucked up the distance to bring millions of viewers face to face with a single screaming delegate among the hysterical thousands far below. ("Television Showed The…" 18)

A photo caption described the zoom lenses as the "Big Berthas of the TV convention coverage [which] ranged throughout the entire convention hall with an all-seeing eye" (19). In addition to offering a closer view of important political proceedings, long lenses also added a human touch to some of the coverage. A *New York Times* correspondent spotted that television cameras picked up activity of a convention chair who:

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slipped her shoes off […] She remembered to put the shoes on again before stepping away. Mrs Howard overlooked only one detail. A powerful television lens in the gallery behind her picked up every detail of the operation ("TV Spies Mrs…")

The general feeling in the popular press was that the television coverage brought viewers closer to the action. *Variety* remarked: "the iconoscope and the zoomar lens are as clinical as a surgeon's scalpel. It cuts through everything. It is the great revealer" (Abel "TV For President!" 2). The headline over a *New York Times* article about that year's Republican convention claimed: "video-set owners have front row convention seat, and in many ways they are closer to the action" (Gould "Radio and Television" 34).

Such positive reviews suggest that television networks made significant progress in their televising of the 1952 conventions, and that the long reach of the Zoomar lens was instrumental in bringing viewers closer to the action. Yet this was an effect which television companies struggled to produce, due to political parties' suspicions about the merits of TV and restrictions placed upon broadcasters. Contemporaneous coverage in *Popular Science* confirms that strict limitations were placed on space for television cameras. Broadcasters pooled their resources and shared coverage. *Popular Science* explained:

all eight cameras will be equipped with Zoomar lenses. […] This lens will make it much easier to get close-ups in the convention hall, for cameras will not be permitted to move around on the crowded floor. (Soule 139)

*Variety* identified further restrictions on the television networks, and the utility of the Zoomar in circumventing them:

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> In setting up the TV equipment, the [networks] were barred from taking direct full-face shots of the speakers on the center platform, with all cameras restricted to the side of the Amphitheatre […] Thanks to the Zoomar lens, however, the closeups practically give the same effect as the direct front view shots. ("Far Cry From…" 23)

In a detailed retrospective report for the Brookings Institution, Charles Thomson recounted how:

> the [Democratic and Republican national] committees tried to prevent television coverage by portable equipment used on the floor of the hall itself. The effect of this was largely nullified by the enterprise of one network, which installed a camera with a long range lens in its control booth. The other networks quickly copied this example. (18)

Television coverage of the conventions was of considerable interest to magazines such as *Life*, which printed spreads of pictures of the technology at work ("Television Showed The…" 18-20). These show clearly that zoom lenses were in use for the events. As Thomson confirms, zoom lenses offered a solution to the problems posed by the convention-floor ban on cameras:

> By placing cameras at the sides and back of the hall and by using long-range lenses, the television networks could easily focus upon anything in the hall not available from the floor platform, such as an interview with a caucus or prominent manager or delegate on the floor. (18)

In some cases, portable cameras – sometimes nicknamed 'creepy peepies' or 'walkie-talkie-lookies' ("NBC Set To…") were permitted on the convention floor. However, their technical limitations rendered them unreliable and impractical, and they gave "at best a murky picture" (Thomson 37). As Gould remarked, reviewing the Republican National Convention in July 1952:

> [NBC] introduced its 'walkie-lookie,' a portable camera, on the floor of the convention, but frankly better close-ups of the delegates were

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> obtained from the regular cameras set up around the hall ("Radio and
> Television").

According to Thomson, a combination of remote sound and zoom lenses offered a
solution:

> In the Republican convention the networks found it preferable to cover
> floor events by combining a radio signal from walkie-talkies carried by
> roving reporters on the floor with video provided by long-range lens
> cameras from the booths. (37)

By the time of the Democratic convention, which took place a few weeks later,
broadcasters had found a further advantage to using long-range shots: their relatively
shallower depth of field excluded extraneous background action. *Variety* noted:

> The background is put out of focus by head-on shots with Zoomar lens,
> rather than often copping major attention, as was inevitable with side
> view cameras. Proof of the video pudding is the fact that during the
> initial quarter-hour of the opening session, the pair of head-on cameras
> accounted for over 12 minutes of screen time. (Lowe 1)

Another account suggests that this was a result of careful planning by Democratic party
chiefs, who "noticed that the side angle camera used in the Republican convention
caught too much distracting background movement" (Blair 48). Gould, though, was
unimpressed, remarking that "the distractions on the screen during speeches were at
least as bad, if not worse, than during the Republican conclave" (Gould "Radio and
Television").

It is clear that Zoomar lenses played a highly significant role in networks'
logistical preparations for the conventions. However, this does not provide a clear
picture of how they were used in the normal run of coverage, or how their use affected
the style of the broadcasts. Fortunately it is possible to refer to archived television
footage from the conventions, which resolves some of these questions. Footage of a

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speech by Senator Everett Dirksen to the 1952 Republican Convention shows some of the ways in which zoom shots were used both to enliven the visual appeal of television coverage, and to capture unpredictable events taking place in parts of the convention hall distant from the main action of the platform speakers.[66] During Dirksen's speech, which took place as part of a 'floor fight' on the seating of delegates from Georgia, the camera generally stays fixed on the head and shoulders of the speaker, panning or tilting only slightly to accommodate slight sideways movements. Occasionally – only four or five times in the first eight minutes of the coverage – the camera cuts away to shots, of various different scales, of the audience. Some of these are long shots showing the size of Dirksen's audiences. In other cases, telephoto medium shots focus on small groups of audience members in front row balcony seats. It is not clear whether these were obtained using fixed focal length lenses or zoom lenses, though the variety of shot scales of subjects, taken from various distances, combined with the limited number of cameras allowed in the convention hall would suggest that the composition of some of these shots may have been achieved using zoom lenses. This is a theory lent credence by the inclusion of one shot in which the director cuts from the 'standard' shot of Dirksen on the podium to a somewhat longer shot from an almost identical position, showing a wider view of the podium on which he stands amid the crowd. This longer shot immediately begins to zoom in, at a moderate pace, until it is only slightly wider than the original shot of Dirksen (see Figure 6). This is a clear example of the zoom lens being used for no other reason than to increase the visual appeal of the coverage.

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[66] The source is a C-SPAN rebroadcast of NBC's live coverage of the convention, viewed via the Museum of Broadcast Communication's online video archive (originally broadcast on 9 July 1952; rebroadcast by C-SPAN 8 March 1989).

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During Dirksen's speech at least two unexpected incidents occurred on the floor; both were captured by the cameras. While broadcasters would by this stage have been well prepared for 'demonstrations' and other events to take place in the audience area at conventions, the precise time, nature, and extent of such events could not always have been predicted. These occasional dramas, it seems likely, would have been a major factor in making coverage seem more interesting to audiences. Therefore broadcasters needed to be able to provide visual coverage of them as quickly as possible and in as much detail as possible. In this regard, zoom lenses evidently proved useful. Approximately 20 minutes into Dirksen's speech, a physical fight broke out among convention delegates (see Figure 7). This momentary disorder had its roots in a verbal confrontation between Dirksen and New York governor Thomas E. Dewey. Viewers saw a lingering shot of Dewey, conferring with members of his delegation, while the crowd cheered its support in the background. The director then cuts back to the convention chair who asks security staff to "take care of the disorder in that part of the hall". This is followed by a cut to a medium shot of delegates surrounding a sign reading 'Michigan'. The camera zooms out, showing the position of the Michigan delegation within the convention hall, and capturing the extent to which the convention seems to be in uproar. Some delegates stand up and face away from the speaker, fixing instead upon the moving crowd. As the movement of the crowd increases, a commentator describes the action:

> There's a great deal of confusion out there. Here goes a fight, there's a fight up. [Inaudible] a photographer getting in trouble, I don't know who was hitting who, somebody got knocked down, but it's pretty hard to tell who it was. Officers were in the middle of it, they really are having a time here tonight.

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Amid this commentary, the camera attempts to capture as much of the action as possible, with the zoom lens proving crucial in providing unbroken coverage of the events on the convention floor. As soon as jostling amongst delegates turns into a fight, the camera pans to follow the confrontation. A zoom-in returns viewers from the wider shot of the convention hall to a closer shot which shows – albeit with poor clarity – interaction between individual delegates, and the intervention of a police officer. In addition, the pictures give some idea of the facial expressions and body language of those involved.

Directors follow a similar strategy when the delegation from Pennsylvania calls for a poll during balloting to determine who will be nominated as the Republican candidate (see Figure 8). Here again, the zoom lens is used to move from a wide shot, encompassing crowds, towards individual delegates huddled around the state's signboard. From the longer shot, individual bodies are barely distinguishable, and faces cannot be seen, but at the longest extension of the zoom, delegates can be seen conferring; one is seen to smile broadly, but most are listening intently to the speaker. Just about visible, though mainly hidden behind the state's sign, is the rapidly moving head of a Pennsylvania convention member who is making an impassioned speech. A few minutes pass before a new and more suitable angle is obtained on the Pennsylvania delegates, during which the camera lingers on the considerably less visually interesting image of the convention secretary calling out names. The length of time it takes to establish a new shot suggests that initial zoom-in shot of the Pennsylvania delegation may have been a last resort in the absence of better images; however, it also provides a valuable demonstration of the practical utility of the device.

It can easily be argued that, from the point of view of mass media coverage, 1952 was one of the most significant American political convention years: the point at

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which patterns and coverage practices were cemented, through hard negotiations between television newcomers and the old hands of radio, newsreel, and the print media. The influential critic Jack Gould, writing in the *New York Times*, lavished praise upon the coverage, arguing that the networks' "masterful" coverage had been "responsible in part for the country's interest in the subsequent campaign that brought out a record vote" (Gould "The Year's Summary"). This was a multifaceted success, involving showmanship by political parties, entertaining commentary from familiar journalists, and the simple fact that convention coverage blanketed the networks to the exclusion of all other programming. But there can be little doubt that the formal options offered by the then-unique Zoomar lens played a significant role in determining the style, and therefore the success, of the coverage. Without zoom lenses the networks would have been stuck between arguing more strongly with the political parties for floor positions – with unpredictable results given the politicians' distrust – or retreating to the sidelines and using fixed focal length telephoto lenses. While it is not possible to be certain about the nature of the coverage had the former happened, we can guess that such coverage would have been considerably more static and less varied than the combination of zooms and wireless sound. Even if audiences were captive, and even if television coverage had struck the average viewer as neither educational nor compelling, television coverage of conventions impressed at least one set of people: opinion makers working for newspapers such as the *New York Times* and think tanks such as the Brookings Institution.

The conventions which followed, in 1956, followed a similar pattern in form and logistics. In a closed-circuit broadcast detailing CBS coverage plans before the 1956 event, CBS president Frank Stanton introduced the broadcast, telling the intended audience – convention delegates – that:

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> television will be there with you, making it possible for the great
> demonstration of democracy […] in action to be seen and heard by more
> than one hundred million Americans in their homes and offices.
> Television has brought to this nation a wholly new form of electronic
> journalism which gives all the people an opportunity to witness the great
> events as they happen and see the leading protagonists of the main issues
> of the day: see and hear for themselves firsthand, so that they can make
> up their own minds. This, I submit, is a great instrument of pure
> democracy. ("Pre Democratic National…")

Later in the programme, Sid Mickelson, the network's vice president for news and

public affairs, explained that:

> Three other pool television cameras will be staring out at you [from the
> sides of the convention hall]. These are the cameras that will be
> following your collective actions, ranging up and down the convention
> floor, closing in as a delegation chairman announces a vote, and pulling
> back to show the excitement as you demonstrate for the candidate of
> your choice.

As Mickelson explains this, the camera zooms forward across a model of the

convention floor, to demonstrate this point. But there is no specific reference to zoom

shots – just to the extreme portability of the new lightweight cameras, feted during the

programme as the network's "newest and most sensational device".

Despite improvements in portable camera technology, limitations on the number

of floor cameras remained. As a result, cameras with telephoto and zoom lenses were

still essential in covering the proceedings. This resulted in similar approaches to

coverage of long and visually unstimulating speeches. When the crowds chanted John

F. Kennedy's name in support of his bid for nomination as the Democratic Party's vice

presidential candidate, a single television camera ranges round and zooms out from the

platform to capture the crowds chanting "We Want Kennedy", then zooms in further to

capture the words on "Stevenson and Kennedy" signs, then further still to capture the individuals holding them and chanting ("Kennedy, Humphrey and…"). When Kennedy later took to the dais to withdraw his nomination bid, the network pool cameras zoomed in and out periodically – not always to capture particular action, but simply to provide a change of framing ("Kennedy Withdraws").

In 2012, zoom lenses remain an important part of the coverage of political conventions and other similar major events, and in their ability to reach from a great distance into the space occupied by a political candidate, official or supporter they certainly have the ability to bring viewers 'closer to the action'. However, for intimacy, this approach was eclipsed by *Primary* (Richard Drew, 1960), in which a lightweight camera – as small and light as the television networks had dreamed of for their live coverage – followed Kennedy as he attempted to secure the presidential nomination in 1960. Since then, moments of real connection between the viewing electorate and the politicians who seek their votes have tended to occur at moments of physical proximity between camera and personality: as seen in televised debates since 1960, Richard Nixon's interviews with David Frost in 1977, and Bill Clinton's televised denials of impropriety in 1998. Conventions have not produced such intimate moments: the zoom, in this context, seems limited to rendering a better view of the action, if not a sense of real closeness.

## Beyond Television

From its beginnings as an evolution of military technology, by the mid-1950s the Zoomar lens had established a firm foothold in the American television industry. It was a mainstay of a wide range of sporting events, the workhorse of *Kukla, Fran and Ollie*, and a crucial element in the successful televising of American political conventions.

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Furthermore, if the evidence from local stations can be generalised, it can be assumed that Zoomar lenses saw wide use in a range of live and kinescoped television applications, which due to their local and/or ephemeral nature were not described by contemporary critics, and have not been preserved for analysis. The zoom shot, it is safe to assume, was a common sight on the television by the early- to mid-1950s.

It is therefore unsurprising that, as the Zoomar lens became more widespread, it began to exert a cultural influence upon the television industry in which it was used. Although Zoomar's models were not the only zoom lenses developed and used by the dawn of the television era, the Zoomar brand name is the only one that appears to have had a significant cultural impact. Increasingly, the Zoomar trademark was used to refer to zoom lenses in general. By mid-1951 references to the use of Zoomar lenses become less detailed and more colloquial: often, the word is no longer capitalised, inviting questions about whether the trademark was becoming a generic term.[67] As the 1950s progressed, it became more common for *Variety* to refer to Zoomar in this way. From time to time, the magazine referred to 'Zoomar-type' lenses or enclosed the trade name in quotation marks to signal a generic reference – such as when reporting on a Russian television station's acquisition of "'zoomar' lenses" (Levine 35). The 'Zoomar' name is also occasionally used within television periodicals as a metonym for the television camera, or television industry. In October 1952 a *Variety* article remarks upon "enterprising music publishers who, seemingly, are not permitting themselves to be caught asleep as the Zoomar switch" (Abel "S-B Plugs 75…" 46); a fictional politician in a 1955 episode of *Alcoa Hour* is "a man obviously smitten by a zoomar lens" (Rose 40); and, as shown above, at least one account of national party conventions included

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[67] Causing problems for some critics: Willemen (2003), for example, states that "Paramount deployed a zoomar lens in the late '20s".

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metonymical references to "television's […] Zoomar lens" ("Television Showed

The…" 18).

References to the lens appear in at least two novels published in the late 1950s.

Perhaps the most striking example is Ernie Kovacs' *Zoomar*, a "bawdy, uproarious

novel" published in 1957, in which "Tom Moore, a young TV executive […] rockets to

the heights on wings of his successful show, *The Miss Wipe-Ola Beauty Hunt*". The

novel contains several passages in which Zoomar lenses are specifically referred to. For

Kovacs, the zoom lens was symbolic of a salacious and voyeuristic approach to popular

television programming:

> "You'll tie up a whole camera with a Zoomar lens, Carl, why not omit it
> and you can get the wide shots with a 35?" This from Campbell.
> "No sir, buddy, I want that old Zoomar and when I want to Zoom in for a
> close-up of them little tiddies, I want to pow right in on it. There ain't
> nothing like a Zoomar for the whole picture and then the hole picture –
> h-o-l-e, that is." Billie's soiled pajamas flapped on the line again and
> Millie excused herself to phone the office. (44)

Several chapters later, Kovacs returns to the theme:

> Steinmetz was inside, playing with the Zoomar. "Zoom in on the old
> tiddies," he was shouting.
> "Zoom in on the old tiddies," the technical director said.
> She held the can of Wipe-Ola, with her thirty-three white, sparkling teeth
> working energetically. The shot on the monitors in the control room
> showed a close-up of her chest. (68)

*Lootville*, by Benedict and Nancy Freedman, also published in 1957, refers more

frequently and in more detail to the use of zoom lenses on television sets. Though

ostensibly fictional, the novel's setting – "the fabulous world of TV, behind Camera

Number Four on the Zane Cochrane Show" – matches closely enough with Benedict

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Freedman's career as a writer on *The Mickey Rooney Show* and *The Red Skelton Show* to hint at an autobiographical element to the storytelling.[68] Given this background, a passage in which the protagonist lyrically discusses the lens, and its significance within the television industry, is worth quoting at length:

> My job was to keep him in the viewfinder. It was the toughest task and most fun I've ever had. We never had the faintest idea which way he was going next, and sometimes I don't think he had. […] I couldn't have done it without the Zoomar lens. This is the nearest thing to the human eye, which can look at a sailboat out in the bay and then at a hangnail on your finger and have them both in focus. With an ordinary turret head and its complement of four fixed focus lenses, I would have twisted my arm off shifting from the ninety to the telephoto to the wide angle and back, and I wouldn't have got the results. But now on the Zoomar I saw for the first time what television could be, what it should be. A new kind of photography, not simply a low-grade motion picture. What I was doing up there was photographing something spontaneous, something that was happening right this minute, unpremeditated, unrehearsed living. There flashed through my mind the things I really enjoyed watching on TV: the political conventions, the basketball games, the fights, "Meet the Press." That was where television was at its best. Not competing with the movie studios to turn out a standard mixture of sentiment and violence, but reporting unpredictable fact. (146-8)

Although the Zoomar lens exerted a significant influence upon television, its use in feature films appears to have been limited; Belton suggests negative audience reactions may have been one reason for this ("Bionic Eye…" 25). Nevertheless, by the mid-1950s, Zoomar seemed to be the dominant force in zoom technology. But this situation was not to last. From the mid-1950s onwards, the market for zoom lenses changed in a

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[68] *Lootville* contains settings similar to elements of both *Mickey Rooney* (set behind the scenes of a television station) and *Red Skelton* (a sketch show). Hyatt confirms that both shows inspired the text (58-9).

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way which gradually led to increasing zoom shots in Hollywood cinema. The

introduction of a new French lens, the Pan Cinor, in apparent contravention of patents

held by Zoomar, altered the market. Simultaneously, increasingly ambitious uses of the

zoom shot by directors of anthology and serial drama helped to clear the way for the

technique's adoption on the big screen. The next chapter documents how changing

zoom technologies contributed to an increasingly dynamic interaction between film and

television style.

**Figures: Chapter 6**

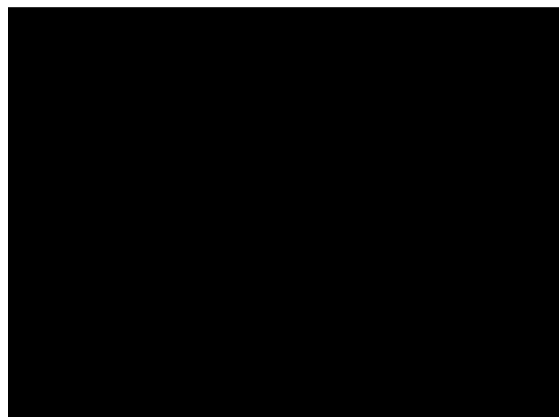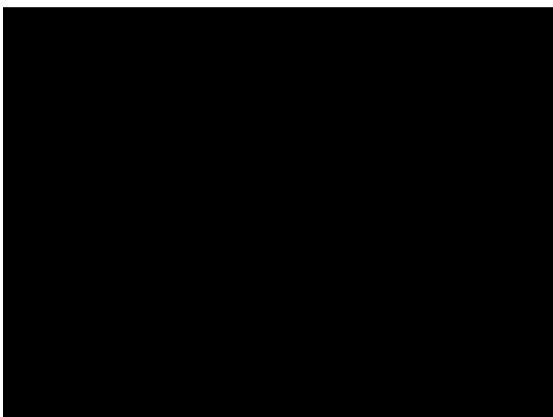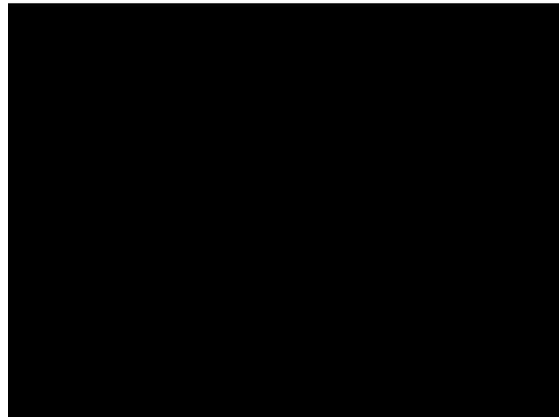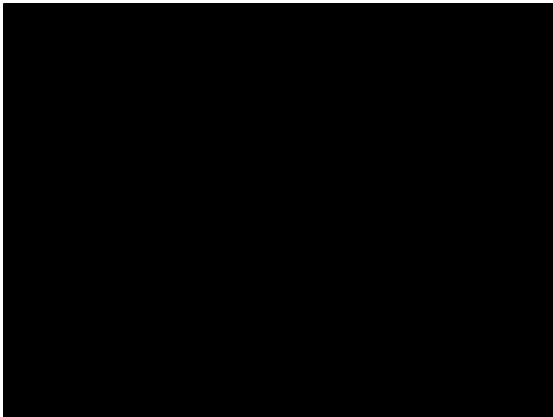**Figure 1:** *Kukla, Fran and Ollie* "Salute To Television" – 'Zoomar' Demo

**Figure 2:** *Kukla, Fran and Ollie* "Lemonade" – Opening Shot

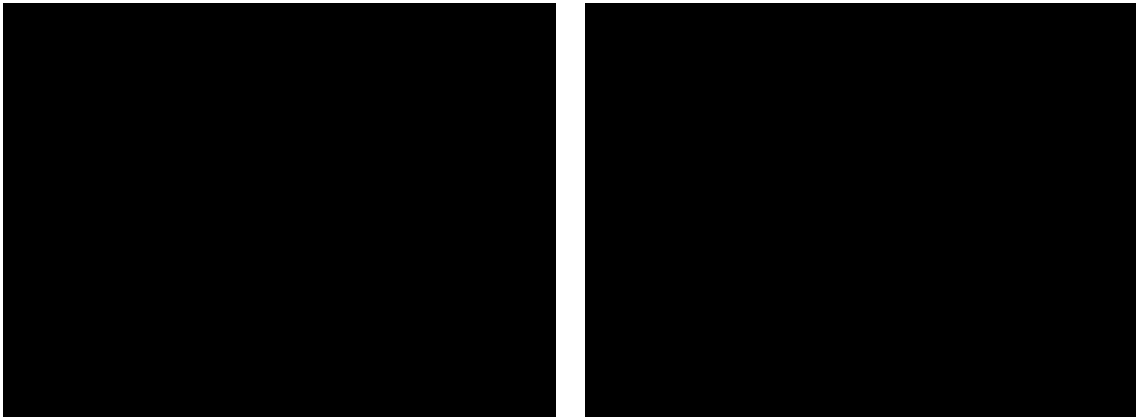Images have been removed from this dissertation by the author for copyright reasons.

**Figure 3:** *Kukla, Fran and Ollie* "Lemonade" – Further Zoom

**Figure 4:** *Kukla, Fran and Ollie* "Lemonade" – Puppet/Human Transition

**Figure 5:** *Kukla, Fran and Ollie* "Puppetry Festival" – Road Trip

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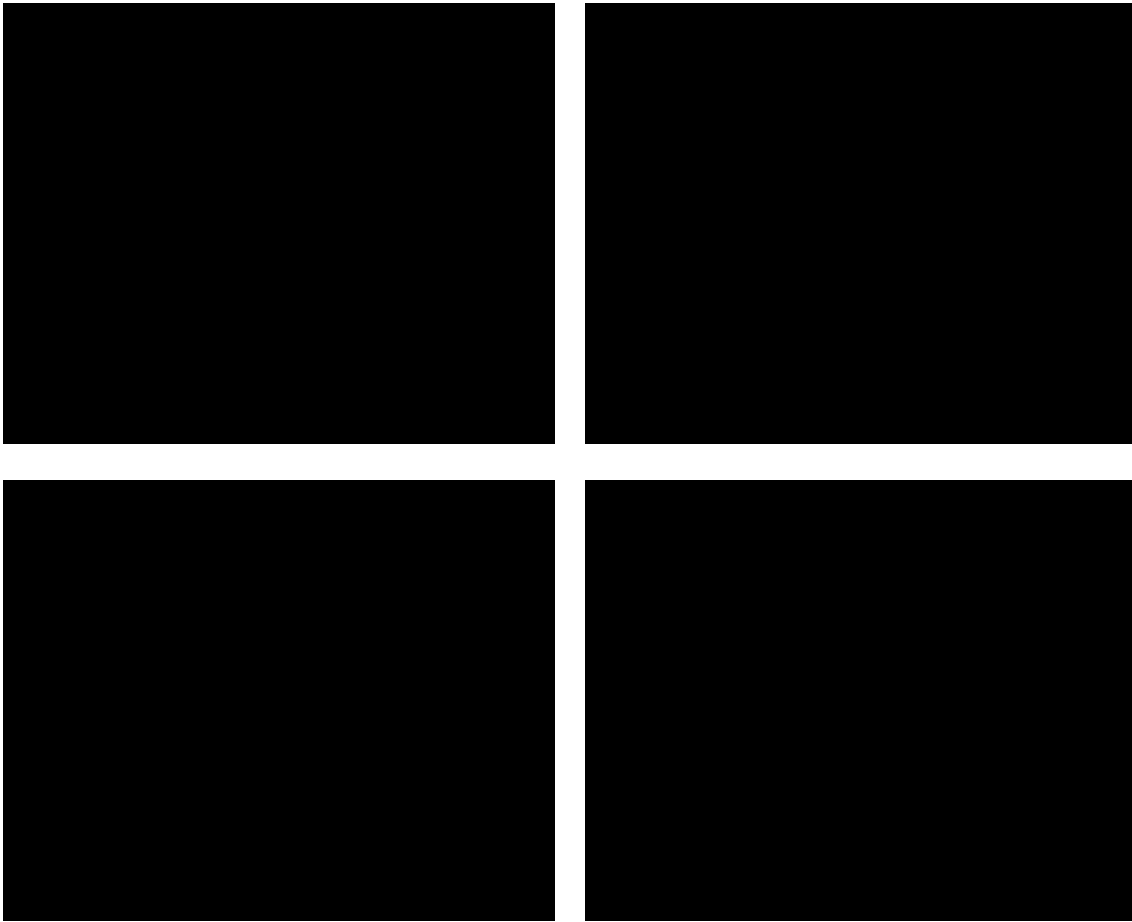
**Figure 6:** Republican Convention, 1952 – Dirksen's Address
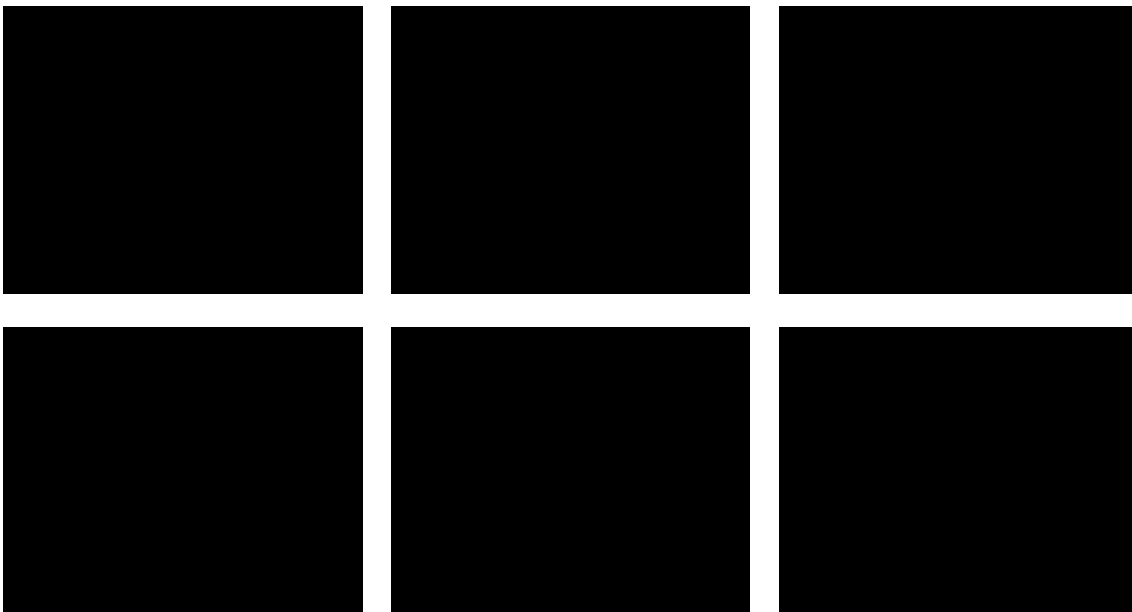
**Figure 7:** Republican Convention, 1952 – Floor Fight

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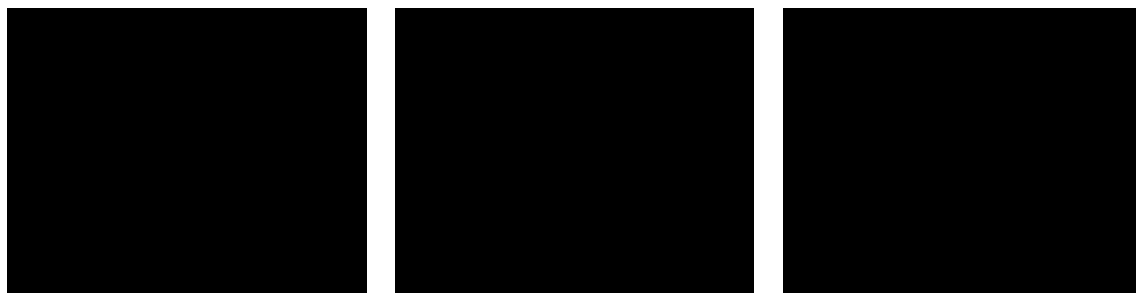
**Figure 8:** Republican Convention, 1952 – Pennsylvania Delegation

## 7. Competition: Paillard and the Pan Cinor

By the mid-1950s, Zoomar had achieved what had eluded all previous innovators,

including the major studios: they had successfully and permanently introduced zoom

lens technology to the television and filmmaking industries. By 1957, the company

claimed to have sold Zoomar lenses to over 257 television stations in the United States,

in addition to the company's sales to stations in Canada, Japan, the Philippines, Mexico,

Brazil, Argentina, Venezuela, Colombia, Puerto Rico, and Cuba (Kaufman 331) –

representing a value, according to one company executive, of approximately $2.25m

(Kaufman 318). The company's range of zoom lenses was used widely across the

television industry, and – to a more limited extent – in feature films. The word zoomar

even showed signs of moving towards common usage as a synonym for the older term

'zoom' – if not quite a household word, it at least became a term with more public

currency than many other jargon words from the industry. Zoomar's success was

boosted by a virtual monopoly enjoyed by the company until the early 1950s, reinforced

by the strength of its two patents, which prevented any other person or company from

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selling optically-compensated zoom lenses in the United States for as long as the patents were valid. The earlier of the Zoomar patents was valid until 1966, and the later until 1972, seemingly guaranteeing the company a medium-term niche market.

Despite its rapid adoption by the television industry, the original 'Field Zoomar' had a number of flaws. Some of these were later recalled by Chuck Pharis, who worked with original Zoomar lenses during the 1960s and 1970s:

> They needed a TON of light just to make a decent image. They could only be used in the daytime. They were quite heavy, and many had to be supported with a cable from the front to the camera just to keep the lens from binding. […] You could not zoom all the way in, as the optics would porthole (the video around the edges of the lens would distort and darken in level as you zoomed in and look terrible) and the video level would drop off big time.

Pharis also recalled that the manufacturing quality of these early Zoomar lenses inhibited camera operators' ability to produce smooth, visually appealing zoom shots:

> [Field] Zoomar lenses used a long metal rod to zoom and focus the lens. Those rods often got bent, and you could not zoom and focus easily. The lens would 'jerk' and the zooms looked bad. Many cameramen would hide a 'good straight' lens push rod in their pants leg, and take it home with them. Once you found a good straight rod, you stole it and kept it. I remember many times, getting to work early so I could get the best push rod for myself. I never took one home with me, but many did!

Bill Pegler, too, recalled that the first Zoomar lenses had "terrible edge resolution", a limited zoom range, and were physically "huge". Perhaps in response to these limitations, some of which had been observed during the earliest tests of the technology, the Zoomar Corporation continued to develop new models, in 1953 introducing the 'Studio Zoomar' – a "smaller and lighter" model which was touted as optimal for color

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television production ("Nearly 100 Exhibits…" 106).[69] Frank Back continued to use his

own position as inventor to promote the Studio Zoomar, addressing fellow television

technicians at that year's convention of the National Association of Radio and

Television Broadcasters ("Official NARTB Convention…" 42). An advertisement

published in *Broadcasting-Telecasting* the following year emphasised the Studio

Zoomar's ability to replace a set of prime lenses. One advertisement quoted six senior

television engineers, five of whom testified that they were using the lens regularly in the

place of fixed lenses ("The New Studio…" 1 February 1954). Nevertheless, the

company hedged their bets: another advertisement showed John C. Merino, the manager

of KFSD-TV "holding up three fingers to show how perfectly the Studio Zoomar

operates with three other lenses on the turret" ("The New Studio…" 1 March 1954).

Despite patent protection, and perhaps because of some of the limitations of the

lens, in the early 1950s Zoomar was met with domestic competition, in the form of the

introduction of Pan-Cinor zoom lenses to the American market. These lenses were

designed and manufactured by the French company Societé Optique et Mechanique-

Berthiot (SOM-Berthiot), and marketed and distributed in the United States by Paillard

Products, Inc, a division of the Swiss camera manufacturer Paillard. The Pan Cinor lens

emerged from an industrial and innovative context different to that of Zoomar, and its

zoom lenses were better designed for feature filming than their Zoomar equivalents –

possibly as a result of the slower development of the postwar television industries in

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[69] Marketing material rarely discusses the interaction between colour filming and televising, and the
development of zoom lenses. It is clear that from the early 1950s, the Zoomar company was developing
lenses with colour applications in mind. There is less evidence as to the extent to which Zoomar and other
companies kept colour filming in mind when developing. Given that colour film is generally 'slower'
than black-and-white film, there is no doubt that its use would discourage a zoom lens, but the extent to
which this was a problem within the film and television industries is little-discussed.

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European countries. Furthermore, the lenses they produced were already in use by
European feature film directors – notably Roberto Rossellini (Brunette 222).[70] For these
reasons, the Pan Cinor lens represented formidable competition for Zoomar's
established product line. This chapter examines what happened when Paillard broke
Zoomar's *de facto* monopoly by introducing SOM-Berthiot lenses to the American
market.[71] In creative terms the intervention of Paillard appears to have led to more
flexible and adventurous uses of the zoom in American television, as camera operators
and directors began to develop the zoom shot beyond the basic techniques adopted
during the late 1940s and early 1950s. This development took place as television
increasingly came to rely upon filmed, as opposed to live, performance. During the
same period, there was also a slow growth in the use of the technology for feature
filming. In the market, Pan Cinor lenses were at first fiercely competed with before
Zoomar made an ill-fated attempt to banish them from sale by suing for patent
infringement. However, by 1958, only eight years after the introduction of the first Pan
Cinor zoom lens to the American market, Paillard Products had decisively defeated
Zoomar in the courts, invalidating their patents in a judicial decision that would, as the
*New York Times* put it, "open wide the field of manufacturing such lens system [sic]"
("Zoom Lens Rights…" 52).

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[70] Brunette, however, expresses a misconception found in a number of accounts of Rossellini's career:
that the "Pancinor zoom device [was] invented and operated by the director himself" (222). Kolker
repeats the notion when he describes Rossellini's zoom as "a kind that is of [his] own invention" (*Altering
Eye* 82). Such remarks overstate the case: it is very unlikely that Rossellini invented a zoom lens, but
instead built a device to enable more easily repeatable zooming using the existing Pan Cinor lens invented
by Cuvillier and others at Berthiot.

[71] In this chapter, Zoomar Incorporated is referred to as 'Zoomar'; Paillard Products Incorporated as
'Paillard'; SOM-Berthiot as 'Berthiot'. The court case *Zoomar Inc. vs. Paillard Products Inc.* is
abbreviated as *Zoomar vs Paillard*.

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## Pan Cinor and Zoomar 16

In the shape of SOM-Berthiot, Zoomar faced a radically different competitor. Whereas Zoomar was a relatively small, but successful, company which specialised in the production of zoom lenses, Berthiot was a much larger, more mature, and more diverse institution. The company was founded in France in 1857, and after undergoing a number of transformations, it emerged from the Second World War with substantial capacity. By 1954, the company employed 1,100 people at three French factories. As in the USA, French industry embarked upon a post-war programme of converting military technologies for civilian use, and in addition to a wide range of camera lenses, the company also joined forces with other organisations to produce a diverse range of products, including dairy machinery and topographic instrumentation (Bandelier).

As Kingslake notes, the first Pan Cinor zoom was designed by Roger Cuvillier and first described in a patent filed simultaneously in France and the United States, and in Britain the following year (171).[72] But this did not lead instantly to the distribution of the new zoom lens in the USA. In contrast to American innovative efforts, which appear to have been geared from an early stage towards the production of a standalone zoom lens, Berthiot initially approached the problem with a view to providing an attachment designed to add a zoom function to a fixed focal length lens. As a result, the mechanism described in the Cuvillier patent is not a lens in its own right but an attachment. As the patent notes:

> when used in conjunction with an objective having a focal length of 25mm such as is suitable for 16mm cinematographic film, the device gives the objective a focal length which can be varied infinitely from 15 to 60mm. (col. 4)

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[72] Fr. Pat. 983,129 and US Pat. 2,566,485, filed 28 January 1949.

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Cuvillier's invention, as described in the patent, is for a lens:

> having an infinitely variable magnifying power and comprising a pair of
> convergent lenses and a pair of divergent lenses arranged so that,
> considered in the direction of travel of the light, each convergent lens is
> followed by a divergent lens and so that one pair can be displaced as a
> pair along the optical axis relatively to the other. (col. 1)

In order to maintain a consistent focus:

> the position of the front lens of the movable group is made adjustable
> relatively to the rear lens […] by turning the barrel by means of a
> knurled ring, the axial position of the [front] lens can be adjusted
> relatively to that of the [rear] lens. […] Thus, the position of the lens in
> the tube is characteristic of the distance of the object, regardless of the
> magnitude of the image. This has the advantage of allowing a range
> finder to be couple to the supporting tube of the lens. (col. 3)

The introduction of the new Pan Cinor lens was noted almost immediately in the

United States. Quoting a report in the French journal *La Technique Cinematographique*,

*American Cinematographer* observed: "unlike other lenses of the type […] the

adjustable components do not move in relation to one another; five elements are

stationary and two are mounted upon a single moveable barrel" ("'Pan Cinor' -

Novel…" 205). However, there was no further mention of the lens in *American*

*Cinematographer* or the *JSMPE* during the following three years, and the patenting and

initial marketing of this lens appears to have been only the first public announcement of

a long, and unfinished, process of technological development. Two subsequent French

patents, filed by Raymond Rosier in 1952 and by Lucien Reymond in July 1953,

describe further improvements to Cuvillier's basic Pan Cinor design. The most

significant development was that, while Cuvillier's device had been designed to be

attached to another lens, the Rosier and Reymond patents describe standalone zoom

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lenses, offering variable focal length functionality without auxiliary attachments. Based on the focal lengths specified in the claims section of each of these patents – 20-60mm in Rosier and 17.5-70mm in Reymond – they apparently refer to the Pan Cinor 60 and 70 models. It is likely that the version of the Pan Cinor introduced to the American market in late 1953 had undergone significant development since Cuvillier's original version.

Paillard Products began promoting the Pan Cinor 60 zoom lens to their amateur customers in 1952 (Paillard Products; "Zoom for really…"), but it was not until the following year that the company also began to address professional customers. In the Spring 1953 edition of Bolex's promotional magazine *Bolex Reporter*, Tennessee news cameraman Sid O'Berry explained how:

> I was introduced to the new Pan Cinor Zoom lens by Paillard Products' Regional Manager, Vladimir J. Wolf, who suggested that since I am a newsreel cameraman and film editor for WSM-Television, I would be interested in a zoom lens. Well of course I was – I had heard of the new lens and was eager to learn more about its features […] I had the chance to use the Zoom lens outside and inside and the results were the same – very good. […] Look at the many advantages it offers the newsreel cameraman where quick lens changing is a necessity, and also the studio use that it can be put to in smooth dollying. (O'Berry)

The Pan Cinor 60 zoom lens was announced in *American Cinematographer* in October 1953, in an article which synthesised elements of two articles previously appearing in the *Bolex Reporter*. *American Cinematographer*'s article on the Pan Cinor was placed within the magazine's 'Amateur Cinematography' section, despite the versatility of the new lens – which was described as being compatible with "Bolex H-16 […] Maurer, Mitchell-16, Auricon Cine-Voice, Bell & Howell 70, Keystone 16mm, Cine Special, Bell & Howell Autoload and Automaster, Revere Magazine, and the Pathe Super 16"

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(Rowan "The Pan Cinor…" 490) – and as being "an ideal tool for use in production of 16mm industrial and TV films" (491). The author of the article makes relatively modest claims for the utility of the lens – suggesting that it "is not intended to *replace* lenses of fixed focal length (each of which realizes a higher degree of optical quality for its own focal length)" (Rowan 490; "Zoom for really…"). However, it also quotes a professional Paillard customer (whose testimonial was also printed in a later edition *Bolex Reporter*), who contradicts Rowan's position by claiming:

> We find in practice the pictures made with Pan Cinor are consistently as sharp as those filmed with the best available fixed focal-length lenses […] We are using this lens almost exclusively for our work in 16mm television, industrial and promotion films, both black-and-white and color. The only difficulty we have found is resisting the temptation to zoom every shot. (Rowan 508; Pennington)

As a result, despite its 'amateur' positioning, the article is as strong a commercial promotion of Paillard's new product as the laudatory articles on the Zoomar lens printed in *American Cinematographer* a few years earlier.

In the same edition of *American Cinematographer* that carried Rowan's report on the new Pan Cinor, an advertisement also appeared for a new product from Zoomar: the Zoomar 16. This was the first Zoomar advertisement ever to appear in *American Cinematographer*. The text of the quarter-page advertisement read cryptically: "Promise fulfilled… Zoomar 16 – Watch for details next month" ("Zoomar Advertisement" 495). The following month, no details were furnished, but a further advertisement declared: "next month… a dream becomes reality" ("Zoomar Advertisement" 557) – and included illustrations of three different cameras mounted with the new 'Zoomar 16' lens. At some point in either November or December 1953, the Zoomar Corporation employed the services of the Weston Co. advertising agency ("Appointments"), though it is not

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clear whether the agency handled advertisements for the Zoomar 16, the then-new Studio Zoomar, or both. In December 1953, Zoomar re-ran the advertisement, with the text altered to read 'available now' ("Zoomar Advertisement" 604). At the same time, a New York industrial film company, Animated Productions Inc, prepared a promotional film:

> as a means of demonstrating to tv [*sic*] stations and producers the mobility and flexibility of the 16mm Zoomar lens-equipped camera [consisting] of a variety of motion picture shots filmed in Kodachrome by Dr Frank G. Back […] on his recent round-the-world-trip. ("Film Readied to…")

It is not until January 1954 that the Zoomar 16 is fully described, in a prominent full-page advertisement at the front of *American Cinematographer*. The advertisement promises "unlimited horizons: with a flick of your finger, Zoomar 16 zooms from normal… to telephoto… to wide angle […] only Zoomar 16 fits all 16mm motion picture cameras" ("Zoomar Advertisement" 10). Prominently displayed in the advertisement, as if etched into the zoom lens illustrated, are patent and registered design numbers. An article published in the same edition of *American Cinematographer* detailed the Zoomar 16's pedigree, situating it as descended from Back's original invention of 1946 and from "the Television Zoomar […] now standard equipment on television cameras in over 100 TV stations throughout the country" (Roe 27). Furthermore, the article covering the introduction of the new Zoomar lens appeared in the main section of *American Cinematographer*, whereas the Pan Cinor 60 had been described in the magazine's "Amateur Cinematography" section. Unlike the account of the Pan Cinor, the Zoomar article confidently describes the new lens as capable of substituting for a suite of fixed focal length lenses, stating that:

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by design, it is not only a special effects lens but a high-quality, high

speed all-purpose lens as well. By being capable of taking the place of all

conventional lenses from 1 in. to 3 in. on the camera turret, it makes the

long-dreamed of 'one-lens camera' an actuality. (27)

The article repeats Zoomar's assertion that "the new Zoomar 16 is the result of more

than seven years of intensive research and development in the field of varifocal lenses"

(50).

The impression given by publicity material and trade press reports is that the

Zoomar 16 was the result of a long-planned process of innovation by the Zoomar

Corporation. Yet, while there is no doubt that significant research and development had

taken place since the introduction of the initial Zoomar lens in the mid-1940s, the

physical appearance of the Zoomar 16 suggests that it also owed something to its

competitor. In design, the Zoomar 16 was strikingly similar to the Pan Cinor 60,

consisting of a short variable focal length lens coupled to a non-reflex viewfinder and

controlled by a pivoting lever (most previous Zoomar models designed for use in

television had been controlled by means of a 'rod' which was threaded through the

mechanism of the camera itself). The similarity in physical appearance and technical

capabilities of the two lenses, as well as their near-simultaneous appearance on the

market, provokes a number of questions and invites consideration of the possibility that

some degree of industrial surveillance, whether informal or otherwise, may have been in

play. There was at least some level of informal discussion between the two companies:

Zoomar employees regularly met with their Paillard counterparts to discuss products

and other matters of business interest. Testifying for the plaintiff in *Zoomar vs.*

*Paillard*, Zoomar sales manager Walter Steuer supplied a detailed picture of the

relationship between the competing companies. Steuer's accounts indicate that there

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was substantial communication between the companies, particularly at trade

conventions "in 1954 and before". Steuer testified that in early 1954, representatives

from Paillard "visited me […] at the convention; they looked at our lens. They wanted

to know how our lens worked. They compared the Pan-Cinor with our lens. They

wanted to find out what we have to offer the customer".[73] A few months later, at the

"Master Photo Finishers and Dealers Association" convention in Chicago, Steuer was

approached by Paillard vice president and sales manager Vladimir Wolf (Kaufman 316-

25). Steuer recalled:

> Mr. Wolf, as sales manager, was interested in these days to sell our
> Zoomar lens, Zoomar 16, and we had quite a number of discussions
> during the meeting until I finally requested [vice president] Mr Srauder
> [*sic*] to be present at one of these meetings, at the same time Dr. Back
> [*sic*] […] The conversation dealt mostly with the possibility that Bolex
> Paillard [*sic*] take over the distribution of our Zoomar 16 in the United
> States. It was requested that Mr. Wolf and I should get together after the
> convention and draw up a sort of letter in which we should state why the
> Zoomar 16 is so much more favourable to be fitted to the Bolex cameras
> than the Pan-Cinor in these days, and I had several conversations after
> this meeting in Chicago, here in New York with Mr Wolf, and we drew
> up a letter, which I sent to him and Mr Stauder – this letter was given to
> Mr Stauder to take with him to Switzerland and make the basis of
> negotiations in Switzerland with Bolex Paillard [*sic*] (320-1)

The long trail of teaser advertisements may suggest that Zoomar was hurrying to

manufacture a product to compete with the Pan Cinor. This option is given credence by

the fact that the 20-60mm Pan Cinor was introduced to the SOM-Berthiot range in

1950. Alternatively, it may be that Paillard somehow become aware of Zoomar's plan to

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[73] Steuer refers to "the Photo Dealers Exhibit in the Amory at Park Avenue and 34th Street [in New
York]" (Kaufman 326).

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launch the new product and struck a pre-emptive importation deal with SOM-Berthiot.

This would offer an explanation for Zoomar's apparent decision to commence

marketing the Zoomar 16 several months before it was to be made commercially

available. Two further options remain: simple coincidence, and the possibility that the

*American Cinematographer* full advertisement and article were published significantly

after the Zoomar 16 was actually brought to market. It is not known how all of this

played out or whether any copying occurred. What is clear is that by late 1956 the

Zoomar Corporation, still under the direction of Frank Back and Jack Pegler, had

decided that the Pan Cinor lenses infringed their patents. They resolved to defend their

position in court. Lawyers, witnesses, and expert witnesses for Zoomar and Paillard

faced each in New York's Southern District Federal Court over seven days in February

1957. In lengthy arguments they debated the nature of the inventions which Frank Back

had claimed in his Zoomar patents, and which they claimed Paillard had infringed upon

in selling Pan Cinor lenses.[74] Paillard's defence took the form of an attack on the

Zoomar patents. The company mounted the counter-argument that Back's patents were

invalid and therefore unenforceable. Paillard's defence was successful, and both of

Zoomar's patents were ruled invalid by the court.

### *Zoomar vs. Paillard*

Our understanding of what took place in the courtroom derives from written transcripts

of the main hearing in the case and from Judge Irving R. Kaufman's judgement,

delivered a few months later on 5 June 1957. Two sorts of information can be discerned

in the *Zoomar vs. Paillard* judgement and transcript. The judgement offers a useful

snapshot of the treatment by the court of the Zoomar patent, and in particular, the basis

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[74] The finding in this case abbreviates these patents as '686 and '817. The same form is followed below.
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on which the court decided that the patents were invalid. The transcripts show the manner in which the case was fought, and show that while it is evident that the court listened to lengthy arguments from expert witnesses, the style and manner in which Zoomar prosecuted its case against Paillard may have played a part in the company's defeat. Zoomar's lawyers were repeatedly criticised by the judge for using inappropriate and outdated legal methods to defend their patents. Back himself was an awkward witness, who gave evidence whilst suffering from a heavy cold, and was he was at times reticent and excessively soft-spoken.

The *Zoomar vs. Paillard* judgement has been summarised by Gortych, a specialist in patent law and optics, who remarks that the case was the "first […] involving a zoom lens" (31). As there seems to be little benefit in rewording his efficient and credible précis, it is quoted here at length, interspersed with quotations from the judgement. According to Gortych:

> At issue were two of Zoomar's lens design patents for Pan-Cinor varifocal zoom lenses (U.S. Patent Nos. 2,454,686 and 2,718,817) for use in cinematography. However, Paillard also had a patent on a four-group Pan-Cinor lens design that issued after Zoomar's patents. In response to Zoomar's allegation of infringement, Paillard produced two prior art patents, each disclosing a three-group varifocal zoom lens for use in microscopy. These patents were not considered by the [United States Patent and Trademark Office] in examining Zoomar's patent applications.
>
> Though Zoomar's '686 patent included a drawing showing a 22 element lens design, the claims were drawn towards a generic varifocal zoom lens for use in cinematography. Thus, the issue of validity of Zoomar's '686 patent boiled down to whether a competent lens designer could have taken a generic three-group varifocal zoom lens having three in-focus positions […] and designed a generic four-group varifocal zoom

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lens having four in-focus positions […]. The court weighed expert testimony on both sides of the issue and concluded that a competent lens designer could have indeed done so. Zoomar's '686 patent was thus ruled invalid for obviousness.

> The court also ruled the '686 patent invalid for insufficient disclosure, noting that the patent did not describe 'the method by which the inventor was able to correct the [lens] aberrations but which are particularly acute in a [zoom lens]:' The court was also critical of the fact that the patent did not set forth the specific design in a table, calling the description provided "woefully inadequate." In short, the court rejected the notion that someone could patent a "type" of lens without setting forth a particular design." (31)

Specifically, the judgment estimated that an ordinarily skilled and competent optical technician would have to spend six years – an unacceptably long period of time – in order to make a Zoomar lens based on the specifications in the patent. Kaufman observed that he thought it:

> extremely doubtful that the 686 patent would serve any more of a function than to encourage the ordinary lens designer during this period with the thought that it could be done […] Patent 686, while informing the lens designer that 'by judiciously choosing' his values he may be able to keep deviations within accepted optical tolerances, does not even inform him what those acceptable tolerances are or what relation they have to the possible range of magnification. (Zoomar Inc vs. Paillard Products)

Kaufman was unequivocal about the insufficiency of Back's original patent, noting that:

> The principal questions facing the art […] were the following: Just how effective would optical compensation be for motion picture purposes? For what range of magnification? And just how could the 'well-nigh insurmountable' designing problems be surmounted? The patent answered none of these questions. Certainly, in a field such as optical

design, where experimentation involves such lengthy, arduous and costly work, including the construction and testing of innumerable models to see whether they might satisfy the essential requirements, failure to make full disclosure is totally inexcusable. By phrasing its claims and specifications in the broadest possible terms, the 686 patent effectively posed a threat to every conceivable optically compensated varifocal device. (Zoomar Inc vs. Paillard Products)

Gortych's summary of the judgement concludes:

The court then scrutinized Zoomar's '817 patented design (see Fig. 4), in light of the '686 patent, the microscope varifocal zoom lens patents, and U.S. Pat. No. 2,566,485 to Cuvillier […]. Zoomar tried to distinguish the '817 patent from the prior art by arguing that the '817 patented design (a) was a complete camera system, whereas the Cuvillier's [*sic*] design was afocal, (b) had a front lens comprised of two separate lenses movable in relation to each other to vary the combined power and improve the image quality, and (c) had a negative erecting lens.

But, the court pointed out that the microscope vari-focal zoom lenses also used a negative erector lens, and also ruled that the variable-gap front lens was not a patentable advance over the Cuvillier design and the '686 design, despite the improvement in image quality. The court concluded that "all that '817 does is add a front lens to the disclosures in Cuvillier and ['686]," and thus invalidated the '817 patent for obviousness. (31)

The judgement shows the legal basis on which Kaufman found in favour of the defendant in *Zoomar vs. Paillard*. The transcripts, however, illustrate in more human terms some of the reasons why the case went against Zoomar. On behalf of the plaintiff, Shereff Brothers commanded a methodologically flawed case which meandered from one subject to another, drawing frequent expressions of exasperation or bewilderment

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from the bench.[75] The flow of Shereff's argumentation is broken, twice, by the need to

gather further material (in one case, precedent for Shereff's proof of prior art; in the

other, a means to communicate the meaning of 'non-linear' to Kaufman). Back – who,

as the company's President and leading inventive light, should have been a key witness

– was at times inaudible, uncommunicative and uncooperative. Given that Zoomar was

the initiator of the case, their arguments might be expected to form a robust and cogent

attack against a trespass upon their intellectual property rights. Instead, their case had

the qualities of a weak defence.

During the proceedings Zoomar's counsel depicted Back as an expert in his

field: a member of ten learned societies, who had published articles in scholarly journals

and trade periodicals, and who had researched optics and worked in the optical

industries throughout his professional and educational career. Back testified that he held

"over twenty" American patents, mostly "in optics" (Kaufman 27). He stated that he

started working on variable focal-length lenses "during the Second World War […] in

1943" (27-8), and explained that after two or three years of trial and error, he settled

upon the design described by patent 686 (38). Responding to questions from his

counsel, Back gave a detailed description of the construction of the lens described by

the patent, and invited Kaufman to look through a model of the Zoomar lens, which had

been partly disassembled and colourized for ease of understanding. The aim of this

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[75] Zoomar's lawyers were the firm Shereff Brothers, whose partners were Louis H Shereff, Harry Shereff, and Albert F Kronman. The transcript identifies Zoomar's lawyer at the trial as one of the Shereff brothers, but does not make clear which. It may be worth considering whether Shereff Brothers were appropriate legal representatives of Back's intellectual property. A search of cases in which they acted as counsel suggests that they maintained a general legal practice, whereas the firm of Levisohn, Niner, and Cohen – representing Paillard – acted in numerous intellectual property cases during the 1950s, especially those concerning patent infringement and validity. There is some evidence that Back was rather attached to the firm: despite their failure during *Zoomar vs. Paillard* and its appeal, Harry and Louis Shereff continued to represent him long after the case, and were named as co-executors of his will.

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evidence was clearly to communicate to Kaufman – a legal expert, but a lay person as far as optical engineering was concerned – the basic principles of the operation of the Zoomar lens. In achieving this aim, however, Zoomar encountered significant difficulties. After hearing testimony about a particular part of the Zoomar lens – the 'erector' element – Kaufman complains: "I am sorry, I don't follow it". Shereff sympathises, agreeing: "I can see the difficulty. It took me a long time to get it." Kaufman chastises Shereff: "Since it took you a long time you have been able to really elucidate this so that I would understand it". Kaufman is forced to allow Shereff to ask questions which lead Back to give a clearer explanation (65). Zoomar encountered further problems relating to technical details again later in the case, when Back attempts to describe the concept of a 'non-linear linkage'. Back describes such a connection thus:

> A linear motion is this (indicating). If I move the lens with my hand this way (indicating) with an even speed, and I would press something together this would cause another piece of equipment to move also with an even speed. This would mean a linear motion […] If I would move one part of that mechanism evenly with that same speed with my hand, it would cause a motion which goes faster and then slows down, or it would go faster, slow down and go faster again; in spite of that acting motion it moves in an even manner. We call it a non-linear [linkage]. (84)

Kaufman interjects: "I must confess I frankly don't see it. That is your problem with trying this kind of a technical case. You must come in and you must demonstrate it simply and mechanically to a non-expert such as I am". Zoomar's counsel, Shereff, claims that they were unable to find such an artefact on the market, but Kaufman suggests that "[Back] could have reconstructed for demonstration purposes something so that we could have seen what he was talking about". Back responds by promising to

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return to his workshop and "make tomorrow a piece of non-linear equipment and bring it back Monday" (85).

In addition to struggling to understand the technical points of the case, Kaufman also made two important adverse decisions on legal points against Zoomar's arguments. When Shereff attempts to introduce into evidence an article from the *Proceedings of the Physical Society* in order to demonstrate the state of the art of zoom lenses (73), he is challenged by Paillard's lawyer, who objects that the article constitutes hearsay evidence. Kaufman agrees with the challenge, asking: "What is the relevancy? You don't prove prior art that way. And this is a man's interpretation of the prior art – a man who will not be a witness and not be subject to cross-examination" (74). Shereff attempts to prove the point with precedent but fails to convince and withdraws the evidence, promising to return to it later (76). Paillard also argued against the introduction of material such as journal articles and awards as evidence of the significance and novelty of the Zoomar lens. Back testified that in 1948 he received "a gold medal award from the American […] Broadcasters Association". Asked to recall what precisely the award had been given for, Back says that it was because the Zoomar lens "makes it possible to follow the action of athletic events at all distances without losing focus" (104). Substantial argument ensues regarding the admissibility of evidence such as this. Cohen, for Paillard, argues that articles in periodicals – whatever their scientific reputation – could not be valued above the hearsay of a single individual. Kaufman asks Cohen: "How about the publication being commonly accepted as a scientifically accurate publication?" – Cohen responds: "We don't know anything about the publications" (107). Kaufman notes that it is "far from clear that the modern trend favors introduction [of secondary sources into evidence]" (106) and goes on to say that he will give little weight to such evidence, depending on the representations made by

each side. The transcript suggests that Shereff had hoped to use numerous such items of

evidence to prove the originality of Back's invention, and reinforce the validity of his

patent. However, it seems that this tactic was not as successful as had been hoped.

Zoomar's patents would have remained valid well into the following decades,

had the company not challenged Paillard in the courts and in the market place. The

earlier patent, '686, would have been valid until July 1966. The later patent, '817,

would have been valid until October 1972. As long as these patents remained in place,

and Zoomar Inc. were prepared to warn competitors away from the market place, then it

seems likely that the marketing of competing zoom lens in the USA would have been

somewhat limited. Furthermore, it is possible that investment in innovation, or in the

import of foreign-made zoom lenses, would also have been curtailed. The significance

of the *Zoomar vs. Paillard* decision was soon recognised by both the press and the

industry. Upon the publication of the judgement, in June 1957, the *New York Times*

reported that "the effect of [the] decision will be to open wide the field of

manufacturing such lens system [sic]" ("Zoom Lens Rights…" 52). Above all, it is clear

that Zoomar recognised the significance of the judgement, for the company appealed the

decision to a higher court the following year. When the appeal failed, the company

petitioned the United States Supreme Court for a writ of certiorari – a legal process

necessary to enable a case to be reviewed by the court – but their petition was denied.[76]

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[76] Despite Zoomar's dogged pursuit of legal action against Paillard, there is evidence that the two parties
may have considered reaching an out-of-court settlement. Partway through the case, during the defence
cross-examination of Back, the case was adjourned for a day. According to a note in Kaufman's diary the
adjournment was "to give parties chance to discuss settlement" (Irving R Kaufman Papers, Box 14,
Folder 1: 177). There is no evidence to indicate the nature of these discussions, or on whose initiative
they took place.

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It is clear that the judgement against Zoomar was a significant moment in the development and marketing of zoom lenses – though some of the effects of the judgment had already taken effect; for example, Pan Cinor lenses were already being marketed in the USA by Paillard. Other effects, such as the more general impact of conditions for investment connected to zoom lenses, would take several more years to develop. *Zoomar vs. Paillard*, and the failure of subsequent appeals, were the final acts in the market entry of the Pan Cinor zoom lenses. Paillard was now free to continue distribution, and with the Zoomar patents no longer valid, there was less to discourage other inventors and importers from attempting to introduce new and different zoom lenses to the US market. It was not until 1962 that the French company Angénieux introduced the 10× lens, which many historians have credited with enabling and provoking an upsurge in the use of the zoom in cinema. Nevertheless, between the mid-1950s and the early 1960s, the new Pan Cinor lens was increasingly adopted by the television industry, which gradually became more adventurous in its use of the zoom. One element of this was the work of a group of directors who would later be characterised as forming a 'TV Generation', and who were later credited with transplanting zoom shots from television to cinema. However, further evidence for television's adoption of the zoom during the second half of the 1950s can also be found in less prestigious television programmes. The following chapter accounts for stylistic changes in television during this period, and begins to consider the manner in which they impacted upon and interacted with film style during the same period.

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## 8. Filmed Television and the Zoom Shot

The zoom lens was quickly established as a tool useful to live television directors. Neal

Arden, writing in *Variety* in 1952, included the lens in a description of the talents and

skills required of a television director:

> [A director] needs eyes in the back of his head, nimble feet, a strong
>
> voice, and a commanding aspect. He has to understand camera angles –
>
> where to aim the darn things, sight and sound perspective, pictorial
>
> composition, matching of sight and sound so that if a character is far
>
> away his voice will be soft, and if near loud; he must be a master of
>
> focus and the use of four different lenses with which most cameras are
>
> now fitted; of film editing, which he has to do in TV as he goes along,
>
> and the use of the Zoomar lens. (Arden 117)

However, this conception of the director was based on live production practices. During

the 1950s, a significant shift in television production took place, away from live

broadcast and towards filmed production. Barnouw explains:

> By the end of 1957 more than a hundred series of television films […]
>
> were on the air or in production. Almost all were Hollywood products,
>
> and most were of the episodic series type. They came from majors and

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independents alike. The films processed by film laboratories were now
mainly for television. (213)

Boddy has accounted for this shift in cultural terms, discussing television networks'

antipathy towards the perceived 'carbon copy' approach of Hollywood studios (75). But

this shift had an equally significant technological dimension: it meant a movement from

television broadcast equipment (iconoscope cameras fitted with lenses calibrated

specially for them) to more conventional celluloid film equipment. Zoom lenses

designed for television – including the Field and Studio Zoomars and the RCA

ElectraZoom – would not necessarily be suitable for use on film cameras. It was in this

context that Pan Cinor lenses, alongside the similar Zoomar 16, were introduced. As the

previous chapter explained, these lenses appear to have been designed with film

applications in mind. As television production shifted to Hollywood and to film, it

became relevant to *American Cinematographer*. As a result, the introduction of the Pan

Cinor and Zoomar 16 coincides with an increase in the extent to which *American

Cinematographer* discussed the use of the zoom shot.

Joseph V. Mascelli's voice is central to this development. During the 1950s

Mascelli was a regular contributor to *American Cinematographer*, and in the 1960s he

edited the society's technical handbook *American Cinematographer Manual* and wrote

*The Five C's Of Cinematography*. He was therefore in a position to reflect

commonplace views about cinematography, and possibly to influence them to some

extent. From this position, Mascelli was one of the first regular *American

Cinematographer* contributors to consider zoom shots in the context of feature

production. The 1957 article "The Use and Abuse of the Zoom Lens" is one of the

earliest examples of an opposition between 'use' and 'abuse' of the zoom. It counsels

'restraint' and urges readers not to 'show-off' but to use the zoom 'intelligently', and

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includes of the earliest detailed confrontations of an issue that becomes central to discourse surrounding the use of the zoom lens: when and whether it is appropriate to use the zoom in place of the moving camera. From the outset Mascelli's article denies that the zoom shot will ever replace the dolly and tracking shot:

> Only the dolly shot gives the impression that the camera is actually going somewhere. Only when the camera moves do people and objects move past each other […] In the extreme, the zoom lens gives the impression of an optical effect since it appears to magnify or reduce the size of object. At its best it closely imitates a moving camera. (652)

In Mascelli's view, the zoom is best used as a cost-cutting device for the "small producer" to whom it:

> offers the speedy solution to modern filming problems where the script demands camera movement, despite a small budget that limits use of dollies, track, extra personnel and the time consumed in setting up and rehearsing both actors and crew. (652)

Mascelli also makes suggestions about how to make the best and most artistically defensible use of the zoom lens. In this regard the connection to the more familiar dolly is retained and reinforced. Mascelli advocates zooms which:

> start slowly, then swing into a precise and definite speed to match the action, then glide to a stop […] Visualise how the shot would appear if it were being filmed from a dolly and imitate the action with the zoom lens.

In addition, Mascelli suggests combining the zoom with "an almost imperceptible combination of panning and tilting (653).[77]

Despite these high artistic ideals there is little evidence of consistent zoom usage at this point – even within individual programmes. Mascelli writes at length in 1958

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[77] Note the similarity between Mascelli's language and that found in manuals distributed with Zoomar lenses distributed in the late 1940s and early 1950s – see page 122.

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about the production of a new series, *All Star Golf*, and gives the zoom lens – brand

unspecified – much credit for reducing shooting time to a single day. In *All Star Golf*,

the zoom is also used as a substitute for a fixed telephoto lens, as well as "to bridge

continuity gaps", and to execute complex camera movements which track golf balls

from tee to hole ("How 'All-Star Golf'…" 27). Mascelli describes how:

> variety in camera angles, lens choice and zoom effects are injected as the
> game progresses in order to keep the camera work from becoming a
> monotonous recording […] The zoom lens is effectively, and often
> dramatically, employed not only as aid to editing. [Producer-director]
> Goltz insists that zooming should be restrained and justified by the action
> or editing. 'After all,' states Goltz, 'that zoom lever isn't a pump
> handle!' (27)

Yet despite all of these varied applications Mascelli claims that the zoom is used "with

discretion, variety and good taste. *All Star Golf* sets a very fine example of the proper

use of zooming techniques for filming this popular sport" (57). Such zooming also

occurs without any apparent loss in respect for the production's visual style – Mascelli

quotes *Variety*'s praise for the camerawork, which it says "could hardly be better.

Cameras zoom in for extra curricular color, facial expressions of the players, their

measuring of the green and attitudes of the onlooker" (27).

### *Night Court*

Aside from *All Star Golf*, another television production which was described in detail

by Mascelli, and which made comprehensive use of a zoom lens, was *Night Court USA*.

As with *Kukla, Fran and Ollie* above, the selection of *Night Court USA* is as much

based on the source's availability – and details of its filming in trade publications – as

on its actual significance as a television programme. *Night Court* originally appeared

"as a live local programme from the Los Angeles studios of KLTA" in April 1958

(Erickson 196). Each episode of the show followed a simple pattern: a series of fictional legal cases were brought before 'Judge Jay Jostyn', played by the actor Jay Jostyn. Plaintiffs would generally either protest their innocence, or plead guilty with mitigating circumstances. After hearing their arguments, Jostyn would decide upon an appropriate punishment. In each episode, the overwhelming majority of action takes place on the courtroom set, though the camera occasionally ventures to side corridors. The extant version of *Night Court* is not the original live series of episodes, but a version re-shot by Banner Productions for national syndication. The title was changed to *Night Court USA* and episodes were produced to a 30-minute format – according to Erickson, the original had been an hour. For this second version, the restrictions of live television programming – notably the necessity of a flexible set-up of cameras to provide continuous coverage with minimal opportunities to change set-ups – were replicated in the form of cost-saving filming strategies. As Erickson notes, "episodes were hastily shot on an assembly-line basis, using multiple cameras and lengthy, uninterrupted takes" (Erickson 196).

A detailed account of production practices on the set of *Night Court USA* is given in a feature article on the series printed in *American Cinematographer* in January 1959. Mascelli explains in some detail how the show achieved its level of realism:

> While almost everything that is done in producing *Night Court* has been done before, in part, the successful combination of the various elements that go into filming a television show have never been so perfectly coordinated. […] Technicians cite the show's free-flowing movement – the genuine 'live' quality of the show. And vast numbers from television's nightly audience have extolled the shows' [sic] 'believability.' 'It seems so real,' many have said, 'it must be filmed in a real courtroom during actual litigations.' ("Filming Courtroom Dramas…" 33)

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According to Mascelli, the *Night Court USA* crew worked faster and more efficiently than most television crews:

> The average producer of a TV film series […] usually completes two to three half-hour shows per five-day week. Banner Productions, in a recent ten-day stretch, completed fifty-six. For this, more than a half-million feet of negative was exposed at a ratio of only three-to-one compared to the four- or five-to-one presently standard for TV film shows (33)

Three Mitchell BNC cameras were used to film the action on *Night Court USA*'s single main set, each taking advantage of a different form of mobility:

> Camera No. 1, employing a 3-inch lens, moves in and out on a crab dolly to photograph the judge and bailiff as each case is called, and subsequently films close-ups of the judge as he presides. Camera No. 2, mounted on a Chapman crane, uses a 35mm lens to cover the courtroom audience and to follow defendants as they are brought in. This camera continues shooting a side angle of the proceedings – with a variety of camera movement – to record two-shots of judge and defendant, group shots of bailiff, public defender and others, or moves in for a closeup of the defendant. Camera No. 2 is actually the master scene camera – the 'work horse' of the show. Camera No. 3, utilizing a Pan-Cinor lens, is mounted high behind and to the left of the judge and covers the defendant as he is brought up to the bench to testify. (33)

Mascelli's article quotes one of the show's cinematographers, William Whitley, who explains how the cameras work together to achieve the desired sense of 'reality':

> Lighting, camera angles and camera movement all contribute to the spontaneous, sometimes hesitant, action of the person on trial. Cameras 1 and 2 are at the far end of their track, and the zoom lens is at its widest position, at the beginning of a sequence so that the courtroom can be re-established and the defendant brought to the bench in a wide-angle sweeping motion. As the case progresses the cameras move in, and the

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zoom lens is adjusted to telephoto position for a more intimate view of
the proceedings.[78] (56)

The significance of *Night Court USA* lies in the contribution the Pan Cinor zoom
lens makes to creating a sense of unrehearsed documentary coverage. As with most
episodes, the episode analysed below ("Episode 7") begins *in medias res*, during a brief
break between the cases (the same mechanism is used to accommodate commercial
breaks). The conceit of 'reality' is reinforced by the structure of each episode, in which
an apparently random selection of cases is heard before the judge. The episode under
consideration here is prefaced with a voiceover:

> Ladies and gentlemen, this is Night Court, taking place as it actually
> happens, with real people appearing in true cases. This session of Night
> Court is already under way. The next case to appear before His Honor
> Jay Jostyn is momentarily to be called by the court clerk, Henry Scott.[79]

The following action is captured in extemporaneous style: as each defendant is called,
the camera pans, tracks, and sometimes zooms to pick them out of a group of
defendants and members of the public seated in the courtroom. As each defendant
approaches the bench, the main pattern of shooting for the exchange between judge,
lawyers, and defendant is established: typically, the defendant is shot from a high angle
approximating the view of the judge (camera 3), while the judge is shot from a lower
angle representing the position of the defendant (camera 1). Occasional shots from the
side show the clerks' bench, the door to the courtroom, and those assembled in the
public gallery.

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[78] A diagram of the set is reproduced at Figure 9.

[79] Each episode begins with a voiceover along these lines. However, as Erickson confirms, while some of
the cases may have had some factual basis, *Night Court USA* must be characterised as fictional: the
show's cast were mostly professional actors and the narrative of each episode was "fully scripted, save for
the extemporaneous comments from the show's 'Judge'" (196).

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In the first 'case' to be heard the defendant, Frank Muller, has been summoned before the court on a charge of assaulting his neighbour Arthur Harrow. Muller wishes to plead guilty, but offers an explanation: he claims that his children had been upset to see Harrow attacking his pet dog, and that after a great deal of provocation, he had attacked Harrow for this reason. A few minutes into Muller's detailed account of his offence, there is a disturbance in the courtroom: somewhere behind Muller, someone sitting in the public gallery appears to lunge across the seating area. The camera which has been fixed upon Muller zooms back to capture a wider view of the courtroom, showing two men confronting each other, and being restrained by court officers. We cut to a side-on shot of the courtroom and as the fracas dies down the camera tracks back towards Muller, and the questioning resumes. In the meantime the original camera returns to its position fixed upon Muller's head and shoulders, and after a few seconds we return to this shot (see Figure 10).

Here the zoom provides a quick and flexible reaction to a change in the narrative. Though the disturbance has clearly been scripted, and is resolved as part of the next case to be brought before the judge, a combination of zoom lenses and moving cameras enhance the appearance that the disturbance has taken the court by surprise. While it can be argued that the same coverage could have been provided merely by cutting between the two cameras, this would have been highly consistent with standard practice in rehearsed drama, whereas *Night Court* aims for the appearance of extemporaneity. Even if the impression of an unrehearsed outburst had been created by having one or both cameras pan or tilt in search of the action, the likelihood is that the impression created would then be of an unprepared or incompetent camera operator. By contrast, and because of its familiarity from news and sports coverage, audiences would

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arguably have had less trouble in 'reading' the zoom-out as a reaction to unexpected activity happening out of view of the cameras.

In the second case to be heard, two comedians – the men who caused the disturbance mentioned above – plead guilty to breaching the peace at a comedy club the previous night, and enter into a comedic dialogue with Jostyn in which they each blame the other for the conflict. Whereas during the previous case, the zoom is used to articulate the surprise of the 'unexpected' disruption to an otherwise straightforward two-way conversation between Muller and Jostyn, in this part of the episode the zoom lens is used more comprehensively. It creates a wide and flexible range of camera positions, thereby accommodating a dynamic conversation between the two standing defendants and the single seated judge. By carefully analysing the way in which the sequence plays out, it is possible to note that the zoom lens when intercut with shots from the other two cameras creates the appearance of a larger number of camera positions than there actually are, and allows for smoother editing of the final sequence. On the face of it, the sequence is an uncomplicated treatment of an undemanding dramatic situation. But the combination of zoom lens, moving camera, and multiple camera technique results and in a more complex and visually impressive sequence than might otherwise be expected.

As the sequence begins, the defendant Mo Littleman is called to the stand. The opening shot is side-on to the courtroom, but as Littleman enters the room, we cut to a position above the judge's right shoulder. This affords a view of Jostyn, the defendant, and the public gallery. As the clerk calls for quiet, we cut to a reverse shot of Jostyn, probably made with Camera 1. We now cut to a lower-level shot of the courtroom, showing Littleman and the public gallery, in a tighter framing. A brief cut back to Jostyn allows the director to return to the high-angle view of the judge and the

courtroom. Littleman stands before the judge, and as the charge against him is read, the camera zooms steadily towards him, travelling from a deep focus shot taking in most of the courtroom to a shallower medium close-up on Littleman. This shot is maintained long enough to see Littleman's reaction to an outburst from Lovell (his estranged business partner), and the judge's demand for quiet. Camera 1 resumes its reverse angle shot of Jostyn, but from a more physically distant position, so encompassing both Jostyn and the defendant in a medium long shot. Another cut returns us to a view of the defendant, but the framing has been altered: the zoom has been adjusted to a somewhat shorter focal length (wider angle) and the camera moved so that interaction between Littleman and Lovell, seated in the public gallery, can be covered. During this interaction the zoom is occasionally adjusted to maintain appropriate framing. In addition, Camera 1 is also used as for intermediate shots to allow the introduction of shots from Camera 2 – the 'courtroom level' camera mounted on a Chapman crane. Importantly, whereas closer shots from the zoom lens on Camera 3 reduce the sense of the depth in the frame, the introduction of shots from Camera 2, equipped with a prime lens, allow a greater play with parallax, and a generally deeper focus. The flattening effects of the zoom in its telephoto position, as seen from the footage shot on Camera 3, are therefore somewhat mitigated.

As in *Kukla*, the zoom is not used in an 'unmotivated' fashion or for 'shock' effects. However, unlike in *Kukla*, the zoom here is used in conjunction with a number of other techniques. Shots are taken from various angles, and one camera physically moves within the set. The zoom shot does not dominate the visual style of *Night Court*. Instead, it enables a number of distinct and discrete shots to be created from the position of Camera 3. As a result, *Night Court* is composed of a wider range of compositions than might otherwise be the case. Furthermore, the zooming action adds a form of

movement which is further distinct from that seen from the crane-mounted camera. The high angle zoom over the shoulder of Jostyn and onto the face of the defendant emphasises power relations within the court – a factor which is ideologically pertinent when it comes to the portrayal of more serious 'cases', such as that of a Communist sympathiser, and of a rebellious young man. Finally, the zoom enables rapid reframing of the profilmic at times of apparently unpredictable drama. This evidently had the dual benefit of allowing faster and less error-prone production, but to the viewer at home, it is a further restatement of the zoom as a tool which is especially suited to the capture of actuality.

**TV Generation I: The Zoom in Television Drama**

By the late-1950s, the majority of work done with the zoom lens was still confined to television. As discussed above, historians have noted that during the 1960s and 1970s the zoom shot became more acceptable and more fashionable in feature filmmaking. This change in the prominence of the zoom shot in Hollywood cinema has frequently been accounted for by the introduction of further developments in technology – in particular the Angénieux 10× lens, which marked a step-change in zoom lens capabilities. But the case has also been made that later developments in the zoom shot were rehearsed in television, particularly by those directors who began their careers on the small screen before shifting to work in the feature film industry. Belton has argued that:

> It was the alumni of the tube (Arthur Penn, John Frankenheimer, Sidney Lumet, Andrew V McLaglen, Sydney Pollack, Stuart Rosenberg, among many others) who brought the zoom to the cinema in a big way when they shifted media base in the Fifties and Sixties (*Bionic Eye* 16)

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When accounting for their own artistic influences, some of these directors have given significant credit to their television careers. Interviewed in 2000, Frankenheimer claimed that:

> Everything I've ever done in film is directly a result of my live television experience. The way I move the camera, the way I frame the shot, the way I work with actors, the way I work with writers, and the rhythm at which I work. Everything. I owe everything to live television. (Frankenheimer)

Despite claims such as Belton's, no accounts have explained in detail how these directors' style, and especially their use of stylistic innovations such as the zoom shot, were translated into later television work. In order to assess how and to what extent some of these directors used zoom lenses and zoom shots in television, this study now turns to an analysis of a sample of their work as directors in that medium. The sample confirms that television directors did use zoom shots in their work from the early 1950s. Furthermore, it shows that directors used zoom shots in a variety of ways – sometimes frequently throughout episodes or series, in order to structure scenes or convey narrative information, and sometimes only on occasion. Though this sample confirms that some of the television directors named by Belton and others in historical accounts used the zoom shot, it also suggests that their use of the zoom lens in television was relatively limited, increasing only in the early 1960s. By then, zoom shots had also become more commonplace in American feature films, and it is therefore important to question the extent to which directors' increasing use of the zoom in feature filming was a direct consequence of their television experience, or whether film and television style were affected simultaneously by technological developments applicable to both industries. In addition, it is essential to be sensitive to the changing contexts of American network television in the 1950s and 1960s. Changes in technology, production centres and

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production practices applied to prestige television drama as well as more populist fare. As Mary Ann Watson argues, the early 1960s marked a change from the 'Golden Age' anthology drama series, to greater production of episodic serials. Changes in recording technology meant fewer studio-produced dramas and an increase in location filming, along with a shift of production centre from New York to Hollywood (Watson, *Expanding Vista* 36-7). While some of the examples below are confined to one or the other television period, others are spread across both, and when feature film production is taken into account the 1950s and 1960s can be seen as a continuous period during which numerous technological, social and geographical factors caused shifts in production practice and style.

This chapter discusses a sample of television episodes directed by Robert Mulligan, John Frankenheimer, Blake Edwards, and Sydney Pollack, and begins to paint a broad picture of television directors' use of the zoom shot. This is followed by a case study of the television work of Robert Altman, which shows in more detail the director's use of the zoom shot. In the case of all of these directors, however, the sample is broad and shallow. The limited resources of this investigation, combined with the inaccessibility of many examples of each director's television work, mean that what follows may be unrepresentative of the full scope of their work. Furthermore, while numerous accounts describe in generalities the production circumstances of television shows such as those discussed below, there are few such accounts relating to specific episodes. Therefore, while it is known (for example) that shows were generally produced in cramped studios by crews working to tight deadlines, detailed accounts of production are not readily available. As is discussed in the conclusion below, there is a great deal of scope for further enquiries to give a more comprehensive account of 1950s and 1960s television style. In the meantime this partial sample represents a modest

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advance in our understanding of the period, and certainly illuminates some of the ways in which zoom lenses were used by some 'TV Generation' directors. This analysis proceeds roughly in chronological order according to when each director was active in television.

Some striking zooms appear in the sample of Mulligan directed TV episodes.[80] "Time of Delivery", a *Philco Television Playhouse* episode first aired in October 1954, is generally shot in a fairly standard manner, but at one point in the narrative, the zoom lens is used to create an extreme close-up on a young couple whose relationship has been central to the narrative. Each act shows disruption caused to the protagonists when a postal worker falls ill and fails to deliver a bag of mail. In the second act, the inconvenienced parties are a young soldier named Willy and his sweetheart, Pamela. Willy's delayed letter to Pamela would have informed her that, rather than marry Pamela and take a job in her family's business, he had decided to extend his enlistment in the Army, and would soon be redeployed to Germany. As a result, Willy is forced to impart this news to Pamela in person. After much discussion, he decides to follow through with his re-enlistment. But as he is heading to catch his train, Pamela rushes (offscreen) onto the station concourse, meeting Willy just as he has walked through the platform gate, which is closed behind him. The lovers meet, separated by a lattice-work platform gate. We cut to a close-up shot of their faces, separated by the gate. They kiss, and as they do so, the camera zooms in for an extreme close-up, isolating their lips and eyes. After they kiss, the camera zooms out, and Willy's army buddy, Eddie, says: "you missed the train". The camera zooms in again, settling on an extreme close-up of Willy

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[80] Mulligan-directed television episodes viewed for this study: *Philco Television Playhouse* "Time Of Delivery" (31 October 1954), "A Man Is Ten Feet Tall" (2 October 1955), *Alcoa Hour* "President" (13 May 1956), *Playhouse 90* "Mystery of Thirteen" (24 October 1957), *DuPont Show Of The Month* "The Member Of The Wedding" (12 June 1958), "Billy Budd" (25 May 1959).

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and Pamela, as the screen fades to black for the conclusion of the act. This is a fairly concealed use of the zoom, which in this case might easily be mistaken for a tracking shot. The device is the exception, not the rule in "Time Of Delivery" and, apparently, in Mulligan's anthology television work in general. Zooms can observed in the *Alcoa Hour* play "President" (May 1956), but only in simulations of television coverage of a political convention which provides the backdrop for the drama. The episode opens with a shot ranging across delegates on floor of fictional party convention, gently zooming in, mimicking "real" convention coverage. The same technique is then used in simulated television coverage which is shown on a monitor within the mise-en-scene. Other than that, however, there are few clear examples of zoom shots in the Mulligan sample.

Television productions directed by John Frankenheimer also offer little in the way of experimentation with the zoom shot. In an interview in 2000, Frankenheimer recalled that he had a significant say over the style of television productions. His directorial style is indeed striking, particularly in its use of wide-angle compositions. Commenting on *Climax!*, he described his camerawork as featuring "extreme wide-angle, extreme depth of focus, a lot of camera movement. Really, really complicated stuff" (Frankenheimer). This recollection is borne out by episodes viewed for this study, which show precisely these sorts of compositions.[81] Zoom shots are scarce, and it may be the case that Frankenheimer's preference for wide angle lenses is itself a reason why zoom shots are not prevalent in his television work: in the cramped conditions of a television studio they allow for close-ups more readily than longer lenses. Nevertheless, a few zoom shots can be identified. The most striking appears in a *Playhouse 90*

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[81] Frankenheimer-directed television shows viewed for this study: *Climax!* "Bailout at Forty Three Thousand" (29 December 1955), *Playhouse 90* "Eloise" (22 November 1956), "The Comedian" (14 February 1957), "The Troublemakers" (21 November 1957), "Days Of Wine And Roses" (2 October 1958), and *DuPont Show Of The Month* "The Browning Version" (23 April 1959).

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adaptation of the children's book *Eloise*, first aired in December 1956. "Eloise" includes numerous complicated and dynamic action sequences, but only one zoom shot – a set-piece camera movement delivered shortly after Eloise (Evelyn Rudie) discovers that her parents are seeking a divorce. As she is comforted by her nanny and an acquaintance, the camera finally tilts up and zooms towards Eloise's face. Rudie appears to hesitate a moment for the zoom to complete before delivering – directly to camera – the scene's final line: "Everything's not alright! I want to see my lawyer!" (see Figure 11). In contrast to the dynamic, fluid camerawork in the episode in general, this combined camera movement is inelegant and jerky. Its halting execution draws attention to itself, and to Rudie's direct performance style.

Frankenheimer also uses the zoom during the opening scene of the 1958 *Playhouse 90* adaptation of "Days of Wine and Roses". While the opening credits roll, the camera zooms onto the shadow of a man drinking wine outside an Alcoholics Anonymous meeting, setting the tone for a drama that takes alcoholism as its main theme. In common with the example in "Eloise", the zoom appears as an isolated special effect, manifesting itself as the only movement visible on the screen at this point. What both of these examples have in common is that they are not mixed with dialogue, nor fluidly integrated into a camera pan, tilt, or track. Nor are they cut into or out of at the beginning or end of a scene. The zooms seem to be treated with something akin to cautious respect. "Eloise" was evidently an ambitious and challenging production featuring a great deal of camera movement around complex, relatively fast-paced blocking on various different sets. Yet for all this adventure and experimentation, barely any zoom shots can be observed. For Frankenheimer as for Mulligan, the evidence is clear that zoom lenses were available when shooting anthology drama episodes. However, their use for dynamic zoom shots was severely limited.

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Blake Edwards' early career was more focused on entertainment shows (*Peter Gunn*; *Mr Lucky*; *Richard Diamond, Private Detective*; *The Mickey Rooney Show*) than anthology drama, and Sydney Pollack did not start his directing career until the early 1960s. Both show somewhat more willingness to use the zoom lens. However, based on available samples of their television work they – like Frankenheimer and Mulligan – probably saw the zoom as a technique to be used sparingly. Moving towards the early 1960s, however, their works show a more adventurous and more complicated approach.[82] In the *Peter Gunn* episode "The Comic", Edwards uses a particularly long and striking zoom shot when adopting the point of view of the episode's villain-of-the-week, a paranoid stand-up comic. As the titular comedian performs his act, we see the audience from his perspective, fixating upon two audience members who appear to be talking to one another. Whispers, imagined by the comic, flood the soundtrack, while the camera zooms in for an extreme close-up on the conversing audience members. In the same episode, Edwards also finds more prosaic uses for the zoom: "The Comic" opens with a zoom-in onto a poster which displays a picture of the comic performing, before dissolving to a roughly matched shot of the same. In another *Peter Gunn* episode, "Wings Of An Angel", Edwards uses the zoom to creep from a medium close-up to extreme close-up, as a character delivers a particularly menacing line of dialogue.

On a different show, Edwards performed bolder experiments with the narrative potential of the zoom shot. The *Mr Lucky* episode "The Brain Picker" opens with an establishing long shot of the protagonist's floating restaurant, moored underneath a bridge with its neon sign flashing. A long, slow zoom – lasting about eight seconds –

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[82] Edwards-directed television episodes viewed for this study: *Peter Gunn* "The Kill" (22 September 1958) and "The Comic" (12 October 1959), *Mr. Lucky* "The Brain Picker" (6 February 1960), *Peter Gunn* "Wings Of An Angel" (18 April 1960).

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tightens the framing on the restaurant. We cut to the inside of the restaurant for the

scene's dialogue, after which the opening zoom is repeated in reverse – on this

occasion, signalling the passage of time, as the next shot returns us to the interior of the

floating restaurant later that evening. Here the zoom acts more traditionally as a

narrative technique than in the examples seen in Frankenheimer and Mulligan above.

But it is important to note that not all establishing and re-establishing shots in this

episode are made using the zoom lens, and neither is the zoom used to accentuate other

camera movements in, for example, a fight scene.

Sydney Pollack's television work shows uses of the zoom which are

substantially similar to those described above.[83] But he, too, advances more complicated

and stylish uses of the zoom shot, the earliest of which appear in "Diagnosis Danger",

an episode of *The Alfred Hitchcock Hour*. The episode concerns the spread of anthrax,

emanating from an African animal-hide drum. Sharp zooms appear four times in the

episode, on the first occasion 'tagging' the drum as significant, and on subsequent

occasions reinforcing the significance of the object as it moves around the city. These

zooms are motivated by narrative alone, but those which appear in "The Dark

Labyrinth", an episode of *Alcoa Premiere* which follows a group of tourists into a

fabled underground cave, have a more psychological motivation. Here, Pollack

combines zooms with abrupt handheld camera movements to simulate both the physical

perturbations caused by an earthquake, and the fear and anguish of the tourists trapped

underground. A sharp zoom onto the face of a screaming male character is followed

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[83] Pollack-directed television episodes viewed for this study: *The Defenders* "Kill Or Be Killed" (5 January 1963), *The Alfred Hitchcock Hour* "The Black Curtain" (15 November 1962) and "Diagnosis Danger" (1 March 1963) *Alcoa Premiere* "Dark Labyrinth" (21 March 1963), *Ben Casey* "A Cardinal Act Of Mercy, Part 1" (26 August 1963) and "A Cardinal Act Of Mercy, Part 2" (2 September 1963), *Breaking Point* "Solo For B-Flat Clarinet" (16 September 1963).

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immediately by a matching and intensifying zoom onto the face of his terrified female companion.

Pollack again uses the zoom to imitate psychological disruption in an episode of *Breaking Point*, "Solo For B-Flat Clarinet". The attention of a troubled character, a clarinettist named Jason Landros, is depicted through a long zoom to the pro-filmic artefact upon which he is fixated – in this case, the nameplate on the consulting room of a doctor whom he wishes to visit. This demonstration of Landros' interiority is matched to an immediately preceding scene in which he appears to suffer a breakdown and interrupts a church service by playing his clarinet from the church's balcony. The shock of the congregation at the disturbance is conveyed by a sharp, high angle zoom from their perspective onto Landros, high above on the balcony. Thus in these scenes, zooms stand for Landros' mental disturbance. One conveys others' shock at witnessing it, while the other conveys Landros' unusual internal patterns of thought.

One of Pollack's most interesting uses of the zoom shot, which differentiates itself from the isolated examples described above, can be seen in an episode of *Ben Casey*. In "A Cardinal Act Of Mercy, Part One":

> Dr. Casey tries to help a woman lawyer kick her morphine habit, but encounters resistance, lies and manipulation when she gets a young man, who is unaware of what is going on, to smuggle some dope into her hospital room. The young man is visiting his mother, who is in the hospital for treatment of injuries received in a beating. ("Ben Casey. Cardinal…")

Pollack uses the zoom shot to articulate a key moment during the episode, which re-establishes the link between two characters and focuses attention simultaneously on the lawyer's professional skills and the vulnerability of the elderly patient in the next bed. The two women are separated by a curtain. As a police detective enters the ward, the

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camera moves from the lawyer's side to the elderly lady's side. We see the detective question her. Then, as he begins to give her account of the assault which she suffered, we cut to a shot from the side of the bed. At first this takes in both the victim and the detective, but the camera immediately begins to zoom forward, enlarging the characters before ultimately zooming 'past' them, filling the screen with the curtain which separates them from the lawyer in the next bed. As soon as the curtain fills the screen, Pollack cuts to a shot of the lawyer, sitting up in bed and eavesdropping on the conversation. Here, the zoom serves to reinstate the spatial connection between the two women, transgressing the physical boundary imposed by the curtain.

Unlike Frankenheimer and Mulligan, Pollack's experiments with the zoom lens gradually became more noticeable and more stylish while he was still working in television. Scrutiny of Robert Altman's work highlights a similar gradual progression from tentative experimentation in the late 1950s, to a more adventurous style in the 1960s. By the end of Altman's television career, his work was beginning to anticipate his later, more familiar, and more comprehensively documented feature work. In common with the directors discussed above, there exist few detailed accounts of Altman's television career. Where it has been considered at all, it has been subsumed within longer studies of his later work in film. Altman's work in television has most often been historicised as a stop on his way to a feature film career: in Gerrad Plecki's words, it was a "gestational period" (1), while for Monaco "there is no evidence that Altman accomplished anything of much value in his television work" (318). Where studies of Altman do not explicitly downplay the significance of his television work, their structure frequently achieves the same end. In Diane Jacobs' *Hollywood Renaissance*, the chapter focusing on Altman accounts for his television career in a few sentences in the middle of a paragraph which starts with his birthplace and ends with his

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being hired to direct *MASH* (63). In *American Film Now*, James Monaco dispatches the

director's biography in similar fashion. Plecki, at least, discusses in some detail the

production circumstances and significance of a range of television episodes, but the

style and content of the shows on which Altman worked are more often overlooked by

biographers, as is the significance of the television industry as a training ground (or, at

least, a place of work) for the director. Daniel O'Brien briefly discusses Altman's

television career but, for lack of primary sources, is unable to discuss the look and feel

of these early career movies, other than to say that it was in early industrial and

television production that Altman "[showed] his inclination to experiment with film

technology, most noticeably in his use of an overlapping soundtrack" (17). As with the

earlier examples referred to above, O'Brien tells Altman's story as one of a director

attempting to break into Hollywood, and struggling to do so: the substance of what he

accomplishes in the meantime is regarded as unimportant. Even in O'Brien's

comparatively recent biography, *Kraft Television Theatre* is dismissed by reference to

its sponsors, the 'makers of processed cheese' – Altman had, himself, complained that

shows sponsored by *Kraft* were "as bland as their cheese" (Plecki 5). Especially in the

case of studies from the 1970s and 1980s, constant reference to Altman's feature film

career is surely a result of contemporary attitudes towards film studies combined with a

lack of archival access to television series. However, as with the muted technological

history of the zoom lens in television told in earlier chapters, the result is that an entire

chapter in Altman's history (and the history of other directors) has been subordinated in

favour of other approaches. It is not that critics have taken the wrong approach to

Altman's television work. It seems to be more appropriate to say that they have failed

meaningfully to approach it in the first place. As Christopher Wicking and Tise

Vahimagi eloquently protest:

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The existence of nearly fifty signed pieces of [television] work [by

Altman] which are virtually unknown, and, if discussed at all, occupy

only a footling footnote or pedantic parenthesis, calls into question the

whole rationale of what passes as academic criticism. Quite simply, we

ask, how can more than thirty hours of film made by one of the most

unique of modern directors be ignored in this way? (85)

Altman's career started later than the other directors to be considered here, and

the bulk of his work surviving for analysis comes from the late 1950s and early 1960s.[84]

The earliest of Altman's television work to be considered here are two 20 minute

episodes of *Alfred Hitchcock Presents*: "The Young Ones" and "Together". In common

with others in the series, the episodes feature simple, compact suspense/mystery

narratives with a few characters, who face one fairly straightforward challenge. Though

neither episode makes use of any zoom shots, they both feature carefully choreographed

moving shots in which the camera seems to dance around the actors and set. Altman

recalled that around this time in his career, an acquaintance – "an actor named Johnny

Alonzo, who later became a rather well-known cinematographer" taught him still

photography techniques. Altman recalled: "I bought a camera, and I had a long lens on

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[84] Altman-directed television episodes viewed for this study: *Alfred Hitchcock Presents* "The Young
Ones" (1 December 1957) and "Together" (12 January 1958), *Whirlybirds* "Infra-Red" (5 May 1958) and
"The Story of Sister Bridget" (1 December 1958), *Millionaire* "The Peter Hopper Story" (10 December
1958), *Bonanza* "The Many Faces Of Gideon Flinch" (5 November 1961), *Bus Stop* "A Lion Walks
Among Us" (3 December 1961), *Gallant Men* "The Gallant Men" (5 October 1962), *Combat* "The
Volunteer" (22 January 1963), *Kraft Suspense Theatre* "The Long Lost Life Of Edward Smalley" (12
December 1963) and "Once Upon A Savage Night" (24 April 1964), and *Long, Hot Summer* "Pilot" (c.
1965).

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it. I had a zoom lens on it. So I spent three or four years shooting still photography. And I became pretty good at it. […] And the zoom lens got me" (Zuckoff 101).[85]

After directing one episode of another Hitchcock television series, *Suspicion*,[86] Altman moved to Desilu Studios where he directed 19 episodes of *Whirlybirds* (broadcast December 1958 to June 1959), a filmed half-hour drama concerned with the exploits of two helicopter pilots who chased criminals, rounded up escaped animals, and took part in various other activities for which a helicopter might prove useful. This lower-profile, lower-prestige engagement appears to have offered Altman a chance to work freely and to experiment with new ways of directing drama. According to O'Brien, in directing *Whirlybirds* Altman "tended not to block out an actor's movements during the shooting of a particular scene, but […] let them move more freely" (21). Only two episodes, "Infra-Red" and "The Story Of Sister Bridget", were available for analysis, and neither shows any clear use of the zoom shot.

Episodes of two separate television series from 1961 show what may be some of Altman's first uses of the zoom lens. In the *Bonanza* episode "The Many Faces Of

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[85] Some biographers trace Altman's interest in zoom shots to one of his earliest feature films, *The James Dean Story* (1957). O'Brien states that "during its production he was introduced to the zoom lens (then a fairly new gadget), a device which was to become an integral part of his film-making style" (20). Patrick McGilligan's earlier biography *Jumping Off The Cliff* suggests that this was not zooming in the sense that we know it from Altman's later films. Rather, it was: "a system […] called 'photo motion' to lend the illusion of variety and movement to the use of dozens of still photos – a process of scanning and creeping into a close-up of considerable detail in order to give some energy to film foredoomed as static. Though he was no stranger to such camera mobility, Altman learned from Stoumen and incorporated this stylistic device into his visual language. It was, in fact, his education in the zoom lens, which was in the process of being widely introduced into the motion-picture industry." (123) The significance of this early example of a zoom in Altman's work is, however, in some question. The technique as it appears in *The James Dean Story* was added in post-production, and is an example of what is today often referred to as rostrum camerawork. *The James Dean Story* shows no evidence of zooms shots in its live action scene.
[86] The episode directed by Altman, "Heartbeat", was not available for analysis.

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Gideon Flinch" (first broadcast November 1961), the zoom may have been used to augment a track-in towards a character who appears, to the surprise of another character, and a hotel-room door. In this case, the device makes a subtle addition to the physical movement of the camera, and it would not necessarily be spotted by the casual television viewer. Indeed, there is some ambiguity about this shot, and it is not possible be certain that a zoom lens was involved at all. An unequivocal example can be found in "A Lion Walks Among Us", an episode of the drama series *Bus Stop* first broadcast in December 1961, in which the zoom is used in a far more arresting manner.[87] During the opening of the episode, viewers see a young man named Luke Freeman (Fabian) murder the elderly owner of a small shop near the fictional town of Sunrise. Freeman's bullet passes through the body of the store owner, striking an alarm clock behind him. The stopped alarm clock becomes an important artefact later in the narrative as detectives attempt to determine when the storeowner died. In depicting the shooting, Altman first shows Freeman wield the gun, then cuts to Freeman's point of view. As the storeowner falls to the floor, the camera first tilts down, then back up, before a zoom frames the ringing alarm clock in close-up (see Figure 12).

Later, Altman directed episodes of various series for Desilu, Warner, Fox and ABC. At ABC, he directed episodes of *Combat*, including "The Volunteer". The episode tells the story of a French teenager who attempts to join a group American soldiers who have liberated his village during the Second World War. They are charmed by his ambition, but prevent him from joining them. Nevertheless, the teenager pursues the soldiers, ultimately committing an act of heroism that saves the life of one of their

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[87] This was a controversial episode of the series. Its violent content led to disquiet among advertisers, and the episode narrowly avoided being removed from the television schedule. It was subsequently discussed in Congressional hearings on television violence. Further details can be found in Watson (48-54).

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number. It is clear that a zoom lens was available to Altman when the episode was filmed, but it is used only once during the episode, at the conclusion of an act, zooming in slightly towards the teenager's face as the image fades out. The cinematography of the episode – which in addition to its television appearance was also screened at the Venice Film Festival – is otherwise dominated by dynamic devices including push-ins and -outs and the frequent use of hand-held and point-of-view shots.

Altman becomes a step more adventurous in an episode of *Kraft Suspense Theatre* entitled "The Long Lost Life Of Edward Smalley". A multi-layered flashback tells the story of an American soldier (the titular Smalley, played by Richard Crenna) who, inadvertently or otherwise, shoots dead a non-combatant in occupied France. As a result he is mocked by his comrades, and that night, in the grip of a nightmare, he stabs one of them to death. The second killing earns him a court-martial appearance. Though his defence lawyer J. Marvin Bean (James Whitmore) has little belief in his client's innocence, Smalley is acquitted on a technicality. Years later, upset that he was dishonourably discharged rather than being convicted of murder, Smalley traces Bean to his office, and threatens to kill him.

The setting of "Edward Smalley" is somewhat similar to "The Volunteer" – both concern a small detachment of American GIs in wartime Europe – but its subject matter and subjective alignment are different. The episode is essentially a psychodrama which investigates Smalley's motivations at two particularly desperate moments in his life. Where zoom shots are used, they are motivated by the need to investigate and communicate a character's psychological state. Smalley's mounting horror as he realises that he has killed a civilian is emphasised through a scene-ending zoom shot onto the face of his dead victim, and a similar zoom can be observed as Smalley later settles down to sleep in a foxhole. As he closes his eyes, the zoom tightens the framing

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around his face. This camera movement coincides with optical and sound effects marking the start of a brief dream sequence (which includes a repetition of the above-mentioned shot of the dead civilian). Both zooms are so subtle as to be easily mistaken for physical camera movement. It is not certain that they were not added using an optical printer in post-production, though analysis of the pertinent scenes suggests that this is unlikely. The most striking (in this case added in post-production as a special effect) zoom effect occurs towards the end of the narrative, as Bean reflects upon the events that passed between him and his former client. His memories are shown through a montage of shots which include a superimposition of the barrel of Smalley's gun framing the lawyer's head. Over suspenseful music, an optical zoom increases the size of the gun-barrel until it dominates the frame and surrounds the lawyer's face. These zooms are not a dominant part of the cinematography, and (apart from of the final gun-barrel zoom) they could easily be missed by the casual viewer. But they are significant because they represent an early use of the zoom to articulate the subjectivity of a particular character.

A significant progression in Altman's style can be noted in a later episode of *Kraft Suspense Theatre*: "Once Upon A Savage Night" (2 April 1964; later retitled *Nightmare In Chicago* and distributed as a B-release). The episode follows the progress of serial killer Harry Brockman (Charles McGraw), nicknamed "Georgie Porgie", who murders young blonde women. As the police pursue Brockman, his path crosses with a missile convoy moving under heavy security along a toll road. Brockman finally kidnaps a dark-haired woman and hijacks a highway maintenance truck. He is eventually overcome by police – leaving his final victim alive. As is demanded by *Kraft Suspense Theatre*'s title and regular format, "Once Upon A Savage Night" is fundamentally a suspense-thriller narrative. However, as with "Edward Smalley", the

murderer is motivated by a vaguely defined pre-existing trauma, giving the episode a psychological dimension which takes it a step beyond pure exploitation.

In a significant development from the limited use of zooms in "Edward Smalley", Altman makes the device central to the episode's cinematography. Along with handheld camerawork and point-of-view shots, Altman uses the zoom to heighten shocking effects at crucial moments. (The extremity of the change from wide angle to telephoto in these shots – a magnification of approximately 10× – suggests that Altman may have been working with new equipment – possibly the newly available Angénieux lenses.) One of the most striking of these shots occurs as Brockman kills his second victim during a sequence set in a strip club. As he leans in, apparently to kiss her, we cut to a extremely high angle from a camera apparently fixed in the ceiling, before zooming rapidly towards the victim's shocked face at the moment she realises that she is being strangled (see Figure 13). This shot is echoed later in the narrative, when the zoom tightens the framing on another blonde whom we are invited to speculate will be Brockman's next victim (see Figure 14). The foundation of this sequence of shots is a classical eyeline match, point of view shot. Through the zoom, however, Altman is able to add a more evocative psychological layer. The camera, initially focused on the conversation between the blonde waitress and one of her colleagues, pans to show Brockman lurking in the shadows. Music and a voice-over, presumed to be that of his mother or another older female relative, takes the audience inside Brockman's mind, and flows over a combined zoom/tilt which captures the waitress, in voyeuristic telephoto, unsuspectingly surveyed by Brockman.

In addition to these overt, psychologically-motivated zooms, the device is also used in a more subtle manner on a number of occasions. During the episode's opening sequence, a transition from the scene of one of Brockman's first murders is achieved

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through a slow zoom towards the leafless branches of a tree, which transforms the image of the tree and nearby houses to a close-up on a few branches, followed by a lap-dissolve into the next scene (see Figure 15). Later in the episode, a short zoom shot coincides with the slamming of a door as Brockman locks a highway worker in a cupboard, combining with the soundtrack to heighten the dramatic effect. Altman occasionally zooms to vary framing both at the beginning of, and during, shots. As well as repeated zooms-in on police cars and convoy vehicles as they travel along the toll road, we can observe movements that, in their complexity, may be early prototypes for Altman's later scene-structuring zooms. One example is a scene which starts with a shot of the flashing lights of a police car outside a highway service station, before the camera zooms back 'through' the windows and then pans to establish a new setting inside the service station, where police and members of the public discuss the urgent need to capture the serial killer. The zoom here offers a smooth transition which inextricably links the police car outside the windows to the hubbub within the building.

There must always be questions about the extent to which film and television directors directly influence the cinematographic styles of productions which bear their names. However, the zooms in "Once Upon A Savage Night" are so extreme, and so motivated by the need to communicate story information, that it is almost inconceivable that they were not used with Altman's consent, and more likely that they appeared at his instigation. This contrasts somewhat with the zoom shots found in "The Volunteer", which (again excepting the artistic optical zoom superimposing Bean's face upon the barrel of a gun) could conceivably have been choices made by the camera operator working on the particular episodes. Altman's comprehensive, adventurous, and at times highly structured use of the zoom lens in "Once Upon A Savage Night" is an important development: Altman's use of the zoom has been described as one of his stylistic

hallmarks (Bordwell, *Poetics of Cinema* 221). It is therefore significant that an example can be found of just such a technique in television work predating *MASH* (1970) by six or seven years.

This examination of a sample of television work by members of the 'TV generation' identified by John Belton, Stuart M. Kaminsky, Drew Casper, and Warren Buckland, confirms that these directors certainly did include zoom shots in their television work – though few or no instances can be found of the zoom substituting for camera movement. These examples of zoom shots in American television show that from 1954 onwards, directors used zoom shots for a variety of purposes: whether to adopt a character's perspective, to focus audience attention on an aspect of the pro-filmic, or simply as another way of moving into a transition from shot to shot. Significant caution is required, however, as to the interpretation of these findings. The directors are too diverse a group to be identified collectively. They were not all working in television at the same time, and nor were they all working on the same type of show. The television careers of Frankenheimer and Altman, for example, overlap by only two years, and while Frankenheimer worked largely in anthology drama, Altman's work was more focused on serial drama. In addition to this sensitivity to differences in industrial contexts, a chronological progression can also be noted. Work dating from the mid-1950s shows limited, reserved, cautious applications of the zoom shot. Directors appear to become more adventurous with the zoom as the 1950s progress. Finally, by the early-mid 1960s, television personnel such as Robert Altman and Walter Strenge can be seen to use the zoom in diverse and complex ways. This development in style appears to run in parallel with that seen in contemporaneous American cinema. Therefore it is essential to question the assumption that television directors transplanted the zoom to feature production, and consider whether pre-1960s technological

developments were responsible for stylistic developments occurring simultaneously in

both media. These observations help to inform the next chapter's re-examination of

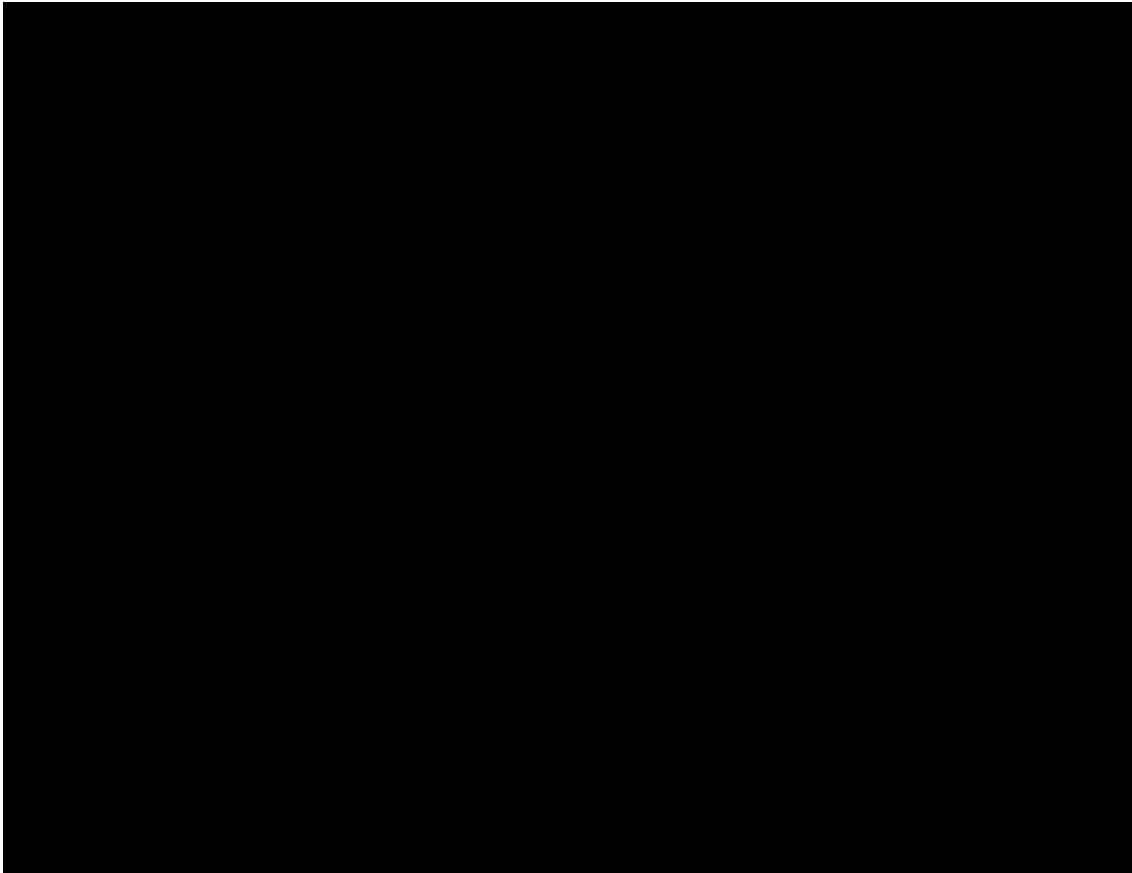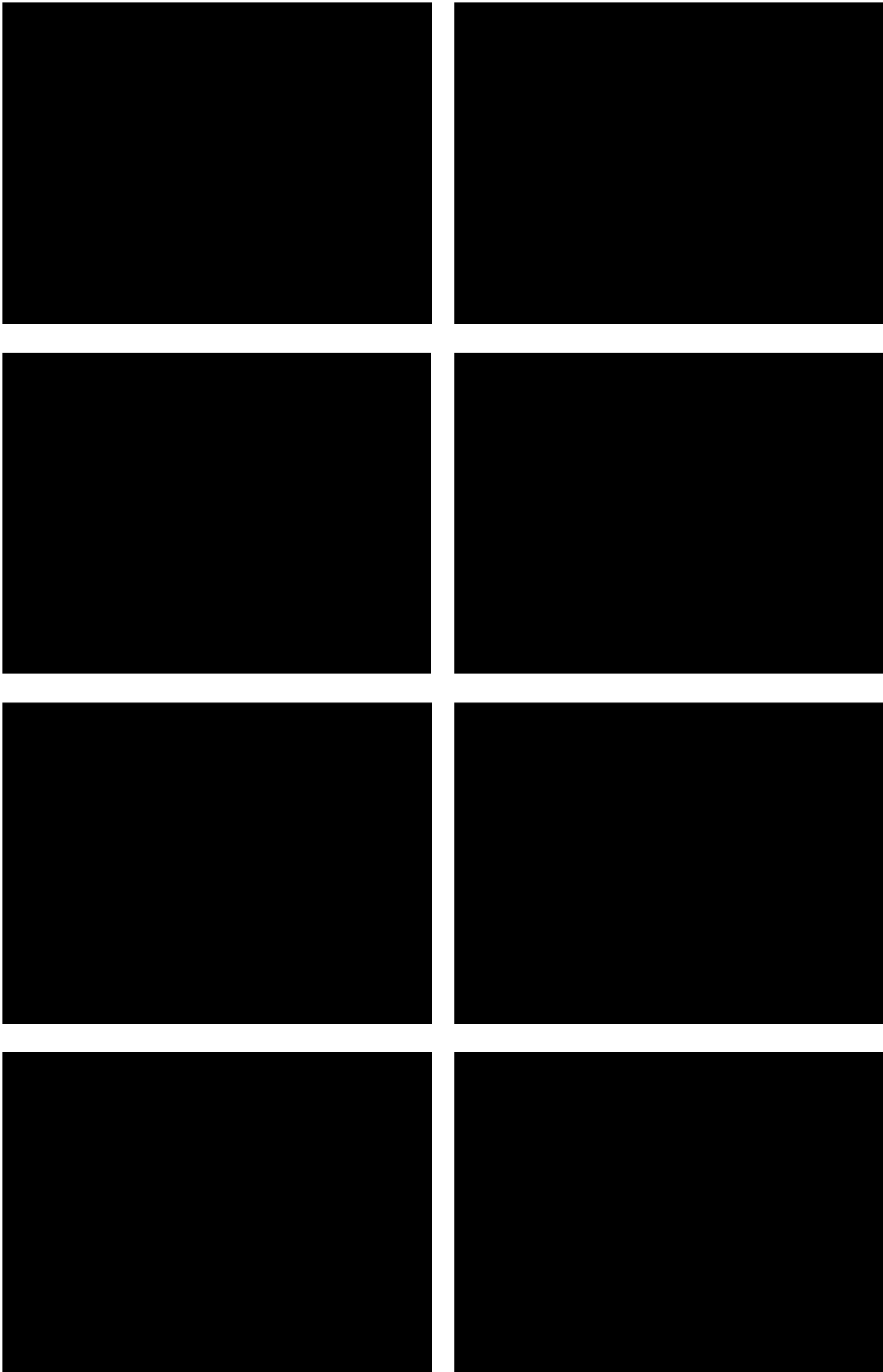developments in zoom style and technology during the 1960s.

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**Figures: Chapter 8**



**Figure 9:** *Night Court USA* set (Mascelli "Filming Coutroom Dramas…" 33)

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**Figure 10:** *Night Court USA* – Courtroom Disturbance
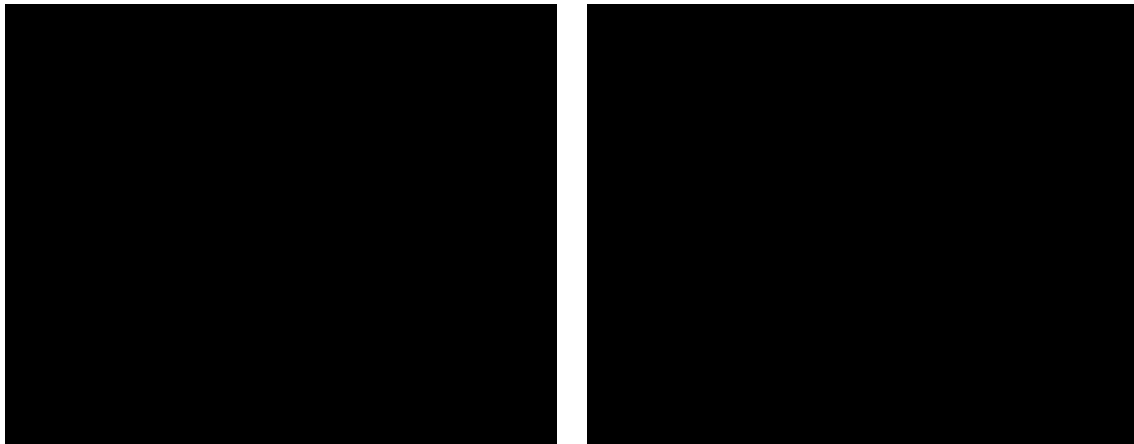
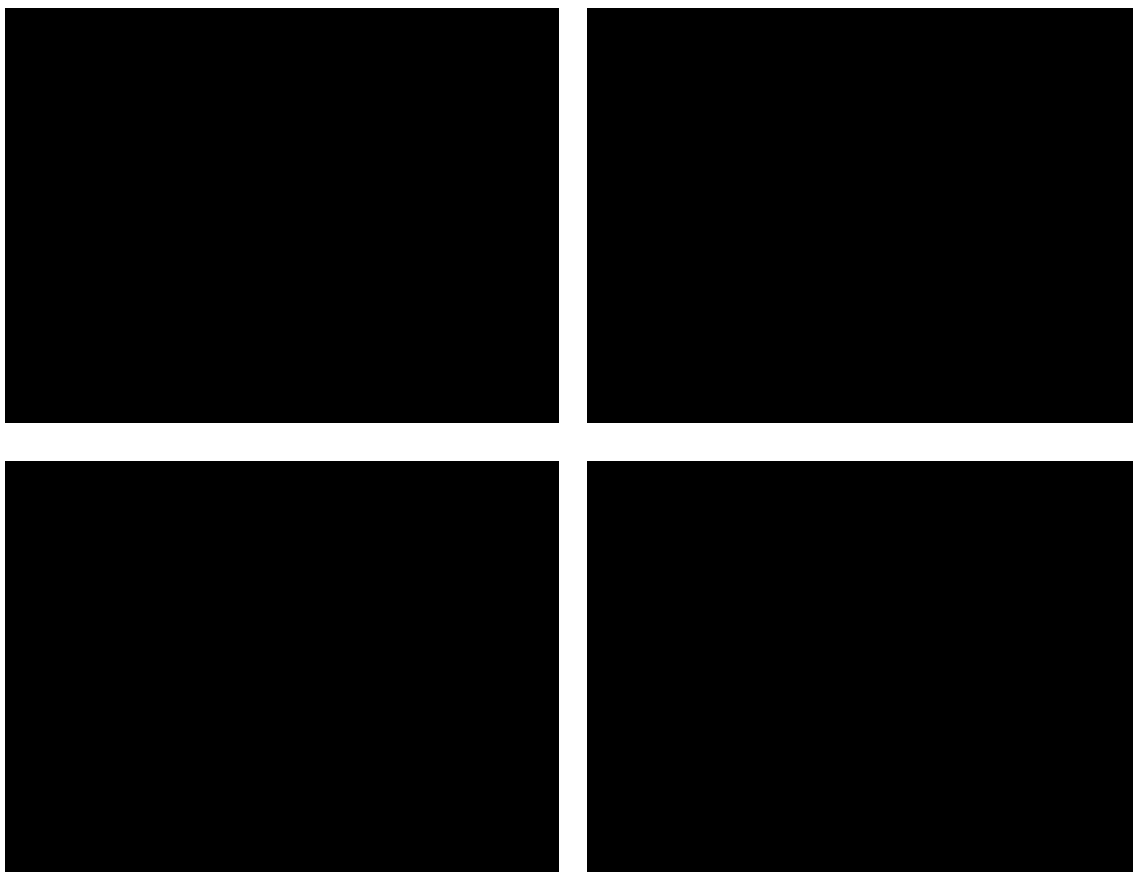**Figure 11:** *Playhouse 90* "Eloise" – 'I want to see my lawyer'

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**Figure 12:** *Bus Stop* "A Lion Walks Among Us" – Shopkeeper Shot
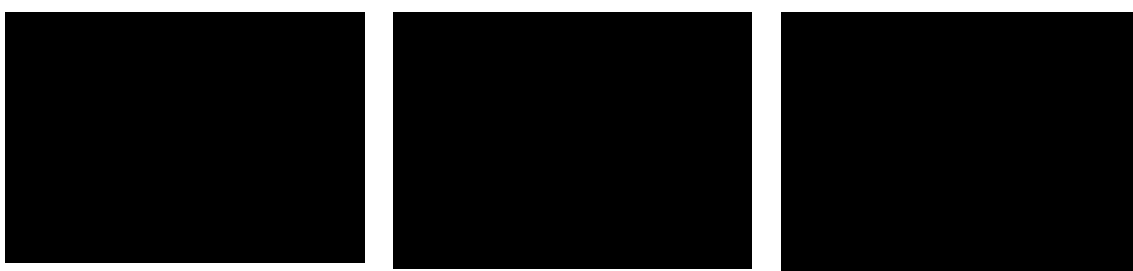
**Figure 13:** Kraft Suspense Theatre "Once Upon A Savage Night" – Woman Strangled

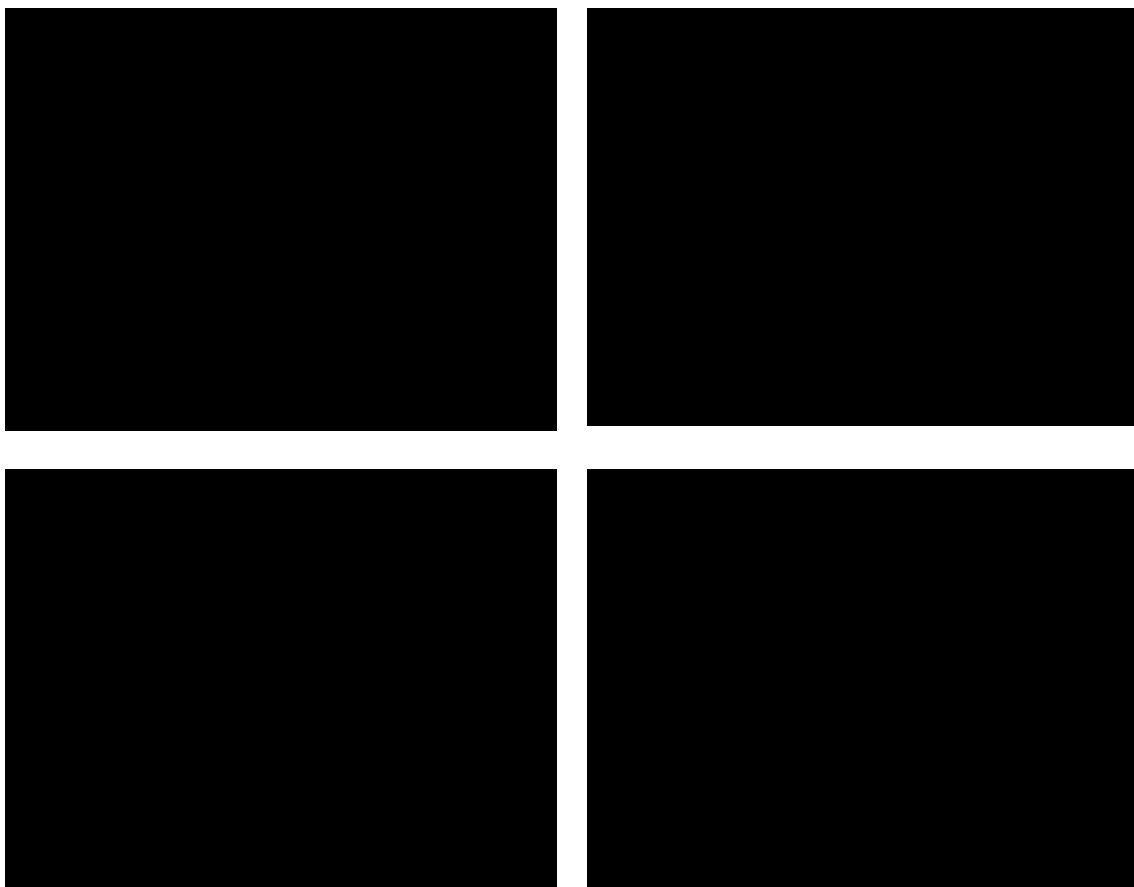Images have been removed from this dissertation by the author for copyright reasons.

**Figure 14:** *Kraft Suspense Theatre* "Once Upon A Savage Night" – Potential Victim
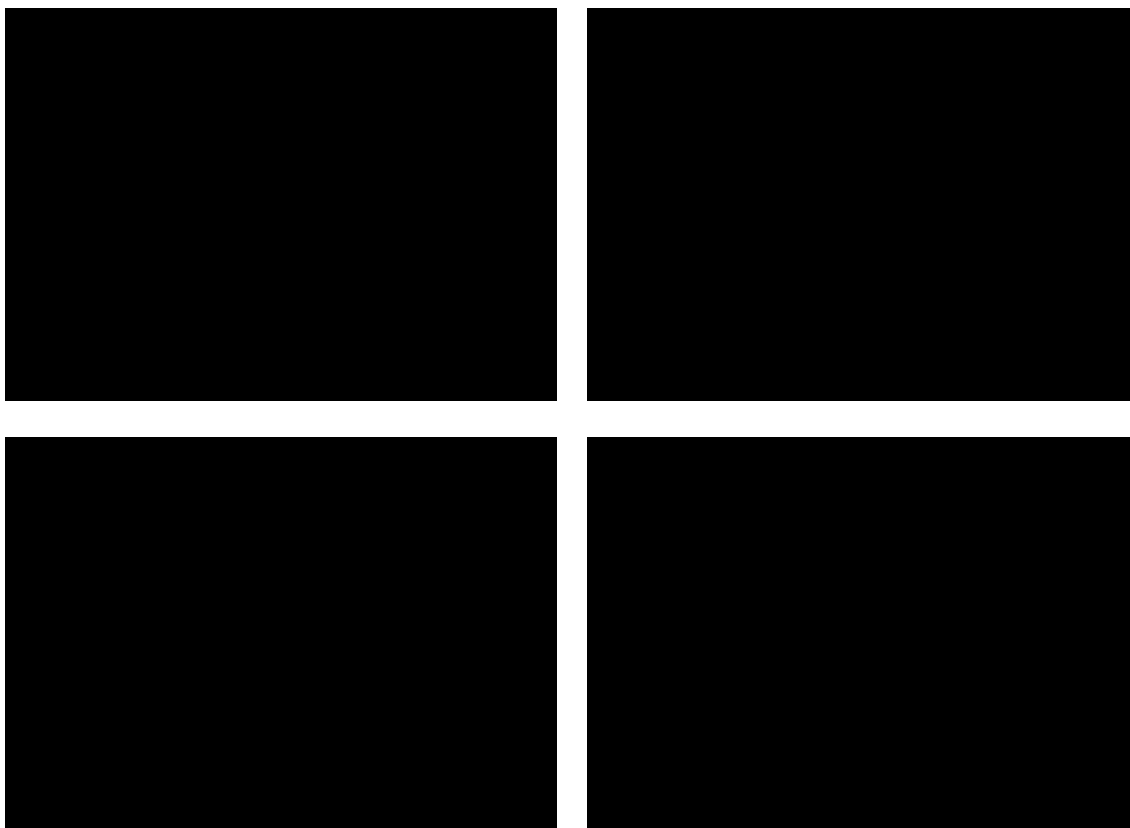
**Figure 15:** *Kraft Suspense Theatre* "Once Upon A Savage Night" – Wintry Trees

# 9. Feature Films Before the 'Zoom Boom': 1957 to 1969

The chapters above demonstrate the extent to which the zoom lens was in use across the

American television industry by the late 1950s. In chapter 10, examples of the feature

film work of four 'TV Generation' directors, covering the period from 1957 to 1969, are

considered in light of their television work. During this period, new technologies were

developed, new stylistic approaches tried, and numerous internal and external influences

acted upon the American film industry. In accounting for the emergence of the 'TV

theatrical' style alone, Drew Casper cites:

> The film companies' aggressive move into the number 1 mass medium
> of TV; the instating of TV-trained execs; the nonchalant exchange
> program between film and TV craft; and the more than 75 directors who
> crossed over into film permanently […] or continued to go back and
> forth. (90)

Given this complex background, and in order to consider the feature-film activities of

the 'TV Generation' in the proper context, it is first necessary to analyse the

technological and industrial context of the period. In common with the chapters above,

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this involves a close examination of technological developments alongside a discussion of attitudes towards the zoom shot, as exemplified by articles in the trade press and contemporaneous and retrospective interviews with directors and other personnel. The second half of this section deals with some of the ways in which zoom shots were used by directors and cinematographers during the 1960s – at the same time that members of the TV Generation were becoming active in Hollywood feature filming. Stylistic developments such as these were in part enabled by rapid progress in zoom and zoom-related technology before and during the 1960s. These took the form of improved zoom lenses, in addition to the development of miniature motors and servo drives which enabled zoom movements to be smoothly executed and – in the later years – pre-set and controlled automatically via electronics.

**Technological Developments**

In January 1957 a response to a reader's question in the "Technical Questions and Answers" column of *American Cinematographer* reflected the choice for cinematographers by the late 1950s, which was between Zoomar and the "more recent" market entrant, Pan Cinor (Strenge 50). The following month, *American Cinematographer* noted that the Benjamin Berg company had commenced selling a 35mm version of the Pan-Cinor zoom lens, which had been introduced for 16mm cameras several years earlier. In May 1957, an article appeared which discussed the Pan Cinor's use in the production of a religious film, *The Easter Vigil*. Three cameras were used for the production, one of which:

> was equipped with the zoom lens, giving it a fixed position versatility by
> virtue of the lens's ability to adjust to a wide range of focal lengths; the
> other was made versatile in its fixed position by means of panning
> action. The combination of shots that were thus obtained by the two

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camera – one panning, the other using the zoom lens – was more than

adequate for proper editing of the film. (Fenyon 309)


Though they had now entered the market, Angénieux were at this point still merely the

manufacturer of a zoom lens which Bell & Howell had chosen to distribute with their

cameras. They were not a major player, and when the Academy of Motion Picture Arts

and Sciences gave a Class II award "for the development of a high speed vari-focal

photographic lens", it was to SOM-Berthiot for their Pan-Cinor (Gavin 222). By this

point the rate at which Zoomar was developing new forms of zoom lens had apparently

slowed, but other innovators had become significantly more active.[88] In addition to

innovation efforts by the French firms SOM-Berthiot (manufacturers of the Pan-Cinor)

and Angénieux, Panavision had a 35mm anamorphic zoom lens "on the drawing board"

by May 1960 (Scot "Panavision's Progress" 324). In September of the same year the

company introduced a 65mm anamorphic zoom lens, telling trade personnel that it

would "permit more versatile and difficult camera set-ups, and […] eliminate in some

cases camera dollying" ("Industry News" 518).

Over the years following the introduction of the Pan Cinor 16mm and 35mm

lenses, *American Cinematographer* described numerous examples of zoom

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[88] Accounts suggest that some of the original Field Zoomar lenses continued to be used into the 1960s: Pharis recalled that as late as 1963 the San Francisco station KGO-TV was still using such a lens to cover high school basketball games. The last new Zoomar lens for film cameras, the 40-120mm Zoomar 35, was introduced in 1956, while the last new Zoomar lenses for television cameras, the Zoomar MK-IV and the Super Universal Zoomar, were both introduced in 1958 (Kingslake "The Development of…" 540; 543). Company documents suggest that toward the end of the 1950s, Frank Back took a less active role than he had done previously. However, in 1957 and 1958, Zoomar had incorporated a number of new subsidiaries, including the Television Zoomar Export Corp, Zoomar Marketing Corp (both in New York) and Television Zoomar Trading Ltd (in Liberia). Zoomar continued to market and sell zoom lenses – its own and those manufactured by others – throughout the 1960s and into the 1970s, before finally being sold to Optical Industries, Inc in late 1977 or early 1978 (Frank Back Papers: box 3 items 36, 37, and 40).

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technology's use in film and television. In addition to Mascelli's report of the zoom used on *All Star Golf*, *American Cinematographer* reported the availability of a new 17-68mm Angénieux zoom lens which: "enables 16mm cameramen to zoom in on subjects with all the impressiveness of a TV sportscast" (Henry 177).[89] Baseball was, once again, the primary suggested use for the new lens, which had been introduced for sale by Bell & Howell. But the article also suggests other uses, including travel filming, suggesting that:

> in filming a market place, for example, [the cinematographer] can make a wide-angle shot to establish locale, then quickly zoom to telephoto position for revealing close-ups of people and interesting detail within the scene – a native basket weaver, marketplace vendor, church spire or an architecturally intresting [*sic*] doorway. (177)

In 1959, in addition to detailing the filming of *Night Court USA* (see above), *American Cinematographer* also detailed the role of zoom lenses in the location filming of the *Bob Hope Christmas Tour* on which a camera equipped with zoom lens was the "workhorse of the set-up" (Lightman "Filming The Bob…" 177). There are only a handful of evident zoom shots in the final edit of the production – a mixture of rapid reframings of fast-moving stage action, along with several zooms toward a heckling 'plant' in audience with whom Hope interacts (see Figure 16). However, the range and variety of cutaway shots of the crowd watching Hope's performance, and the apparent lower-resolution of some of these shots, suggest that the zoom was more extensively used as a substitute for a range of fixed focal lengths.

Theatrical cinematographers also began to use zoom lenses more frequently from the mid-1950s. Salt has linked this to the increasing availability of zooms for

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[89] It should be noted, however, that this article appeared in the 'Amateur Cinematography' section of *American Cinematographer*.

35mm filming, produced by both Paillard and Zoomar (*Film Style and Technology* 244).

From 1958, following Zoomar's courtroom defeat against Paillard, Pan Cinor zoom

lenses became a prominent feature in camera advertisements. Kling Photo Corp's

promotional material emphasised the lens's utility for capturing news footage, showing

Movietone cameraman Jack Painter operating a Pan Cinor 150 zoom lens mounted on

an Arriflex 35 camera, under the heading "You Can't Miss With An Arriflex 35"; later

advertisements tended to be less specific as to the industry in which the product might

be used. As Salt notes, zoom shots can be seen in *Apache* (Robert Aldrich, 1954) and

*The Incredible Shrinking Man* (Jack Arnold, 1957) (Film Style and Technology 244).

The latter makes limited use of a mixture of zoom shots made during filming, and

optical zooms added afterwards, but the zooms which do appear are varied in their

purpose. They range from zooms which focus the glance of the protagonist, to a pair of

zooms which simulate the rocking of a suspended beam which he is attempting to walk

along.

      By the end of the decade, feature films were making considerably more

comprehensive use of the technique. Numerous zoom shots appear in *Odds Against*

*Tomorrow* (Robert Wise, 1959). In an article for *American Cinematographer* the film's

director of photography, Joseph Brun, explained that:

> We used the zoom lens quite often, not as an instrument to obtain
> magnification or to approximate traveling shots, but as an editorial
> medium corresponding to a progressive fast or slow switch of image
> format, or as a rythmic [*sic*] element in combination with sound and
> dialogue. (479)

This is a fairly accurate assessment of the zoom shots that appear in the film, which

show significant variety in their style and motivation. Zooms which "switch image

format" – by which Brun seems to mean shot scale – gradually close in on targets,

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including a man making a cash delivery to a bank (see Figure 17), and a moving bus.

Several times, the zoom is used as part of an eyeline match shot to demonstrate that a

character's attention has been drawn to an object or subject (see Figure 18), anticipating

similar techniques found in film and television produced late into the following decade

(see, for example, *I Spy* and *They Shoot Horses, Don't They?* discussed below). These

zooms are performed at a relatively slow pace, but as the film's narrative intensifies,

zooms become more rapid – quickly moving towards one of the bank robbers as he is

discovered by a police officer, and zooming down towards the face of Johnny Ingram

(Harry Belafonte) as he climbs a ladder in the film's climactic scene (see Figure 19).

Zoom lenses were also used on the set of *–30–* (Jack Webb, 1959), which was

shot "on a single set" by *Dragnet* cinematographer Ed Colman. *American*

*Cinematographer* highlighted the various ways in which zoom lenses were used in

order to overcome some of the limitations imposed by working on a single set with few

moveable walls:

> a zoom lens was employed in conjunction with the dolly-mounted
> camera to 'lengthen out' some dolly shots where it was not feasible to
> dolly past a certain point. For example, a scene would start with a long
> shot and the camera would then dolly-in a far as possible, until blocked
> by a desk or other object. As the dolly eased to a stop, the zoom lens
> operator would take over, picking up the forward movement and
> continuing to push in to a big closeup. A sharp camera crew was
> essential to achieving such a transition with smoothness and subtlety.
> ("Shooting '–30–' On…" 760)

The article also hints towards methods regarded as standard practice for use of the zoom

lens:

> In other instances the zoom lens – which had a range from 38mm to
> 170mm – was used in the conventional manner. At several points in the

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story the camera is framed on a group. A particular story point is made

and the lens is zoomed in for a closeup to show the expression on the

face of a player reacting to some action or passage in the dialogue. (760)

However, unlike some earlier marketing-led articles which advocated for the zoom lens,

and in common with Mascelli's caution in 1957, the passage of the article which deals

with the zoom lens warns that:

> Despite the notable results achieved with a zoom lens on this production,
> Colman is well aware that a zoom is no panacea for photographic
> problems on the set. He points out that most zoom lenses are tricky to
> operate smoothly, have several unfortunate technical shortcomings, and
> are often misused. A major disadvantage, he says, is that zooms have an
> inherent 'flatness' which produces an effect on the screen very much like
> that of zooming in on a still photograph. (760)

Despite these misgivings, Colman maintained the view that "zoom lenses have a

definite place in contemporary film production when intelligently used with specific

effects in mind" (760). In 1960, *American Cinematographer* described how a zoom lens

was used on the set of *Studs Lonigan* (Irving Lerner, 1960) to "[follow] a struck ball

across the table and into a corner pocket" (760), and mentioned the use of zoom lenses

for action sequence shooting on *Hell To Eternity* (Phil Karlson, 1960):

> One camera, equipped with wide angle lens, was placed at ground level
> in a trench dug directly to the rear of Hunter and Williams. This camera
> covered the two actors in one corner of the frame and in the background
> also included the Japanese. Another camera, placed above the ground,
> covered a general view of the Japanese in action. The third camera,
> mounting a 'zoom' lens, followed Hayakawa and his men as they moved
> about the set. Three men manned this camera: an operator, one assistant
> controlling the 'zoom' handle and the other pulling the focus. (436)

The zoom shot in *Studs Lonigan*, though noticeable, is confined to the pool table scene

described above (see Figure 20), while *Hell To Eternity* makes somewhat more frequent

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use of the device, particularly towards the end of the episode. Karlson applies the zoom to one moment of particular dramatic significance – a zoom out from the hand of a dying soldier (see Figure 21) – in addition to occasionally using the zoom to demonstrate spatial context around large groups of Japanese soldiers (as in Figure 22). Despite the apparent novelty of the zoom lens in the feature film context at this point, few of these accounts offer an opinion as to the merit of the device: instead, they simply mention that it has been used.

Over the following years *American Cinematographer* maintained a high level of interest in zoom lens motorizations. The Zoomar Corporation was one of the earliest developers of such a mechanism, advertising in April 1956 a zoom lens "with two flexible shafts attached which can be connected to remote manual or electric controls"; the company also sold "miniature D.C. motors" to accompany the lens ("What's New" 57.4). Following the Zoomar device launched in 1957, Arriflex developed a similar product in order to provide operators with "the […] finger-tip convenience of zoom operation that results in smooth, readily duplicated zooms" (Forbes 46). The unit permitted operators to set a zoom speed in advance, and then zoom in and out at that speed, though the device did not allow changes in zooming speed during operation. Some cinematographers, meanwhile, took it upon themselves to produce semi-automated zoom lenses. Independent camera operator Snuffy McGill converted a Nikkor 85-250mm (2.95×) lens designed for still photography so that it could be used with an Auricon Pro-600. McGill had noted that "with zoom lens virtually standard equipment today for newsreel and sports events cinematographers, one of the big problems is effecting quick focus change when panning from a bright open areas to one in shade or vice versa" (McGill 474). To remedy this, McGill commissioned two

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equipment service companies to modify the lens and manufacture a linkage to a separately purchased variable focal length viewfinder.

By late 1962, after 14 months of research and development, MGM had created an "electric motor drive with remote control […] for [35mm] zoom lenses" ("Motor Drive For…" 632). The device, developed by a camera assistant named Paul Koons, was designed to automate the rendition of zooms based on presets and appears to have been designed with multi-take Hollywood production processes in mind. Koons describes how "it is mistake proof […] After initial pre-setting, it repeats its 'custom' operation for as many takes as desired" (632). Koons' invention initially found use in the production of films including *The Courtship of Eddie's Father* (Vincente Minelli, 1963) and *It Happened At The World's Fair* (Norman Taurog, 1963). Far from the research and development departments of major studios, independent camera operators were also striving towards more convenient methods of zooming. One such operator, Roy Zeper, complained in *American Cinematographer* that:

> Manufacturers of zoom lenses have so concentrated on improving the optics of such lenses that one of the photographer's greatest needs – a motor-driven zoom lens – has received little or no attention. As far as I know, no such device applicable to zoom lenses now on the market is presently available. For the lone cinematographer working with a zoom, panning and tilting the camera simultaneously while operating the zoom control lever is exceedingly difficult. (Zeper 168)

Zeper went on to give an account of how he developed a remote motor drive for a Pan Cinor zoom lens which he used with a Bolex H-16 camera in order to film shots for a "sequence of low-angle moving camera shots" taken from the front of a car. Like McGill, Zeper appears to have worked alone to overcome a problem that he had observed, and which had not been satisfactorily resolved by equipment manufacturers.

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Most historical accounts of the zoom lens agree that the most significant development of the 1960s was the introduction of Angénieux 10× lenses (P. Monaco 70; Salt, *Film Style and Technology* 258; Nowell-Smith 98-9). Though the Angénieux's major contribution to the zoom lens market did not occur until 1963, when their new 10:1 lenses for 16mm and 35mm filming were introduced, the firm had been developing zooms since the mid-1950s. Their first model, a 17-68mm lens designed for 16mm cameras and distributed in the United States from around 1958, was a direct response to, and competitor for, existing Zoomar and Pan Cinor lenses (Kingslake "The Development Of…" 540). However, from around 1962, after eight years of research and development, Angénieux began to manufacture two new zoom lenses: a 12mm to 120mm model for 16mm filming, with a maximum aperture of ƒ/2.2, and a 25mm to 250mm model for 35mm filming, with a maximum aperture of ƒ/3.2. The lenses were identical in their basic design, consisting of 14 optical elements arranged in 10 groups. For 16mm cameras the lens was produced in two essential designs: one with an integrated reflex viewfinder enabling a camera operator or director to monitor framing and focus even if the lens was mounted on a non-reflex camera; and another, without the additional weight and expense of a viewfinder, designed for reflex cameras. For both film formats the lens was produced in a range of further variations to make them compatible with the various cameras already on the market, including variations to fit Paillard, Bell & Howell, Auricon, Cineflex and Cameflex cameras as well as for vidicon television cameras (Pont 193; 201).

The availability of the new Angénieux lenses was mentioned for the first time in *American Cinematographer* in the periodical's "What's New" section in September 1962. The low-key product announcement, which noted that the camera manufacturer Arriflex was selling "a new zoom lens for Arriflex 16 – the Angénieux Model 120 –

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which zooms from 12mm to 120mm focal length" ("What's New" 43.9) gave little clue of the transformation which was to take place in the zoom lens market. Though the zoom was a well-established technique by the beginning of the 1960s, until December 1962 the promotion and discussion of zoom technology in *American Cinematographer* was relatively inconspicuous. Advertisements tended to occupy less than a full page, in low-prominence positions. In 1962 *American Cinematographer* carried no full-page advertisements for zoom lenses, but by 1963 the market had changed radically. In addition to numerous prominent advertisements by various distributors, the "What's New" columns in the periodical's April, May, June, July, September and December editions all featured a promotion of the fact that one company or another was selling the new Angénieux zooms. In three of these instances the company was Zoomar International, "an affiliation of three well known firms" (Zoomar International), which had been incorporated specifically to distributing the new zoom lenses.[90] There can be little doubt that the introduction of the Angénieux 10× lens was highly significant, and enabled directors and cinematographers to carry out more adventurous experiments with variable focal length. However, their significance must be placed in the context of the longer-term development of zoom lens technology, and of stylistic developments during the 1960s.

**Stylistic Developments**

The established nature of zoom technology by 1962 is reflected in the wide range of theatrical applications found for the zoom lens. This, of course, is before the Angénieux 10× lens credited with revolutionising the use of the zoom was even introduced on a

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[90] The development, introduction and innovation of the Angénieux 10× zoom lens is discussed in greater detail in Hall (2009).

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widespread basis. As early as 1962, zooms were highlighted both for their utility and positive stylistic impact. During 1962 alone, *American Cinematographer* discussed the use of zoom lenses for concealed location filming on the street, for narrative purposes in *Judgement at Nuremberg* (Stanley Kramer, 1961), for momentary impact in *Experiment in Terror* (Blake Edwards, 1962) – see Figure 23 – and *Bye Bye Birdie* (George Sidney, 1963), and for routine non-theatrical engagements such as educational filming. The style and impact of zoom shots in these examples reflects the diversity of their industrial backgrounds and generic positioning. *Judgement at Nuremberg* is partially structured by zoom shots which bracket passages of action: long and smooth zooms – sometimes performed sharply and sometimes gradually – frequently pick out or contextualise key characters. Such zooms appear at least 22 times in the various courtroom scenes, and are rarely combined with any other camera movement.[91] By contrast, two contrasting films – *Experiment In Terror* and *Bye Bye Birdie* feature isolated zoom shots used for specific and limited purposes. Describing *Experiment In Terror, American Cinematographer* highlighted a 'photographic innovation', which was:

> used in photographing a scene in which the criminal attempts to intercept Kelly's sister walking home from school. The object was to capture, virtually in one continuous shot, the whole action as observed from the position of the criminal seated in a car parked sat the curb. The girl is approaching from behind, and he watches her progress intently in the car's rear-view mirror. ("Experiment In Terror" 320)

Using a zoom lens and an oversized rear-view mirror, a striking shot was created in which:

> the lens was zoomed back to take in the whole car and sidewalk beyond as he comes into the picture. The effect is similar to a moving camera

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[91] For more detailed discussion see Hall (63-8).

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> shot made from an automobile traveling on the street slightly ahead of
> the girl. (321)

The professionalism of the endeavour, and the organic nature of its conception, are emphasised:

> The whole thing is so expertly devised and executed that few persons are
> aware that it is anything but straightforward photography. Nor was the
> shot planned and included in the script. Like so many of the
> photographic innovations that mark this picture, it was a spur of the
> moment thing, Lathrop explains.

In *Bye Bye Birdie*, the zoom is used on a small number of occasions to augment the physical movement of the camera:

> At the end of the sequence ['Honestly Sincere'] a zoom lens racks the
> scene back suddenly to show the understandably exhausted participants
> passed out on the ground. The camera, mounted on a boom, continues to
> dolly back another 200 feet, then soars upward 35 feet for the fade-out.
> ("Plotting Camera Angles…" 754)

Zooms lenses featured among the equipment of filmmakers shooting secretly on the streets of Hong Kong (Loring 41), and *American Cinematographer* also highlighted the use of the zoom in educational film production. Here, the manner in which such developments are discussed indicates that the economic advantages of the zoom lens were already being weighed against aesthetic concerns:

> The zoom shot may often be accused of lacking artistic integrity, but if
> it's not overdone it does solve the problem of introducing the closeup,
> particularly if backed up by suitable references in the dialog. It has the
> attendant advantages of being much cheaper to execute than a trucking
> shot or cutaway, and of saving considerably on editing time. Here again
> the camera must be caapble [*sic*] of accepting zoom lenses if necessary,
> though this is rarely a problem. (Berridge 742)

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This attitude was repeated in an unsigned article containing advice on location

photography, which suggested to readers:

> Another valuable aid is the zoom lens. This can be used as your only lens
> with the option of zoom effects. It is easy to over-use zooms, however,
> as such effects are often startling to an audience and should be reserved
> for occasional, specific instances. ("Location Photography: Helpful…"
> 228)

Over the next few years, the zoom became more commonplace in industrial discussions

and starts to be used in a more adventurous way, often as a means of overcoming certain

production challenges. On the set of *Fail Safe* (1964), director Sidney Lumet used the

zoom for scenes in which:

> The size of the set and the physical distances covered within split
> seconds required the use of the new 10:1 (25mm to 250mm) Angenieux
> zoom lens to move from closeups of the 'radar' to wide shots of the
> Omaha war room. (Hirschfield 483)

This is not a one-off or even occasional technique, but a method used throughout the

film. Generally it is used in the manner described by Hirschfield, but on at least one

occasion the zoom plays a more complicated narrative role: such as when aircraft are

being monitored on radar from rooms in different locations, and zooms to and from

these screens provide a visual link for action taking place in different locales (see Figure

25). It can also be noted that *Fail Safe* ends with a series of optical zooms onto the faces

of New Yorkers startled as their city comes under attack from nuclear missiles, though

this final series of zooms is not cognate with the earlier use of the technique.

Differences of opinion over what constituted appropriate uses of the zoom lens

continued during the 1960s. Accounts given in the trade press indicate that decisions

about whether to use the zoom were finely balanced between considerations of

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practicality and stylistic effect. They were also subject to the – often contrasting – opinions of directors, directors of photography, and other personnel working in film production. An isolated example of this can be seen by drawing a comparison between two films – *Hud* and *The Outrage*, both directed by Martin Ritt, and both shot under the supervision of James Wong Howe. Despite having senior creative personnel in common, and being produced in quick succession, each film adopts a different approach to the zoom shot. In *Hud*, the technique is not used, even where there is a clear practical justification for doing so. As Howe told *American Cinematographer*:

> Some of [the] interiors were so small that we had to use a wide-angle lens to get any sort of establishing shot. We didn't use too many dolly shots inside – nor did the director want to use a zoom lens as a substitute, which may seem surprising since he comes from live TV. He simply has found that the zoom lens has been overworked. I don't care for it either because it produces just a flat frame coming toward you. In a zoom shot the perspective is static – the camera doesn't pass anything and you have no sense of true movement. It is just a set composition being blown up by degrees. (Lightman "The Photography of…" 414-6)

However, only eleven months later, after serving as Ritt's cinematographer on *The Outrage* (1964), it seemed that Howe had changed his mind. As *American Cinematographer* observed:

> while both Howe and director Ritt normally dislike using zoom lenses because of the perspective they create, there are several sequences in *The Outrage* where the zoom lens was used in combination with dolly and pan movement to create certain desired visual effects. ("The Outrage: Offbeat…" 198)

Despite Howe's justification for the appearance of the zoom in *The Outrage*, the effects he mentions do not seem carefully chosen with a consistent motivation in mind. In stark contrast to *Hud*, the zoom appears at least ten times during the course of the film, most

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often as a convenient means of altering shot scale, with occasional 'shock zooms' (as in the Colonel's suicide – see Figure 24). The evidence indicates that 'appropriateness' was defined arbitrarily, depending on the circumstances surrounding shooting, and the nature of the relationship between director and cinematographer.

Not all advice published in *American Cinematographer* during the 1960s was sceptical about the zoom. One of the most significant articles on the subject (based on length, focus, and prominence) was written by Richard Moore – a cinematographer and "founder and executive vice president of Panavision for the first nine years of that company's existence" ("New Uses for..." 438) – and appeared in July 1965 under the headline "New Uses for Zoom Lenses". Moore painted an optimistic picture of the future of film and television cinematography, calling attention to "a wealth of new ideas and techniques with which to help recapture the theatre-going audience" (439) and advocating that "the cinematographer, as the most important man on any movie set, must be the leader in accepting these new ideas and techniques".[92] Making a case study of the zoom lens (of which he reports hearing "a distressing amount of adverse criticism […] from first cameramen down through film loaders"), Moore argues that:

> The zoom lens is a rather exotic piece of equipment, which must be
> understood to be used effectively. The most common complaint lodged
> against them is that zooms, in the hands of an unsophisticated director,
> are over-worked. Certainly, in the tv commercial field, the zoom effect is
> used to the point of being ridiculous […] But when used with discretion,
> a zoom shot can produce sensational effects. (439)

Moore makes the case for zooms of all speeds, from low-speed zooms combined with helicopter shots, to "medium speed zooms […] to gain an effect that no amount of dolly

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[92] Moore's enthusiasm for the zoom may have been somewhat connected to his company's commercial interests: Panavision had developed the Panazoom lens during the early 1960s, and the equipment was in competition with Angénieux and Pan Cinor models also on the market.

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track or cranes could produce" (439), to the "undeniably startling effect" produced by fast zooms. He dismisses concerns about changes in perspective caused by zoom shots, and reassures his audience about the resolving power of modern zoom lenses – drawing particular attention to the "remarkable degree of acutance" of Panavision and Angénieux zooms (439), which he describes as so sharp that:

> they can be left on the camera permanently and used as a lens with an infinite number of fixed focal lengths. The advantages of doing this are immediately apparent in terms of time and motion […] and for the assistant cameraman it eliminates the drudgery of continually changing one fixed focal length lens for another. (439)

As evidence for the versatility of the zoom, Moore cites the "countless tv commercials, a series of half-hour tv shows, and numerous features" (440) on which he has used it, giving a particularly detailed account of the zoom's utility as a substitute for a set of prime lenses during the production of *Operation CIA* (Christian Nyby, 1965):

> Fully 20 per cent of this picture was shot with the Arri and the Angenieux zoom, yet there are only three actual zoom shots in the entire film. I found that leaving the zoom lens on the camera at all times was of tremendous value since it facilitated grabbing shots that would otherwise be lost. With the zoom lens I could get just the right framing or image size with a simple turn of the wrist rather than shifting lenses or moving and re-leveling the camera.

Moore concludes his article with a plea to cinematographers unconvinced by the value of the zoom: "Don't close your mind to the zoom. It opens up terrific opportunities for exciting and dramatic photography, and anything that does that is worth the best effort on the part of any cinematographer" (441).

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This, however, was evidently not a position shared by all in the film industry. In a letter published in the next edition of *American Cinematographer*, Hal Mohr – ASC president from 1963 to 1965 – responded to Richard Moore's article:

> [He] has presented some very cogent and valid suggestions for extending the usefulness of zoom lenses, but I don't think that the zoom's inherent dangers can be dismissed with a simple 'So what?' For whenever focal lengths of lenses are changed at a fixed camera position, there will be a compression effect between the foreground subject and background […] This is particularly annoying in the case of definable background, such as a row of building columns, and it is more obvious to the viewer when done continuously with a zoom, than when the same thing is done with a series of cuts. Also, while the 3:1 zoom he mentions (25mm to 75mm) will usually be acceptable, far too often one yields to the temptation to run through the entire 10:1 range, often with disastrous results. (Mohr 491)

Indeed, despite Moore's optimism, the position by the mid-1960s is more accurately summed up in an article published the following year, which states:

> Since the advent of zoom lenses and the growing popularity of this important optical tool, there has been much controversy between cinematographers as to the advantages and disadvantages of zoom lenses, perspective-wise, as compared with conventional lenses. (Donohue "Focal Length and…" 500)

Donohue objects to the use of zoom lenses as a substitute for physical movement of the camera, suggesting that such a techniques reduces the 'fluidity' of cinematography:

> Zoom lenses, while extremely useful in certain situations and for specific effects, should not be used as a lazy man's substitute for dolly or trucking shots. When misused in this way the effect is much like that of progressively cropping in on a still picture and there is a certain sterile flatness to the result that the more dramatic cinematographer finds unaesthetic. In contrast, a dolly shot made with a not too extreme wide-

angle lens creates a constant shift of spatial relationships between the various elements in the scene as the camera moves past them – thus resulting in a "fluid" perspective which carries its own special impact. (500)

In common with the industrial debates highlighted throughout this study, the articles above reflect a range of attitudes towards the zoom. What is strongly apparent is flexibility of opinion, as demonstrated by James Wong Howe's changing attitude to the zoom, and by the willingness of *American Cinematographer*'s editors to publish Moore's lengthy advocacy of the zoom despite the evident disapproval of senior figures within the American Society of Cinematographers. This accords with Patrick Keating's contention that *American Cinematographer* did not "enforce convention by fiat" (4) and in this case it shows that the journal did not attempt to do so. Instead, it reflects a range of industrial activity, personal opinion, and commercial imperative. There are two commonplaces of aesthetic criticism of the zoom shot in the 1960s and 1970s: that they 'deny' a natural sense of perspective in films in which they are used; and that, as a further symptom of this effect, they present compositions which are 'mere' progressive magnifications or demagnifications. This may be part of the reason why, for a period during the mid-1960s, zoom shots remained generally limited to isolated uses within narratives which used more familiar cinematographic techniques. *Who's Afraid Of Virginia Woolf*, for example, follows this pattern – confining its use of the zoom to a few shocking or surprising moments, but otherwise restricting the camera to fixed focal lengths.

The films discussed by *American Cinematographer* use the zoom in a fairly limited way, but a wider range of creative uses for the zoom lens are exhibited in contemporaneous television texts. In 1965, the periodical again highlighted the role of

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zoom lenses in filming the *Bob Hope Christmas Show*, specifically identifying the manner of their use as substituting for camera movement. The show's director of photography, Alan Stensvold, wrote:

> [Angénieux] Zoom lenses give us complete photographic control of the subject matter, enabling the cameramen to change focal lengths instantly in order to ride with whatever may happen during a show. However, we don't actually zoom with our zoom lenses. You might more accurately say that we dolly with them. Whenever the performers move in a way to change the composition, we coast smoothly in and out lenswise to accommodate those moves and keep the composition trimmed. Our operators have become very adept at the use of the extremely versatile zoom lens. (Stensvold 112)

However, this description of the photographic practice on the 1965 *Bob Hope* tour is somewhat inaccurate. Aside from the meaninglessness of the claim that "we don't actually zoom with our zoom lenses", there are a number of zooms which have little motivation from on-stage action; furthermore, 'coasting smoothly in and out' is a generous assessment of the camera operators' technique, which manifests itself in numerous small, rapid zooms in and out, and quick pans and tilts.

A richer example of zoom technique in mid-1960s American television is the comedy-drama espionage series *I Spy*.[93] During the show's first season, *American Cinematographer* highlighted innovations in zoom motorization technology designed for the show:

> Electronic Zooms: In shooting 'I Spy' the number one rule is that no passers-by should know where the cameras is [sic] or, for that matter, that there is a camera filming at all. Since the sound man never leaves his location (within two to three blocks), the camera will interlock. One of

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[93] *I Spy*, starring Bill Cosby and Robert Culp, ran for three seasons (82 episodes) on NBC from 1965 to 1968.

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the major technological advancements in use is our electronic zooms
[sic]. We have taken our regular angular zoom lenses and built control
motors – one for the zoom, one for the focus, and one for the f-stop.
(Said 182)

As a result, it was explained, all three functions – focal length, focus, and exposure –
could be controlled by a single individual. As a result, Said claimed that camera
operators would be better able to compensate for actors who "fail to hit their marks
correctly" – with the added benefit that it would be unnecessary to consult other crew
members before doing so.

In addition to zoom shots made during location filming – which are sometimes
prominent to the point that they make the show look more like a travel documentary
than a comedy drama – *I Spy* contains a range of zoom shots similar to those found in
contemporaneous feature films. Early episodes are relatively restrained in their handling
of the zoom, but as the first season proceeds a more adventurous approach becomes
evident. The zoom is frequently used emphatically, and sometimes as part of a highly
literal point-glance construction of spatial relations. This can be seen in a sequence of
shots in the episode "Chrysanthemum" (6 October 1965), which show Scott's view of a
speedboat, beginning with a shot in which he literally points at the boat, followed by a
zoom to the boat itself, followed by a re-establishment of the trio, from a different angle
(see Figure 26). The pre-credit sequence of "Dragon's Teeth" (13 October 1965) reveals
the agents' targets, a couple dancing at a party, through an insistent, though somewhat
restrained, zoom (see Figure 27). As is frequently the case at the beginning of episodes
of *I Spy*, there is little clarity as to why Scott and Robinson are at a particular location,
and the mystery persists until the episode's target is revealed. That moment is
punctuated, in this episode, by a sharp zoom. The power of the fast zoom is again

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exploited in "Danny Was A Million Laughs" (27 October 1965), when it is again used to animate the point-glance relationship between Scott and a hidden object – in this case, an assassin hidden in a restaurant (see Figure 28).

However, the zoom does not dominate *I Spy*: some episodes, including "The Time Of The Knife" (3 November 1965), feature few or no zoom shots, preferring a combination of camera mobility and emphatic cuts to close-up. The concluding episode of the first season, "One Thousand Fine" (27 April 1966), contains just a few zooms. One transforms a long shot to a medium shot, and another creates a dramatic close-up of a poisonous snake (see Figure 29). Neither is similar to the 'snap' zooms which can be seen in earlier episodes. Episodes from later seasons show similar contrasts: "Mainly On The Plains" (22 February 1967) combines a series of gradual, less perceptible zooms during that episode's particularly languorous, oblique pre-credit sequence, but contrasts these with a number of faster and more extreme zooms later in the episode as the action intensifies. "Home To Judgement" (8 January 1968), from the middle of the final season (1967-8), demonstrates a repeated use of extremely high ratio zooms from the perspective of characters: in the first instances, zooms-in from Scott and Kelly's viewpoint; later in the episode, zooms-out from the perspective of the government agents who are hunting them. These zooms unfold at a moderate pace, being somewhat more emphatic than those seen during the concealed location of earlier episodes, yet considerably less intense than the snap zooms described above. Overall, while different episodes adopt different approaches, zoom shots remain a significant but not overwhelming or deterministic feature of the cinematography of *I Spy* throughout its three-season run.

By the late 1960s, zooms were increasingly described in accounts of the production of a high-profile productions, and were often used as the standard lens on a

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camera. In 1968 an *American Cinematographer* article about the filming of *Camelot* (Joshua Logan, 1967) remarked approvingly that "although the camera seems to move fluidly throughout the production, there are only four actual dolly shots in the entire roadshow-length film" (Lightman "Capturing On Film…" 30). Describing the shooting, Herb Lightman explained that:

> First up were the Forest sequences […] to be filmed in a man-made woodland glade […] It was a magnificent set – with only one serious drawback: there were no 'wild' trees. They were all more or less permanently anchored in the floor, leaving no place to lay dolly tracks. Here again Kline was forced to manipulate the zoom lens in lieu of genuine moving camera shots, but the method worked so well that he continued to use it throughout the filming – which accounts for the fact that there are only four genuine dolly shots in the entire picture. (33)

As in earlier years, the zoom remains a device whose use must be justified by personnel, but zoom shots and 'fluid' camerawork are no longer seen as mutually exclusive. By the late 1960s, creative personnel have developed more nuanced ways of discussing their use of zoom shots. The film's director of photography, Richard H. Kline reported to Lightman that:

> On almost every shot we made, with the exception of close-ups, there was some shift in image size called for and we were able to execute this smoothly with the zoom lens. I like using it this way as an 'adjustment' lens, rather than for shock value – as it is often mis-used. We never had to take out a wall and rarely even had to move a table, and we were able to loosen or tighten compositions without laying dolly tracks. Of course, the best usage of the zoom is in conjunction with the movement of actors in the scene. The adjustment of image size and the movement of players 'synchronize' – so to speak – so that the audience is unaware of the technique being used. (33; 48)

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Similar logic was applied to location shooting of *The Thomas Crown Affair* (Norman Jewison, 1968), where zoom lenses were used to film a scene in which the protagonists leave the bank they have raided. The director of photography, Haskell Wexler, explains how a camera:

> equipped with zoom lens, was located in a doorway across the street. With that camera we were able to get the movement of cars and people walking close to the camera in the foreground and, as the robbers came out of the bank, the operator was able to tighten the composition with his zoom – thus maintaining the feeling of the street, while concentrating interest on the action. ("The Boston Location…" 742)

Similarly, Leon Shamroy describes zoom shots in *Planet Of The Apes* (Franklin J. Schaffner, 1968) in terms of their concealment from the audience:

> Throughout the entire film Shamroy has utilized a simple, clean and direct style – with no obvious tricks to mar the realism of what is essentially an unreal subject. He used no special filters. He did use a 10-to-1 zoom lens in a few selected scenes, but he even has certain reservations about that often-convenient instrument.
>
> 'The zoom lens can come in handy now and then, but I'm getting a bit tired of zoom lenses because I feel they're over-used,' he comments. 'Some directors consider the zoom lens to be just another toy, and they use it that way. It can sometimes speed things up if you use it as a variable focal-length lens, instead of for actual zooming – but, generally speaking, zoom lenses have shallower depth-of-field and are not as sharp as fixed focal-length lenses. A zoom lens, smoothly operated, can simulate camera movement to a certain extent, but it will not take the place of a dolly, because the effects on perspective are quite different'. (Lightman "Filming *Planet Of…*" 277)

Edward Dmytryk expresses a similar view in the course of an extensive interview about his relationship with various directors. Dmytryk said:

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> I wish we'd had the zoom lens a long time ago, actually. I consider it an extremely effective piece of equipment. However, I believe it should probably be used very infrequently. People are going 'zoom lens-happy' as they always do with any new technique, and it's kind of silly. I've used it in the last few years in several ways. For instance, while shooting on *Mirage* in New York, I wanted to get what amounted to a dolly shot following Gregory Peck across one of the busy streets of Manhattan. Well, I couldn't actually lay a dolly track across the street. We couldn't clear it for our purposes, except for the normal traffic, long enough to shoot, but we couldn't lay a dolly track across it. But I was able – and here, of course, the operator becomes tremendously important – I was able to get such a smooth pull-back with the zoom lens on Greg Peck crossing the street that it actually looked as though we were dollying right across the street with him.

Dymtryk describes the crew's priorities in concealing the use of the zoom shot, and differentiates this mode of use from other more 'dramatic' zooms which appear in the film.

> Since his image remained constant you weren't really aware of the difference in perspective as far as the background was concerned, which is, of course, the difference between a zoom and a dolly shot. Then when we got to the other side of the street, we were able to pan with him and follow him down the street. It made a very effective shot which I couldn't have got in any other way, except by putting my camera on wheels. That's one valid usage. Another has to do with the fact that we often dolly up close to a face for dramatic effect. A zoom lens can do such a shot better, more effectively and more easily than can be done on a dolly. However, I don't think you could use the zoom to really good advantage more than five or six times in the average feature. (Lightman "The Director-Cameraman…" 364-5)

Dymtrk adds that when filming *Anzio*, the zoom was used dynamically 'perhaps eight or ten times' – and was used just as often as a substitute for prime lenses.

These three films present a strong example of the way in which industrial descriptions of the application of the zoom sometimes diverge from the evidence of the films themselves. Kline, Wexler, Shamroy and Dymytrk all emphasise the continuity, appropriateness and the concealed nature of the zoom in the films which they work on. Yet examination of these films shows that zoom shots were also used in a manner which creates an optical effect obviously different from that created by camera movement. *Camelot* includes some quite abrupt zooms which – through they coincide with camera or actor movement – are made *more* noticeable through this coincidence. An early scene in which Arthur (Richard Harris) jumps off a tree is a case in point (see Figure 30), as are some of the zooms in the May Day dancing scene, and the extreme zoom towards Lancelot (Franco Nero) on his first introduction (see Figure 31). The *Thomas Crown Affair* includes scenes in which the zoom does more than simply 'tighten the composition', but radically alters the space depicted by the camera. A shot of a police interrogation room begins with a close-up on the face of a witness wearing a green dress, before zooming back to reveal progressively more of her surroundings, placing her on an intermediate image plane, and finally – in conjunction with a tilt and pan – decentring and marginalizing her (see Figure 32). The zoom is similarly handled in *Mirage*: the dolly substitute which Dymytrk describes is present (though perhaps not as smoothly executed as he would wish his colleagues believe), but so are a number of sharp, high ratio, emphatic zooms at a number of key points during the narrative. While Dymytrk desires, perhaps, to stress the skill with which he accomplished the difficult task of integrating the zoom into his camerawork, its latter appearances are far more significant to the overall style of the film. The substitute zoom serves the needs of the mobile frame; the later zooms connect with the troubled mind of David Stillwell (Gregory Peck), the apparently-hallucinating protagonist, in a manner similar to that

seen in some of the earlier television programmes detailed above. But it is in *Planet Of The Apes* that the most substantial difference between the cinematographer's account and the final film can be found. Shamroy claims 'reservations' about the zoom and complains of its overuse. The article which reports these views describes 'a few selected scenes' in which the zoom is used. Yet *Planet Of The Apes* contains numerous prominent zoom shots. It opens on a zoom shot and closes on a series of zoom shots. As the narrative progresses, zooms appear in the service of a variety of effects: to articulate shock (the discovery that Stewart has died during the voyage), to introduce new characters (the entrance of Dr Zaius), to adopt the perspective of other characters (Zira's viewpoint as Taylor shaves his beard), and for less 'motivated' reframings such as the zoom towards the plant, and the repeated zooms towards trees during the initial chase scenes (see Figure 32, Figure 33, Figure 34).

The evidence here indicates that a broader, more active market for zoom lenses and associated technologies led to more creative uses of the technology during the 1960s. Television continued to be a proving ground for new techniques, but there was an evident conflict between those who wished to adopt the zoom more comprehensively, and those who felt that it was contrary to traditional forms of visual storytelling. While the industry made extensive and creative use of zoom shots, its personnel generally discussed the technique in disapproving terms – as evidenced by the frequency with which words and concepts such as 'misused', 'overused', and 'zoom-happy' appear – balanced against notions of restraint, justification, and professionalism. There is no evidence for an industrial push towards using the zoom in a particular way: Moore's "New Uses…" is unique in the strength of its advocation, and its author was not sufficiently senior to have caused a step change in industrial attitudes. Industrial discourse alone only partly reflects industrial practice, but when taken together with the

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film and television texts themselves, the conflict between dominant practice and innovative/disruptive technology and technique becomes clear. Writings on the zoom during the late 1950s and 1960s were, it would seem, symptomatic of stylistic change made possible by technological innovation, and by the perennially complex series of professional circles in which Hollywood cinema operated during the 1960s. The next chapter discusses how, against this backdrop, TV Generation directors developed their own ways of integrating zoom shots into their work.

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**Figures: Chapter 9**
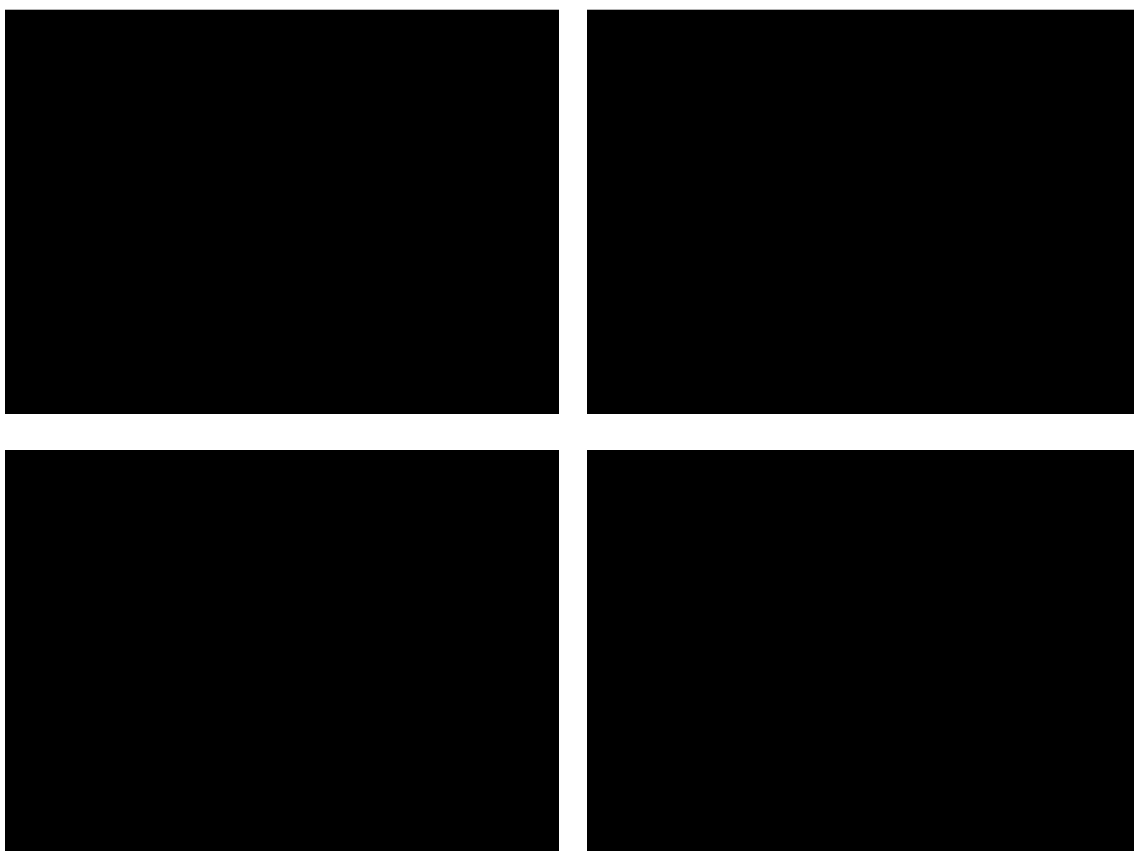
**Figure 16:** *Bob Hope Christmas Tour* – 'Heckler'

**Figure 17:** *Odds Against Tomorrow* – Cash Delivery

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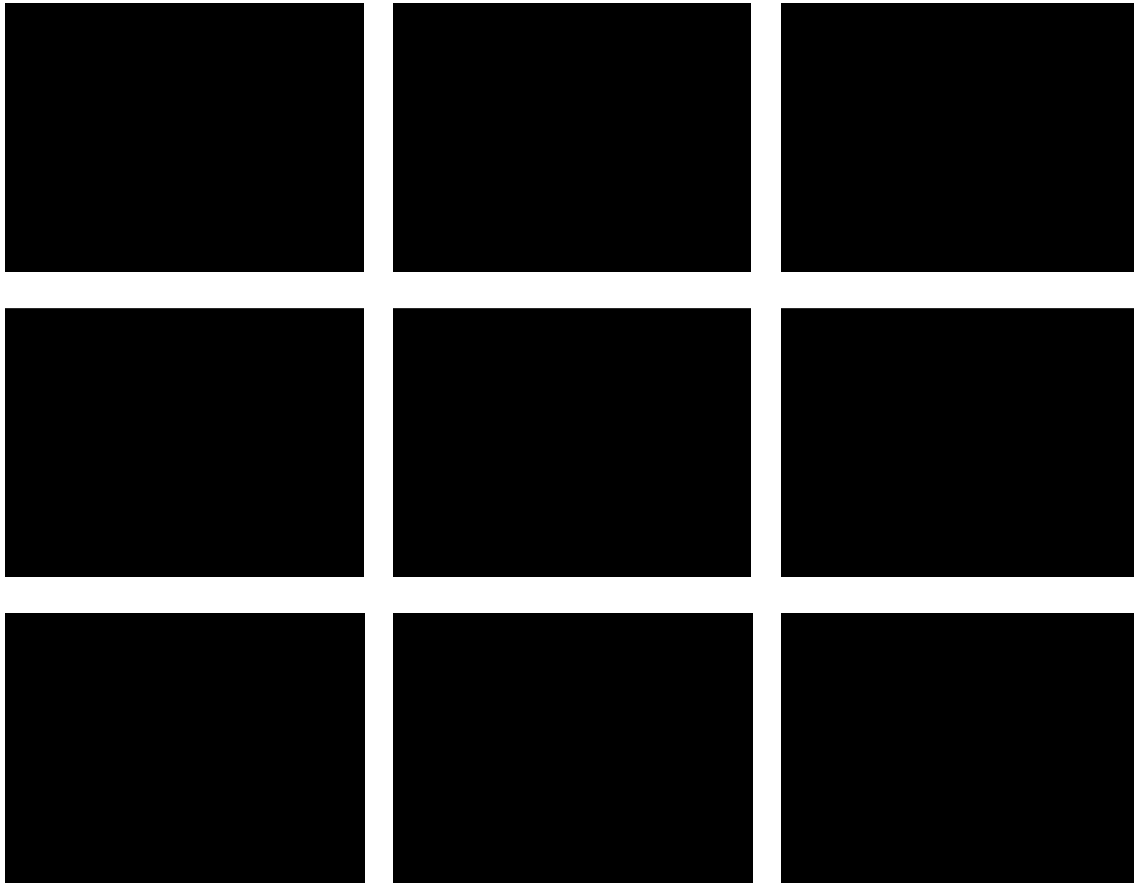
**Figure 18:** *Odds Against Tomorrow* – Point-Glance Zooms
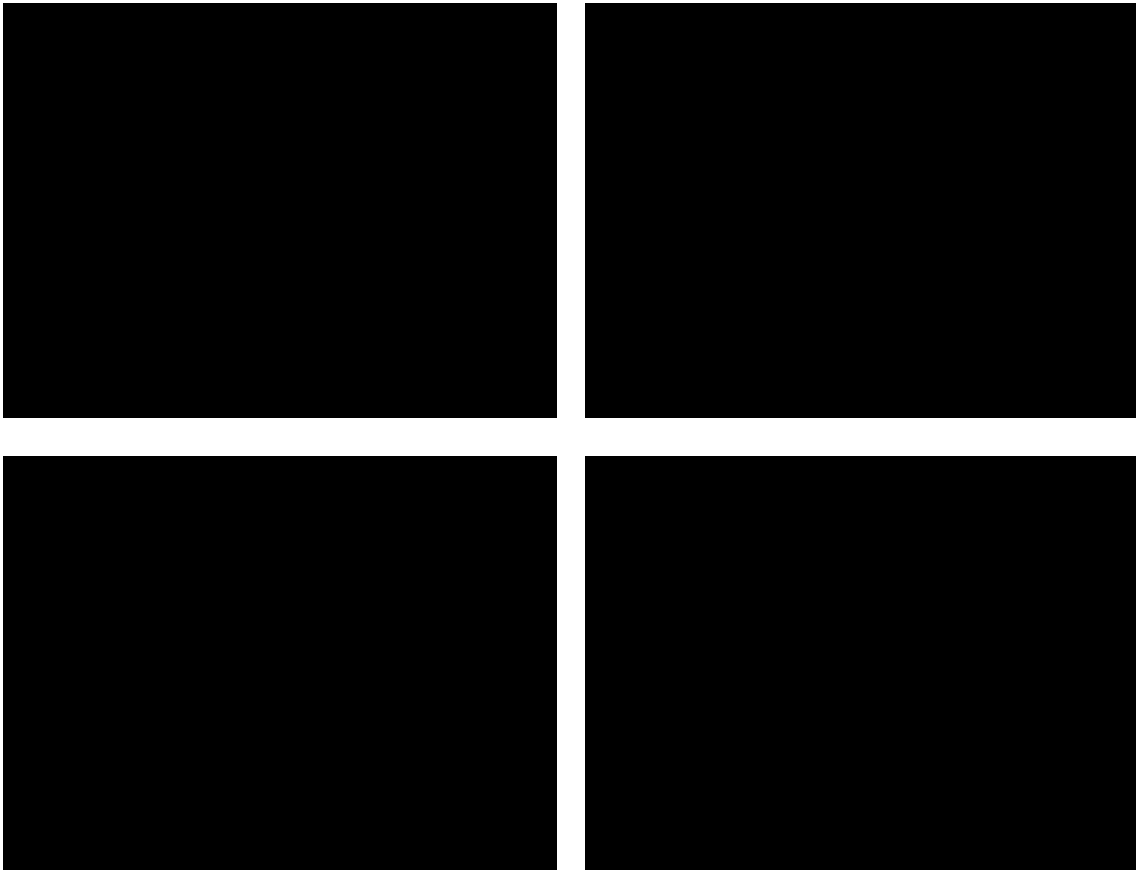
**Figure 19:** *Odds Against Tomorrow* – Shock Zooms

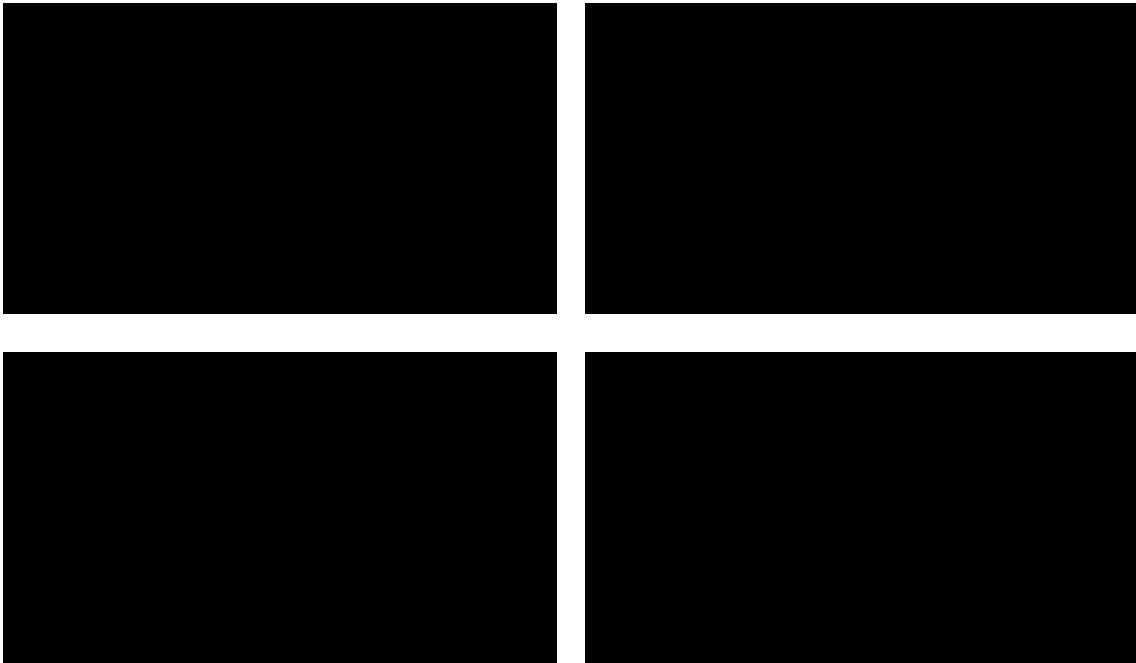**Figure 20:** *Studs Lonigan* – Pool Shot

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**Figure 21:** *Hell To Eternity* – Dying Soldier

**Figure 22:** *Hell To Eternity* – Prisoners of War

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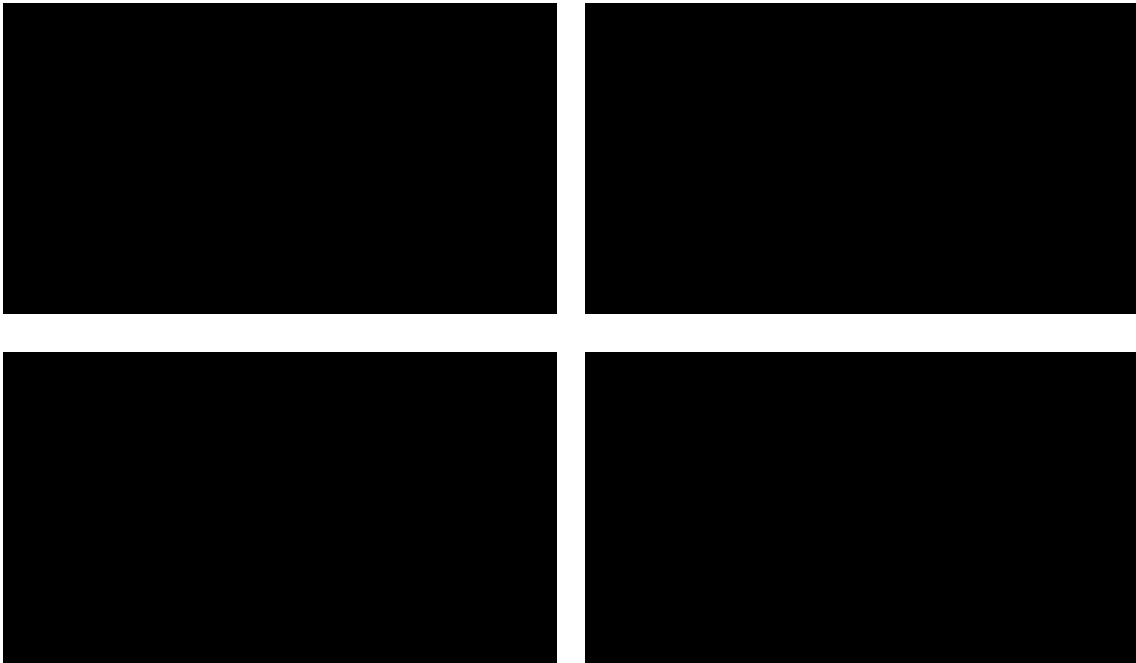
**Figure 23:** *Experiment In Terror* – Rear View
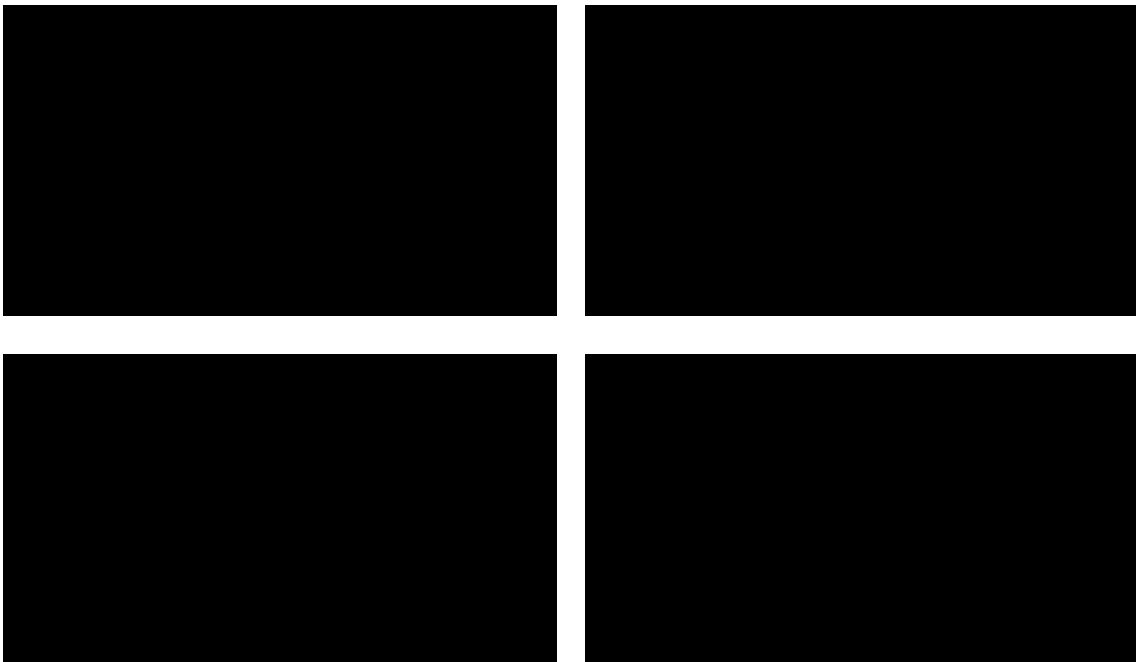
**Figure 24:** *The Outrage* – Colonel's Suicide

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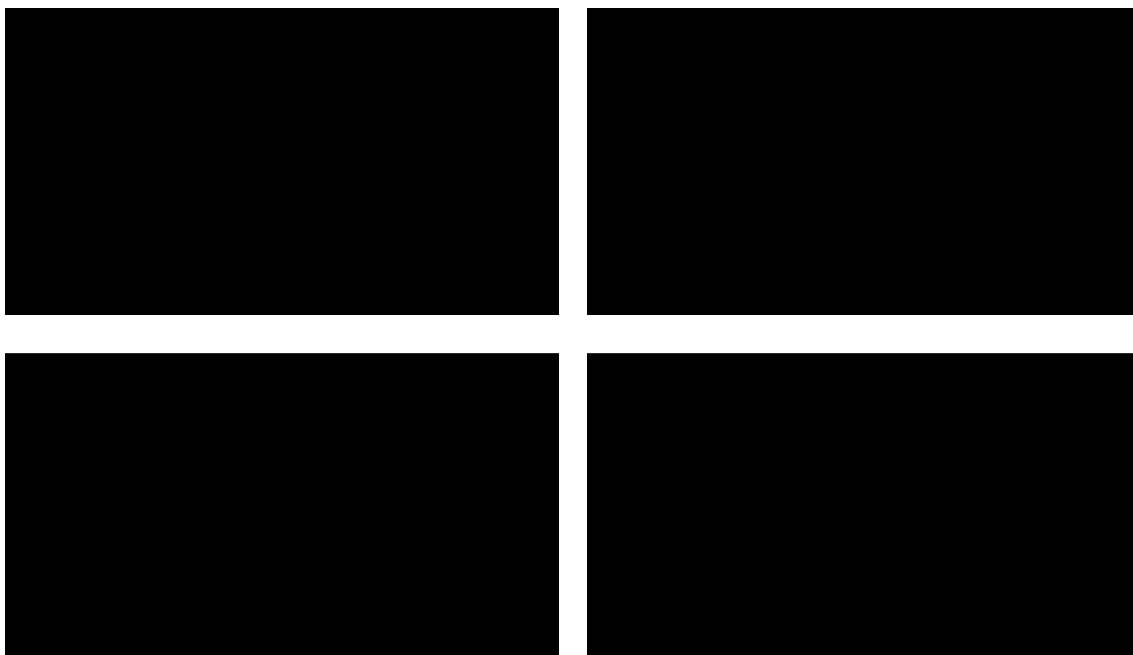
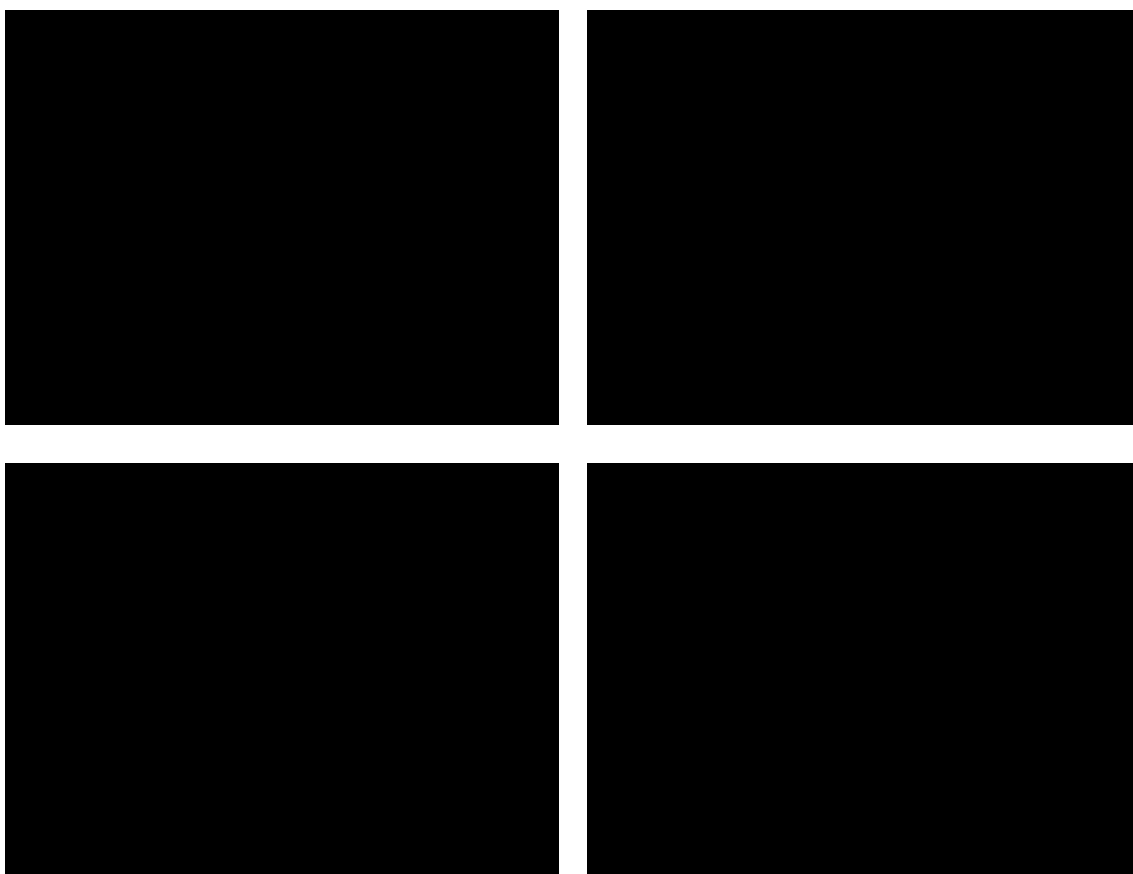**Figure 25:** *Fail Safe* – Russia-bound

**Figure 26:** *I Spy* "Chrysanthemum" – Speedboat Getaway

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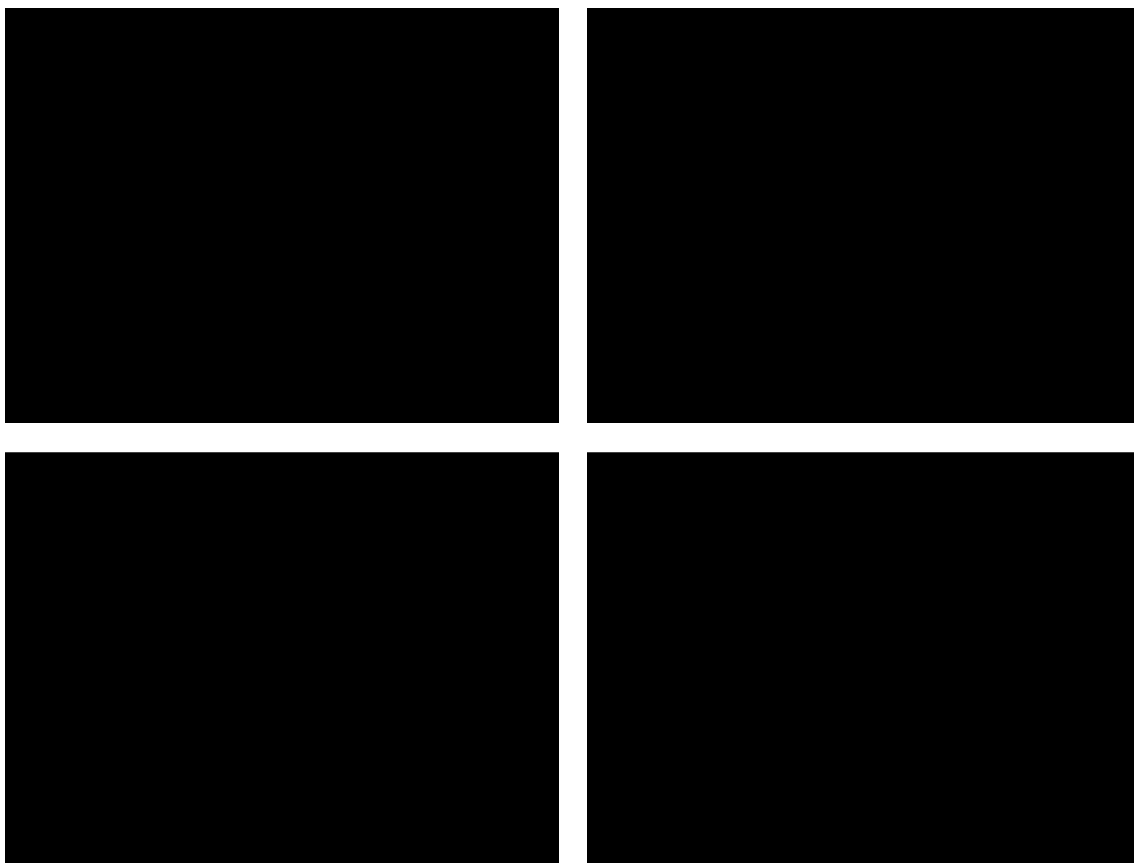**Figure 27:** *I Spy* "Dragon's Teeth" – That's Your Assignment

**Figure 28:** *I Spy* "Danny Was A Million Laughs" – Trouble, Eleven O'clock

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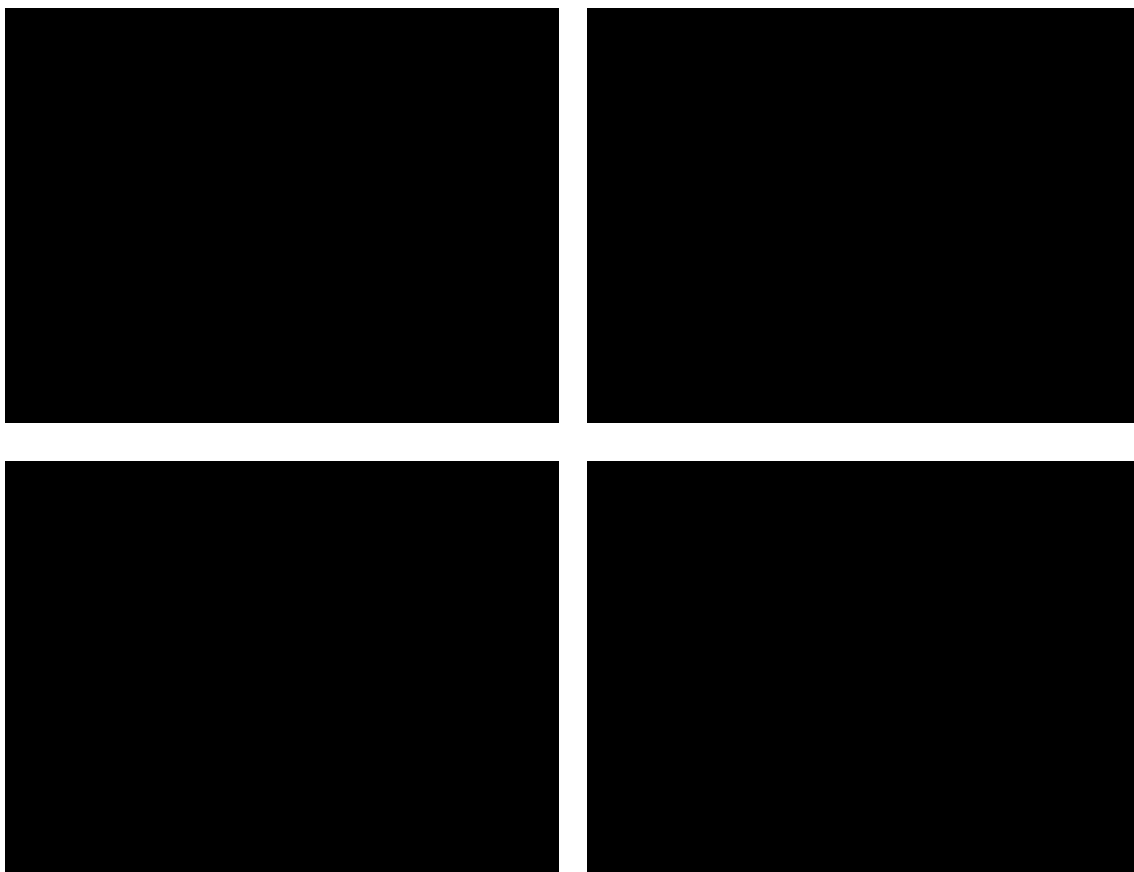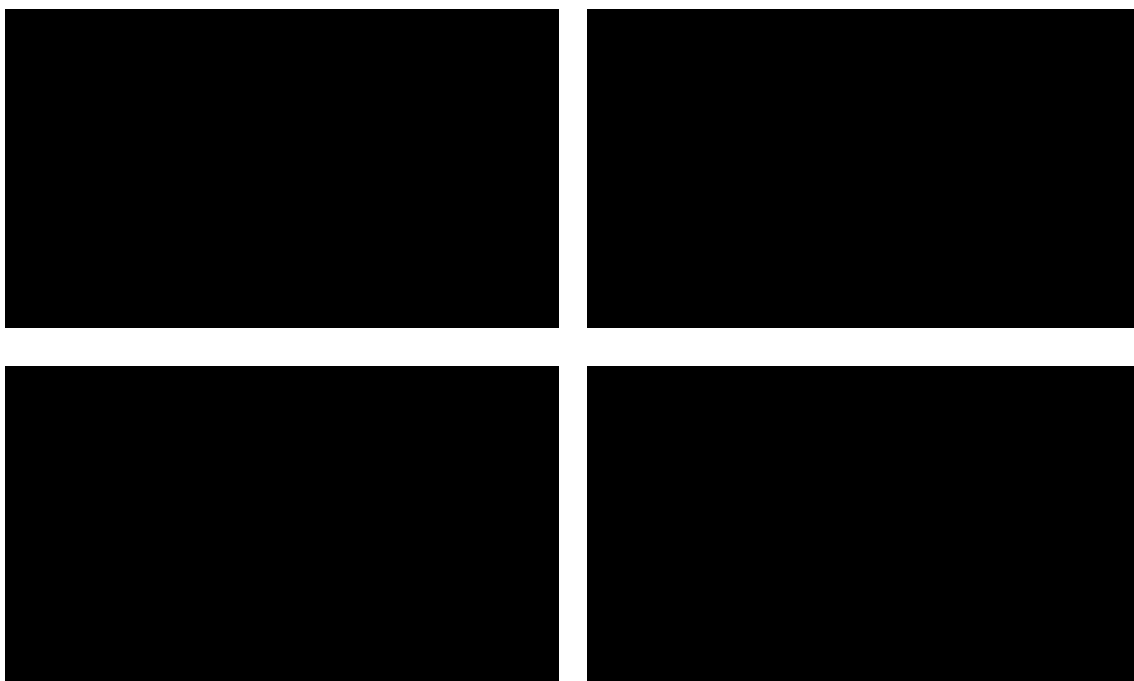
**Figure 29:** *I Spy* "1000 Fine" – Bathing Platform; Poisonous Snake

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**Figure 30:** *Camelot* – Arthur Sings

**Figure 31:** *Camelot* – Lancelot du Lac

**Figure 32:** *The Thomas Crown Affair* – Interview Room

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**Figure 33:** *Planet Of The Apes* – Stewart, Dead

**Figure 34:** *Planet Of The Apes* – Dr Zaius

**Figure 35:** *Planet Of The Apes* – Taylor Shaves

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## 10. TV Generation II: The Zoom in Feature Drama

During the 1960s, Hollywood directors and cinematographers used the zoom in diverse ways across a wide range of films and television productions. Their experimentation was encouraged by the maturing market for the zoom lens. After Zoomar's early domination, during the 1950s Berthiot, Angénieux and Panavision lenses also became available. Other factors influenced the growth of the zoom shot – especially the rise in location and synchronised sound shooting – while colour filming and filming on non-standard film stocks may have militated to an extent against the zoom lens. At the same time, some of the directors who later became known as the 'TV Generation' began to work in feature film production. As discussed in the literature review above, critics and historians have argued that they transplanted to the film industry techniques first developed in television, causing a change in film style. It has been suggested that the zoom is among the techniques which were transplanted in this way.

This theory is important because it has frequently been used as part of a longer and broader narrative about the development of postwar American visual culture.

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Buckland, contextualising the work of Steven Spielberg, argues for a complex

landscape of influences upon the filmmaking of the period between the mid-1960s and

1975, encompassing European 'New Wave' art cinemas, the New York school of

filmmaking, and technological developments relating to handheld filming. But foremost

in his account of the period is the observation that "a number of directors […]

exchanged TV directing for Hollywood feature filmmaking in the 1960s and, by doing

so, transformed its aesthetics and working practices" (10). In the case of the zoom shot,

critical claims for such stylistic continuity have been made without reference to

supporting textual evidence. This chapter analyses the film work of four of the TV

Generation directors discussed above.[94] The claim that television influenced film during

the 1960s is not in question. The analysis below reveals an aspect of how this influence

exerted itself. While confirming that TV Generation directors used the zoom in their

film work, the evidence suggests a lack of continuity between their work in television

and their work in feature films, and further emphasises the heterogeneity of the 'TV

Generation'.

**Robert Mulligan and John Frankenheimer**

Like John Frankenheimer, Robert Mulligan appears to have used the zoom lens in a

very limited fashion when directing television drama. This cautious approach continued

in his early film career, and as a result discussion here of his film work is brief. No

obvious zoom shots can be seen in *Fear Strikes Out* (1957), *The Rat Race* (1960), *Come*

*September* (1961), or *The Spiral Road* (1962). When zooms do appear, they are most

often isolated. The first unambiguous zoom shot in a Mulligan film appears in *To Kill A*

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[94] This analysis has not been significantly hampered by problems of availability. A full table of the films
viewed can be found at Appendix 1.

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*Mockingbird* (1963). It is the only such shot in the film: a rapid, sharp zoom onto the face of Nathan Radley (see Figure 36). The zoom is executed, *Vertigo*-style, in parallel with camera movement in the opposite direction, though it is too fast for the discomfiting impression usually attributed to this effect to have any substantial impact.[95] In *Love With The Proper Stranger* (1963), a zoom shot taken from a rooftop closes in on a shop at the beginning of the film's second act, while the film concludes with a zoom out from the same position. In *Baby The Rain Must Fall* (1965), a dynamic zoom highlights the apprehension felt by Henry Thomas (Steve McQueen) as he investigates Miss Kate's (Georgia Simmons) bedroom. A few subtle zooms appear in *Inside Daisy Clover* (1965): once as Daisy (Natalie Wood), standing on a pier, takes a cigarette from her waistband, and again during an establishing shot of a yacht belonging to Wade Lewis (Robert Redford). It may be the case that Mulligan also used the zoom to create a transition which appears as a jump cut in the final edit: a sudden movement closer to a newspaper which features Daisy Clover on the front cover. Whether the zoom lens was used to achieve the change of focal length necessary for the jump cut, or the jump cut was used to disguise a zoom, cannot be determined. In *Up The Down Staircase* (1967), a zoom shot smooths the transition from opening credits (composed of assorted 'wild' shots of the streets of New York City) to the theatrical photography of the film proper, zooming in upon two characters who appear in the film which follows. Zooms can occasionally be seen as the film proceeds, but they are somewhat lost amongst the general movement of handheld camera. In common with Pollack, Mulligan's most adventurous use of the zoom lens does not come until the end of the

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[95] In *Cinema Stylists* Belton appears to suggest *To Kill A Mockingbird* opens with a shot which includes a zoom (106). There may be an element of zoom to this shot, but it is very difficult to discern.

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1960s with *The Stalking Moon* (1968), which contains numerous zooms, particularly in exterior action shots in which characters are on horseback.

In terms of adoption of the zoom shot Mulligan's approach is most similar to Frankenheimer's. However, although initially as cautious about the zoom lens as Mulligan, Frankenheimer deployed the technique sooner, and in more innovative and visually interesting ways, as the 1960s progressed. Frankenheimer's first feature production, *The Young Stranger* (1957), was made in the midst of his early television career. Frankenheimer later complained that he been unable to meet his full potential in the production of this film, because a veteran crew had been unwilling to accept his ideas about style (Moskowitz 129; Higham 92). No dynamic zoom shots can be identified in the film. However, this appears consistent with Frankenheimer's television production practice at the time. As detailed above, while wide angle compositions are a feature of his television episodes in the second half of the 1950s, his use of the zoom was extremely reserved. Over the following ten years, Frankenheimer's adoption of the zoom lens was gradual and tentative, but by *The Gypsy Moths* (1969) he was using the technique in a manner unrecognisable from his television career. Despite this, he did not embrace the zoom lens in the manner of Altman or of early 1970s television. The application of the zoom shot at this point in Frankenheimer's career is more suggestive of a gradual organic development in style than of a sudden affectation, and there is little evidence to support the assertion that Frankenheimer imported tried-and-tested zoom techniques from television to feature films.

Frankenheimer's approach to the zoom begins in a fashion similar to his work in television. In his second feature, *The Young Savages* (1961), the zoom lens is used to adjust the framing of a sequence of images seen through binoculars. As in "Eloise", this is a solitary use of the zoom shot: the film is otherwise limited to shots of static focal

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length. Frankenheimer is little more adventurous in *All Fall Down* (1962), in which the

zoom appears twice, purely for framing reasons during a brief bowling alley sequence.

It is also possible that a zoom lens was used as a substitute for prime lenses during the

production of the film: this is suggested by a series of jump cuts in which Beatty's

position in relation to the background set remains almost constant (see Figure 37).

*Birdman Of Alcatraz* (1962) continues the limited approach, adopting the zoom on a

few occasions to obtain close-ups of the protagonist's birds (Lightman "Birdman of

Alcatraz" 355), but otherwise avoiding the technique. It is not until *The Manchurian

Candidate* (1962) that dynamic zoom shots begin to make meaningful and more

frequent appearances.

In *The Manchurian Candidate*, zoom shots take a form not noted in

Frankenheimer's earlier television work, and in the films which follow they are used in

increasingly adventurous ways. The first zooms in the film, a pair of high-ratio but

moderately-paced zooms onto the faces of wounded soldiers as they are being loaded

onto military helicopters, are straightforward emphases of pro-filmic significance.

However, Frankenheimer subsequently zooms twice to reflect the perception of

characters: once onto the face of Bennett Marco (Frank Sinatra) when he appears at the

door in search of Chunjin (Henry Silver), and again repeatedly from the perspective of

military officers as they attempt to prevent the climactic shooting in the convention hall.

The frequency and nature of the zoom shot in this film represents a subtle but

significant departure from Frankenheimer's earlier practise. It is, apparently, his first

use of the technique to represent the interior thoughts or perceptions of a character.

*Seven Days In May* (1964) adopts a similar approach to *The Manchurian

Candidate* in its use of the zoom to simulate television footage and other forms of intra-

diegetic actuality – including, for example, surveillance footage of President Lyman

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(Fredric March) at his lake retreat. However, *Seven Days* is not stylistically identical to

its precursor, as it is here that Frankenheimer first adopts the technique of zooming to

'tag' significant people and items. Frankenheimer zooms twice onto the licence plate of

a car carrying General Scott (Burt Lancaster), onto a note regarding the economy, and

onto a cigarette case. The identification of significant props and moments via the zoom

is repeated in *The Train* (1964), which features repeated zooms onto coins later used to

block the oil pipe of a locomotive, and subsequently onto timepieces to emphasise the

'ticking clock' narrative device used to create tension during an early sequence.[96]

*Seconds* (1966), which has been retrospectively identified as forming a 'paranoid

trilogy' with *The Manchurian Candidate* and *Seven Days In May*, shows a further

gradual progression in Frankenheimer's adoption of the zoom shot. "Tagging' zooms

remain in evidence (for example, to the base of a tennis trophy on which the phrase

'Fidelis Eternis' is inscribed, and onto a significant newspaper report), but they are

joined by frenetically-edited scenes of a wild naked party and are punctuated by rapid

zooms, which are further intensified by cutting close to (whether before or after) the

zoom shots. This technique departs from Frankenheimer's previous practices, but is

similar to applications by other TV generation directors working at the same time – it

also appears in festival scenes in *What Did You Do In The War, Daddy?* (Blake

Edwards, 1966) and party scenes in Pollack's *The Slender Thread* (discussed below).

'Tagging zooms', in the sense that they are used in *The Train, Seconds* and

*Seven Days In May*, are absent from *The Gypsy Moths*, but psychologically-motivated

zooms make brief appearances. They reflect the mounting concern of Mike Rettig (Burt

Lancaster) as he notes blustery conditions prior to his parachuting display, and later,

spectators' shock as he plummets to his death. At least part of the purpose of the former

[96] This sequence is discussed in greater detail in Hall (56-63).

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series of zooms is to suggest that Rettig may be in some peril. These zooms, like those used during the 'naked dancing' sequence in *Seconds*, are punctuated by rapid cuts between Lancaster's stolid face, and increasingly wild panning/zooming shots of the audience and a fluttering windsock (see Figure 38). The sequence mixes overt intra-shot dynamic zooms with Rettig's gradually increasing scale in the frame. Bingham describes the sequence as follows:

> In a montage of thirteen shots in all, Browdy talks while Rettig, expressionless, looks. He sees the stands begin to fill with spectators. Back to Rettig, as a slow zoom begins to move in on him. His head turns slightly, as does the camera from his point of view; he sees people stroll in from their cars. Zoom in closer; another head/camera turn, more aimless this time, toward the crowd. Closer in to him; faster, a moving point-of-view shot, even more aimless than before. Return to Rettig, back to the camera movement, as we are in the point of view of a man whose eyes are shifting, whose mind is wandering. Back to him; as we come closer, his own point of view becomes more erratic: a rapid zoom to a windsock. Back to Rettig, still closer. Now a shot of the loudspeaker. Finally, we hold on the shot of Rettig looking off, while Browdy and the children have completed their entire action, which is an instruction of how to help the divers recollect their chutes when they are back on the ground. The real story, however, is Lancaster, and it plays as a series of French New Wave—style jump cuts of him, broken up by a succession of shots that in effect stare off into space. (225-6)

It is important to note, as Bingham does, the pacing of this brief sequence of shots: 13 cuts between Rettig and his point-of-view in approximately 20 seconds, and the frequency of cutting intensifies as the sequence progress.[97] The result is an arresting sequence out of keeping with the visual style of the rest of the film, which ties the zoom

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[97] In addition to these dramatic zooms, in *The Gypsy Moths*, Frankenheimer also uses the zoom to adjust framing during scenes set in parachute team's aircraft.

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shot firmly to Rettig's concerns about the risks associated with parachute jumping.

Having established this connection, Frankenheimer exploits the zoom at subsequent

moments of crisis. After a series of successful jumps, Rettig's attempt to make a descent

whilst wearing a complicated wingsuit ends in failure, and Frankenheimer uses a series

of sharp zooms onto horrified spectators as Rettig freefalls onto the grass in front of

them. This technique is further repeated as his colleague Malcolm Webson (Scott

Wilson) hesitates before unfurling his parachute during the subsequent memorial

display.

The similarity between Mulligan and Frankenheimer's television work evidently

continued into their feature films during the 1960s. Although Frankenheimer uses the

zoom much earlier than Mulligan, they both generally reserve the device for occasional

usage, reflecting specific narrative priorities. While Frankenheimer uses the zoom more

often as the 1960s progress, like Mulligan he never uses the zoom as a scene-structuring

tool, and rarely uses it to substitute for camera movement. The work of Pollack and

Altman, by contrast, shows more comprehensive and complex explorations of the

potential of the zoom.

**Sydney Pollack**

Pollack's feature career began in the mid-1960s, several years after Mulligan and

Frankenheimer. Unlike those directors, Pollack's work contains numerous zoom shots,

and there is little coherence in their use from one film to the next. However, by the end

of the decade, Pollack uses the zoom in a manner typical of that seen in mid-late 1960s

cinema. In *This Property Is Condemned* (1966) and *They Shoot Horses, Don't They?*

(1969) Pollack zooms in a calculated and thoughtful manner to express the internal

thought processes of subjects; however, and in common with the majority of

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Frankenheimer's work throughout the decade, zooms also appear frequently in fulfilment of a wide range of functions: occasionally standing in for camera movement, sometimes evoking shock, and sometimes intensifying the pace of a sequence.

In Pollack's first feature *The Slender Thread* (1965), which concerns the hunt for a suicidal woman (Inga Dyson, played by Anne Bancroft) after she calls a telephone hotline manned by a volunteer (Alan Newell, played by Sydney Poitier), zooms are most frequent in the opening titles and during the film as action becomes more frenetic. Particularly striking are a wild series of fast zooms during a nightclub scene, matching the brash drum-and-electric-guitar soundtrack and enthusiastic whooping of the crowd. Zooms also appear during a search sequence, purely to flag significant material to the audience, and again for the same reason when a character's attention is drawn to a newspaper headline. In common with examples from his television work, Pollack also uses the zoom to reflect the perception and/or location of Inga Dyson, who while contemplating suicide on a beach is emotionally affected by the discovery of a small sandcastle. The camera zooms to the sandcastle when she first spots it (see Figure 39), before following Dyson to the sandcastle, where she falls on her knees and empties a bottle of alcoholic drink over it. Later, a long zoom shows Dyson standing on a dockside as, in voiceover, she describes how she "even tried to get arrested, but everyone looked the other way". The zoom closes in on an isolated Dyson, but cinematography and context conspire to prevent the audience from feeling in any way closer to her (see Figure 40). Though Dyson seems close, and we are not 'looking the other way' as 'everyone' did, the distancing quality of the telephoto zoom means that even in looking closely at her, we are unable to maintain any sense of proximity.

Pollack's approach to the zoom is somewhat different, and at its most interesting and complex, in *This Property Is Condemned*. Here, zooms contribute significantly to

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the retrospective mood of the film. That the story is told in the past tense is clear from the outset: the narrative begins with a meeting between Willie Starr (Mary Badham) and a young boy, Tom (Jon Provost) during which Willie begins to recount the film's main narrative. But the retrospection is more organised, and inheres more deeply, than in this simple expository device. It can be seen in the opening scene in the form of Willie's dress and jewellery – an ill-fitting, poorly maintained red dress which she declares 'belonged to her sister', and it further emerges when Willie's sister Alva (Natalie Wood) visits the cinema with Owen Legate (Robert Redford), where they watch *One Way Passage* (Tay Garnett, 1932). As the pair leave the cinema, they discuss the film, and though framed as a reminiscence of the show, the narrative purpose of the conversation is to prefigure Alva's death, which the audience (and perhaps Alva herself) must already know is a potential resolution to the narrative:

| | |
|---|---|
| Owen | Cry-baby. |
| Alva | But it was, so sad. You know, sometimes when I see a sad movie, I want to see the end again, just hoping it'll come out better the second time. |
| Owen | No use. No matter how many times they show it, she dies in the end. |
| Alva | Wouldn't it be wonderful if she didn't? I mean, what if you went to see it again, and the end was totally different? I mean like, if folks did like her, and she didn't die? |
| Owen | Think how unhappy you'd be, though. You couldn't cry in the end. |

In the final scene, Willie also recalls the film – though she does not mention the title – and compares the manner of Alva's death to that which she saw in the film. Retrospection is therefore a key device, and as a result it is notable that Pollack's most

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significant uses of the zoom in this film animate moments which reinforce or re-inscribe the sense of retrospective telling.[98]

The zoom first appears in this manner about four minutes into the film. After the opening credits and expository dialogue between Willie and Tom, in which Willie explains her personal circumstances and those of her absent sister Alva, the film cuts to a shot of the pair sitting on the railroad track. Willie gestures toward a derelict building in the distance and says: "Boy, you see that house over yonder? We used to have some high old times in that big yellow house." As she delivers this line, the zoom advances, first retaining its focus on the characters in the foreground, before refocusing to make legible a broken sign reading 'ROOMS' (see Figure 41). This is followed by a lap dissolve into shots of the house filmed at closer range, while Willie continues: "Musical instruments going all the time, piano, Victrola, Hawaiian steel guitar, everybody playin' on something. It's awful quiet now, though." The camera investigates the shuttered windows, and finds a poster which reads: 'This Property Is Condemned'. After another cut, and while Willie describes how she now lives alone in the house, the camera moves inside, finally zooming (at a more moderate pace than the initial zoom) through a broken screen door, back towards Willie and Tom on the railroad track. A further cut returns to the initial position close to the pair, and Willie's dialogue completes the transition to the present: "Sure is empty now, though."

This sequence forces a series of disorienting changes of position and perspective. During the second zoom, which returns to Willie and Tom, the camera moves from extreme long shot to long shot (through a zoom), then cuts to a further low-

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[98] The sole exception to this is during a confrontation between Alva and Legate. Other moments of particular drama are reinforced by camera movement: when Alva's mother remarks 'she and JJ got married', Alva's shock is shown through a rapid track-in, not a zoom.

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angle long shot and to a level-angle medium shot. This mirrors the series of shots which

take place after the first zoom, which initially moves the perspective from a frontal

medium shot of the house to a closer, oblique shot. This may disrupt the scene's spatial

continuity – still delicate because the film is only minutes into its running time – but the

pay-off is the establishment of the zoom as a clear visual motif for retrospection.

Pollack returns to this motif occasionally as the film progresses. When Alva finally

leaves Dodson, she sees through a train carriage window the house which the audience

first encountered in the opening scene. Her lingering glance is emphasised through a

zoom-in, and as in the opening scene it is a zoom of sufficient ratio to transform the

rough shape of *a* house into a clear vision of *the* house around which the narrative is

based. Like the earlier zoom, this one makes legible the (intact) sign advertising rooms

to let. The house is maintained in this zoomed-in view until it disappears behind the

window frame, and we cut back to see Alva, who looks back, troubled: we are invited to

infer that Alva is considering her past in Dodson. The next cut – to an exterior of the

train, via a transitional shot of the railway track – is accompanied by a change of pace,

both musical (up tempo, and the increased volume of the clattering railroad) and visual

(a static shot of Alva is replaced initially with a shot of the track racing past). Yet

Alva's attitude is unchanged: in the next shot we see her looking with furrowed brow

out of the window, and the gradual zooming out of a helicopter shot reveals that the

train has travelled to a dramatically different location – away from dry, dusty Dodson to

the Mississippi coast. This zoom, somewhat like that which returned to Willie and Tom

in the opening sequence, removes us from Alva's retro/introspection and begins to

indicate the context of the scene that is to follow.[99]

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[99] Salt misidentifies these shots as forming the film's opening sequence (1992, 258).

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The zoom is called upon for the final time during the closing scene, where it is one device among others (track, 'crane' and helicopter) which removes the camera from the action and signals the conclusion of the narrative. Here again the zoom is part of a mixture of techniques which denote retrospection. The concluding conversation restates Alva's demise, contrasting it with that in *Love Me Tonight*. Willie, finally, predicts:

> I'm gonna live for a long, long time. Like my sister. When my lungs get affected [*sic*], I'm gonna die like she did, with all my rings, my gold charm bracelet from Marshall Field, then I guess somebody else'll inherit all my beaus. Sky sure is white. Well, so long.

At the end of this line, Willie turns to walk back along the railway track, in the opposite direction to the start of the film. In this final shot, the poor state of her dress, which used to belong to Alva, is clearest to the audience: for the first time we see clearly that it is haphazardly pinned at the back, and we see the extent of a tear which reveals Willie's undergarments as she walks away from the camera. While Willie preoccupies herself with how her death might mimic Alva's, the audience is left considering the life that Willie faces. The scarlet dress, barely covering Willie, invites the audience to consider her future: as she makes her way down the railway track, she is also on track towards the same exploitative fate as Alva. In a final reference towards the spectatorship which is another running theme of the film, Tom stands silently and watches as Willie walks into the distance. He remains still for several seconds, before swinging his arms and retreating from the railway track. A zoom carries out the initial movement away from Willie, but this turns within seconds into a retreating tracking shot before ascending, by crane or helicopter, into the air and away from the railway track. The zoom is at its most conventional here, as a signifier of withdrawal from the diegetic world, but because of

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the close link throughout the narrative between the past tense and the zoom, this final lens and camera movement has an added power and significance.

While *The Scalphunters* (1968) contains many more zoom shots than *This Property Is Condemned*, it does not build upon the former film's psychological complexity. Instead, the zoom is used as a routine tool for directing attention through framing, with some particularly long, deliberate zooms – often from extremely high angles. On many occasions these shots adopt the perspective of the film's characters – including two shots which appear to adopt the perspective of Joe Bass's (Burt Lancaster) horse. Pollack uses the zoom less often, but for similar purposes, in *Castle Keep* (1969). The two films contain numerous examples of what may be called unmotivated, though not necessarily self-conscious zooms, which inject focal length movement into a scene which might just as well be covered with a series of static shots, or with physical camera movement.

Despite this apparent change of direction, *This Property Is Condemned* was not exceptional in terms of the psychologically motivated zoom, for in *They Shoot Horses, Don't They?*, the two approaches can be seen to blend somewhat. There are many zoom shots in the film, but while they often seem merely to be reframing space, they are also frequently psychologically significant.[100] Like *This Property*, *They Shoot Horses* is temporally complex, consisting of three components: a main narrative – the dance marathon in which Robert (Michael Sarrazin) and Gloria (Jane Fonda) participate, interweaved flashbacks to an "imaginary scenario with a horse […] employed to inform

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[100] During this period Pollack was also somewhat involved in the production of *The Swimmer*. Most available sources agree that the majority of the film was shot by Frank Perry prior to Pollack's involvement: Meyer credits Pollack with "one sequence" (11), and a report in *Variety* reported that this was a "sequence involving Janice Rule" ("New York Sound…"). As a result, although it contains numerous interesting zoom shots, *The Swimmer* has not been included in this analysis.

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the metaphorical meaning of the film" (Meyer 57), and flash-forwards to Robert's arrest and questioning. The flashbacks remain temporally disconnected from the main narrative, which ultimately catches up with the flash-forward. In *They Shoot Horses*, the zoom straddles the boundary between routine mobile frame function, and special psychological effect related to the film's temporal complexity. It is loosely tied to the character Robert, and this connection is established from the outset, with the introduction of three motifs which are repeated throughout the narrative: the memory of a galloping horse, the isolated interiority of Robert, and the contrastingly brash showmanship of the dance marathon's (as yet unseen) emcee – represented by the first utterance of the phrases 'around and around they go' and 'yowzah, yowzah'. Each of these is emphasised by a zoom shot in the film's opening ten minutes.

Pollack's first use of the zoom associates the child in the horse sequence with Robert, leading the audience to infer – though it is never explicitly confirmed – that the boy is 'young Robert'. The final shot of the opening montage is physically immobile, unlike those which precede it. A long shot shows a young boy, almost lost amongst tall grass and in front of a muted backdrop. The zoom closes in to a medium shot, slipping out of focus before cutting to a well-focused medium shot of Robert standing on a beach, beside the pier which is to be the film's primary setting. The two shots are meticulously symmetrical: Pollack positions the pair, identically dressed in hat, dark coat, and light-collared shirt, as if in conversation with each other, the boy's right shoulder foremost in the first shot, the man's left shoulder foremost in the second. As Figure 42 shows, the zoom out mirrors the zoom in: drawing back from Robert, and bringing his background into focus. The only breakdown in symmetry, the mismatch in focus between the final frame of the first shot and the first of the second, is accounted for by the soundtrack, which changes on the cut from dreamlike non-diegetic music to

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the loud crashing of the waves behind Robert. The simultaneous cut back into focus and change in sound suggest a sudden return to the narrative present: we sense that we have shared Robert's memory or (as Meyer suggests) his daydream.

As the narrative proceeds, the zoom shot maintains its attachment to Robert. It is the zoom which re-establishes him skulking on the margins of the dance hall, seemingly unsure of whether or not to take part (see Figure 43). This zoom occurs shortly after the emcee draws Claudia's attention to Robert, but it does not directly adopt her gaze: it is not a point-of-view shot. (Indeed, not long after, once the dance is underway, Claudia points one of the other competitors out to Robert. Pollack cuts to a static shot of another dancer to indicate Claudia's point of view.) As in other parts of the narrative, the zoom remains broadly objective: the camera moves to centrally frame Robert before the emcee calls to him, drawing him to Clauda's attention. On being hailed as 'cowboy', Robert looks about himself, pats his chest and raises his eyebrows in a Chaplinesque pantomime of uncertainty. The zoom, however, leaves the audience in no doubt that we have apprehended the correct target, and its decisiveness of movement leaves even less room for ambiguity because it restates the connection-forging first established in the fantasy/memory opening sequence.

Once Robert and Claudia are united as dance partners, the zoom shot remains more interested in him than in her. Early in the marathon, during a slow dance, Pollack moves restlessly from couple to couple, establishing the ensemble cast. The starlet and her partner, and the sailor and his partner are picked out in relatively short focal lengths, through cuts and camera movement. Robert and Claudia, by contrast, are approached via the zoom (see Figure 44). Yet we are as uninterested in them *as a couple* as they are in each other. The two couples we see prior to Robert and Claudia maintain some level of physical attachment – whether embracing or holding hands. When we see Robert and

Claudia, they are barely touching: framed from the waist up, we are left to guess that they may be holding hands out of view of the camera. And when the soundtrack joins Robert and Claudia, their dialogue directs attention not to *them* but to *him*: Claudia irritably asks "what are you looking at?" and Robert explains that he is trying to see the sun through a window in the roof.

Despite its attachment to Robert, the zoom is not reserved for him. A contrast is created late in the film by a zoom towards Claudia, picked out in a spotlight, walking the dance floor alone (see Figure 45). The zoom, we might speculate, highlights Robert's absence. But the symbolism of this moment is not entirely clear, for throughout the film Pollack uses the zoom for a variety of purposes which have no direct bearing upon Robert. Pollack also uses the zoom as a diversely functional reframing device, applying it variously to approximate the gaze of a character (Claudia's "God, check that one"); to accompany and emphasise a sudden change of tempo (a snap zoom to 'Mr Rhythm' at the start of the Ten Minute Derby); to smooth the transition between establishing shot and the action which follows; or as sharp zoom-out to emphasise shock when one of the female competitors wakes, screaming. These zooms, complementing those used for more psychologically-motivated purposes, reflect typical uses of the zoom shot found in the films described in the preceding chapter, and in much of Frankenheimer's work during the 1960s. In films, Pollack builds upon approaches to the zoom shot first tried in television: a combination of emphasis of characters and their interior thoughts (as in *Breaking Point*), and occasional negotiations of the pro-filmic space (as in *Ben Casey*). Pollack largely limits his use of the zoom to occasions on which there are specific meanings to that particular camera movement: in which the zoom offers something which other techniques cannot. However, Pollack's zooms perform this function more obtrusively and more stylishly than similar functions

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in Frankenheimer, and there is evidence for the emergence of zooms which structure space. Yet while, by the end of the 1960s, Mulligan, Frankenheimer and Pollack had each applied the zoom in ways which were radically different from their earlier films and prior work in television, their use of the lens is overshadowed by the work of Altman.

## Robert Altman

In the few films Robert Altman made during the 1960s, a film style emerged which uses the zoom shot not as a momentary or specific device but as an integrated feature of each film's visual style. According to Robert Kolker:

> The zoom for Altman is a tool of narrative inquiry, an attempt to understand characters and mise-en-scène, the signifier of a cautious but assured approach, a means to discover detail and emphasis, a way to connect disparate parts. It does not have the positive sense of space transgressed as does the tracking shot. Rather – in Altman's hands at least – it inscribes the parts and details of the visual and narrative field. With the zoom, and in conjunction with his editing, Altman can create a field of action and event that is detailed and particularized. The point of view given the viewer is that of discoverer and connector. The zoom functions as an offering of perspective and detail, of coaxing, leading but never totally or comfortably situating the viewer, or closing off the space that is being examined. (371)

This, however, is a critical commentary written with the benefit of hindsight, and the ability to survey Altman's entire career. Stylistic connections between Altman's television work and his later feature films are not entirely uncomplicated. *Countdown* (1968), which makes extremely limited use of the zoom lens, demonstrates that Altman was not simply bent on using the device in what contemporary critics and cinematographers would have called an 'unrestrained' manner. In common with

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Pollack, and to an extent with Frankenheimer, Altman uses the zoom at moments in which the audience is invited to see something of a character's psychology: in "Savage Night", the malicious gaze of the serial killer; in *That Cold Day In The Park*, the isolated vulnerability of Frances (Sandy Dennis). Here, attention to the zoom suggests a link between Altman's television and film work that is overlooked by Kolker when he argues that *Countdown*:

> would hardly be worth mentioning were it not an example of the kind of formal structure that Altman and most of the other filmmakers discussed here are working against. It is a prepared text that the director has only to transfer to film; there is no space for the inflection of style, which, for Altman, makes its initial appearance in *That Cold Day in the Park*. (361)

In fact, the handful of zoom shots in *Countdown* – the first of which does not come until over halfway through the running time – share something with those of "Once Upon A Savage Night" and in some ways anticipate *That Cold Day In The Park*. *Countdown* was evidently made before Altman had adopted the zoom-dependent style on which he relied during the early 1970s. Yet, despite Kolker's claim that the film is an example of the 'Hollywood anonymous' style, there are moments at which Altman directs his subject in a manner suggestive of stylistic continuities between earlier television work and subsequent feature films. *Countdown* lacks the highly organised, structured approach to the zoom found in later Altman films (from his next, *That Cold Day In The Park*, onwards). But when the zoom does appear in the film its use is not atypical, in the context of Altman's earlier television and later film work.[101]

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[101] Some scenes towards the end of the film were re-shot by Bill Conrad after Altman was removed from the production. The extent of the reshooting is not clear, but James Caan has implied that as little as a day's reshooting was needed (Zuckoff 147-8).

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The zoom, at its first and most significant appearance in *Countdown*, is the final moment in a six-minute sequence of scenes and images which emphasise the loneliness, isolation and fear of astronaut Lee Stegler (James Caan) as he is strapped into his spaceship for an ill-fated solo mission to the moon (see Figure 46). After a brief establishing shot of the nearby launch tower, the sequence starts with the film's final shots of Stegler's most intimate relationship, as he lies on a double bed with his wife Mickey (Joanna Moore), talking to her about his decision to take part in the mission. She lies close to him, her head on his shoulder and her hand on his abdomen. As Stegler talks, the camera tracks along his body, and the light catches Mickey's engagement ring. Mickey asks Stegler to "be sure to wake me before you leave", but we do not see whether he does so.

The next scene begins at dawn, with a further establishing shot of the launch tower against a pink sky. The camera tilts down from a banner reading 'Good Luck Pilgrim Astronaut Lee Stegler', and we see Stegler leave his hotel to be met by fellow astronaut Chiz (Robert Duvall) and a NASA official. The car drives away and we cut to shots of anonymous reporters and camera operators standing around, and then to a shot of a small number of camera operators ready to film Stegler's emergence from a trailer where he has been preparing for launch. Dressed in a spacesuit which obscures his face, Stegler boards a support van with anonymous NASA technicians. Chiz is the last to board the van. As he does, he turns and tells the assembled media: "OK, let's go." Suspenseful brass notes accompany the closing of the van door, and the music mounts as we see, in long shot, the van drive to the launch tower. Stegler, Chiz and the others sit wordlessly, and what we can see of Stegler's expression from inside his helmet is unreadable.

The van arrives at the launch tower and Stegler parts with another of his colleagues. The suited NASA official remarks: "if you take care and don't blow your luck, I'll see you again". The pair embrace and the official adds: "God go with you, Lee." Chiz and Stegler go together to the top of the launch tower. Again, no words pass between them. A small team of anonymous white-suited technicians help Stegler to climb into the capsule. By now, there is no musical soundtrack, emphasising the lack of discussion. Once inside the capsule, Stegler shakes the hands of each of the technicians, before noticing a toy mouse belonging to his son, hanging in the capsule. Stegler asks: "I can see I'm not going to be alone. Whose idea was this?" Chiz explains, wishes Stegler a good trip, and in a lingering shot we see their parting handshake. Chiz appears emotional, but Stegler's face is no longer visible.

Chiz leaves, and a small team of technicians prepare and close the door to the capsule. One by one they finish their tasks and leave the module. As they do, we see intercut shots of Chiz riding an elevator to the bottom of the launch tower. Stegler is now entirely invisible to us. The last technician leaves the scene, and the shot is held for a few seconds, before cutting to a new angle, showing Stegler's face through a small window. The soundtrack returns: at first a deep bass rumble, and then higher-pitched mounting brass chords. A zoom towards the window transforms what is visible from a barely recognisable face behind a window, into a face large enough that we can discern movement of the eyes and eyelids, and finally into an extreme close-up which seems to show, for the first time in the sequence, Stegler's terror (see Figure 46). His one visible eye darts nervously from side to side, and if not tear-filled, seems to shine more brightly than might be expected. The brass note reaches a crescendo, Stegler closes his eyes, and we return to a long shot of the launch tower.

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The sequence expresses its themes clearly: one by one, we see Stegler separated from those to whom he is professionally and personally closest. In most cases, Stegler expresses less emotion than might be expected. The only exception is in his final night with his wife, yet still he does not communicate with her; instead, he delivers a monologue. Stegler parts from the NASA official and Chiz with few words, and maintains an appearance of bravado which is only revealed in the length and warmth of their handshakes and embraces. He does not joke, or communicate in any way, with any of the technicians who strap him into the capsule; nor with the assembled media at the bottom of the launch tower. In parallel to these displays of loneliness, and failure to connect, we see signs and symbols of Stegler's mounting physical isolation: the banner which names him, alone, as the 'pilgrim' astronaut; the NASA official's wish that "God go with you", a standard parting wish given additional poignancy by our knowledge that no-one else will; Stegler's ironic comment that the presence of his son's toy mouse means that he is "not going to be alone"; the methodical departure of Chiz and the technicians as they retreat from the module. Throughout these, again, Stegler's fear is evident: in the rambling monologue to his wife; and in all the behaviour described in this paragraph.

It is not, of course, by accident that Altman chooses to close this sequence with a zoom shot, and the zoom shot that closes it is not brief. Nor is it diluted by coordination with camera movement – rather, it is intensified by the abrupt return of music to the soundtrack. The zoom animates the moment at which the audience regains subjective access to Stegler – access which had been progressively lost throughout the sequence. As in television examples, Altman calls upon the zoom to forge a direct link between the audience and the interior perspective of a protagonist. As in *That Cold Day In The Park* (1969), the zoom is long, transforming utterly the what we see of the mise-en-

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scene. The *Countdown* zoom eliminates the edifice of the lunar lander capsule, transports the audience through the glass of its window, and adopts an apparent position so close to Stegler that it is possible to read his emotions from the frantic movement of his right eye alone. This may be recognised as a turning point: symbolic, perhaps, of Altman's progression from 'Hollywood anonymous' (though this is a problematic concept) towards a more personal style, in which the power of the zoom is more fully recognised.

Altman's 'lonely' zoom is apparent, and much more powerful, in *That Cold Day In The Park*. The zoom articulates the isolated subjectivity of Frances Austen (Sandy Dennis) in contrast to the youthful play of her unnamed captive boy (Michael Burns). As Kolker puts it, the two leading characters:

> can be seen as the first of Altman's passive characters, acted on, in this case, by their repressions and their environments – the gloom of Frances's apartment and the shallow brightness of the streets the boy wanders. Their environments help to define them, but they are at the same time set off from the worlds they inhabit. A sense of isolation and inwardness is achieved by the shots that zoom away from Frances in her apartment to a wall of glass bricks or the lights of the street seen out of focus through the window. (411)

The zoom, in particular, is associated with Frances' gaze, and with her psychological interiority, from the film's outset – and deserves more detailed discussion here. In the first scene following the credit sequence, she spies the boy sitting on a bench beneath her kitchen window. As the conversation of her dinner-guests continues on the soundtrack, the audience follows her gaze through a creeping zoom which tightens the framing of the boy on the bench (see Figure 47). The next shot returns to the dinner party and to conventional match cutting, which seems to place us on the level with

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action: as if we are at the dinner party. But it is only a moment or two before Frances is lost in contemplation of the boy she has seen through the window. To compound the other clues to her psychology – a break in her movement, a vacant expression on her face – the camera zooms towards her (see Figure 48), tying down the psychological connection between what she/we have seen and what she now feels.

The zoom, then, signifies and evokes Frances' interiority. When she plays music for the boy, her enjoyment is conveyed by a tightening zoom. As the music transports Frances momentarily to a different emotional plane, the zoom transports us out of the master-shot / close-up editing formulation. At the end of the zoom we see Frances in telephoto close-up, then the boy in telephoto close-up. As Frances is disturbed by the ringing telephone, she switches off the music and we are switched abruptly back to the master shot, as if restored from hypnosis by a snap of fingers. On another occasion, as mentioned by Kolker above, as Frances and the boy share a meal, the zoom retreats from the dining table to reveal that the camera's gaze is broken by a partition of glass bricks. Frances remarks that she wishes the boy could speak, and the zoom brings us into her subjectivity by simultaneously withdrawing from the boy and revealing the presence of the glass wall. The physical boundary between audience and subject mimics the emotional boundary between Frances and the boy in a manner which, partly because it is articulated through a dynamic zoom shot, belongs within the realm of Frances' subjectivity.

On a third occasion, when Frances leaves the apartment to attend a medical appointment, the zoom travels with her. As she sits in the waiting room the camera occupies several more-or-less fixed positions, altering the framing through various zooms. The voices of other women in the waiting room, passing the time in casual conversation, are disembodied by the zoom shot, whose dynamic flexibility

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simultaneously describes, yet partially withholds, their nearby physical location. This sequence, beyond the apartment, mirrors the boy's earlier journey to his family home and to his sister's houseboat: it provides to the audience important information about each character's background, and hints at their motivation. However, there is a formal difference between the two journeys. The boy's journey is conveyed in master shots and close-ups, while Frances is portrayed using the dynamic zoom. This contrast represents a more elaborate expression of the subjective interiority/exteriority contrast established in the film's opening scene, and demonstrates that the zoom is portable: it follows Frances wherever she goes, whether she occupies her apartment, the doctor's waiting room, or a bowling green.

As *That Cold Day* reaches its conclusion, we see that the zoom is portable enough to be transferred from one character to another. For the larger part of the narrative, the boy retains the balance of power. His fraudulent mutism stands for a larger exploitation of Frances's apparent vulnerability. He is compliant when they are together, and respectful of her apartment. Though we are soon shown the sinister side of Frances's interest in the boy, the threat posed by her attempts to imprison him is negated by his successful escapes. When left alone in Frances' apartment, the boy invites his sister to visit, and makes only token efforts to prevent her from abusing Frances' unknowing hospitality. Frances's motivations remain concealed and complex; the boy's actions, by contrast, are straightforward teenage mischief. Only in the film's final moments, as Frances stabs a prostitute she has procured for the boy, are the power relations reversed. The fast zoom towards the boy as he perceives a knife embedded in the prostitute's chest is one of the film's most arresting moments, and its power is underlined by the zoom's reattachment to the boy's point-of-view (see Figure 49). The film offers little time to adjust our attachment to the two characters. It is clear that

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Frances' delicate, obsessive vulnerability has been supplanted by murderous jealousy. The final (zoom) shot, now from the boy's point-of-view, helps to convey the film's other conclusion: that he is now genuinely trapped, bewildered, with an uncertain future.

But this is not the only way in which Altman uses the zoom in *That Cold Day In The Park*. One of the drawbacks of much existing criticism of the zoom is that it tends to place an undue weight on the specific qualities of the device itself. As we have seen, the zoom can certainly be used to mimic certain psychological phenomena and, as is clearly demonstrated in the example above, it can bring an audience within a given character's subjective field. However, Altman uses the zoom lens for purposes other than the narrative set-piece. In *That Cold Day* he mostly avoids using the zoom for simple, familiar push-ins. Instead, he substitutes the dynamic zoom for another familiar editorial device: the lap dissolve and the ellipsis it conventionally implies. Here is where we may begin to question some of the critics who have reacted negatively towards the zoom. One contemporaneous critical review, for example, notes:

> Altman's direction runs to fancy reflection shots, blurry transitions, and ponderous camera movement. He strains to be ornate but cannot relate his devices to his heroine's subjectivity […] to become a good director he must stop mistaking half-baked mannerisms for psychological profundity. (Dempsey 56)

Dempsey's "blurry transitions", it seems certain, are Altman's frequent scene-ending zooms-in (usually accompanied by a de-focussing of the lens). Creating a visual effect more familiar from the start of a dream or fantasy sequence, in this case they substitute for the lap-dissolve. Each instance of their use precedes a narrative ellipsis, and as a result they are as rigorously conventional as the lap dissolve itself. Yet in concentrating on the zoom as a technical device, rather than as a means of editing in-camera,

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Dempsey misses a crucial element of the zoom's appeal. Here, each zoom-marked

ellipsis recalls our allegiance to Frances, and those initial tied zooms which depicted her

first glance upon the boy. As a result they reinforce, rather than undermine, the utility of

the zoom lens – showing it to be a device with more narrative potential than indicated

by more tentative, 'restrained' uses made earlier in the decade by Altman's forebears.

Throughout the 1960s, as television generation directors moved into their feature

film careers, they adopted zoom techniques familiar from the small screen. Mulligan

and Frankenheimer used the zoom only occasionally in television, and were similarly

hesitant to do so in film. Altman and Pollack, in accordance with their practice in

television, were somewhat more adventurous: Pollack carried long 'psychological'

zoom shots from television into some of his early feature films, while Altman began to

develop the 'spatial structuring' so often noted by critics. However, these directors were

not alone in using the zoom in feature filming during the 1960s, and their strategies in

feature filming were as heterogeneous as they had been during their television careers.

The development of the zoom shot during the 1960s was, it seems, no less complex than

during the 1940s and 1950s. It is evidently an oversimplification to place on the

shoulders of a small group of television directors the responsibility for bringing the

zoom to film. Such a reductive and incomplete interpretation underplays both the role of

television beyond anthology drama, and the significance of technical progress relevant

to both the television and film industries. It suggests that rather than examine such a

history through the teleological filter of 'transfer' from one (less privileged) medium to

another (more privileged) medium, it is more productive to examine the two alongside

one another, within the complex contexts of technology, style and culture. This

conclusion is very much in accordance with Belton's advocacy of a "stratified,

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uneven, […] nonlinear" approach to film history.[102] The next section leaves behind
Frankenheimer, Mulligan, and Pollack, and considers critical reactions to Altman's
films of the 1970s, which have been amongst the most-praised examples of filmmaking
in which the zoom is a key determinant of the visual style. However, consistent with the
analysis above, the next section also addresses early 1970s television production, and
suggests that Altman's practice, while striking, may not have been as exceptional as has
often been argued.

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[102] See page 54.

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**Figures: Chapter 10**

**Figure 36:** *To Kill A Mockingbird* – Nathan Radley
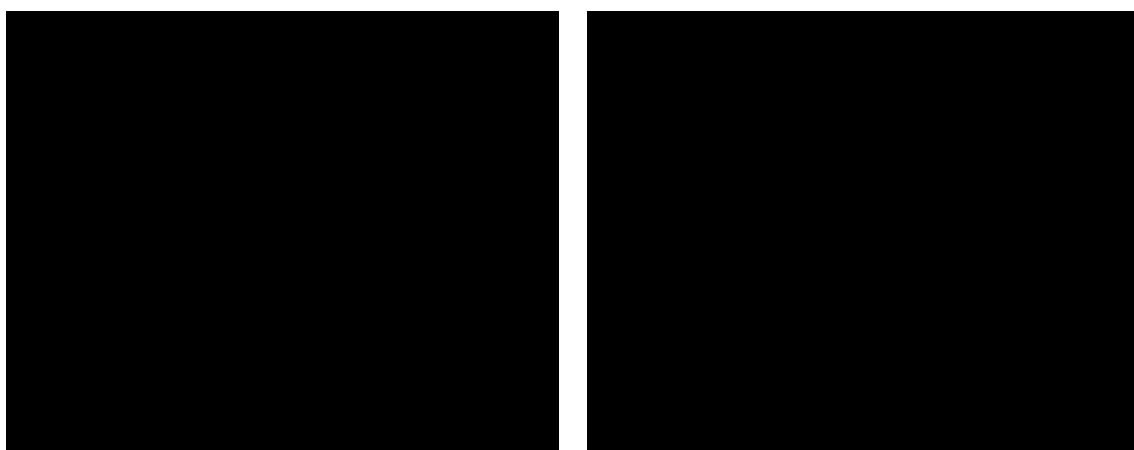
**Figure 37:** *All Fall Down* – Berry-Berry

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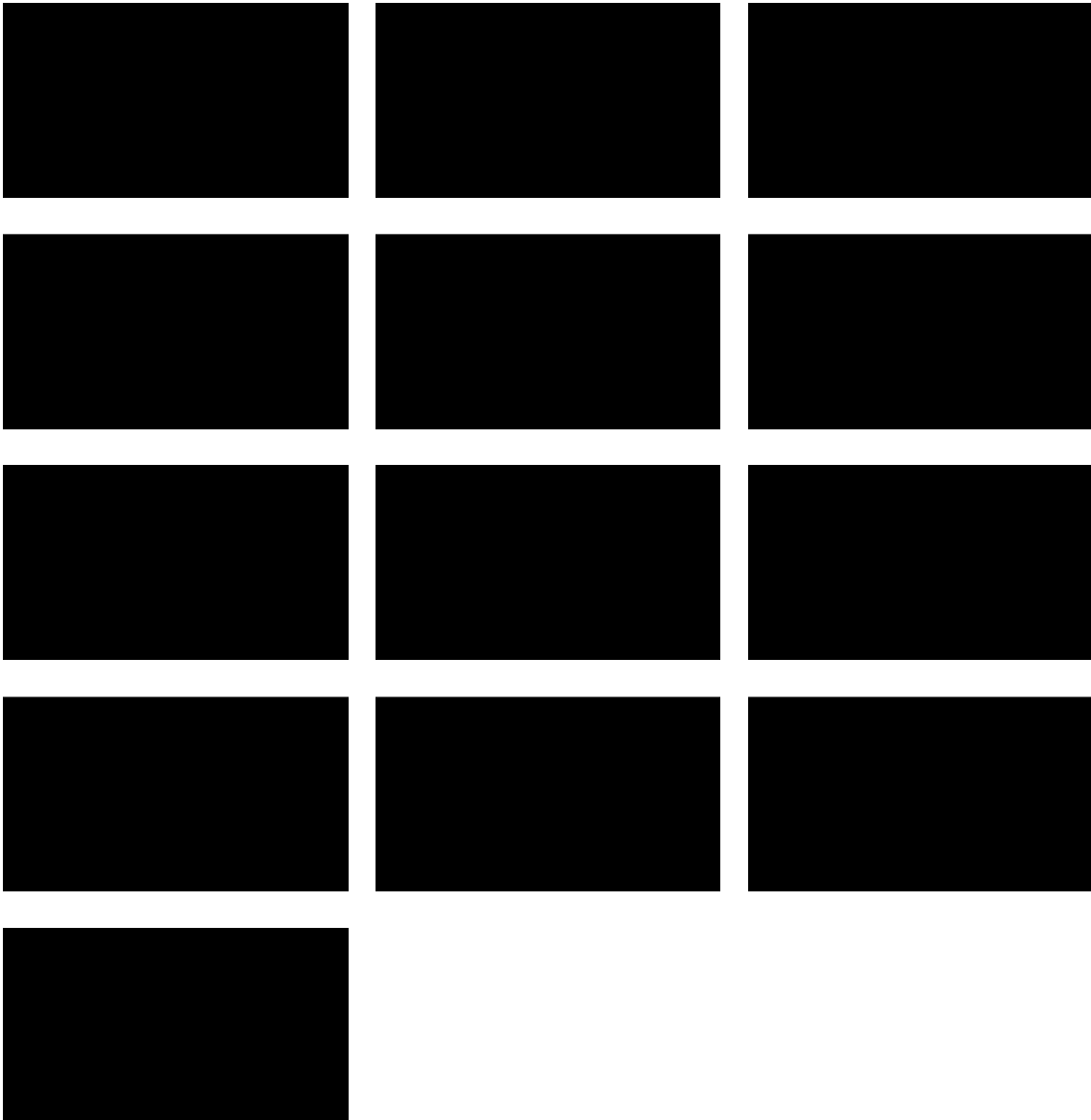
**Figure 38:** *The Gypsy Moths* – Weather Conditions

**Figure 39:** *The Slender Thread* – Sandcastle

**Figure 40:** *The Slender Thread* – Alone
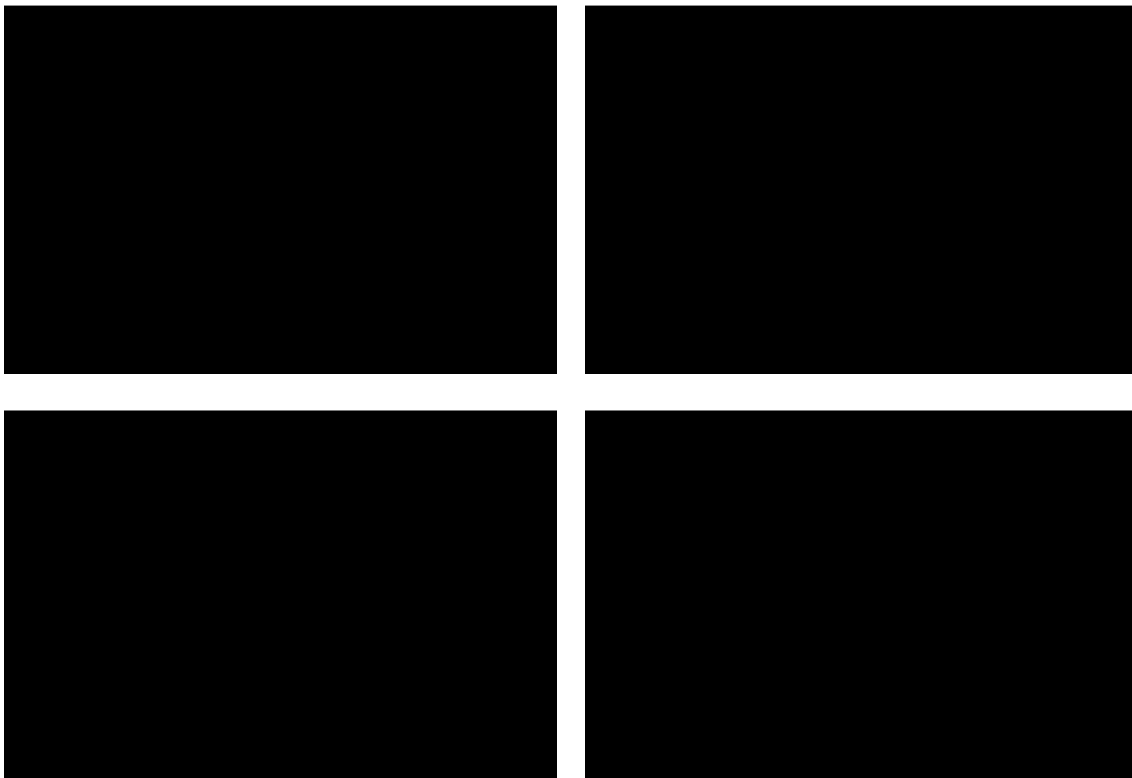
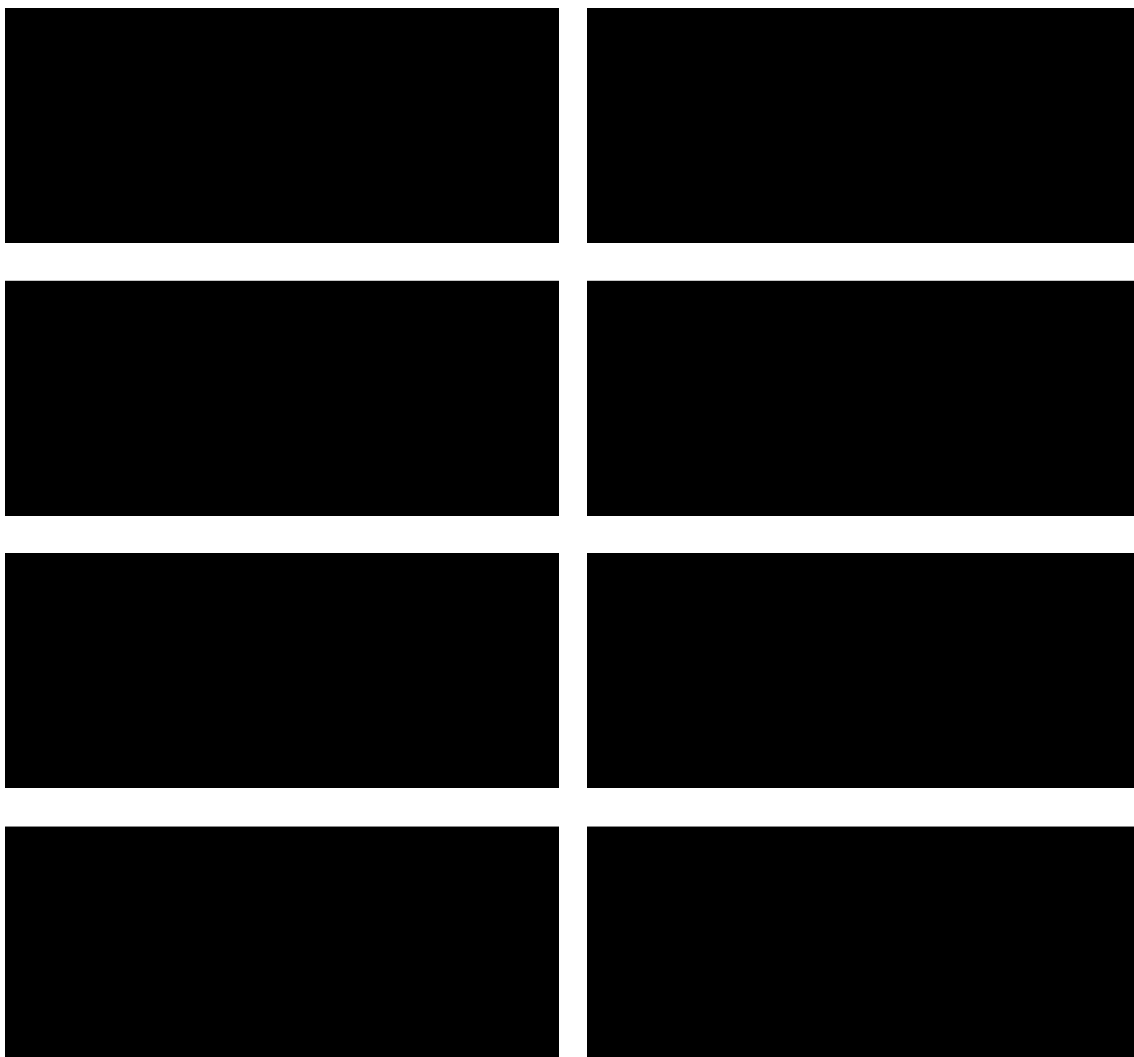**Figure 41:** *This Property Is Condemned* – The House

**Figure 42:** *They Shoot Horses, Don't They?* – Symmetrical Zooms

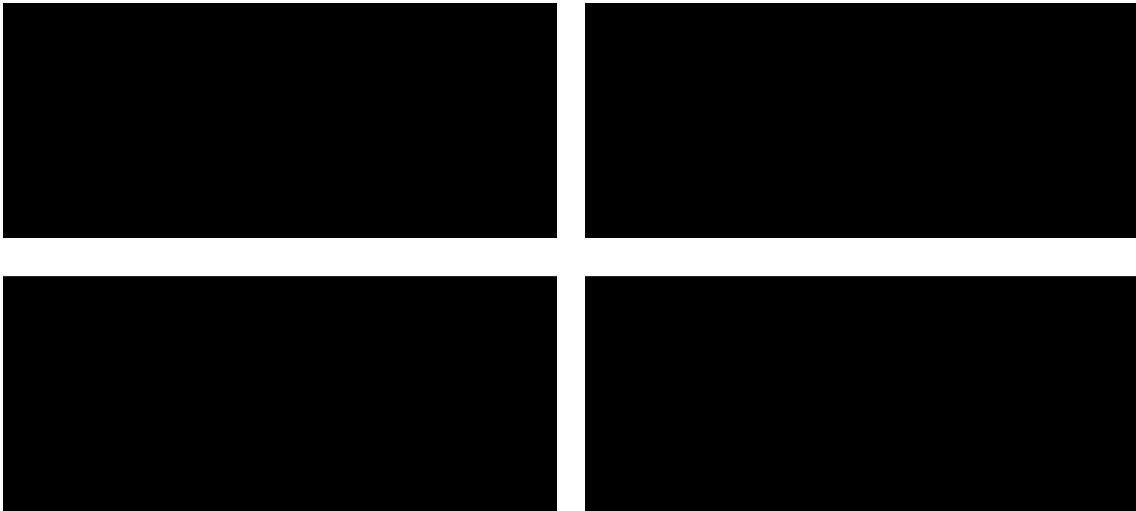**Figure 43:** *They Shoot Horses, Don't They* – "Hey cowboy!"

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**Figure 44:** *They Shoot Horses, Don't They?* – Dancing Together
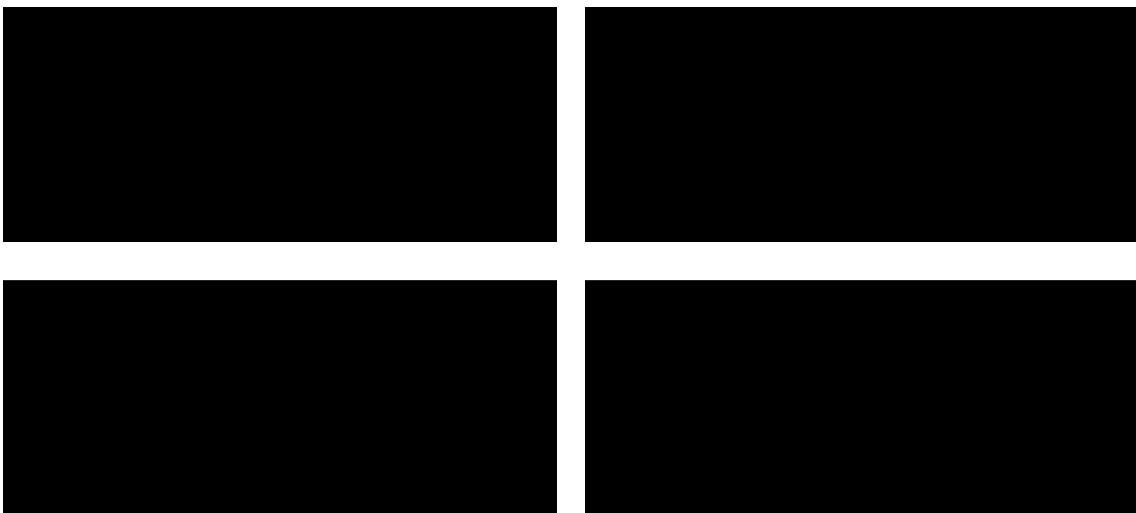
**Figure 45:** *They Shoot Horses, Don't They?* – Claudia Alone

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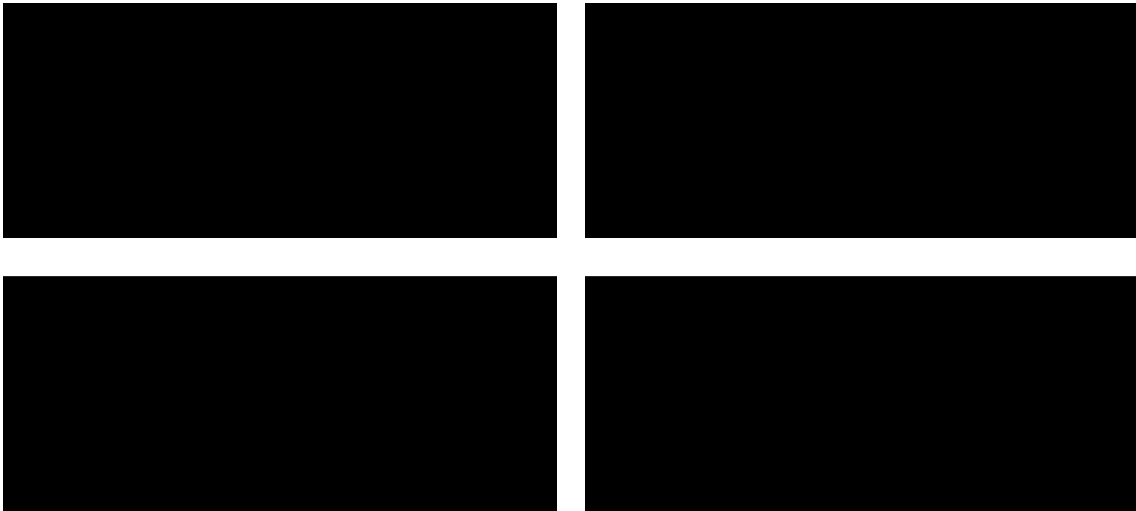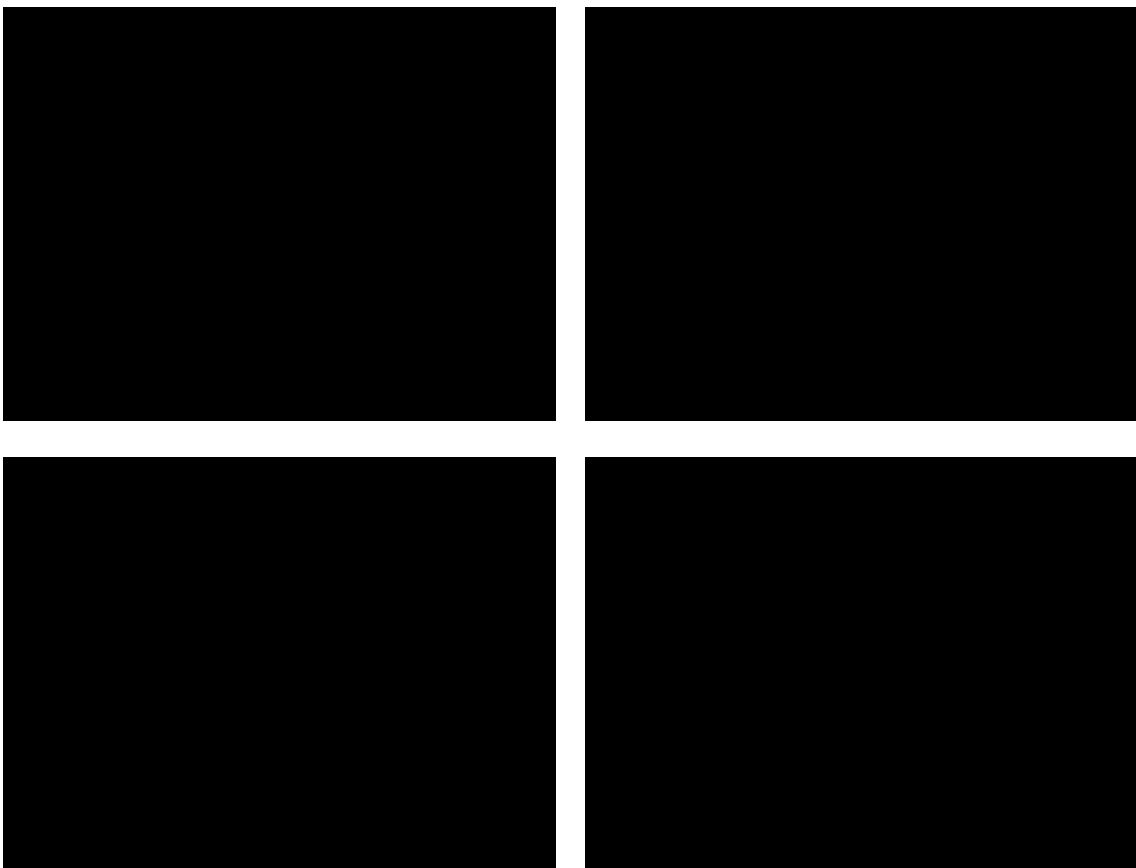
**Figure 46:** *Countdown* – Locked In

**Figure 47:** *That Cold Day In The Park* – First Encounter

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**Figure 48:** *That Cold Day In The Park* – Distraction
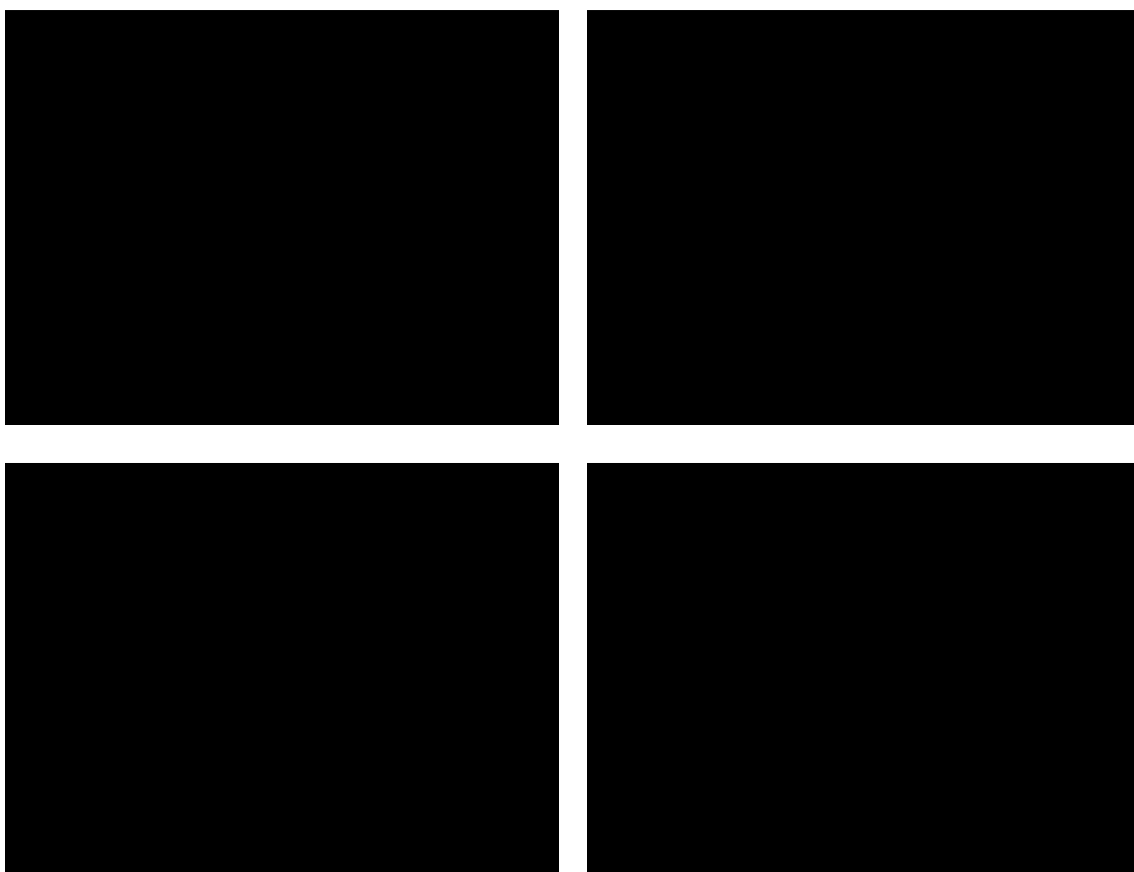
**Figure 49:** *That Cold Day In The Park* – Stabbing

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## 11. Future Directions: The 1970s and Beyond

"There are, for instance, three grave 'diseases' which often afflict cameramen, who unwittingly pass on the infection to their audience. These diseases are known as 'Panitis', 'Tiltitis' and 'Zoomitis'."

*Your Book Of Film-making*

Diamond: I think most young directors today, if you offered them the choice between a good script and a zoom lens, would take the zoom lens. Wilder: Take away the zoom lens. Just don't let them have it.

*Billy Wilder, in conversation with I. A. L. Diamond, 1976*

Zoom lens technology has always developed in a gradual, complex, and incremental fashion. The direction of its development was influenced by the needs of the military during the Second World War, and was geared particularly to television during the years immediately following. Nevertheless, the zoom shot was never entirely absent from feature film production, and understanding the ubiquity of the zoom on the small screen

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during the 1950s helps to establish why the zoom shot became popular so quickly in the mid-late 1960s following the introduction of the Angénieux 10× lenses. Yet the rapid adoption of the zoom during the 1960s was not the result of a straightforward transfer from 'television' to 'Hollywood'. As the previous chapters confirm, changes took place in a more complex manner. Furthermore, by the early 1970s television was adopting uses of the zoom which were as adventurous as those found in the contemporaneous work of directors such as Robert Altman, Roberto Rossellini and Claude Chabrol. This has important implications for the way in which directors such as these, and especially Altman, have come to symbolise early 1970s approaches to the zoom. This concluding chapter considers the implications of this study upon three of the themes which run throughout the project. It reconsiders critical approaches to the zoom by juxtaposing accounts of Robert Altman's zoom-inflected style of the early 1970s with a discussion of the use of the zoom in 1970s television drama. It discusses possible future enquiries which may emerge from this study. It highlights, in particular, the scope for further enquiries into the style and production circumstances of early postwar American television, and describes the potential for a broader and more global account of the development of zoom lens technology.

## "Jazz Improvisations" or Television Style?

Critical attitudes to the zoom lens crystallized during the early 1970s with the development of academic film studies. Critics writing about the zoom borrowed from the views of working directors and cinematographers, often adopting the belief that the zoom was peculiarly prone to 'abuse'; that its tendency to compress, or 'flatten', image planes at the telephoto extreme was particularly salient to considerations of zoom itself; and that the zoom as a visual technique was more powerfully connotative than other

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camera movements. Yet directors who discussed with *American Cinematographer* their attitudes towards the zoom lens remained ambivalent. As they had done during the 1960s, they gave conflicting accounts of their attitudes. Self-proclaimed users of the zoom followed the established form of criticising all uses of it but their own, often misreporting the latter. Interviewed about the production of *Hello, Dolly!* (Gene Kelly, 1969), director of photography Harry Stradling remarked:

> Personally, I think zoom shots can be good if there is a need for them on the picture, but, in general, I don't care too much for them. I have the feeling that they are being overused in a lot of pictures. People zoom in and out for no logical reason, and I think this is very distracting. The zoom lens can be used once in a while very effectively, but I think that in future films we will be getting away from so much use of the zoom – because it's too much of a mechanical device and it usually shows up like what it is. (Lightman "Behind the scenes…" 177)

While most descriptions of the zoom's 'appropriateness' are not elaborated, the opinion that the zoom signifies novelty and (not always welcome) artistic innovation is expressed on a number of occasions, often through the repeated observation that the zoom would be an anachronistic tool in the context of an historical production. A note about the Academy Award nomination of *Anne of the Thousand Days* (Charles Jarrott, 1969) describes the film as "old-fashioned in the best possible way – avoiding modern camera fripperies such as wild zooms and tricky selective focus shots which would have been anachronistic to the 16th century drama" (Lightman "The Five Best…" 334). Oswald Morris imagined that Tevye's family in *Fiddler On The Roof* (Norman Jewison, 1971):

> are really making this picture themselves. They've bought a small camera, and they're probably got a little cart they can use for making simple dolly and tracking shots. They wouldn't have a zoom lens – I

shouldn't imagine they could afford one – but they would keep things

basically simple and very honest, because they'd know no other way of

approaching it. (Lightman "On Location With…" 1223)

While filming *Wild Rovers* (Blake Edwards, 1971), Philip Lathrop remarked that though

he was not opposed to the zoom *per se*:

One thing I want to avoid is the slick mechanical gadgetry that we use so

much in making pictures today – things like helicopters and obvious

dolly shots and zoom lenses. I think that this would be very false in

relation to a period Western. (Lightman "Wild Rovers: Case…" 657)

Aside from concerns about anachronism, a different kind of objection could be heard

from directors and other creative personnel during the early to mid-1970s. During this

period, a number of directors invoke the memory of their industrial forebears to explain

why, amongst other 'showy' techniques, they preferred to avoid the zoom. Speaking

during the production of *The Last Picture Show*, Robert Surtees reported that Peter

Bogdanovich:

won't even allow a zoom lens on the set. He detests zooms, even when

they're used just to follow someone. Orson Welles had told him that a

zoom creates artificial movement and, technically, he's correct. A zoom

shot is merely a magnification of an object. It doesn't give you at all the

same perspective as you'd get, for example, if you dollied through a

doorway. However, there were many times when it was necessary to

move the camera just a couple of feet to tighten up the composition

during a shot. Using the zoom for this purpose would have saved literally

days on the picture, but Peter would insist on laying track and dollying

that couple of feet. He has his integrity – which is very important to him

– and you have to respect him for that. ("The Last Picture…" 103)

*American Cinematographer* continued to occasionally discuss the zoom in detail, but in

the first standalone discussion of the merits of the zoom lens published since Richard

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Moore's 1965 article "New Uses For Zoom Lenses", Karl Malkames adopts a

disapproving tone:

> If, from the average film production of this past year, we were to remove
> every wobbly hand-held shot, every zoom, freeze-frame, slow motion
> and jump-cut, the remaining footage would be indeed meagre. This is not
> to suggest that there is not, in many cases, an intelligent reason for such
> devices, but let us ponder for a moment a comment from one of the most
> respected masters of the art. (712)

Like other articles published at the time, Malkames refers to the 'great men' of the

Classical era: after quoting a passage from Charlie Chaplin's autobiography in which

the silent star remarks that he 'loathes' 'tricky effects', Malkames declares:

> My own camera setup is based on facilitating choreography for the
> actor's movement. When a camera is placed on the floor or moves about
> the player's nostrils, it is the camera that is giving the performance and
> not the actor. The camera should not obtrude. (712)

Malkames elaborates Chaplin's disregard for the self-conscious camera into a

pronouncement on the use of the zoom lens:

> Any move or device that reminds the viewer that he is looking through a
> camera lens (unless the purpose is to establish a *subjective* camera),
> shatters the illusion of participation which is what we are usually striving
> to create. Nor can we alternate abruptly between an objective and
> subjective camera with effecting the same negative result. The sense of
> involvement enjoyed unconsciously by the spectator is jeopardized or
> destroyed each time we introduce an obtrusive element.
>
> Let us contemplate for a moment the much used and abused *zoom*. It
> may surprise many to learn that the zoom lens (albeit a slow, low-quality
> ancestor) was available to Roy Totheroh while he was shooting *Modern
> Times* in 1935. Even if the excellent variable focal length lenses of today
> had existed during the 20's and 30's it is doubtful that many of the top
> cameramen or directors would have employed the zoom while the

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camera was rolling. It would have remained a time-saving convenience to have but one lens for all angles. The most disturbing effect of the zoom is the *flattening* of the image or destruction of the third-dimension illusion. The feeling of depth suggested by parallax interplay and shifting planes when the *camera* moves is instantly cancelled if replaced by a *zoom*.

The value of the zoom in news or documentary filming, however, speaks for itself. The case being made here is simply for a reappraisal of the use and misuse of the zoom lens today (713)

On the basis of these discussions of the merits and pitfalls of the zoom, it would be tempting to conclude that 'artistic' and/or 'quality' films shunned the zoom lens (or insisted on their use only in a limited or specifically motivated fashion), while television producers and personnel working on (for example) adventure, disaster, and exploitation movies used them with no qualms. But the facts do not support such an argument. Lathrop, who argued that the zoom would be anachronistic in a period Western, later applied arguments against the zoom to his filming of the dramatic and present-day disaster film *Earthquake*, explaining that:

I'm not against zoom lenses. There are times when zoom shot can be very effective, but there are a lot of people who don't quite understand how a zoom lens should be used, and they use it incorrectly. It's a tool like any other camera tool. If it's used right, it's terrific – but to use it because you've got a zoom lens and say: 'Look what I did. I zoomed into a close-up!'… Who cares? (Lathrop 1333)

Close examination of trade discourses around the zoom therefore suggests that, as in the 1960s, directors *claimed* only to want to use the zoom in a certain way, but often used it in other ways as well. Others, notably James Wong Howe, were strident and famous opponents of the zoom, but had used the technique earlier in their careers, while those who appeal to the style of Classical directors ignore, it seems, the technological

circumstances under which those directors did their work. This attitude was echoed and reinforced in the trade press, and it seems likely that a combination of accounts of specific productions by working directors and cinematographers, and articles expressing broader statements of principle, fostered a view of the zoom lens which became part of the emerging critical consensus during the first half of the 1970s.

During this period, the films of Robert Altman were a major factor in this development and crystallisation of attitudes towards the zoom. After *That Cold Day In The Park*, and for at least the first half of the 1970s, Altman's films – including *M\*A\*S\*H* (1969), *Brewster McCloud* (1970), *McCabe & Mrs Miller* (1971), *Images* (1972), and *The Long Goodbye* (1973) – adopted a style which made maximum use of the zoom. As a result, Altman's zooms have been used by critics to symbolise his particular style of filmmaking, while accounts of the zoom – including many of those discussed in the literature review above – include Altman in their discussion of the zoom, often isolating his filmmaking as containing particularly masterful uses of the technique. In this vein, Geoffrey Nowell-Smith writes: "When the tide [of zoom shots] receded a few film-makers were left who had discovered uses for the device other than as *maniera*. Examples would [include] Robert Altman" (99). Pierre Berthomieu argues that despite the zoom's heritage in television, and association with directors such as Schaffner, Frankenheimer, Mulligan, Pollack and DePalma, Altman's approach was different. His techniques "touch upon the theatrical nature of cinema […] but a profoundly post-war version of theatricality, in which the use of the zoom comes naturally to Altman" (94-5).[103] Cook's account offers another example of this tendency:

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[103] In the original: "Malgré l'influence de la période, Altman n'hérite réellement d'aucun de ces mélanges. Son art de metteur en scene touche à la nature théâtrale du cinema (la reinvention perpétuelle, au present, de l'interaction entre acteurs, decor et camera). Mais sa théâtralité se distingue évidemment de

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Altman probably used the zoom more systematically during the 1970s than any filmmaker before or since. His most salient films in this regard are *M\*A\*S\*H*, *McCabe & Mrs Miller*, *The Long Goodbye, Nashville*, and *3 Women*, but virtually all of his 1970s work is composed of long takes structured by panning and zooming. […] Altman's cultivation of a fast, flexible pan-and-zoom style went hand-in-hand with his use of actor improvisation and ensemble playing, which is turn placed considerable creative responsibility on his cinematographers. According to Vilmos Zsigmond […], DPs had to operate their own cameras in such improvised situations in order to 'grab' significant action. (*Lost Illusions* 362)

For some critics, the frequency of zooms in Altman's work during this period forces a consideration of what it *means* to see a zoom shot when almost every shot in that film includes, or is, also a zoom (Cameron et al 5). For Robin Wood, however, the frequency and overtness of the zoom is a key component of its appeal:

Altman (within the context of the American commercial cinema) bears something of the same relationship to the zoom/telephoto lens as Welles to deep focus and Ray to Cinemascope: he didn't invent it, but his peculiar genius has enabled him to grasp and realise its expressive potentialities. The zoom is central to the change in the relationship of audience to film. Its significance lies in its obtrusiveness: directors who use the zoom 'tactfully', trying to make a zoom-in indistinguishable from a tracking-shot, are not really using it at all, but trying to suppress its particular properties. For Altman, the zoom is at once his means of guiding his audience's consciousness and of asserting his own presence in the film; but he has also grasped its potential for dissolving space and undermining our sense of physical reality. (8-9)

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l'expressivite rhetorique classique. En quoi Altman est profondément un artiste de ce XX siècle qui commence après 1945: l'usage du zoom lui est naturel, là où le grand style hollywoodien s'épanouit dans celui du travelling et de la grue."

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Michael Tarantino, whose 1975 discussion of 'movement as metaphor' in the work of Robert Altman is dominated by the zoom, offers one of that period's most detailed accounts of a director's use of the technique. Camera 'movement' in *The Long Goodbye* carries, for Tarantino, contradictory meanings. On the one hand:

> At its most obvious level, what this movement does is further to extend the feeling of expectation in the viewer. The film is structured round conversation more than action, and each scene involving two or more people talking steadfastly refuses to adapt to the standardised editing procedures. The movement of the camera is such that the viewer is conscious of it in an overt sense, and it is a decided factor in forming the lines through which the film is to move. (98)

Somehow, the zoom is simultaneously meaningless and meaningful: Tarantino claims that "the overwhelming characteristic of the camera movement is its non-functionality" (98), but also argues that "when one keeps using the same tool to lend emphasis to every event, one winds up stripping the importance from everything" (99). While there is little clarity to Tarantino's argument, other than a clear view of the ambiguity of the zoom, the article is nonetheless salient for its thoughtful and affirmative discussion of camera 'movement' and the zoom. Tarantino makes a number of case studies out of moments, in *The Long Goodbye*, at which camera movement is particularly noticeable and meaningful. He positions the style of the film as:

> the direct antithesis of the style a director like Howard Hawks would employ in a film such as *The Big Sleep*. Camera movement in Hawks' film was of an extremely economical and functional type. In the 1940s, the hard-boiled detective was just that, and the style had to fit the content. If a clue was there, it was to be located. If a relationship was there, it was to be illustrated. (98)

In *The Long Goodbye*, Tarantino suggests:

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the camera does not locate or illustrate anything. It merely goes in and out, moving in the same circles as its protagonist. While its displacement within the narrative is directly opposed to the style of a Hawks, its ultimate goal is essentially the same – to define the atmosphere in which the characters function. (98)

Discussions of Altman's use of the zoom – which emphasise theatricality, and a systematic approach – have much in common with earlier industrial discourses. However, they break with tradition to the extent that their comparisons with great classical directors are favourable, rather than unfavourable: locating Altman as a rare genius whose talent makes otherwise forbidden techniques acceptable. This divergence of opinion is positive in the sense that it makes progress away from the limitingly conservative terms in which the issue was discussed in the trade press.

Altman's use of the zoom was afforded a privileged critical space in the context of a varied and contradictory industrial discourse around the technique. Yet it was precisely this conception of the zoom that informed critical opinion in the early 1970s and which – as the literature review at chapter 2 above demonstrates – has remained broadly current ever since. Little of the broader context has been discussed in the literature surrounding the zoom shot. To begin to fill this gap, this study highlights a development in television style which took place contemporaneously with Altman's increased use of the zoom. A few weeks before production of *M\*A\*S\*H* began, the ABC television network screened a two-hour *Movie Of The Week* drama pilot entitled "A Matter Of Humanities" (26 March 1969), and subsequently commissioned the series *Marcus Welby, MD*. By the time the final episode of *Welby*'s first season had screened on 14 April 1970 – a few weeks after *M\*A\*S\*H* had opened on general release – the series cinematographer, Walter Strenge, had developed a visual style that also used zoom lenses liberally in order to structure space and attention, in a manner which

contrasted with an earlier important series, *I Spy*. Walter Strenge's work on the

television drama series *Marcus Welby, MD* and *Owen Marshall, Counselor-at-Law*,

have been briefly mentioned in scholarship on the zoom, but like passing mentions of

the Zoomar lens, they gloss over a complicated and important aspect of image text

history.

Strenge's work as a television cinematographer encourages an entirely different

approach to the development of zoom lens style. While the TV Generation directors

discussed above have been emphasised in film studies accounts, during the 1970s

*American Cinematographer* paid some attention to Strenge's working practices.

Strenge's voice was significant within the industry: from 1958 to 1960 he served two

terms as president of the ASC; during the 1960s he wrote the 'question and answer'

section of *American Cinematographer*, and edited the *American Cinematographer*

*Handbook*. Yet because he was, by the 1970s, at the end of his career – he died in 1974

aged 76 – he has remained relatively obscure. Well before the TV Generation directors

migrated to feature films, Strenge's career had progressed in the opposite direction.

After twenty years as a director of photography on features, from 1950 his career was

dominated by television work. *American Cinematographer* published two substantial

articles on Strenge's work at the end of his career, as he filmed episodes of the ABC

television series *Marcus Welby, MD* and *Owen Marshall, Counselor-at-Law*. These

articles, which are discussed in greater depth below, describe a cinematographer who

uses the zoom as a standard tool. While it may seem somewhat anomalous to discuss a

director of photography in the context of a discussion which has mainly focussed on

directors, this is a consequence of the available evidence, which provides rich detail

about the views and practices of Strenge, but relatively little about the directors of these

television episodes. An examination of a small selection of Strenge's earlier work

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reveals hints of a gradual stylistic progression similar to that which can be found in the television and film work of the TV Generation. Furthermore, in the early 1970s, Strenge developed ways of using the zoom lens which were similar in many ways to those adopted by Robert Altman – significantly calling into question the medium-specificity of later developments in zoom lens style.

Television episodes shot by Strenge are less readily available than those of the television generation. "Journey Into Darkness", an episode of *Arrest & Trial* (8 December 1963), shows the zoom lens in occasional, but relatively complex use. Early in the episode, the murderer at the centre of the narrative, Paul LeDoux (Roddy McDowell) is picked out with a zoom which reveals him to have been loitering around the murder scene. The scene opens on a shot which shows a pawn shop with part of the road in front of it visible, in addition to a car and a crowd of people. A detective leaves the shop, climbs into the car parked in front, and drives away, leaving the crowd of bystanders dominant in the frame. Once the car is out of frame, an individual begins to leave the crowd, taking a few steps towards right of frame and towards the camera. He raises his hand to block the sun, and as he does so the camera zooms to a closer shot which isolates him against the crowd in the background. A later scene performs the opposite: the zoomed-in camera isolates LeDoux amidst a dockyard setting, then zooming out and panning to show more of the surrounding environment. Starting from a medium long shot, a slow zoom introduces assorted dockside paraphernalia – mooring posts, lifeboats, and so forth – before moving further out through a long shot and into an extreme long shot. As this takes place, the contrast changes, leading to a composition in silhouette as LeDoux walks slowly through the dockyard, once again alone in the frame. Despite these moments, the zoom does not dominate the visual style: physical camera

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movement is often used to establish closer shots, and cuts to close-ups for conversations between characters.

A similar approach is evident in "The Jar", an episode of *The Alfred Hitchcock Hour* (14 February 1964) in which the zoom appears as a substitute for tracking – notably during a sequence in which a Charlie Hill (Pat Buttram) hunts a man who he believes has stolen his property. This is in addition to at least one striking zoom shot used to show that the man has found the jar, propped up on a log: a short series of eyeline match cuts between Hill's face and the swamp, before a long zoom in to the jar signals that he has found what he sought.

The evidence suggests that by 1968, Strenge had become considerably more adventurous in his use of the zoom. "A Dangerous Proposal" – an episode of the action-drama series *Run For Your Life* (3 January 1968) – shows the zoom used to its fullest extent both to deliver quick shocks and also to gradually alter framing. It is most strikingly used early in the episode as Gillian Wilmot (Judy Carne) sits at an outdoor café table with Sir Henry Hiller (Albert Dekker). In a movement which lasts for less than two seconds, a long sharp zoom draws the audience towards a car in the distance, where the show's principal character Paul Bryan (Ben Gazzara) is standing. As the zoom takes place, and after it is completed, Wilmot leaves the café table and walks to the car in order to enter a conversation with Bryan. In other scenes, the zoom is used in a less dramatic fashion, apparently both as a substitute for prime lenses (suggested by the appearance of numerous different focal lengths from a fixed camera position) and as a dynamic zoom. Halfway through the episode, during a scene in which Hiller paces forwards and backwards, gradual zooms maintain him at roughly the same size in the frame. On other occasions, the zoom is used to the full extent of its range, zooming in for a close-up of Wilmot's face at a bedroom doorway, before zooming out rapidly to

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capture the entire room. This is performed as a single movement without accompanying panning or other camera movement. Smooth, rapid zooms are then used to change the framing as Wilmot takes measurements of pictures on the bedroom walls. A final zoom, the reverse of that which opened the sequence, bookends the scene and removes viewers from the space of the bedroom.

Though Strenge's early career is relatively undocumented, it is fortunate that two of his later television filming engagements are as well documented in *American Cinematographer* as many major films made at the time. The two observational articles, published in March 1970 and March 1971, are of additional historical value because they create a clear picture of the way in which zoom lens technology was used to film television shows by the early 1970s. Robert Kerns observed a day of shooting of the *Marcus Welby, MD* episode "Neither Punch Nor Judy" (23 December 1969), and later observed the production of "Owen Marshall – Counselor-at-Law" – "a two-hour feature for the *World Premiere* television series" (12 September 1971) which was subsequently picked up as the ABC serial drama *Owen Marshall – Counselor-at-Law*. Each of the episodes, and others from the same series, are extant and the finished episodes can therefore be compared with Kerns' account of their production.

The earlier of the articles, "A Day On The Set Of *Marcus Welby, MD*", describes the filming of several scenes from the first season episode "Neither Punch Nor Judy", on Stage 20 at Universal City, and on the studio's backlot. Kerns describes how the production used two cameras – "a new Mitchell BNCR on a crab dolly [and] an Arriflex IIC", the Mitchell fitted with "motor driven Angenieux 25mm-250mm zoom lens [and loaded with] East Color Negative, Type 5254" (265). After describing the filming of a routine sequence, Kerns describes a sequence with:

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more complicated action. Holliman and Young come down the walkway to the sidewalk speaking lines. Brolin rides up on his motorcycle, alights and joins them in dialogue. Leytes decided to play the scene in one continuous take. Strenge employed the Angenieux 10-1 zoom to film the action. The camera was stationary no dollying. It picked up Young and Holliman and moved with them as they proceeded down the walk holding them in proper frame. As Brolin rode up, the camera panned over to him slowly, zooming at the same time. It then panned him over to Young and Holliman, keeping all three actors in correct perspective by slowly zooming back. (267)

Kerns' account indicates that using the zoom was not an easy, much less a lazy, solution for the crew of *Marcus Welby MD*:

It took every member of the camera crew – including Strenge – to make this shot. Hoffberg physically controlled the camera. Blumel worked the motorized zoom and Wolk pulled the focus. As the camera panned back and forth, there was an exposure change so Strenge handled the lens stop. Four pairs on hands were on the camera but the scene went smoothly. (267)

The zoom was not, however, the only lens used in the production of this episode of *Marcus Welby, MD*. Kerns describes two scenes in which a prime lens was used to shoot singles: in the case of a scene which called for the examination of teenage character Richard Ross (Peter Hooten):

the master scene was made with the Angenieux zoom lens covering both actors. When the director was satisfied, he ordered close-ups of both actors. Strenge replaced the zoom lens with a 75mm lens. He changed the position of the key and the fill light as each actor was photographed in close-ups. (269)

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Nor was the zoom the exclusive means of obtaining a sense of movement in the sequences: for a subsequent scene on the same set, involving Kiley (Brolin) and the priest, Father Morley (Patrick Tovatt):

> the master scene […] was a combination dolly and zoom action. While the camera dollied across the set parallel to the actors, the boom was lowered slightly and the lens slowly zoomed in. Strenge turned on a small lamp mounted on the camera just over the lens. It was an eye-light known as an 'OB'. As the camera dollied and the players moved about the set, this little lamp kept just the right amount of light on their faces. Incidentally, the assistant cameraman had to crouch precarious on the crab dolly with his zoom control while this shot was made. (269)

The zoom is a prominent feature in each of Kerns' descriptions of scenes filmed on the day he observed, yet neither Strenge nor any of the other crew members comment on this directly. It is clear that other techniques are in use: prime lenses for singles, a certain amount of dolly movement, and the Arri IIC, which Strenge describes as "indispensable […] in making hand-held subjective shots" (266).

The completed episode accords with this account of production practice. Some camera movement is evident, but it is generally limited to short, oblique lateral movements, apparently along dolly tracks – as Kerns notes, "the set was quite small with very little room to move about in" (269). Where significant alterations of scale or depth are called for, they appear to have been performed using the zoom lens. During the episode's pre-credit sequence the first shot of a cramped apartment depicts a child playing with a baby on a low bed. A zoom out brings the rest of the apartment into view, showing the girl's father opening the door to Welby (see Figure 50). At the end of the pre-credit sequence, another zoom works in the opposite way, moving in from a medium close-up encompassing a hospital bed, Welby and Father Hugh, to a close-up

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of the priest, who is suffering an asthma attack. This is in common with the general practice on the series of frequently ending acts on a sharp zoom (see Figure 51).

Subsequent scenes show the zoom generally used in the same way: not exactly to replace camera dollying, as the technique is in no way imitative of it, but to pick out subsections of an overall scene for closer attention. This is different from "isolating detail in the frame" mentioned by Cook, and much more like the "structur[ing of] scenic space by hovering and focusing selectively within it" that he links to European New Wave cinema (362). In the scenes which immediately follow the pre-credit sequence, zooms – alternatively -in and -out – move between two pairs of key framings, showing a wider view of a waiting room, and a closer shot of the receptionist's desk (see Figure 52). In the next scene, involving the examination of a teenager's tennis injury, and consistent with Kerns' description, this opening master shot is followed by a shot-reverse shot sequence through the ensuing conversation, from camera positions ostensibly perpendicular to the master shot (see Figure 53). At the conclusion of the conversation, the master shot returns. Welby's nurse enters through a door and the camera simultaneously pans and zooms to show her inspecting an x-ray; and, when she has finished doing so, the zooms extends further to an extreme close-up of the x-ray itself (see Figure 54). On another occasion, a character – a teenage girl (Ronne Troup) whom Father Morley is counselling – gets out of a chair and walks towards the camera, which zooms out to keep her consistently framed and reveal her broader setting. The camera then tracks the teenaged girl to another more distant part of the set, zooming in as she sits down in another chair, to establish the beginning of another shot/reverse shot sequence depicting her conversation with Father Morley. Kerns' observation of shooting was, it appears, made purely on sound stages and the Universal studio backlot, and the article makes only passing mention of location shooting in and around Santa

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Monica. However, a scene shot on location for "Neither Punch Nor Judy" indicates that the zoom was used for purposes consistent with those of studio-based shooting. In the episode, Drs Welby and Kiley go to lunch at a shoreside diner. The first location shot covers the entry of their car to the restaurant car-park, then zooms in to pick the pair up as they walk towards the camera, in conversation (see Figure 55).

Zooms are not always 'perfect' in *Marcus Welby*. On occasion, they are performed hastily and 'adjusted' at the end of the zoom. What does *not* occur in this episode – at least, not in a way which is revealed by the final edit – is for the zoom to entirely take over the framing and staging of entire scenes. As with mid- to late-1960s feature films, forms of camera movement other than the zoom are evident, and as Kerns describes, a separate lens is used for single shots added later in editing. The following year, Kerns returned to Universal City to spend a further day with Walter Strenge as he filmed "'Owen: Marshall, Counselor-at-Law', a two-hour feature for the World Premiere television series" ("Using The Zoom…" 226). This time, rather than presenting a general overview of shooting routines and techniques, Kerns framed his observations within the context of Strenge's enthusiasm for the zoom lens. Kerns notes that:

> With the recent improvement in the overall quality of varifocal or 'zoom' lenses, it was inevitable that cinematographers would come to rely on them as a general, all-purpose lens. Not only has the zoom lens replaced a number of primary lenses but, because of its unique ability to continuously change the focal distance, is able to create the illusion that the camera is moving towards or away from the scene. In a sense, the zoom lens can all but eliminate the dolly in making moving camera shots. (226)

In this context, Kerns adds:

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Strenge was on the 21$^{st}$ day of a 23-day schedule. He said that so far he
had photographed *every scene* in the picture with the Angenieux 25mm-
250mm lens. 'It has not been off the camera except to be cleaned and
checked each evening,' he added. (226) [104]

Kerns describes the shooting of a typical scene in which the zoom lens is used in place
of a dolly:

The company was working a cramped set. It was a small bathroom with
stall shower and wash basin. As the scene opened, Arthur Hill was seated
cross-legged under the washbasin repairing the drain. Sorrell Booke
entered from a door and moved over to where Hill was working, stooped
down and talked with him. The Mitchell camera was mounted on a hi-
hat. The varifocal lens picked up Booke as he walked into the room and
dollied with him over to the wash basin where Hill was working. (226-7)

Strenge emphasises the versatility of the zoom, suggesting that in addition to replicating
shots made with a dolly, the zoom could capture shots:

that would be difficult, if not impossible, to capture with the camera
moving on the dolly. For example, this lens can travel down the length of
a table, move up a staircase or jump across some large prop. There is
really no limit to the type of shot you can get with a varifocal lens. (227)

In this article, Kerns describes in greater detail the operation of the "Joy Stick"
electronic zoom control, which enabled its operator, Walter Bluemel, to zoom in or out
at a consistent rate and to "'feather' his moves at the beginning and end so that it
virtually duplicates the gradual starts and stops that a regular camera dolly makes" (228;
270). This level of electronic control, however, did not reduce the complexity of
operation: while Bluemel "handle[d] the focal changes on the lens", fellow assistant
camera operator Max Wolk "control[led] the focus knob" (270). As on the set of

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[104] However, in the same article Kerns notes that Strenge, exceptionally, had used a 25mm lens to capture
a wide shot (228).

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*Marcus Welby, MD*, studio operations still involved at least two pairs of hands on the camera.

Kerns' article on "Owen Marshall: Counselor-at-Law" has a significance beyond its descriptions of production practices. It also engages, in a way that his article on *Marcus Welby MD* does not, with considerations of the aesthetic impact of the zoom lens, and addresses a number of potential criticisms of the device. It is a strident declaration of the benefits of the zoom lens, of the sort that had not appeared in *American Cinematographer* since Richard Moore's article in 1965. It promotes the use of the zoom lens not only in its text but in its headline – "Using The Zoom Lens Creatively" – and standfirst, which summarises the article's argument:

> "In the hands of a skilled 'Pro', the much-overused and abused zoom lens becomes a fluid varifocal instrument that saves a great deal of valuable time in production and can 'go' where no crane or dolly could ever go. (226)

Two self-evident themes are particularly pronounced: as good as the zoom lens can be, it relies upon technological progress (a good quality lens) and skilled operation (a highly professional crew). Kerns emphasises Strenge's personal qualities, mentioning that he won an Emmy for his cinematography of *Marcus Welby MD* (226), and also points to the experience of his colleagues:

> Strenge said that he was fortunate in having the same crew that had worked with him on the *Welby* show […] These men had all worked together as a team for a long time. There was no wasted time or energy. Everything moved with the kind of efficiency one has come to expect from Hollywood crews. (228)

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The importance of a well-trained, 'professional' crew is emphasised by Strenge's descriptions of his own use of the zoom – compared with that of unspecified others. Strenge tells Kerns:

> I prefer to call [zoom lenses] *varifocal* lenses. Unfortunately the term 'zoom' has come to mean for me a lot of aimless, wild shots into nowhere. When used properly, the varifocal lens is a wonderful tool, but if used with wild abandon, it can become rather boring. Varifocal is really a more accurate name because the lens combines a wide range of focal lengths housed in a single optical system (227)

Strenge adds:

> The secret in making an effective dolly shot with the varifocal lens is to start the lens move *when the player begins to move or when the camera is panned or tilted*. The player should be making some sort of obvious movement such as walking in to the shot, sitting down, arising – things like that. The lens should be started slowly, the speed increased, and then brought to a slow halt. Focus must be consistent with all lens moves. And a good, motorized zoom unit is essential. (227) [105]

The technological advancement of the zoom lens is also emphasised, though the lens in question – the 35mm version of Angénieux's 10:1 zoom lens – had not been significantly changed since its introduction in the early 1960s. Nevertheless, in addition to citing "recent improvement[s] in the overall quality of [zoom] lenses" (226), Kerns also remarks that "according to Strenge, the resolution [of the Angenieux zoom lens] is as good as – if not better than – any of the prime lenses he has used" (227). Of equal, though relatively unremarked, significance are other developments and innovations discussed in the article – especially Kodak 5254 film stock and the Joy Stick zoom control.

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[105] Original emphasis.

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The pilot episode indeed shows comprehensive and complex use of the zoom shot, in excess of that which appears in *Marcus Welby MD*. One interior shot, for example, begins with one character in the foreground and another in the background: the foremost character makes a drink, and is followed across the set by a zoom shot. The camera rests, then follows the pair as they walk to a couch, where they sit down, a further zoom moving in to frame them in a two-shot. The sequence is intercut with some singles, but the master shot follows purely with zoom shots. The episode also includes some relatively extreme and rapid – shifting from two-shot compositions to head-and-shoulders singles. Frequently, such zoom shots are combined with other forms of camera movements – especially panning. This style can also be seen in the second season episode "Love Child" (9 November 1972), which in addition to frequent zoom shots whenever characters move around the set, includes some considerably more 'stylish' uses of the zoom which purposefully direct the visual and mental attention of the audience. In an early scene, the zoom pulls back from a medium shot of two young women in a swimming pool, before resting on a new medium shot of Owen Marshall and his companion at the poolside, with the women in the background (see Figure 57). In another scene, the zoom is used in combination with the panning camera to explore and break down the space in a hospital room; in the same scene, a trivial movement in staging (a character sitting down on the side of a bed) is depicted through an adjustment of the zoom lens. As in *I Spy*, the zoom is also used to animate point-glance spatial relations, reflecting the attention of characters in the mise-en-scene; but in the more cramped interiors of *Owen Marshall*, such shots seem both more obvious and more intense (see Figure 58). The zoom, finally, is also frequently used at the beginning and end of acts (before/after the insertion point for a commercial break)

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Critical discussions about Altman's zoom, as far as they concern themselves with style, can also be applied to Strenge. Whether his zooms might also be seen as "jazz improvations on a fixed melody" is open to debate, but there can be little argument that in *Marcus Welby* and *Owen Marshall, Counselor at Law* exerts control over the spectator's gaze just as Karp notes that it does in early Altman (25). Furthermore, as in Wood's account, much of its significance must lie in its obtrusiveness, for in these televisual examples the zoom is not merely used as a form of concealed tracking shot, but also appears alongside and in conjunction with physical movements of the camera.

However, there is more to critical assessments of Altman's zoom than innovations in attention-direction and spatial structuring. It is more difficult to judge whether the zoom as it appears in the television examples above really "structure space", "dissolve space" or "undermine reality", though there are moments, especially when the zoom is being used to describe madness as in *Breaking Point* or *Peter Gunn*, when it must come close to doing so. Similarly, the claim that Altman's zoom is self-conscious, insofar as it helps the director to "[assert] his own presence in the film", is one with few analogues in accounts of television from this period: Caldwell's discussion of the television auteur relates more strongly to later 'quality' television, and the most famous auteurs of American television's Golden Age were the playwrights: Paddy Chayefsky, Gore Vidal, Delbert Mann, and others. Yet it stretches the boundaries of logic to argue that, if an obtrusive or overt zoom in a film of Robert Altman's can be theorized as an expressive of directorial intention, a similar zoom in a contemporaneous television production could not be similarly described. There would be many arguments against such a position, the most obvious deriving from an auteurist conception of the primacy of the director; however, this would be easily challenged by a great deal of

recent film theory and criticism, as well as by the fact that the producer, director, creator and writer of *Marcus Welby, MD* are each credited prominently over the opening scenes of each episode of the show, following the form of contemporaneous films (see Figure 56).

Questions of television authorship as against cinematic authorship are beyond the scope of this study, but given the stylistic similarities between television and Altman in the early 1970s, the zoom lens would seem to highlight their significance. That the same style, and the same progression in style, can be detected in the work of each suggests that directors may not have had the primary responsibility for introducing and developing zoom shots to film and television. It also provides further evidence for the assertion that the stylistic shift thought to have taken place between film and television may have been a shift shared simultaneously by both mediums. The parallel between the work of Altman and of Strenge suggests that the view of Altman as exceptional with regard to his use of the zoom is somewhat ahistorical. This further emphasises the importance of a broader view of the film and television industries, which not only addresses questions of authorial voice and individual creative decisions, but also examines the complex interaction between personnel and technological systems. The significance of the foregoing enquiry in this respect is summarized below, along with some suggestions for further work to address the zoom as a socially-shaped technology, and a case for a more detailed examination of the interplay between early postwar American television and the Hollywood film industry.

## The Social Construction of the Zoom Lens

Until now, histories of the zoom lens have concentrated on the outcome of the device – the zoom shot and its meanings – and have barely addressed the significance of the way

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in which the technology itself was developed. In drawing conclusions, it is possible to look through a number of interpretative frames, each of which suggests a slightly different approach to the events. Social histories of technology lead us to emphasize the complexity of invention and innovation, and to consider how each development represented a radical or incremental advance over previous technologies.

This investigation shows that there is a complex and interesting set of working practices and motivations behind the development of the Zoomar lens. The story which emerges is consonant with other accounts of technologies innovated during and after the Second World War. There is a particularly strong parallel with Eric Hintz's account of the development, by Samuel Ruben, of miniaturized batteries. Both Ruben's work and Back's took place ostensibly outside of the auspices of large-company research and development, and under the supervision of individual independent 'inventor' figures. In both cases the United States Signal Corps appears to have acted as an incubator for technologies which would later be turned to civilian purposes. Like Ruben, who "worked on a fascinating assortment of defense-related ideas" (Hintz 31), Back turned his hand to numerous forms of innovation. In both cases, once the war was over, civilian innovation of wartime technology did not take place immediately or automatically. As Ruben needed to "fix certain technical problems" (31) with his battery technology, so Back needed to alter the systems he had designed in order to encapsulate them in products which would be of use to peacetime camera operators. Furthermore, just as Ruben's miniature batteries did not meet their full potential until transistors allowed for the further miniaturization of other components in electronic devices, so Back's Zoomar lens – newsreel applications notwithstanding – awaited television for full innovation.

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Parallels to the innovation history of the Zoomar lens can also be found in the histories of the development of processes as disparate as Cinerama and crystal radios. The widescreen projection technique known as Cinerama was developed by Fred Waller and exhibited at the 1939 New York World's Fair, before being "adapted for the military during World War II as an aerial combat simulator for gunnery practice" (Hall and Neale 141). After a number of false starts, the system eventually gained investment and wider use. As Belton notes: "Cinerama [followed] a classic pattern of uneven development, charting a course across several different media […] and through a variety of industrial domains (the armed services, the motion picture industry)" (*Widescreen Cinema* 99-100). Crystal radio technology underwent a similar process of military-catalysed innovation: Richard J. Thompson's account describes how the "Signal Corps Procurement Planning Section" (33) carried out a scoping exercise similar to that hinted at by L. D. Wallick's letter to Frank Back (see page 88). As a result of that exercise:

> [It became] clear to the Signal Corps that something had to be done to augment the production capacity of the crystal industry; in fact, a real mass production industry needed to be created. Likewise, the Signal Corps realized that the job was too important to have the work scattered throughout several of its different branches. A new section devoted entirely to the production of quartz crystal oscillators was needed. (33)

The ensuing innovation process fostered "a remarkable spirit of cooperation – cooperation among private industry, the Signal Corps, and various government agencies" (32) which led to a transformation in the state of the industry. Whereas in 1940 "no more than two dozen companies could be found in the entire country that played any role at all in the production of crystal oscillators", by 1944 "150 crystal manufacturing companies" attended a conference in Chicago, organised by the Signal Corps (31). It is clear that variable focal length lens technology was only one of a

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number of technologies nurtured by the defence establishment of the United States during the Second World War.

This interpretation has important implications for the way in which the development of the Zoomar lens is historicised: in particular, it emphasises the extent to which chance was a factor. The trajectory of Back's career was not predetermined, but shaped by numerous external forces. As Williams and Edge remark:

> Central to SST is the concept that there are 'choices' (though not necessarily conscious choices) inherent in both the design of individual artefacts and systems, and in the direction or *trajectory* of innovation programmes. If technology does not emerge from the unfolding of a predetermined logic or a single determinant, the innovation is a 'garden of forking paths'. Different routes are available, potentially leading to different technological outcomes. (866)

By chance, Back was born and educated in an Austria at a time when that country's academic institutions, in the fields of physics and engineering, were strong. Equally by chance he had an early opportunity to visit the USA on business, and this may have given him an advantage when he emigrated to the United States in 1939. These factors coincided to place Back in the right place, and at the right time, to design and build a new form of zoom lens. In an article for the *Journal of the Photographic Society of America* in 1950, Back himself noted the broader movement of which he had been part:

> Oddly enough, these great strides in lens-making progress have come about simultaneously with a shift of the photographic center of the world from the eastern to the western hemisphere. America today leads the world in the production of high quality lenses. Before World War I, most good lenses were made in Europe. But gradually – thanks to scientists here and many who came here from abroad – this country has taken the lead in high quality lens production. (Back "Optical Lens Development" 62)

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Back's career history suggests that he might as easily have specialized in viewfinders, or further improvements to flight simulation, or endoscopy; or returned, in peacetime, to Austria. Emphasizing the degree of chance involved in the development of the Zoomar lens is a useful corrective to the 'great man' approach which has seen Back described as the "'father' of the modern zoom lens" ("Industry News" 646). It reminds us of the complexity of the inventive process, and of the innovative culture to which Back was contributing.

However, this interpretation takes us only so far. Though it was happenstance that placed Back in a position to develop the Zoomar, it was not entirely by chance that once in that position, he ended up doing so. Close parallels with Hintz's account of Ruben and with Waller's development of Cinerama, as well as broader institutional parallels with the development of crystal frequency control radios, suggest that Back's success was due partly to the efficiency with which the mobilizing, wartime, and postwar United States enabled skilled personnel to contribute their expertise to the war effort, and thereafter enabled them to commercialize elements of their inventions. Though Back may not have envisaged it when he emigrated, the innovation and commercial policies of the United States government were calibrated to encourage him to invent something of use to the war effort, and then build a profitable business around that invention.

Moreover, in addition to the discrete innovation stories behind technologies as diverse as the zoom lens, portable batteries, Cinerama and crystal radio, it is possible to begin to reconstruct social networks which may have formed around a community of innovators and companies, especially around New York City, who worked closely with the military establishment in order to solve problems for their mutual benefit. It is known, for example, that Fred Waller met Frank Back at least once: the two men

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presented papers at the same SMPE technical conference panel on 15 October 1945. In addition to sharing a common platform to spread news of their inventions, the two men also shared a common sponsor in the United States Navy, and had both exhibited technologies at the 1939 World's Fair in New York (Ehrenhaft and Back 231). Back and Ruben both worked in association with Signal Corps Engineering Laboratory at Fort Monmouth, New Jersey – as did the men and women contributed to the effort to invent and innovate crystal radio technology. It seems clear that there was a vibrant and interconnected network of scientists and technologists, clustered around the industrial cities of the Eastern seaboard of the United States. While the individual accounts of the inventions discussed in the preceding paragraphs have given details of these networks as they pertain to the individual invention in question, there may be some benefit to taking a broader view of these networks, and examining the extent to which the overall network functioned to promote innovation, and thereby to influence visual, artistic, and communications culture in the United States and beyond.

This addresses only the inventive stage. The Zoomar lens was also innovated, with great success; indeed, its innovation may be the characteristic which does most to make it stand out from other zoom lenses developed around the same time. It is known that Zoomar's marketing during the 1940s and 1950s relied upon a hands-on sales approach. Back, Pegler, Fairbanks and others (a significant number of people, most of whom are anonymous, and their job descriptions and training unknown) sought to influence personnel in the film and television industries. The evidence suggests that they did this much more in personal meetings and visits, and at trade conferences, than simply through the trade press. In these venues they also interacted with other companies. Because of the ensuing court case, most is known about Zoomar's interaction with Paillard; but it would be safe to assume that Zoomar staff shared ideas

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and maintained rivalries with numerous other related companies. The extent and manner of such relationships, Paillard aside, are largely unknown. It is possible that through a gradual accumulation of industrial awareness of the Zoomar lens, coupled with energetic salesmanship, Zoomar encouraged more and more television stations to adopt their technology. This, however, is a conclusion based on available evidence. The truth may have been different to this best-guess. Despite the best efforts of this study, many aspects of the marketing of the Zoomar lens remain mysterious. It is not known, for example, whether Back, Fairbanks and Pegler's initial decision to sell to newsreel companies, before changing their focus to television, was a strategic decision or a misstep. How Back and his business partners met, how they organized themselves, and who was primarily responsible for investment, and research and sales decisions – all remain mysterious. Though the NBC evidence gives some strong indications, these are limited to a single company and point in time.

At the other end of the interpretative spectrum is the possibility that, from the perspective of end-users, the Zoomar lens appeared sufficiently radical and disruptive, and its advantages so self-evident, that it needed little active marketing. In this interpretation it may be suggested that, while sales trips, positive references in periodicals, word-of-mouth and advertising influenced the success of the Zoomar lens, they did so in a relatively minor way. Indeed, the Zoomar lens fits quite neatly within aspects of Bower and Christensen's definition of a disruptive technology. While Zoomar lenses offered the unique ability to vary focal length, the device "perform[ed] far worse along one or two dimensions that are particularly important to […] customers" (Bower and Christensen 45). It was large and heavy, its image quality was relatively low, and its minimum focusing distance long. However, the number of television stations which bought and used Zoomar lenses suggests that the capacity to

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zoom was adequate compensation for the product's deficiencies. Though the Zoomar was not disruptive to the extent that zoom lenses immediately supplanted turret-mounted primes, the re-engineering of Walker's zoom as the RCA ElectraZoom, further developments by the Zoomar company, and the patent battle with Paillard, all suggest that the introduction of the original Zoomar was a disruptive development which was followed by the introduction of a succession of new models which aimed to improve not only the disruptive (variable focal length) feature, but also on the technology's sustaining qualities of size, image quality, and focusing distance.

A previous study suggested that, based on evidence from trade periodicals and film texts, the Angénieux 10× lens was probably an incremental rather than a radical development (Hall). Investigation of the Zoomar lens supports this theory, and the innovation history of earlier lenses offers valuable evidence to support this point. It is entirely consistent with Bower and Christensen that Zoomar did not long remain the market leader, but were instead supplanted by other companies Berthiot/Paillard, Angénieux, Panavision, and Canon. Zoomar's disruptive zoom lens became a sustaining technology which was developed further by other companies: it was the other companies who did the work of moving the zoom lens along the expected performance trajectory, making it smaller and lighter, and developing lenses with higher zoom ratios and better image quality. However, much of this history remains only partially explored, or not at all. The variety of possible interpretations detailed above expose lacunae and ambiguities. Some of the gaps will never be filled. However, further work is possible that can shed additional light on the history discussed here, either by adding information to the current account, or by growing aspects of the study in directions which appear promising. The final section of this conclusion suggests some of these potential future studies.

**Mapping Future Enquiries**

As the introductory chapter stipulated, this study has narrow chronological and geographical limits. Throughout the 20<sup>th</sup> century zoom lens development took place in numerous countries: in France, Germany, the USSR, Japan, and the United States. It is likely that auxiliary technologies such as motorizations were developed in a wider range of countries: it is known, for example, that in Italy Roberto Rossellini helped to develop such a device for use with the Pan Cinor zoom lens (see footnote 70). As this study has proved to have broader implications for film and television studies, so studies of the zoom lens in other national and transnational contexts might be useful. One place to start, for the researcher with French language skills, may be in the company archives of Angénieux, SOM-Berthiot, and Paillard-Bolex. Given that many European filmmakers made striking use of the zoom shot during the 1950s and 1960s, and that in many cases their zooms were more adventurous than those seen in Hollywood, it seems reasonable to assume that investigating the history of zoom lens innovations in the European context might shed further light on the development of such film styles. In addition, while numerous critics have linked European approaches to the zoom to developments in Hollywood cinema, little primary evidence has been offered relating to the mechanics of this relationship. No such evidence was uncovered in the course of this study, but a broader investigation which encompasses the careers and working practices of European directors, and looks beyond the trade press, might be illuminating.

> In addition to expanding the geographical scope, further research might enquire more deeply into zoom lens development taking place beyond the chronological limits of the study. Asking questions about zoom lenses may be a productive entry point for broader research relating to early film technology. The work carried out by Rolla T. Flora and Joseph Walker in the 1920s, in conjunction with Paramount's interest in the

Magnascope variable focal length projection lens, suggests a substantial level of inventive effort, some of which may have been supervised or aided by Fred Waller, who worked for Paramount's special effects department in the 1920s (Belton, *Widescreen Cinema* 99). Little detail was uncovered by this study as to the development and marketing of the RCA ElectraZoom; the company archives of NBC and RCA may shed light upon this. The extent to which company records and trade periodicals may enlighten us as to this period is unclear, but it is an obvious area of interest to this enquiry. Earlier still, further work may be needed in order to more fully describe how the optical industries of the 19th century – including nascent photography, pre-cinematic entertainment, and astronomy – related to the emerging film industry. While existing historical accounts (for example Kingslake and Morrissey) acknowledge the role of telescope designers in advancing the art of variable focal length lens systems, little interpretive work has been done to demonstrate the extent to which these innovations were connected to later zoom lenses. Finally, the hint of a 'zoom' of some sort in late 18th century lantern shows is intriguing, especially in light of later pronouncements about the zoom's 1960s and 1970s modishness. Further research may help to indicate the extent to which 'zooms' in lantern shows were commonplace, the effects that they may have had on audiences, and whether it is valid to suggest – as this study does, tentatively – that they may be cognate with the zoom shot seen in modern film and television.

In addition to looking further back into history, the more recent past must not be neglected. The major gap in source material in the current study has been in insights into the innovation, research and development strategies of the companies concerned, and information about working practices and decision-making procedures in film and television production. Therefore, discussions with current lens manufacturers and users of zoom lens technology might be of use to future generations of historians.

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Furthermore, though some historical and critical accounts locate the zoom in the 1960s and 1970s, the briefest sampling of film and television since reveals that zoom shots continue to appear in films and television programmes, with as diverse a set of applications as seen in the 1960s or 1970s. In addition, recent film style has sometimes incorporated small jerky zoom adjustments as a means to generate a sense of nervous energy or cameraphone-age verité; this technique can be seen in *The Hurt Locker* (Kathryn Bigelow, 2008), *Cloverfield* (Matt Reeves, 2008), and numerous others. In television, the technique is a staple of high-tension series such as *24*. Even in *The West Wing*, which is defined by its sedate Steadicam-based mobile frame, the zoom is occasionally used to animate moments of high tension, such as a fight between two characters in "Drought Conditions" (23 February 2005), and a hectic political convention in "2162 Votes" (6 April 2005). Zooms also continue to appear regularly in news and sporting coverage across the world.

Beyond the outgrowths and extensions of the present project, there is also potential for a number of studies with tangential connections to the research presented here. Key among these is the need for a more detailed, empirical, formal history of early postwar American television style. Numerous books have been published on the subject of postwar and 'Golden Age' American television, but few give much information as to what television programmes were like during that period, and still fewer discuss specific examples of programming – especially where non-live anthology drama programming is concerned. Caldwell is a notable exception, offering detailed discussion of *Texaco Star Theatre*, *Leave It To Beaver*, *Peyton Place*, and others; many examples describe specific episodes and sequences, based on archival viewing (32-72). Numerous volumes offer an institutional account of American television, constructing their historical narratives from the top level, focussing on institutions and executives, rather than

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programme-makers and audiences. Other texts appear to give details about a wider range of television programme, but on closer inspection often prove largely to consist of basic data (air date, actors, guest stars, ratings, writers, critical reception, etc) rendered to prose: useful to the fact-checker, but again lacking a qualitative sense of what the audience might have seen. In the course of unfolding their institutional histories, media historians have included numerous anecdotes from television production, and in some cases, the style and tone of television productions has been outlined. The anecdotes are frequently dramatic or spectacular: accounts of live television dramas often emphasise the great trouble to which directors and set designers went in order to bring drama to life in a small studio. One account describes a studio transformed into the Mississippi River, filled with so much water that managers feared the floor would collapse. Another describes lavish provisions made for the first Hallmark Hall Of Fame production: "'a mammoth studio' replete with 40-foot castle walls, 'immense interiors of Westminster Hall', massive baroque designs, and wide, open exterior sets" (Sturcken 88). Such anecdotes tend to reinforce the notion of early television spectacle, and they have the benefit of making for lively reading. However, comparing recollections and contemporaneous accounts with programmes-as-broadcast often shows that what the audience saw was not what the crew committed to memory – or believed it was producing in the first place. Effort does not always equal effect.

Critical narratives around multimedia offer the second reason to fill in the television style gap. Many historical accounts of American television mention – and in some cases are framed around – the relationship between, and convergence of, American television and Hollywood film. In film studies, much has been made of the impact of the 'TV Generation' whose stylistic innovations have been seen as a foreshock of the New Hollywood. A full and meaningful account of American

television style would mean looking beyond live television drama and into the less auspicious corners of American television. In addition to prestigious, feature length drama, networks also produced significant quantities of shorter-form drama and quiz shows (including, as Jack Gould complained in 1952, "pedestrian little half-hour quickies that [clutter] up the networks"). These, it may be assumed, are less well-preserved – but recent academic practice urges that it is beneficial to be inventive about how 'lost' television can be analysed. Jason Jacobs describes strategies for the analysis of television when recordings are not extant – drawing on accounts of production, scripts, photographs and studio floorplans. In Jacobs' wake, further research is currently underway, looking into British television productions not always available for analysis. Numerous recent textbooks and histories detail the ways in which television can be discussed in formal analytical terms.[106] Brett Mills has written of the dangers of "invisible television". Highlighting the case of recent, long-running programmes which "lots of people watch" but which generally escape critical notice, Mills identifies "the focus on the new" and the "issues of access" as two of the reasons why important television texts can be critically neglected. In the case of some of the television identified here, both issues appear to apply. However, this study has demonstrated that early postwar American television programming may be more readily accessible than it has been in the past. If this is the case, then there is scope for further investigation into this important but in many ways relatively unknown aspect of media history. Furthermore, while the programmes discussed above are anything but new, they have fresh and challenging implications for the critical context around film and television.

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[106] For a list of recent introductory texts on television studies see Butler, *Television Studies: Critical Methods And Applications*, 359.

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Mills' argument, that invisible television should be rendered visible, must apply to the historical as well as to the contemporary.

The zoom lens changed film and television; film and television changed the zoom lens. As Wood observes, in relation to the growth of the zoom shot in the cinema: "the implication of such changes cannot be formulated simply" (8). As far as the cinema is concerned, substantial attempts have been made to express the complexity of the zoom and its meanings. Yet in attempting to account for the intermedial history of the zoom shot, and in attempting to express the relative significance of formal and technological history, reductive formulations have been relied upon. The deceptive simplicity of many such analyses belies the uniquely varied set of meanings carried by the zoom lens, and denies the complexity and passion of the reactions it provokes. Away from theoretical and critical approaches to cinema, this study opens doors to numerous other histories and disciplines, all of which have the potential to reflect back onto film and television history. More should be known of the complex social relationships which underpin the development, innovation, and failure of film technology. More should also be known about the style and stylistic influence of early postwar television, beyond prestige television and memorable comedy. This study demonstrates that the development of the zoom lens was at all times gradual, incremental and complex. It is unlikely that the zoom is the only device to have been treated reductively or dismissively. It is also unlikely that it is the only technology, text, or individual hiding a wealth of valuable historical information. Future studies, emerging from simple questions about everyday technologies, have the potential to reveal such information, and in the process to further advance our understanding of the interaction between film and television style and technology.
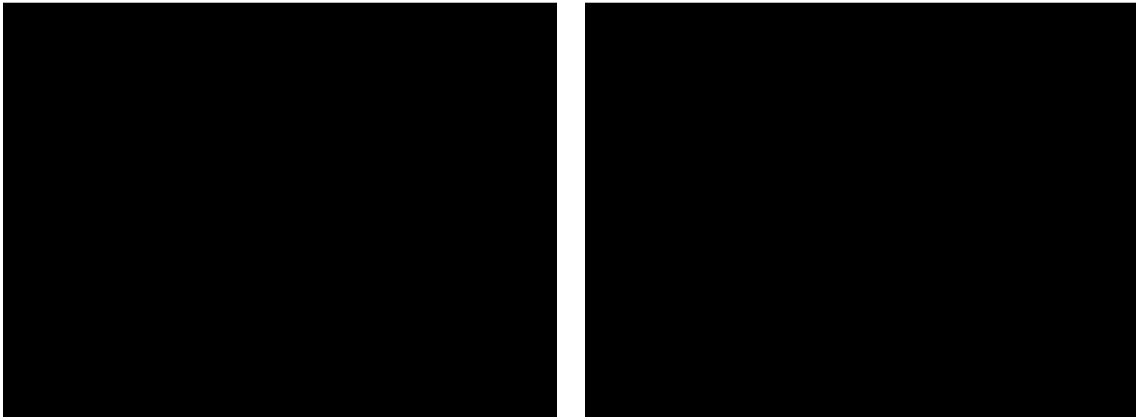
**Figures: Chapter 11**

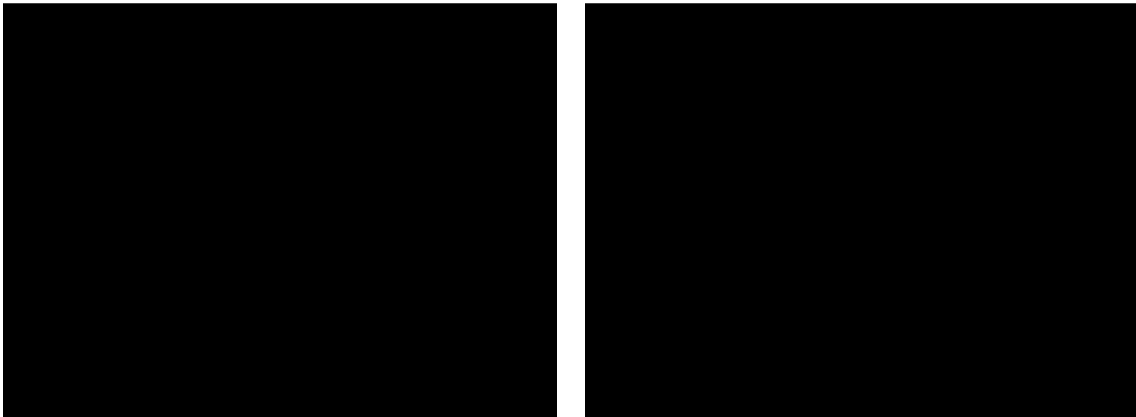**Figure 50:** *Marcus Welby, MD* "Neither Punch Nor Judy" – House-Call

**Figure 51:** *Marcus Welby, MD* "Neither Punch Nor Judy" – Asthma Attack

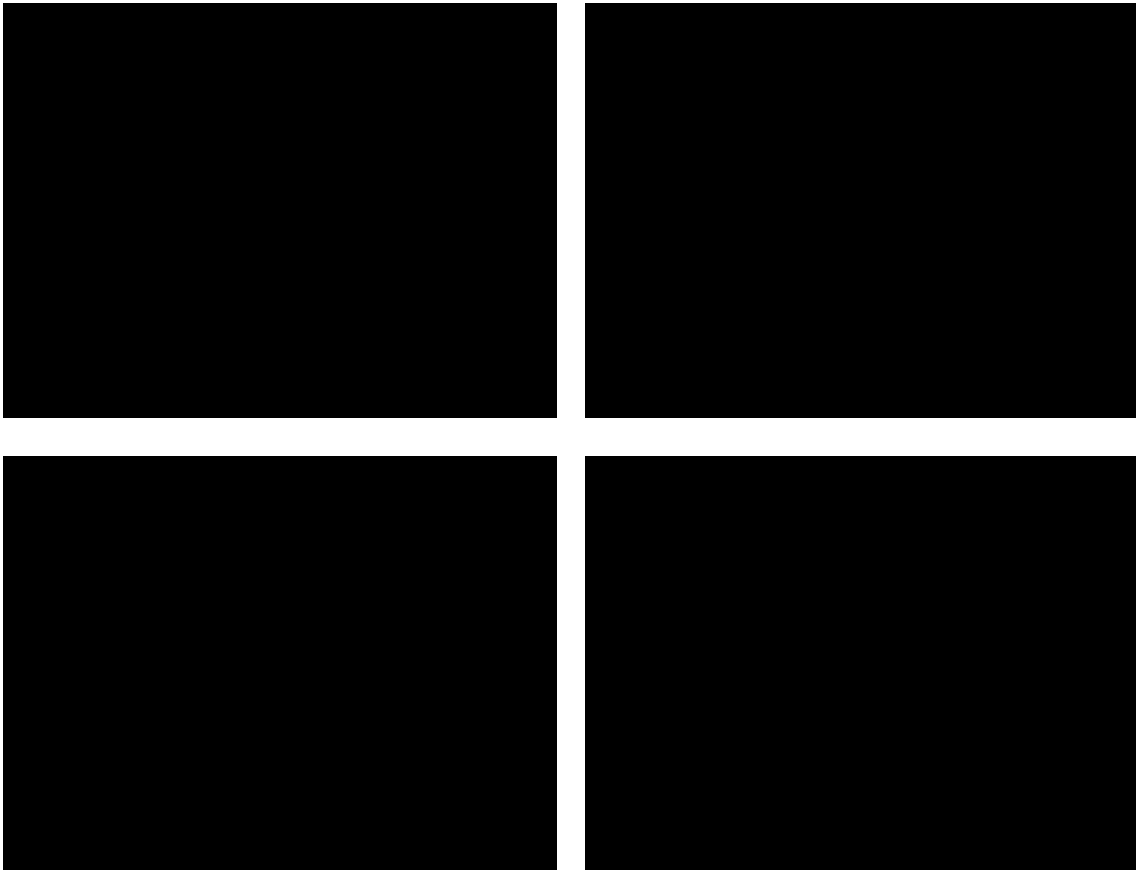**Figure 52:** *Marcus Welby, MD* "Neither Punch Nor Judy" – Telephone

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**Figure 53:** *Marcus Welby, MD* "Neither Punch Nor Judy" – Tennis Injury

**Figure 54:** *Marcus Welby, MD* "Neither Punch Nor Judy" – X-ray

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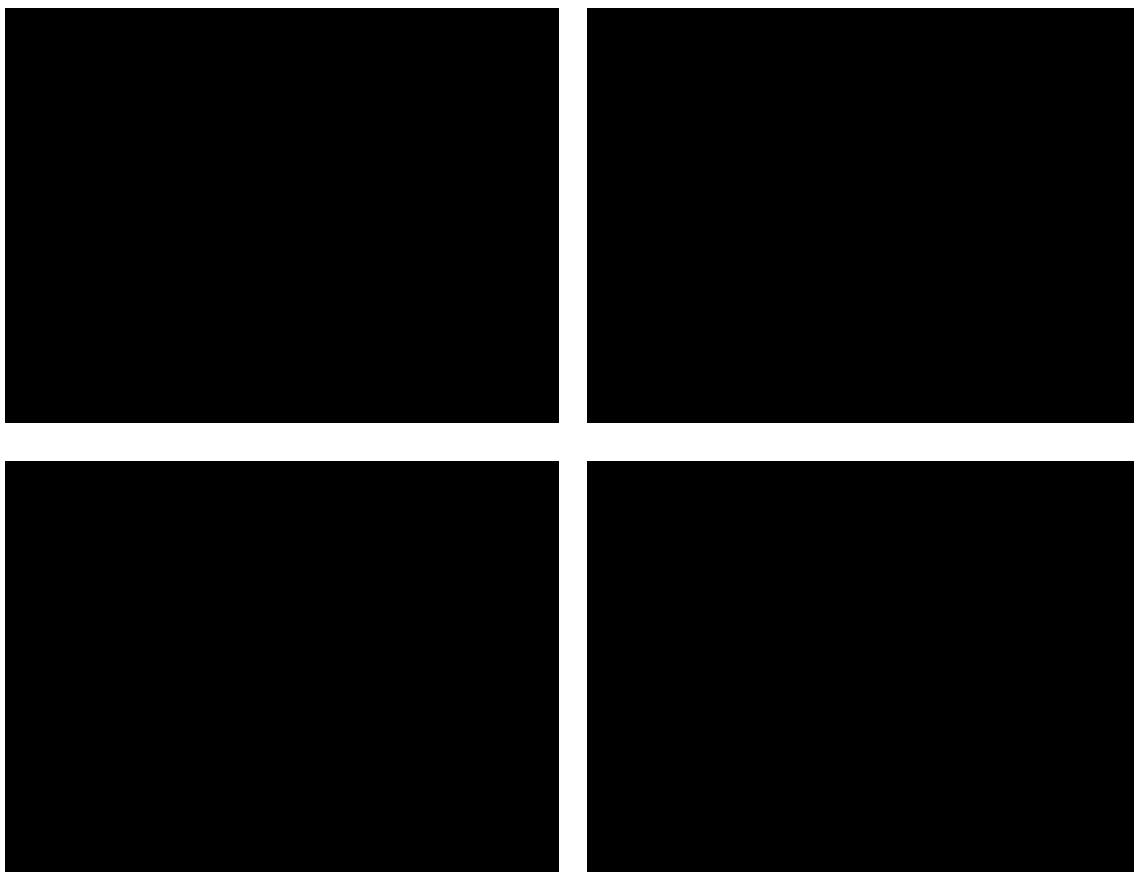
**Figure 55:** *Marcus Welby, MD* "Neither Punch Nor Judy" – Moby's Dock

**Figure 56:** *M\*A\*S\*H / Marcus Welby, MD* – Director credits

**Figure 57:** *Owen Marshall, Counselor at Law* "Love Child" – Swimming pool
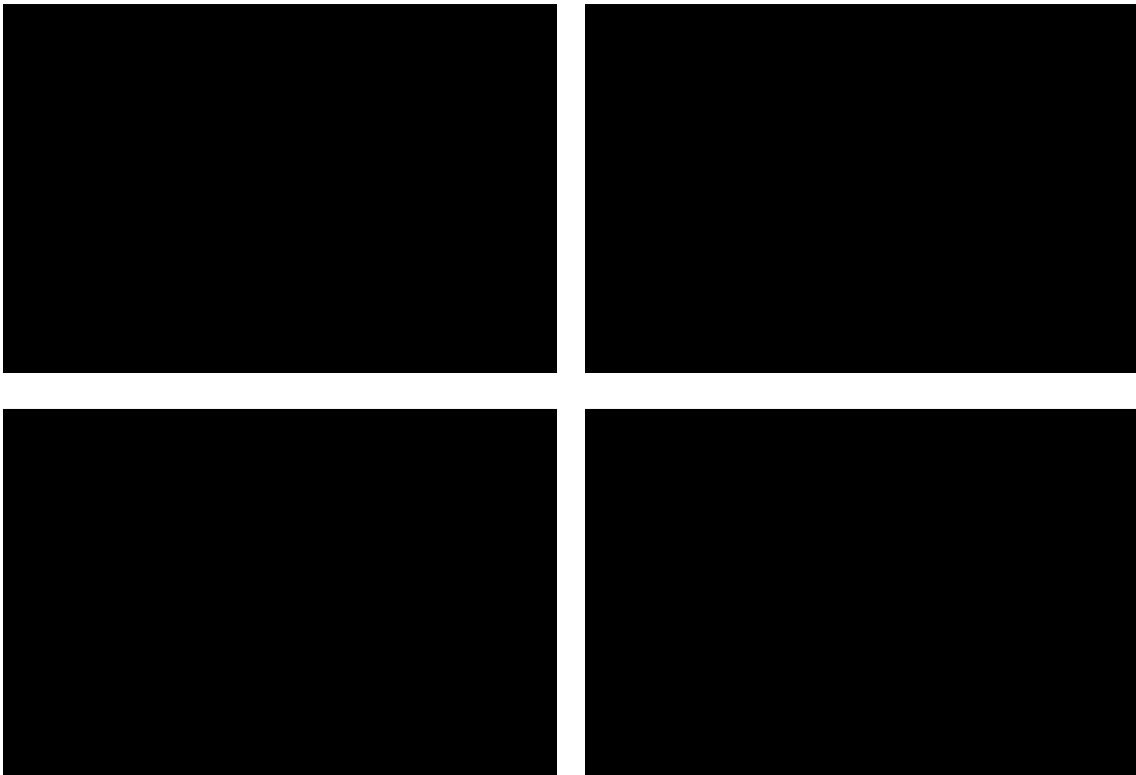
**Figure 58:** *Owen Marshall, Counselor at Law* "Love Child" – Stare-down

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# **Appendices**

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**Appendix 1**

Table of films released before 1970 by Robert Mulligan, John Frankenheimer, Sydney Pollack, and Robert Altman. All were viewed for this study except those crossed-through, which were not available.

|  | **Mulligan** | **Frankenheimer** | **Pollack** | **Altman** |
|---|---|---|---|---|
| **1957** | Fear Strikes Out | The Young Stranger |  |  |
| **1958** |  |  |  |  |
| **1959** |  |  |  |  |
| **1960** | The Rat Race |  |  |  |
| **1961** | ~~The Great Impostor~~ <br> Come September | The Young Savages |  |  |
| **1962** | The Spiral Road | All Fall Down <br> Birdman Of Alcatraz <br> The Manchurian Candidate |  |  |
| **1963** | To Kill A Mockingbird <br> Love With The Proper Stranger |  |  |  |
| **1964** |  | Seven Days in May |  |  |
| **1965** | Baby The Rain Must Fall <br> Inside Daisy Clover | The Train | The Slender Thread |  |
| **1966** |  | Seconds <br> Grand Prix | This Property Is Condemned |  |
| **1967** | Up The Down Staircase |  |  |  |
| **1968** | The Stalking Moon | The Fixer | Scalphunters | Countdown |
| **1969** |  | The Gypsy Moths <br> ~~The Extraordinary Seaman~~ | Castle Keep <br> They Shoot Horses, Don't They? | That Cold Day In The Park |

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