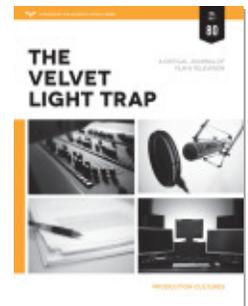"Dancing, Flying Camera Jockeys": Invisible Labor, Craft
Discourse, and Embodied Steadicam and Panaglide Technique
from 1972 to 1985

Katie Bird

THE VELVET
LIGHT TRAP

"DANCING, FLYING CAMERA JOCKEYS"
Invisible Labor, Craft Discourse, and Embodied Steadicam and Panaglide Technique from 1972 to 1985

BY **KATIE BIRD**

ABSTRACT

This article examines how below-the-line discourse shaped the aesthetics and labor of Steadicam craft style. Through over thirty years of industrial training, Steadicam operators cultivated an invisible style to formally mimic a kind of faster and cheaper dolly shot and to mitigate the apparatus's uniquely embodied quirks. This article reexamines how Steadicam's discursive and industrial history with competing technologies like Panaglide potentially destabilizes a coherent narrative of technological and craft evolution. By highlighting the eccentricities of stabilizer craft in the late 1970s and early 1980s, this article explores how the formation of practitioners' athletic training and metaphoric discourse reimagines how we as film and media scholars might account for histories of style, labor, and technology more broadly.

ACADEMY AWARD–WINNING DIRECTOR OF PHOTOGRAPHY EMMANUEL LUBEZKI, ASC, OWES A great deal of his success to the Steadicam camera stabilizer.[1] Whether operated by Chris Haarhoff, SOC, in *Birdman* (2014), Jörg Widmer in *Tree of Life* (2011), or P. Scott Sakamoto, SOC, in *The Revenant* (2015), Steadicam and its practitioners create the freedom of movement so often admired in Lubezki's work and the intangible "organicity" so often described by the films' critics. Steadicam's smooth mobility—relieving the camera from the confines of a dolly track and stabilizing the bumpiness of a hand-held shot—has been its industrial selling point since its invention by Garrett Brown in 1973. Yet the formal possibilities of its embodied quirks subtend a more complicated and contested institutional history.

What contemporary directors or critics might call "organic," many operators might call inelegant, even "bad," technique. Take, for example, a 2010 YouTube video entitled *Steadicam Op vs. Director*, uploaded by user lisagav1.[2] In this humorous industrial critique, an unnamed Steadicam operator used the ExtraNormal Movie Maker generator to highlight misunderstandings between a director's aesthetic demands and an operator's technical, artistic, and professional craft. In the video, the director explains the vision for the Steadicam shots to an operator: "I guess what I'm looking for is for it to be a bit more organic. . . . Does it have to be so smooth? Can you rough it up a bit?" The operator responds, "So you don't want a handheld shot? I can just operate badly if that's what you want?" The unspoken but heated miscommunication between director and operator revolves around the simple question of what about the shot will look "good." For the operator, the description of "organic" requires by necessity "operating badly," making something

look worked over, showing signs of mistakes, even using the innovations of the rig against itself.[3] "Organic," for the operator, is a rhetorical "bullshit film school term" that is "overused by poser hacks" and that has "nothing to do with actual camerawork."[4] For the operator, a quality Steadicam shot as dictated by a detailed thirty-year history of manuals, training videos, workshops, and trade newsletters should be indistinguishable for the audience from a tracking shot. In other words, despite its obvious mobility, a Steadicam shot should look as predictable, clean, and stable as if it were produced using a dolly. The Steadicam shot, like its operator, should be invisible to the audience.

"Organic" did not and does not exist as a specific term for Steadicam operators then or now. To operators, the only thing organic about Steadicam is that a human body operates it. Its mystification as a term by directors, scholars, or critics seems to point to a Steadicam shot that calls itself out as such and fails to hide under the invisibility of a dolly shot or an ultrasmooth handheld shot. Steadicam style—as a Victorian art critic such as John Ruskin might have suggested—is valuable because of its relationship to the imperfections of the human body itself.[5] This imposition of aesthetic sensibility by the director and critic's label of "organic" on the operator's craft training and specialized technical language highlights the complicated and contradictory terrain between below-the-line craft discourse and formalized aesthetic terminology of directors, critics, and film scholars. To better develop what we mean when we call something a distinct Steadicam style, we must first examine the contested historical context in which the look, technology, and labor practices of Steadicam came about. In this article, I argue that the aesthetic and technical language of specialized below-the-line Steadicam operators necessitates a reevaluation of scholarly and critical discussions of cinematographic style. Here, I look at production culture and specifically craft discourse as an important site for rethinking film style as work and rethinking the history of film style as a history of labor. I use competing sets of craft discourses in a Panaglide/Steadicam case history to articulate the terms of what such an approach might look like. In their verbal and physical manifestations, below-the-line discursive practices of stabilizer operators illustrate a history of style that is varied, contested, and complicated even at microlevels of technological change and technicians' daily embodied experience on set. I showcase the early years of stabilizer history where the technical and aesthetic

experiments of two competing stabilizing technologies, Steadicam and Panaglide, concretized the dominant mode of stabilizer style in practice by operators today. Prior to stylistic codifications in the late 1980s, the two competing practitioner discourses offered more nuanced possibilities for how stabilizer aesthetics could be used in production and experienced by audiences at the time.

Take Panavision's imitation of Steadicam technology, the Panaglide, which was used alongside Steadicam from 1977 to the early 1980s. Panaglide was both lauded and criticized for its more wobbly and wavy aesthetic (thanks to its less sophisticated arm and lighter weight). While obscured or written over in Steadicam's history, Panaglide and Panaglide operators produced a distinct and sometimes desirable aesthetic even if this look was a result of its own mechanical deficiencies. Steadicam's and Panaglide's more intuitive appeal stemmed directly from their physical attachment to the operator's body. Both devices attach the camera to the operator via a vest, a self-articulating arm, and a gimbal, which reduces transferred friction to the shot and leaves the operator free to move around the set. While mid- to late 1980s Steadicam professional literature would restrict and codify the languages and practices around the technology, the eccentricity and variety of stabilizer deployments in the 1970s showcases how operators had not yet developed a strict understanding of how Steadicam shots ought to look. Steadicam's constant use alongside so-called inferior competing stabilizer technologies, like the short-lived Panaglide, led to confusion as to the ideal use and quality of shot produced. This article is not designed as a technicist argument meant to justify Steadicam's ascendancy over Panaglide; instead, it is an attempt to document the role that industrial competition and craft contentions played in the formation of what are now seen as dominant and inevitable Steadicam practice and style. In this, my emphasis is not simply to compare the units' benefits or deficiencies but to illustrate how discourse and uses surrounding each during this turbulent early period altered language, norms, and embodied work on set that eventually concretize in Steadicam craftsmanship. It is impossible to divorce the history of stabilizer style and craft technique from questions about technological change, just as it is equally impossible to divorce questions about embodied labor practices from the technologies. As Rick Altman explains in his call for a "crisis historiography," technical change in institutions, in contexts of use, and in a

particular technology's dominance or obsolescence is determined, in part, by the practitioners who use them.[6] The ways in which stabilizer operators experimented and discursively framed both systems' unique quirks in movies, television, commercials, and industrial films during the period reflect the contested and complicated history of the craft and its applications.

Forty years after Steadicam's invention, the problems and possibilities afforded by its unique attachment of camera to human operator still complicate the language by which below-the-line technicians, above-the-line personnel, critics, and scholars describe what makes a Steadicam shot inimitable. In this way, a history of craft discourse that probes the messiness inherent in such discursive failures and gaps between technician-director-critic-audience illustrates the broad considerations necessitated by a history of film style in the context of labor. These histories often included moments of profound changes in technology, but their ultimate arbiters are the very workers who navigate the institutional, economic, and social conditions.

While such calls for industrial reflexivity are at the heart of media industries studies and production culture scholarship championed by John Caldwell, Vicki Mayer, Miranda Banks, and many others, my aim here is not to promote a singular below-the-line position and its discourse in order to advance questions of below-the-line authorship.[7] To do so negates the power dynamics inherent in industrial relationships between above-the-line and below-the-line workers and even within status-quo rankings of craft departments. It is here that I take up John Caldwell's discussion of below-the-line labor and how critical practices of craft discourse demand greater attention to ways that workers develop nuanced and aesthetically distinct insights into the very artworks they produce. As Caldwell explains, "These interactive forms of cognition during a shoot suggest that scholars should look beyond the standard split between film 'theory' and film 'work,' and consider how film industrial practices, technologies, discourses, and interactions also involve critical analysis, theoretical elaboration, and aesthetic sense making."[8] In other words, we need not label style alone as the ultimate source of meaning in a text if we decide that the work of the work is worthy of our attentions. The implication of such an expansive project need not limit itself to film production labor, as many below-the-line technicians have in the past worked and will continue to work across visual media,

whether it be film, television, commercial, industrial, special effects, online content, and even video games. Stabilizer operators' agency as film production workers asserts itself in day-to-day discursive interactions with other industrial practitioners on and off set. Their agency is not dependent on whether their work is seen, appreciated, and named by directors, scholars, and critics. After all, a Steadicam shot is a Steadicam shot, regardless of whether a critic or scholar knows how to label it as such.

I begin, then, by looking at the contested discursive history of the invention and industrial use of Steadicam and Panaglide stabilizing systems. In this history, I chart out how discursive battles between Steadicam and Panaglide operators and manufacturers in the 1970s and early 1980s expedited invisible style while dually integrating aspects of embodied craft technique. Next, I look at how Steadicam training manuals and workshops pair metaphoric descriptions of craft knowledge with discourses of athleticism and dance, and I explain why we should take seriously this historical embodied language as a mode of craft workers' aesthetic theorizing. Finally, I position these craft metaphors and worker aesthetic theory alongside the earliest iterations of Steadicam and Panaglide filmmaking. Here I offer a short production case study for thinking about how Steadicam and Panaglide discourse informs three films from the early period of the craft: Eric Van Haren Noman's Panaglide in *Days of Heaven* (Terrence Malick, 1978), Garrett Brown's Steadicam in *The Shining* (Stanley Kubrick, 1980), and, finally, Raymond Stella's Panaglide in *Halloween* (John Carpenter, 1978).

STEADICAM AESTHETICS IN THE MAKING: GOOD-BYE PANAGLIDE, HELLO INVISIBLE DOLLY!

In 1976 the stabilizing technology Steadicam emerged in its first feature production in Hal Ashby's Woody Guthrie biopic *Bound for Glory*. In an elaborate crane step-off tracking shot, inventor/operator Garrett Brown's Steadicam looks overhead at a migrant camp, floats down to earth, and weaves its way around shuffling workers before finally landing on a union rally. For its production complexity, the shot also presents key aesthetic features of early stabilizer technology: smooth, highly mobile, dynamic, curious, and constantly capturing nonstop action. While Steadicam's later production practices promised low-cost and more flexible corollaries to existing

techniques (a smooth handheld shot or a mobile dolly), early stabilizer aesthetics and practices offered at times playful, experimental, and investigative modes of camera movement. As early Panaglide operator and Steadicam adopter Ted Churchill explained, "One of the more interesting aspects of Steadicam, and one which makes operating continually challenging and rewarding, is the vast range of possibilities that exists for its use—possibilities which extend from the most precisely technical to the most liberally stylistic."[9]

Both Steadicam and Panaglide stabilizing devices operate on the same conceptual principles as a gyroscope, even though the unit itself does not contain one. Steadicam and Panaglide rigs consist of a heavy vest tightly strapped to the camera operator and an arm that juts out from the vest's chest-plate and bridge-plate on a waistband. This structure insures the heavy weight management of the vertical "sled," a center post holding up a stage platform for camera, batteries, and monitor. The sled balances from the outstretched arm on a gimbal and stabilizes the load between camera, battery, and other weights placed on the top or bottom of the center post. The camera can be placed in high mode or low mode of the sled, boom up and down, and pan left and right within these positions. The gimbal connecting these elements on the sled provides the possibility for fluid motion and requires a great deal of control, finesse, and training from an operator. The rig can weigh between forty-five and eighty pounds, depending on the weight of the camera, batteries, and additional components. In the early years, purchasing a Steadicam from Cinema Products cost anywhere from $30,000 to $75,000 for a full kit, and they were used primarily by operators in southern California.[10] Panaglides were initially available for rental only via Panavision and its international distributors, having a wider use outside of the United States, as well as with independent and art house productions outside of Hollywood.

Both Steadicam and Panaglide systems create fluidity of movement despite and because of the technologies' attachment to a human operator. Thus, for the first time, the camera could move through space like a human because of its unique attachments to the human body. As David Samuelson, ASC, wrote in a September 1977 *American Cinematographer* article entitled "A Survey of Current Film Production Techniques," "Floating camera systems . . . introduce the possibility of shots that were just not done before, because they were impossible. Their effect can, I think, best

be likened to that of a low-level helicopter. Cameras may swish up and down stairs, float across barriers, run ahead of a pursuing artist and operate over types of terrain which heretofore, had the shot even been possible, would have involved laying tracks and/or using a large camera crane."[11] Filmmakers began using Steadicam to transcend the physical and conceptual limitations of other tools. More importantly, the Steadicam shot became distinct in aesthetic form and feeling from handheld, tracking, tripod, and crane shots. As Peter Rosenfeld, SOC, explains, "Steadicam is now more of a language that we [use] to tell a specific story or to find something within the set to tell, that you can't really tell with conventional equipment."[12] Part of this "language" also involved a history of parsing out each technology's desirable qualities into a concrete set of formal practices and norms.

The existence of two stabilizer systems in the early years challenged formal assumptions of what these kinds of moving camera shots ought to look like and how they might be used as tools on set. While the Steadicam camp sought to streamline training protocols and establish drills for producing smoother and invisible shots into the 1980s, the less craft oriented and rental driven market of Panaglide used the device for all sorts of narrative and aesthetic purposes. Both use of the systems in the early years showed signs of a more embodied style and experimentation with narrative camera movement. Rather than blending in with preexisting techniques, the stabilizer shot visibly stood out. However, Panaglide's technical disadvantages made its look and operation more noticeable and unpredictable than Steadicam, and its legal problems and lack of industrial and craft support would lead to its obsolescence. The history of both devices' development and manufacturing set the stage for our understanding of their unique aesthetic signatures employed by operators at the time.

In 1972, out of a desire to produce a handheld shot that looked as stable as a dolly shot, Philadelphia-based camera operator and commercial producer Garrett Brown set to work on a series of experimental designs for an apparatus that could mimic the way that humans see and move around in space. Brown experimented with his earliest iterations of the stabilizing technology ("The Pole," "The Brown Walking Boom," and "The Walking and Talking Machine") on local commercials for his production house, the Moving Talking Picture Company.[13] In the spring of 1973 Brown and his associate Warren G. Paul screened the first demo footage

FIGURE 1. Garrett Brown discusses his prototypes and demo reels on the DVD extras of many films he operated, including *Rocky*, 1976 (frame enlargement taken from "Steadicam: Then and Now," Special Feature on *"Rocky": 2-Disc Collector's Edition* [Los Angeles: Twentieth Century Fox, 2006]).

of their 16mm version of the "Brown Stabilizer" at Panavision's new headquarters in Tarzana, California.[14] Although in attendance, Robert E. Gottschalk, president of Panavision, seemingly dismissed the future potential for the stabilizing system as the proposed intention to rent the technology did not promise to produce a significant enough return on research, development, and production costs. Gottschalk also raised the possibility that Panavision had developed its own stabilizing device that could hold a 35mm camera's weight.[15]

In 1974 Brown returned to Philadelphia to make a 35mm "Brown Stabilizer" prototype and updated demo reel to promote the device to potential large-scale manufacturers. In the demo reel, Brown wore the rig and produced a series of "30 impossible shots": rambling around the Pennsylvania hills near his barn workshop and a sequence with Brown chasing his girlfriend, Ellen, up and down the stairs of the Philadelphia Art Museum.[16] This demo featured both footage shot using the stabilizing device and some footage depicting Brown operating the new rig. The art museum stair footage would go on to captivate manufacturers and directors alike, and it directly inspired John Avildsen and Sylvester Stallone's now infamous sequence ascending the very same Philadelphia stairs in *Rocky*.[17] Brown's production of an impossible shot also mirrored the athletic energy from the camera apparatus to the very athleticism seen on screen. Here, the operator operating, paired with the footage shot, inextricably linked the images produced with the body of its labor. Not long after Brown finished his final demo, he signed a development and manufacturing deal with the president of Cinema Products, Ed DiGiulio, in November 1974.[18]

Thereafter, Cinema Products engineer Arnold DiGiulio worked with Brown for another year and a half, updating the arm and renaming the device "Steadicam."[19]

During the same period of Brown's development and manufacturing deal with Cinema Products, Panavision and Gottschalk were at work developing and testing a competing stabilizer technology. In 1977, a year after Steadicam's feature-film debuts in *Bound for Glory* (Hal Ashby, 1976), *Rocky* (John Avildsen, 1976), and *Marathon Man* (John Schlesinger, 1976), Panavision unveiled the Panaglide. As the Steadicam camp tells it, shortly after Gottschalk's and Brown's Panavision meeting in 1974, Gottschalk set out to obtain Brown's then pending patent and mimic Brown's device. These accounts range from innocuous (a team of engineers developing a unit based on Gottschalk's description) to dramatic (Gottschalk sending undercover spies to infiltrate sets or manufacturing meetings, and one account where Gottschalk himself jumped out from behind a bush during testing for *The Heretic* to take snapshots of the rig). Gottschalk has since claimed the idea was inspired by many different technologies, including a suspension contraption designed for Japanese delivery bikes.[20] Not three years later, in a 1979 out-of-court legal agreement, Panavision settled a patent infringement suit brought against its Panaglide by Cinema Products. Panavision agreed to continue renting units, with royalties to Cinema Products.[21] Eventually the rigs were upgraded from Panaglide's "inferior" gas cylinder arm to Steadicam's patented iso-elastic spring arm, and finally the remaining rentals were sold off in the early 1980s as used rigs to eager new operators. The industrial backstory to Steadicam's conflict with Panavision's Panaglide is a story narrated and propagated by the Steadicam camp.

A self-promoting figure, Brown has provided the dominant narrative of Steadicam's history: inventing and innovating the technology; developing masters' workshops; publishing the craft's trade publication, the *Steadicam Letter* (1987–95); participating in various behind-the-scenes and *American Cinematographer* interviews; and penning his own forthcoming biography about his years as the technology's inventor and sole operator. From the beginning Brown was both the shower and the teller, the inventor and the revelator. Most recently, Brown was awarded a lifetime achievement award by the Society of Camera Operators and spoke at a Lincoln Film Society retrospective of Steadicam in filmmaking.[22] In his own accounts of the invention's inception, Brown has

claimed, "I was the only one in the world who could make such shots, yet it was also clear that none but crazed obsessives would endure using this contraption."[23] Brown's enthusiasm is playfully magnetic, and his explanations of the technology and its aesthetics are primarily (and sometimes humorously) prescriptive (i.e., this is what a Steadicam can and *should* do) versus descriptive (its experiments and its possibilities). For Brown, Steadicam serves a primarily utilitarian function on set above and beyond its unique aesthetic signatures. This utilitarian function was the technology's and craft's largest economic selling point from the earliest days of its invention to its later uses in commercial television. According to Caldwell,

> not only could the device preempt costly crane and dolly rentals, and the time needed to lay track across a set or location, but it cut to the heart of the stratified labor equation that producers imported to primetime from Hollywood. On scenes demanding Steadicam, the Director of Photography, the "A" camera operator, the focus-puller, and one or more assistants would merely stand aside as a single Steadicam operator executed lengthy moves that could previously consume inordinate amounts of program time. Steadicam was, then, not just a stylistic edge; it was also offered concrete production economies.[24]

Steadicam, alongside Brown's other subsequent stabilizing technologies and sports-related camera rigs (Fly Cam, Dive Cam, Scuba Cam, etc.), were all born of functional rather than aesthetic concerns. But even Brown acknowledged early on that these "stunt cameras" quickly became interesting for a host of other possibilities. Behind Brown's thinking is the idea that if the camera could do more things, then the camera operator could explore more ideas, shots, and narrative possibilities as a result.

The years between 1977 and 1983, which Brown would later term the "contraption wars," included a lengthy battle between Cinema Products' Steadicam and Panavision's Panaglide over their competing industrial claims of ownership and technological superiority.[25] Steadicam operators and developers have often discounted nuanced differences between Steadicam's and Panaglide's films and practitioners, as well as subtle mechanical distinctions between the two, as merely the result of Panaglide's inferior, "copycat" technology. Yet, such subtle differences describe significant variations in both weight (up to twenty pounds) and weight distribution, thanks to the proprietary functionality of Panaglide with Panavision's other recent technological innovation: the

extremely lightweight Panaflex camera. Another significant difference involved Panaglide's inferior vest and prototype arm, which, according to DiGiulio, suffered as a result of its gas-cylinder arm, causing Panaglide's particular waviness and uneven horizon lines: "It had friction. If an operator with the Panaglide jumps up and down you can see the camera doing this."[26] While DiGiulio perhaps overemphasizes the degree to which the device reacted to operator movement, these slight differences gave Panaglide its first-glance calling card as the "floating camera," a phrase utilized by Steadicam in a pejorative context to indicate its lack of grounding to the horizon. This effect is most recognizable in *Halloween* and *Days of Heaven,* which used the prototype gas shock arm before switching to a spring arm copied from Steadicam. Both stabilizers were introduced and talked about on the market as "floating cameras," and only later would Steadicam rebrand "floating" as the pejorative quality of Panaglide.

Despite these differences, these devices look almost indistinguishable to a nonpractitioner's eye. The single academic book on the subject, Serena Ferrara's *Steadicam Techniques and Aesthetics,* uses the so-called copy-cat quality of the two technologies to discount and sometimes superimpose Panaglide with Steadicam by calling it "the Steadicam effect" when referring to different shots in the early period. Ferrara's discussion presents Panaglide as a mere blip in a wider history of Steadicam and often refers to the apparatus as merely a "clone."[27] One of the main difficulties in researching the Panaglide system and Panaglide debates between 1976 and 1979 is that much of the press about Panaglide in trade publications and in Steadicam industrial writings refers to the system in diminutive terms such as "the other system," "the glide," "the imitator," "the imposter," and "the one that doesn't work."[28]

A fuller account of this moment in stabilizing history suggests that these kinds of dismissals were everyday tactics in industrial promotion, marketing, and competitor aggression. Panaglide's marketing similarly participated in modes of shoptalk "shit talking" by avoiding any mention of Steadicam technology. An adequate construction of this history must go beyond accepting these slights at face value to recognize that this level of discourse signifies a longer, more mundane history of cross-industrial microaggressions. Such language does not necessarily signify truths about any technology in relation to another but rather specifies a vernacular of industrial interaction. Yet Steadicam's success at narrativizing

an industrial history dismissive of Panaglide is part of what makes it so difficult to parse out lived and felt differences between the two technologies. The argument for seeing the technologies as the same in all aspects (labor, craft practice, and aesthetics) stems in large part from the lawsuit's citation of their material spring-arm similarities while refusing to recognize the sensual and aesthetic differences noted by practitioners. The mood of the "contraption wars," while accusatory, inflammatory, and litigious, also fueled fascinating discussions about both aesthetic and technological distinctions between the two systems.[29]

Part of my interest in reinserting Panaglide into industrial histories of craft discourse and technology is to discover in what ways it allows us to examine a richer, murkier, more complex series of interactions between spectatorship, technology, and craft aesthetics within a turbulent period of industrial change. For operators, directors, and audiences, the dual market of both Steadicam and Panaglide offered an additional variety of aesthetic choices in its eccentricities or even its faults as a technology. Other accounts suggested that slight differences in the mechanics of the arm offered less control and stability, causing the Panaglide to be slightly more reactive and receptive to an operator's touch. While this added to Panaglide's now negative "floating qualities," its responsiveness also imparted to the image what was described as a more corporeal feeling or even possessing a consciousness of its own. Ted Churchill, who operated both Panaglide and Steadicam during his career, joked affectionately that he would charge $35 an hour to rehearse with the temperamental Panaglide while only charging $10 an hour to rehearse with a Panaflex camera on a Steadicam. Yet even in 1991 Churchill reflected on the final gasp of increasingly rare Panaglide: "The Panaglide, both light and quiet, alas, is on (and I'm told over) the cusp of obsolescence."[30]

Because this early period of competition with Panaglide challenged acceptable kinds of techniques and expedited formal modes of Steadicam craft training, its impact can be felt explicitly in discursive language of practitioners and implicitly via on-set practices during and long after the contraption wars. In 1985 Steadicam was fast becoming an industry of its own, with a cadre of well-trained operators commanding large wages on studio productions. In 1987 operators formed their own craft organization—the Steadicam Operator's Association (SOA)—and filtered all training, work placement, and stylistic norms through the organization's

publication and job clearinghouse, the *Steadicam Letter*.[31] In addition to skills training and mechanical advice, SOA also sought to standardize the Steadicam look. As part of this standardization process, operators were trained to make Steadicam conform as best it could to existing production methods, primarily by using a Steadicam to replicate a dolly shot or by using a Steadicam operator as a living tripod. To accomplish these looks, the Steadicam training process and discourse sought to filter out characteristics that most tied the image to quirks of the operator's body. The very signatures that made the early stabilizers of Panaglide and Steadicam so virtuosic were the exact markers that signaled the presence of a living and breathing operator behind the camera. In the process of making such shots more "invisible" to the overall style and narrative of the film, Steadicam operators were taught to reduce potential traces of the very subjectivity and bodily shifts that might give their operation as such away.

This tension between operator freedom and craft protocol for standardized dolly-like shot increased twofold in the 1990s when the device was utilized for fast-paced television dialogue "walk-and-talk" scenes thanks to its appearance in the TV show *Homicide: Life on the Streets* in 1993. Its rise outside the feature film arena was also thanks to Cinema Products development and marketing of additional (less expensive) tools for lighter-weight electronic production, including Steadicam EFP in the 1980s and the JR version, intended for the prosumer market, later in the 1990s.[32] While Steadicam and other industry stabilizers have evolved and developed cheaper, lighter, and consumer-line iterations in thirty years, the basic principles of the early units' users and their underlying contentions about its embodied quirks still determine the technologies and practices associated with large-scale industrial Steadicam craft today.

Alongside this dominant history of innovation, Steadicam operators (and even users of the increasingly obsolescent Panaglide) continued to utilize the experimental and playful aesthetic aspects of their stabilizing devices first introduced in the 1970s in a range of media products. Such a model importantly points to modes of technological or labor history that resist false narratives of "inception" as underlined in Jean-Louis Comolli's apparatus theories.[33] Thus histories of technological or stylistic innovation often exist entwined with labor practices, devices, and aesthetic sensibilities seemingly at odds with dominant norms of production and

standardization. Despite the formal craft's emphasis on producing a more invisible style, the embodied techniques of the early practitioners were never fully eradicated in craft training and on-set improvisation.

Today, Steadicam labor is still a conceptually and physically distinct form of cinematographic craft. Assembling, operating, and maintaining such a device requires not only the usual cinematography craft skills but also a strong and physically fit body and the tinkering knowledge of a machinist. It is a system one must learn to "breathe with" and is described by operators as both an extension of one's own body and an entirely different body attached to one's own. Steadicam engages the tactile senses of operators and spectators due to its relationships to touch, dance, and breath. What Steadicam profoundly suggests of manual practice, craft technique, and emerging technology of its time is an aesthetic whose virtuosity and sensual responses derive from the very bodily conditions of its human labor. In this way, language of critical description breaks down, and one must do it to know it.

EMBODIED STEADICAM TRAINING: DANCE CLASS MEETS BOOT CAMP

Since their inception, Steadicam and Panaglide required additional genres of aesthetic description precisely because stabilizer craft discourse primarily depends on alternative—noncinematic—modes of descriptions. From dance to music, sport, and painting, stabilizer operators describe the cinematic motion of their practice and affective experience as a kind of camera operation on steroids. In stabilizer training, learning to use the camera itself comes long after operators have mastered moving with the rig through space. Since the beginning of their history, Steadicam operators have learned how to use Steadicam through dance lessons. The first dance is called "walking the line," and it is a skill Chris Haarhoff, SOC, describes as "like dancing with someone for twenty years and they never let you lead."[34] Entire Steadicam training manuals, safety guides, and exercise philosophies are devoted to the "inertia," "balance," and even "tight-rope" walking involved in retraining the body to work with and not against Steadicam's weight and movement. That the operator's own body must not only literally fall away from the Steadicam but also have both the strength to guide and the flexibility to be moved by the Steadicam is indicative of the contradictory

forces at work when shooting. Randy Nolan, SOC, offers two metaphors: "It was always like Tai Chi to me. You get it started and it sort of takes over, you only need to pull back a little. Operating a Steadicam is like having a marble on a plate; your body is the plate; the Steadicam is the marble. The only difference is that the marble is not on the plate, it's in space."[35] Perhaps this is why comparing Steadicam shots to tracking and handheld shots feels so frustrating for operators; not only do these shots not look the same, they in no way *feel* the same. When thinking about metaphors of sensation as a kind of discursive craft practice, it is helpful to make recourse to theories of embodiment and labor embedded in the context of a historical phenomenology.

Bruce R. Smith's description of "historical phenomenology" as "an ambient quality of knowing in-place-and time" is a useful way to think about both Steadicam craft discourse of style and the embodied sensations described by operators.[36] James Kearney and Kevin Curran develop the definition of historical phenomenology even further by explaining two important premises: first, that "feeling and sensing have a history," and second, that these "are not historical artifacts in the same way . . . since feeling and sensing are embodied, subjective processes."[37] The "nebulousness of feeling" so often voiced by craft practitioners attempting to translate their embodied sensations and perceptions of making in interviews gives us clues—in the strangeness or cloudiness of their lexical description—to the historically subjective experience often undocumented in more traditional records of discourse and technique.[38] So when Steadicam operators claim they can name the operator behind a shot based on an intuition of how that person's body moves in space, they are keying into an embodied witnessing of their own and others' labor through abstractions of the senses. Perhaps director of photography Vittorio Storaro, ASC, described the abstractions inherent in Steadicam operation and its aesthetic possibilities best:

> In other words, Steadicamera has a Steadicam movement, there's this floating feeling that is almost aquatic, let's say, that has an emotion of its own, that has a beauty of its own, a style of its own and it should be used when that kind of movement is needed and I think it shouldn't be a substitute for the movement of something else, even if it's been done a lot because a dolly couldn't be used, so they picked up the Steadicam and took two steps backward, But it's different, it's something else.[39]

Technicians' use of metaphors to describe this "something else," these kinds of indescribable embodied camera movements, also points to corollaries in puppetry and even aspects of motion-capture technology. As early as 1810 playwright and philosopher Heinrich von Kleist grappled with the dilemmas of how to describe the action of puppeteering and the witnessing of the puppeteer's performance in an essay entitled "On the Marionette Theater." For Kleist's interlocutor, who describes the scene, what makes the puppeteer's performances so personally felt by the audience requires the basic bodily mechanics of inertia, gravity, and the puppeteer's manipulations of the contraptions' lines and curves: "for it is nothing other than the *path taken by the dancer's soul*; and he doubted if this could be achieved unless the operator transposed himself into the marionette's center of gravity; that is to say the operator dances."[40] Or, to paraphrase, the puppeteer himself must dance. To move in such a way, the object (in Kleist's case, a puppet; in our case, Steadicam) must be infused with the puppeteer's/operator's body and feeling.

Description here shows us something about the embodied experience and the historical act of witnessing, of what prompts, provokes, and pleases the viewer in the dynamic interaction with performance and performer. Similarly, dance choreographer William Forsythe's recent experiments with dance and motion-capture hope to illustrate and pinpoint the differences in dancers' motion and their visual and physical effect on audiences.[41] Charles Atlas's prescient use of early stabilizer technology in his short 1978 dance film *Locale* sought to suture the choreographed movements of dancers to the parallel trained maneuvers of a camera operator.[42] Rather than reverting to other phenomenological and aesthetic appeals to body, camera movement, and cinematic experience (as previously discussed by Barker, Sobchack, and Morgan), it might be useful to think of these kinds of Steadicam operators' techniques as embodied performances captured by the very cameras they are operating.[43] In this way, highlighting Steadicam operators' own sense of athletic performance in this craft also helps elucidate the intricacies and felt nuances that mark a Steadicam shot as unique. To do this, returning to basic dance instruction is necessary.

We can think of "walking the line," the first movement any operator learns, as stepping the figure-eight grapevine, but having to move not just yourself but a Steadicam's heavy weight. A Steadicam moving in one direction tends to keep moving in that direction. Like a dance partner, operator

must use both strength and grace to direct the Steadicam to where the operator wants it to go, keeping it on the same line. While dance training seemingly happened almost intuitively, according to Steadicam and Panaglide operator accounts, its prescription as a formal training method occurred in the earliest Steadicam workshops in Rockport, Maine, and in Steadicam EFP training VHS tapes, and it was finally concretized in 1980's *Steadicam Letter* articles and formal and informal manuals. As in professional training workshops, *The Steadicam Operator's Handbook* instructs new operators in the art of foot pattern worksheets, not unlike dance instructional manuals. But moving both one's own feet and the seventy-pound apparatus "with a mind of its own" can be incredibly difficult, though also incredibly easy once the two are in sync. As operators progress, they transition from "walking the line" to "making the switch" between operating positions in a basic "line dance."[44] The dance partner metaphors therefore aren't just descriptive but practical. If operators treat the tool as a thing that also wants things, then operators can utilize this "consciousness" to their own advantage.

The daily labor of a stabilizer operator involves a kind of skillfully trained dance improvisation. In the final shot of *After Hours* (Martin Scorsese, 1985), operator Larry McConkey, SOC, was given free range to experiment with the Steadicam. McConkey explained, "Michael Ballhaus [director of photography] lit a large office so that I could shoot in any direction without concern about seeing lights or grip equipment. Staging was very simple and Scorsese told me to 'have fun.' The music for the scene was played over speakers. I was being given a virtual playground while Marty and Michael watched the video from an adjacent room."[45] In the shot, McConkey navigates the maze of office cubicles, haptically grazing account books, pushing in on metal desks, circling employees, propelling forward and backward, and levitating seemingly on a whim. Yet, McConkey often thinks of his own Steadicam training as not just a dance of "phrases" but also a dance informed by his other bodily and structured craft training as a classical concert pianist: "Each transition between phrases comes at carefully considered points in time and space with a frame that defines something about the characters, the set, or both. . . . [T]he result is the imposition of an internal rhythm to the shot."[46] McConkey emphasizes the work, even if considered "play," as a learned sense of musical structure, a structure that in its impositions offers new kinds of freedoms. Like Marcel Mauss's "techniques of

the body," McConkey's account of musical drills translates to Steadicam operation on the shared system and efficiency structures of habitual bodily training.[47] The terpsichorean curves in the *After Hours* shot feel dance-like and even improvisational despite and because they are rehearsed like a pianist moving through keys.

An official "master" Steadicam operator like McConkey has mastered the craft of years of Steadicam practice and mastered their relationship to their Steadicam "animal" (another term some operators use for the rig).[48] While some operators refer to rigs as dance partners and to operating as dancing, others think of the machine as a moving beast. "I think of myself as a camera jockey," remarks Jerry Holway, SOC, and many operators describe the apparatus as a mode of transportation or a ride, calling the act of operating "flying." All Steadicam operators agree that the performance itself is inscribed with emotions and reactions from the body of the operator. The performative quality of Steadicam operation suggests a certain kind of awareness produced between operator, camera, and observer, an awareness that results in something like the feeling of happening upon a scene. The Steadicam operator's dance seems to look, or explore, as if for the first time out of curiosity or hesitation, the body's gestures reacting as if in some new surroundings. This finding or happening upon, with all its emotional valences and contingencies, also inextricably contains the athleticism involved in controlling such reactions.

A different language of macho athleticism exists alongside the emotional metaphors wrapped up in Steadicam dance training. Training protocols emphasize constant physical strength workouts and stretch routines (including yoga) and often go into detail about back safety concerning the long-term shortening and compression of the spine. Additionally, Steadicam manuals instruct new operators on the art of training muscle memory similar to the kinesthetic or procedural memory involved in learning to ride a bike or swim. The training suggests creating the visual memories necessary for executing shots in the same way that athletes previsualize their competitions.[49]

The athletic performance and dance sensitivity are integral aspects of how operators experience their own craft. What is so fascinating about these metaphors of balance or inertia is the way they might help condition our own critical descriptions of the craft and its embodied aesthetics. The entwined dance and athletic metaphors help us remember the various components involved in the craft of Steadicam operation: first, technical expertise required of any camera operator; second, physical strength and stamina; and finally, an understanding of how their own emotions, reactions, and feeling are transcribed into their choice of compositions. A Steadicam shot therefore is always a performance of the particular craft and histories of Steadicam dance.

The levels of figurative description necessary for many Steadicam operators to describe what they do goes beyond a simple need to communicate to a noncraft audience. These accounts of worker reflexivity, figurative language, and metaphoric descriptions also serve a practical role for operators on set. What it means to simply "get the shot"—whether a dynamic and virtuosic long shot like McConkey's in *After Hours* or even as seemingly simple as a walk-and-talk following shot in *ER* or *West Wing* by Emmy Award–winning operator Dave Chameides, SOC—often means something much more complicated for the operator. Operators think about themselves and their work as an always evolving and complex configuration of several roles: camera operator, athlete, dancer, and camera jockey. The combination and shift of these roles at any given point in a shot requires for them both material and conceptual modes of preparation, execution, and description. As McConkey explains of his shot in *After Hours*, "The very path to transcending the use of physical means to achieve abstract thought and emotion lies in the absolute reliance and involvement with mechanical things. It's how I make music."[50]

This intuitive recognition is built on a knowledge of personal quirks (ways of moving in space), as well as the weight and placement of load by the operator's body. In other words, no Steadicam shot performed by different operators would look alike even if filmed under the exact same shooting conditions, flight path, and start and stop marks. What is obvious here for operators is not obvious for critics or audiences. What is remarkable in operators' way of speaking about this recognition and their own operation is that sense itself is a kind of witnessing and a kind of accounting for a practice that can only be fully understood by practitioners. This movement, feeling, and sensation of personal operator quirks cannot be easily rendered to a consumable "way of watching" Steadicam to nontechnicians. Although each technology and practice offers subtle aesthetic markers, I want to think about ways in which ineffable sensations of operators in their historical moment might inform and

expand how we as scholars, critics, and teachers approach our own descriptions of these kinds of shots.

I want to conclude this article by considering the history and discourse of Steadicam and Panaglide craft and labor in relation to films featuring the devices in the earliest years of their inception. Discourse of Steadicam operators insists we take the qualities of the technology and its technique as inherently embodied. As part of this embodiment, operators struggled in the early years to design and execute shots that highlighted the technology's unique mobile and stabilizing capabilities while increasingly concealing those elements that made shots seem too intrusively human. Here, we might recall my initial suggestion that when people outside the craft ask for something that looks organic, operators now perceive such results as "bad," "full of mistakes," or drawing too much attention to themselves. This is a tension we must take seriously, but it is also one that attests to constantly shifting modes of craft discourse and workers' own aesthetic sense making over time.

PUTTING PRACTITIONER DISCOURSE AND AESTHETIC SENSE MAKING INTO PRACTICE: THREE QUESTIONS AND CASE STUDIES FOR MEDIA SCHOLARSHIP

While the history of Steadicam's invention and its contention with Panaglide bespeak the very bodily and economic effects of the technologies on operators' material lives, I also want to take seriously how far metaphors of dance, improvisation, athleticism, and embodied technique might inform other modes of critical and scholarly interaction with these texts. Workers' industrial technique need not necessarily contradict or overwrite traditional modes of film analysis by media critics and scholars. Instead, we might think how these accounts provide an aesthetic complement and historical context to rethinking existing innovation-oriented histories of style and technology. Each of the films in this section exposes multiple experimental and exploratory ways in which technicians utilized Steadicam and Panaglide in early years of the craft. This richness of mechanical and bodily modes made available by the craft during the period highlights the instability and possibilities around its emergence rather than solidifying markers of a concrete style. A wider index of films, television shows, and commercials shot with Steadicam and Panaglide in the late 1970s and early 1980s demands a more critical

attentiveness to the larger industrial production structure and political contexts of the moment. The range of genres, production scales (budget, Hollywood blockbuster, art house), and narrative functions (POV, supernatural, stunt work, even as a gun prop in *Alien*) suggests the sheer range of the two technologies' resonance and reverberation in all levels of media production at the time.[51] The critical industrial reflexivity evidenced by Steadicam and Panaglide operators during this early period offers an exciting alternative mode of film history where thoughts, feelings, and discursive insights of practitioners are forefronted as valuable sources of aesthetic theory. As part of this alternative discursive history of style, I want to put forward a series of questions media scholarship might take up going forward.

First, when film critics implicitly reference Steadicam shots in their reviews of films, are they unconsciously remarking on the process and performance of Steadicam operators? The making and reception of Eric Van Haren Noman's Panaglide in *Days of Heaven* seems to suggest as much. Speaking about Panaglide in the film, director of photography Néstor Almendros, ASC, explains, "In the beginning, Terry [Malick] was very enthusiastic and wanted to do practically the whole movie with Panaglide. . . . The weight of the system is considerable and the operator has to be an Olympic athlete. If the system becomes standard equipment in the state it is in now, we will have to create a whole new generation of *cameramenathletes*, and the problem will be to find athletes who are also artists."[52] Panaglide was impractical for all scenes due to the number of things it captured in its moving frame (including crew members), creating problems for continuity, but most importantly because it produced a particular kind of overwhelming aesthetic effect. Yet even Almendros exclaims, "The main sequences and shots in *Days of Heaven* could not have been done without a Panaglide. It is these scenes that the audience and the critics continually talk about."[53] Indeed, part of what critics at the time of the film's release might have been getting at when they overwhelmingly called the film pictorial or painterly points to the film's emphasis on image as process rather than *as image*. The film's decided deemphasis on plot and character—in favor of play, freedom, and potentiality—prompted frustration and even annoyance from some critics who termed the film "cold." Yet Vlada Petric of *Film Quarterly* praised the film and instructed both critics and audiences to appreciate the cinematic and perceptual

FIGURE 2. Rare photos of *cameramanathlete* Eric Van Haren Noman operating the Panaglide are featured in camera operator John Bailey's interview on the *Days of Heaven* (1978) DVD extras (frame enlargement [New York: Criterion Collection, 2007]).

encounter of image and sound: "In nearly all the shots of the harvest the camera *glides* [my emphasis], giving the viewer a palpable sense of the rhythm and space in which the action occurs. This is not to say that the camera never stands still. . . . Yet, visual movement prevails on the screen: its overall dynamism matches the nature of the subject filmed, which is essentially *movement*, that is the constant motion of people, machines, animals, and natural forces."[54] Rather than producing a packaged cinematic scape that conforms to the atmosphere of the narrative, Petric suggested that Malick directs our eyes and ears to the understanding that a film is a result of an encounter with the world. For Petric, technology—particularly the encounter of various modes of traditional techniques with new camera technologies—is at the heart of the film's "kinesthetic impact," "dynamism," and "palpable sense of rhythm and space."[55] While Petric doesn't explicitly label "tracking, panning, and craning shots" as Panaglide (though these are certainly what they are), her writing strongly suggests its unconscious presence with words like "glide." Most interesting for Petric is that the world's demand of constant interaction also requires a continual process of camera description.

Like the encounter of the dance described by stabilizer operators, Petric's emphasis on an embodied interaction between camera, world, and characters points to watching Panaglide as watching a process of continuous recompositions. In this way, however, critical language alone fails as evidence for recognizing labor and Panaglide technique as such. Yet these gaps in formal analysis to describe the ineffable effect produced by such shots are nicely complemented by reconsidering operators' and technicians' articulations of the effect. Almendros's notion of *cameramenathletes* paired with technicians' description of operating as a kind of dance of curiously looking, moving, and happening upon an unknown world seems to more accurately account for the kinds of corporeal camera movements by stabilizer operators so often utilized in *Days of Heaven* and in Malick's later films. The combination of critical description and operator discourse offers insights into the process of filmmaking and the stylistic choices neither could do alone.

The discourse history of Steadicam and Panaglide also reveals how operators' utilization and adaptation of other established technologies with their rigs altered their operating practices and stylistic norms. In particular, how did

Steadicam and Panaglide practitioners utilize or problem-solve impositions and enhancements posed by component technologies and on-set limitations? While operating on *The Shining*, Brown's Steadicam craft practice was challenged by a rigorous shooting schedule and learning to adapt the apparatus to work with other camera technologies. In the film, Brown's Steadicam shots appear in two distinct aesthetic forms: Steadicam shots operated on a wheelchair dolly (much of the Overlook Hotel "tracking" shots) and upright walking Steadicam shots.

Originally designed by Ron Ford to be used with various mounts on Kubrick's *A Clockwork Orange* (1971), the wheelchair dolly would come to be used on a great many Steadicam shots in the Overlook Hotel.[56] On the one hand, the wheelchair dolly was devised to alleviate extra physical labor by operators Brown and Ray Andrew (perhaps a necessity, as Kubrick often demanded a seemingly excessive number of takes). On the other hand, the wheelchair dolly's Steadicam shots possessed a peculiar kind of eerie and slick sensation distinct from a walking Steadicam shot and from the uneven horizon line of the Panaglide. The resulting qualitative effect is something uncannily smooth and mundanely like shots produced with other wheeled vehicles more so than those indexing motion of the human body. When Danny (Danny Lloyd) takes corners on his bike, in the now infamous shots around the Overlook Hotel, the wheelchair Steadicam mimics a lag in duration. Part of this has to do with the camera and the operator's inability to capture Danny slowing down to take the turn while the operator and camera are still at full thrust, and when the camera and operator must slow to take its turn, it misses Danny's acceleration at the top of the curve. The shots feel more like a car on a track than a body cutting corners at an angle.[57] The wheelchair Steadicam shots are prescribed by the speed of their motion but also in the way a wheelchair's movements are restricted to large maneuvers

FIGURE 3. Vivian Kubrick's short documentary *Making "The Shining"* features scenes of Garrett Brown operating the Steadicam upright in the maze and in the halls of the Overlook Hotel on the modified wheelchair dolly (frame enlargement as featured on Warner Two-Disc Special Edition DVD, 2007).

and its inability to react and improvise. The choice to add the wheelchair dolly drastically altered the kinds of embodied practices inherent to the craft by severing the Steadicam rig from the operator's body.

The upright walking technique, on the other hand, creates specific echoes of its operator's bodily labor. As Brown remarked, his time on *The Shining* refined his craft by attuning him to small movements of his body that would change the feeling of a given shot. He explains that in the thirty plus takes of an early Steadicam scene in the film where Wendy (Shelley Duvall) and Doctor (Anne Jackson) leave Danny's Denver bedroom: "I liked participating in that *way* of working because I got a chance to refine what I did to an extent that I'd never even approached before. I got to learn the closest dimensions of the apartment. What would happen if this foot was 6 inches in this direction or if I took another half step?"[58] The body imposes itself on the Steadicam at the smallest increment, at the tiniest variations in speed, and even at times according to the intensity of the operator's breath. As Steadicam operator Ted Churchill explains of the "classic" upright technique, it becomes impossible to remove one's own subjectivity from the end shot: "Since Steadicam operation is the act of individual will, it can behave

similarly—make spontaneous lateral moves, instantaneous stops and starts, accelerations, decelerations; be passive or aggressive, omniscient or participatory. Or, with equal facility, it can articulately follow the same behavior in another person."[59] Unlike the "eel like smoothness" and weightlessness of the interior wheelchair Steadicam shots, the upright shots offer room for slight adjustments in movement (we can get closer to characters and their surroundings and make small, tight turns to move with their actions). Unlike *Days of Heaven*, which utilized the Panaglide as a marker of process and engagement with the world, the various additional components of the wheelchair dolly added to the Steadicam in *The Shining* at times heightened or diminished both its mechanical effect and the imprint of its operator's body.

Ultimately, the project of restoring craft discourse to critical accounts of early stabilizer style and technological change poses its own historiographical questions. Namely, how does the experience of witnessing and producing early Panaglide and Steadicam aesthetics hold up over time, and what institutional and industrial mechanisms exist to suture these now erratic images into dominant modes of invisible stabilizer craft? In my last example, I look at how digital postproduction transfers in recent distributed versions of *Halloween* (John Carpenter, 1978) present historiographical problems for scholars wanting to study the unique look of Panaglide in its early years. Shot on Panaglide by Ray Stella, SOC, and director of photography Dean Cundey, ASC, *Halloween* offers an interesting argument for Panaglide's role in subjective camera POV shots in horror and thriller genres. Later, when Garrett Brown was asked to shoot the opening sequence for Brian De Palma's thriller *Blow-Out* (1981)—a send-up of Michael Myers's serial killer point of view from *Halloween*—the operator originally imagined that this was his chance to do a good POV Steadicam shot, "one that felt like a true human," without, as he called it, the drunken rolls and horizon tilts characteristics of the "bad" Panaglide shot. As Brown proclaimed, "I wasn't doing a good one, I was doing a parody of *Halloween*, I was doing a crappy horror film. You know it's not easy to be bad, particularly after Kubrick. So, every part of it went against the grain for me. Every aspect of it. Moving clumsily as if every footstep was showing."[60] As Brown describes it, De Palma wasn't really interested in why the original Panaglide shot was "bad" and how Brown could make it a "good" Steadicam shot; instead, De Palma was interested in the aesthetic quirks or mistakes that made

the body behind the camera even more visible: the waviness, the unintended glances, the ever-so-slight and barely perceptible bob of footsteps underneath the camera. Because of its technical problems with stability, the Panaglide looked and felt inherently more like a human POV, now an almost unsettling combination between prototypical Steadicam movement with a dash of handheld operation.

It is here where test footage shot with an early Panaglide in Panavision's Tarzana parking lot by Ray Stella in preparation for *Halloween* is so useful.[61] Test footage allows us to see in fuller detail the quirks of the technology and how craft and labor practices contain or explore these quirks from each device. In other words, test footage forefronts the interaction (and sometimes struggle) between technology and operator. These broad markers of technological nuance and craft practice come in handy when looking at "cleaner" and more sophisticated shots within the final film (or even comparing the test footage, the POV shot in *Halloween*, and the POV Steadicam shots by Brown in *Blow-Out*). The test footage shot showcases exactly these differences in control and weight—the Panaglide seems incredibly light, and the horizon line seems to swerve and dip more sporadically than Steadicam's demo footage. Because Panaglide does offer something different, even if a bit messy or unclean, it stands out as a site of discursive struggle in early histories of Steadicam and is also indicative of Steadicam's move into cleaner, coherent, and more industrially stable forms of Steadicam style.

Yet, this site of struggle may not seem so obvious when watching the film in retrospect. Thanks to the film's popularity and continued home rentals, the film has received multiple and regular DVD releases over the years. To market a DVD to a new or similar marketplace, companies offer special editions, restored, or digitally remastered new features. One of these iterations, the highly contentious Anchor Bay twenty-fifth-anniversary DIVIMAX transfer, involved a digitally color-enhanced and improved image stabilization not approved by Cundey because it looked so different from earlier theatrical, televised, and DVD versions.[62] What this means for historians and even film scholars solely interested in the aesthetics of the film is a different kind of image and perhaps different possible interpretations of the sequences using the device. Here is where an attention to craft discourse reminds us of the industrial dynamics and histories at play when "correcting" a shot for future audiences according to

discordant notions of proper form. The Panaglide's radical and erratic POV shot seems at once normal to our eyes accustomed to seeing Steadicam used as POV shots, but it also seems less obtrusive than it might have to original audiences and even to Garrett Brown's discernment. What is "bad" about the Panaglide shot has now been brought into line with more stable Steadicam aesthetics. Placing test footage side by side of various remastered versions highlights what we miss out on when trying to make the bad image look good—or what precisely we fail to see without a technician's eye.

Scholarship that seeks to tell histories of labor and technology within histories of style must also address the varied confusions, debates, and enigmas within narratives of aesthetic change. When a contemporary director demands an "organic" shot from an established Steadicam operator, their inability to aesthetically see eye-to-eye has as much to do with current power relations as it does with a longer history of craft style and tradition. If we look at films, television shows, commercials, and other media artifacts that contain stabilizer shots in different periods as documents of these kinds of changes in industrial practice, then we must also take a closer look at how these objects are materially changed by broader histories of industrial discourse. Where is such experimentation in Steadicam aesthetics desirable, and where is it unacceptable as a mode of operating? What kinds of operators are given permission within the craft to adapt their own operating practices at odds from dominant invisible modes? In what ways are all operators always experimenting? Such broader structures of discourse within the industry at large and even within smaller craft formations seek to bring eccentricities and "bad objects" of their own histories more into line with a dominant narrative of innovation.

Such is the case and problem Steadicam operators face today when filmmakers challenge them to reproduce an embodied-transparent shot no longer thought acceptable within craft traditions of invisible style. John David Rhodes has suggested that to see labor at work in a film requires some sort of failure of labor power "to efface itself as labor. Somehow it has labored itself into view."[63] Rhodes's examples of this laboring into view are all characterized as production or craft mistakes (i.e., an in-frame boom-mic). What also often gets labored into view is the complexity of a craft discourse and the historical (re)emergence of a technology, such that thirty years after the evolutionary dead end of Panaglide, its

more embodied aesthetic has become implicitly transcribed into some of the very training practices involved in producing "invisible" style. We see labor, in Rhodes's schema, when it has accidentally made its invisibility visible. What I hope to have illustrated throughout this article is how such laboring into view is also, through craft discourse on Steadicam and its relation with Panaglide, a complicated and highly contentious history of style inextricably tied to a history of work. A Steadicam shot is not just a marker of cinematographic style but the result of a material body at work in its economic, institutional, historical, and aesthetic contestations.

About the Author

KATIE BIRD is a PhD candidate in film studies and English at the University of Pittsburgh. Her areas of focus include production culture, film historiography, labor, craft discourse, and filmmaking. Her dissertation concerns how below-the-line craft discourse in Hollywood reimagines histories of style in the context of labor. She holds BA degrees in film production and English from Loyola Marymount University and an MA in literary and cultural studies from Carnegie Mellon University.

Notes

1. Throughout this article, I use the acronyms of professional craft organizations to indicate membership in either ASC (American Society of Cinematographers) or SOC (Society of Camera Operators). While both are honorary organizations, ASC primarily includes Directors of Photography, whereas SOC includes career camera operators of various ranks with a large contingent of Steadicam Operators. In this sense, the organizations represent and speak to different kinds of working practices in the industry. Technicians listed in the article without these designations are not to my knowledge members of ASC/SOC or are members of other national or international craft guilds.

2. *Steadicam Op vs Director*, YouTube video, 1:57, posted by "lisagav1," August 16, 2010, https://www.youtube.com/watch?v=7wVEPVz2SSs.

3. John David Rhodes's essay suggests that the only way that labor can show itself within industrial filmmaking involves such

markers of mistake or being overly worked over. Rhodes cites the Italian concept of *sprezzatura* in craftsmanship, where artists strive to make a piece look easy or effortless despite the difficulty of its creation. This motto of "invisible style" is often utilized by film workers, such as cinematographers, when they remark that a shot is good when audiences don't notice the cinematography as cinematography. John David Rhodes, "Belabored: Style as Work," *Framework* 53, no. 1 (2012): 47–64, doi: 10.1353/frm.2012.0005.

4. *Steadicam Op vs Director*.

5. In response to the growth of factory-made objects of his Victorian period, Ruskin lauded the imperfection inherent in the craft work of Gothic cathedral and the Arts and Crafts movement: "You must either make a tool of the creature, or a man of him. You cannot make both. Men were not intended to work with the accuracy of tools, to be precise and perfect in all their actions. If you will have that precision out of them, and make their fingers measure degrees like cog-wheels, and their arms strike curves like compasses, you must unhumanize them. . . . On the other hand, if you will make a man of the working creature, you cannot make a tool. Let him but begin to imagine, to think, to try to do anything worth doing; and the engine-turned precision is lost at once. Out come all his roughness, all his dullness, all his incapability; shame upon shame, failure upon failure, pause after pause: but out comes the whole majesty of him also" (John Ruskin, *Stones of Venice*, vol. 2, 1867 Archive.org 2007, ark:/13960/t8ff3v84h).

6. Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2004), 16.

7. John T. Caldwell, "Screen Studies and Industrial 'Theorizing,'" *Screen* 50, no. 1 (April 1, 2009): 167; Vicki Mayer, *Below the Line: Producers and Production Studies in the New Television Economy* (Durham, NC: Duke University Press, 2011); Vicki Mayer, Miranda J. Banks, and John Thornton Caldwell, eds., *Production Studies: Cultural Studies of Media Industries* (New York: Routledge, 2009).

8. John T. Caldwell, *Production Culture: Industrial Reflexivity and Critical Practice in Film and Television* (Durham, NC: Duke University Press, 2008), 7.

9. Ted Churchill, "Steadicam: An Operator's Perspective. Part One," *American Cinematographer* 4, no. 64 (April 1983): 113.

10. Jan Harlan's letter to Stanley Kubrick lists the base price of $30,000. See Jan Harlan to Stanley Kubrick, displayed in *Stanley Kubrick* special exhibition, Los Angeles County Museum of Art, November 1, 2012–June 30, 2103. Janice Arthur listed a base price of $25,000 plus additional back-up and component parts, resulting in a full rig grand total of $60,000 in the early 1980s. See Clifford Terry, "Steadi as She Goes: An Interview with Janice Arthur," *Chicago Tribune*, May 16, 1993, http://articles.chicagotribune.com/1993-05-16/entertainment/9305160450_1_steadicam-camera-frito-lay.

11. David Samuelson, "A Survey of Current Film Production Techniques," *American Cinematographer* 58, no. 9 (September 1977): 923.

12. "SOC Steadicam Forum," *Camera Operator: The Journal of the Society of Camera Operators*, Fall/Winter 2006, 42, https://issuu.com/cameraoperators/docs/soc_co_2006fallwinter.

13. Garrett Brown, "Inventing the Steadicam. Part 1: Code Name 'Pole,'" *Camera Operator: The Journal of the Society of Camera Operators*, Fall/Winter 2006, 33, https://issuu.com/cameraoperators/docs/soc_co_2006fallwinter.

14. A short clip featuring Brown wearing a prototype from a demo reel is available to view here: *SG Life Achievement Award: Garrett Brown*, YouTube video, 00:09–00:13, from the Steadicam Guild Life Achievement Awards on April 8, 2013, posted by "Steadicam Guild," August 10, 2013, https://www.youtube.com/watch?v=v-8_jgfiZfg&list=PL8QcVDaAA3Mk__5cBZKrv95veyl2mv2rU&index=2.

15. Garrett Brown to Don Rogers, Chairman Scientific and Technical Awards Committee Academy of Motion Pictures Arts and Sciences, December 17, 1976, Linwood G. Dunn Papers, Margaret Herrick Library, Academy of Motion Picture Arts and Sciences.

16. To view ten clips from the reel, see Ariston Anderson, "'Impossible Shots' That Changed Filmmaking Forever," *Hollywood Reporter*, August 14, 2014, http://www.hollywoodreporter.com/news/steadicam-inventor-reveals-impossible-shots-725346.

17. Garrett Brown, "The Iron Age," *Steadicam Letter* 1, no. 4 (March 1989): 5, http://www.stabilizer-news.com/steadicam-letter-march-1989/.

18. Brown to Rogers, December 17, 1976, 5.

19. Ibid., 6–7.

20. A more in-depth accounting of this legal conflict is documented in the Academy Scientific and Technical Awards investigation between the two technologies. See Dunn Papers

21. Serena Ferrara, *Steadicam Techniques and Aesthetics* (Boston: Focal Press, 2001), 143.

22. Carolyn Giardinia, "Steadicam Inventor Garrett Brown to Get SOC Lifetime Achievement Honor," *Hollywood Reporter,* October 31, 2016, http://www.hollywoodreporter.com/behind-screen/steadicam-inventor-garrett-brown-get-soc-lifetime-achievement-honor-942549; Dan Sullivan, "Going Steadi: 40 Years of Steadicam," *Film Society of Lincoln Center*, December 16–January 3, 2017, http://www.filmlinc.org/series/going-steadi-40-years-of-steadicam/.

23. Garrett Brown, "Ancient History: The Brown Stabilizer," *Steadicam Letter* 3 (December 1988): 8, http://www.stabilizer-news.com/steadicam-letter-december-1988/.

24. John Caldwell, "Steadicam," in *Encyclopedia of Television*, Museum of Broadcast Communications, http://www.museum.tv/eotv/steadicam.htm.

25. These years marked Steadicam / Cinema Products' turbulent legal history during the first five years of its production as Brown and Cinema Products became embroiled in lawsuits with competing stabilizing technologies from Panavision's Panaglide to various Russian and Japanese prototypes, and even to the amateur tinkerers

posting DIY stabilizer guides in local movie-maker magazines. Garrett Brown, "The Contraption Wars," *Steadicam Letter* 2, no. 1 (June 1989): 1–8, http://www.stabilizer-news.com/steadicam-letter-june-1989/.

26. Ferrara, *Steadicam Techniques*, 143.

27. Ibid., 52.

28. For some of this "floating" language in battle, see Richard Fuller, "Explorations: The Floating Camera," *American Film* 2, no. 9 (July 1977): 16–17; also, a heated response to Fuller: Steven E. Michaud, "Letters: Steady There," *American Film* 2, no. 3 (November 1977): 4.

29. To this day, online Steadicam forums still feature debates about the differences between the two technologies, as well as aesthetic examples cited by practitioners to highlight the differences in their own involvement with Panaglide. Some members on Steadicam forums even conjecture about the use of home-made and reengineered Panaglide rigs well into the 1990s, with one member suggesting that perhaps the 1999 *Matrix* film was shot on a Panaglide copy. For more detail on Panaglide's appearances after 1988, see Erwin Landau, "Historic Pictures II . . . ," The Steadicam Forum: Pictures and History Archives, http://www.steadicamforum.com/index.php?showtopic=219&hl=panaglide; and Rich Cottrell "Panaglide," The Steadicam Forum: Pictures and History Archives, http://www.steadicamforum.com/index.php?showtopic=12230.

30. Ted Churchill, "The Moviecam Compact," *Steadicam Letter* 3, no. 2 (April 1991): 6, http://www.stabilizer-news.com/steadicam-letter-april-1991/.

31. Additionally, the organization and newsletter provided the impetus for many other craft organization publications and workshops, including training manuals and VHS instructional series, industrial job directories, established testing of skill levels, codified stylistic norms, beginners workshops, and formation of master operators at the 1988 Rockport Workshop. A roster of names features the major players of Steadicam both in the 1980s and today, including Academy Award–winning operator Chris Haarhoff, Janice Arthur, Garrett Brown, Ted Churchill, Mike Elwell, Jerry Holway, John MacNeil, Jeff Mart, Jimmy Muro, Mark O'Kane, Rick Raphael, Erich Roland, Bob Ulland, Ralph Watson, and Ian Woolston Smith. See "News Flash from the Masters," *Steadicam Letter* 1, no. 1 (Spring 1988): 7, http://www.stabilizer-news.com/steadicam-letter-spring-1988/.

32. Caldwell, "Steadicam."

33. Jean-Louis Comolli, *Cinema against Spectacle: Technique and Ideology Revisited*, trans. Daniel Fairfaix (Amsterdam: Amsterdam University Press, 2015), http://www.oapen.org/search?identifier=611591.

34. "The Steadicam Forum," *Camera Operator Magazine*, 45.

35. Ibid.

36. Bruce R. Smith, *The Key of Green: Passion and Perception in Renaissance Culture* (Chicago: University of Chicago Press, 2009), 9.

37. Kevin Curran and James Kearney, introduction to *Criticism* 54, no. 3 (July 1, 2012): 354.

38. Ibid.

39. Ferrara, *Steadicam Techniques*, 154.

40. Heinrich von Kleist and Christian-Albrecht Gollub, in "On the Marionette Theatre," *German Romantic Criticism*, ed. A. Leslie Wilson (New York: Continuum, 1982), 239.

41. William Forsythe, Maria Paulazzi, and Norah Zuniga Shaw, "Synchronous Objects: One Flat Thing," Advanced Computing Center for the Arts and Design, Department of Dance, Ohio State University, 2009, http://synchronousobjects.osu.edu/.

42. Charles Atlas, *Locale*, Merce Cunningham Dance Company (1978).

43. Daniel Morgan "Where Are We? Camera Movements and the Problem of Point of View," *New Review of Film and Television Studies* 14, no. 2 (2016): 222–48, doi: 10.1080/17400309.2015.1125702; Daniel Morgan, "Max Ophuls and the Limits of Virtuosity: On the Aesthetics and Ethics of Camera Movements," *Critical Inquiry* 38, no. 1 (2011): 127–63, doi: 0093-1896/11/3801-0010; Jennifer Barker, *The Tactile Eye: Touch and the Cinematic Experience* (Berkeley: University of California Press, 2009); Vivian Sobchack, "Toward Inhabited Space: The Semiotic Structure of Camera Movement in the Cinema," *Semiotica* 41 (1982): 317–35.

44. Jerry Holway and Laurie Hayball, *The Steadicam Operator's Handbook*, 2nd ed. (New York: Focal Press, 2013), 61.

45. The music during shooting—Mozart's Symphony No. 45 in D Major—matched the music used in the final cut of the film. Larry McConkey, "The Long Steadicam Shot," in Holway and Hayball, *The Steadicam Operator's Handbook*, 431.

46. Ibid., 433.

47. Marcel Mauss, "Techniques of the Body," in *Incorporations*, ed. Jonathan Crary and Sanford Kwinter (New York: Zone Books, 1992), 77.

48. The "master" designation was born out of a need for operators to self-classify the Steadicam Operators' Association (SOA) job listing service. However, the tongue-in-cheek classification descriptions penned by Brown suggest a sense of humor with the designation itself. Brown lists the following levels with their abilities from "Living Master" to "Invertebrate." Garrett Brown, "What Is a Master?," *Steadicam Letter* 1, no. 1 (Spring 1988): 11, http://www.stabilizer-news.com/steadicam-letter-spring-1988/.

49. Holway and Hayball, *The Steadicam Operator's Handbook*, 75.

50. McConkey, "The Long Steadicam Shot," 437.

51. The diversity of these experiments also includes, among others, a Keds commercial shot by Hal Wexler and Brown (1974), *Marathon Man* (Schlesinger, 1976), *Exorcist II: The Heretic* (Boorman, 1977), *Rocky II* (Stallone, 1979), *Risky Business* (Brickman, 1981), *Wolfen* (Wadleigh, 1981), *Reds* (Beatty, 1981), *Taps* (Becker, 1981), *Porky's* (Clark, 1981), *Star Wars: Return of the Jedi* (Lucas, 1983), *One from the Heart* (Coppola, 1981), and other unlisted commercials, music videos, and industrial films.

52. Néstor Almendros, "Photographing *Days of Heaven*," *American Cinematographer* 60, no. 6 (June 1979): 593–94.

53. Ibid., 594.

54. Vlada Petric, "*Days of Heaven* by Terrence Malick," *Film Quarterly* 32, no. 2 (Winter 1978–79): 38, doi:10.2307/1211939.

55. Ibid.

56. Brown and grip Dennis (Winkle) Lewis adapted the Steadicam for the Elemack head designed for the rig and secured it to a Mitchell mount. Brown could still level and reduce any imbalances that might cause the rig to float. The wheelchair dolly allowed Brown to sit in a chair and operate the rig without the need to physically chase Danny Torrance (Danny Lloyd) around the set. Garrett Brown, "The Steadicam and 'The Shining,'" *American Cinematographer* 61, no. 8 (August 1980): 61, 850.

57. Kubrick wanted to make this effect even more pronounced by adding a kind of speedometer to the wheelchair rig that would dictate a consistent speed and distance between the camera and the object it followed. As Brown has said of this camera work, "I think, the oily smoothness of Stanley's camera cumulatively made the vast cold environs of the Overlook feel dangerous throughout." Had the tool been implemented (most setups using the device were already shot when Kubrick thought of the idea), it would have added additionally to the feeling of the wheelchair Steadicam's technicity and further removed any recognizable organic qualities evoked by the walking Steadicam. See Holway, *The Steadicam Operator's Handbook*, 82.

58. Garrett Brown, Feature Commentary. *The Shining* (Kubrick, 1980) as featured in Warner Two-Disc Special Edition DVD, 2007.

59. Churchill, "Steadicam: An Operator's Perspective. Part One," 114.

60. Garret Brown, "Interview with Steadicam Inventor Garret Brown," disc 1, *Blow Out*, directed by Brian De Palma (New York: Criterion Collection, 2011).

61. *Halloween Panaglide Test, Pre-production before Principal Photography Began*, Vimeo video, 4:26, posted by "Billy Kirkus," July 27, 2013, https://vimeo.com/71166481.

62. *Halloween: DiviMax 25th Anniversary Edition*, directed by John Carpenter (1978; Beverly Hills, CA: Anchor Bay Entertainment, 2003), DVD.

63. Rhodes, "Belabored," 57.