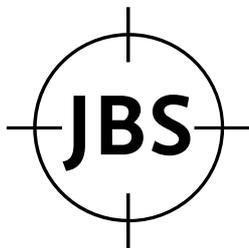


“Old Dog, New Tricks”

James Bond’s Digital Chaos

CHRISTOPHER HOLLIDAY

The James Bond film series has, since the turn of the millennium, evolved an increasingly vexed and ambivalent relationship to digital visual effects and computer graphics, one that can be squared to the perceived ideological and stylistic fracture between the opposing tones of the Pierce Brosnan (1995-2002) and Daniel Craig (2006-present) eras. The significance of 007’s grittier, revisionist renewal and the framing of more recent Bond cinema since Craig’s debut in *Casino Royale* (Martin Campbell, 2006) as an active “going against”, has been critically and culturally understood as a move intended to correct the franchise’s increased encroachment towards digital imagery and computer processes as vital support for Bond’s unique brand of suave endeavour, physical dexterity, and heroic heterosexual masculinity. As Orit Fussfeld Cohen argues, “the gradual increase in digitization” across the James Bond franchise since the release of *GoldenEye* (Martin Campbell, 1995) reached its pinnacle with the 20th instalment and 40th anniversary feature *Die Another Day* (Lee Tamahori, 2002), a film that marked a clear shift in aesthetic priorities from the “careful and discrete deployment of digital technology towards a combination of multiple digital techniques” (2016, 108). Responses to the film in the Hollywood trade and British press (both at the time, and particularly following Craig’s darker, moodier tenure as 007) have routinely expressed reservations at how Brosnan’s final outing as the British



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secret agent leans too heavily on digital imagery (Longwell 2002), with an obviousness to its application that draws attention to computer animation's status as a technology of illusion.

Die Another Day's intrusive digital imagery would, however, appear to rapidly cede to more physical effects practices for *Casino Royale*. James Bond became more explicitly aligned with the multi-part *Mission: Impossible* (1996-present) and *Bourne* (2001-2016) action film series – alongside Christopher Nolan's "The Dark Knight" trilogy of *Batman* (2005-2012) reboots – that were likewise celebrated for their practical effects imagery and in-camera techniques (hand-held camera-work, location shooting), which allowed for an articulation of masculinity and physicality free from pervasive digital enhancement. Yet despite the Bond films' perceived hesitation towards computer manipulation, the recent Craig era has frequently turned to CGI as support for 007's daring screen adventures. This article explores the contradictory, ambivalent, and often disruptive relationship between contemporary Bond films and computer graphics, alongside the place of the franchise at the crossroads of the analogue and digital, by reflecting on recent Bond cinema's often veiled application of its VFX imagery. Drawing on writing on Bond from popular effects journals, alongside Matthias Stork's work on "chaos cinema" (2013), it establishes how the franchise's increased deployment of digital technologies and computer-generated elements from the Brosnan era to the recent "quadrilogy" – *Casino Royale*, *Quantum of Solace* (Marc Forster, 2008), *Skyfall* (Sam Mendes, 2012), and *Spectre* (Sam Mendes, 2015) – has been understood as a rigorous aestheticisation of 007's encroaching neuroses (Binotto 2013). This article concludes by focusing on the numerous digital processes and effects technologies contained within *Spectre's* opening sequence, a seemingly unbroken four-minute long take that combines live-action footage together with the digital editing, virtual matte projections of Mexican urban architecture, and the rendering of "CG trees, buildings, stalls and crowd generation (Bakowski qtd. in Frei 2015, n.p.). Such "chimeric" qualities to *Spectre's* mixed media "posthuman" opening (Ayers 2015) creates a discreet and "chaotic" ontological layering of times, spaces, and environments, which in its seamless inscription of digital VFX imagery positions the 007 series as a vital space to think through the different types of encounters that spectators can have with technological processes in the contemporary media environment.

007'S DIGITAL DILEMMA

While the space fantasy of *Moonraker* (Lewis Gilbert, 1979) opened the door to the 007 franchise for new kinds of computerised visual effects via its "optically-

produced simulated lasers” organised by a “digitally-controlled system” (Burgess 1979, 987), the Bond series has been widely celebrated for its sophisticated pre-digital effects traditions. Figures central to Hollywood’s history of practical modelmaking, such as Frank George (special effects assistant on the first four Bond films); Roy Field (who provided optical cinematography and visual effects in the Sean Connery and early-Roger Moore eras); John Stears (who won the Academy Award for Best Visual Effects for *Thunderball* [Terence Young, 1965] and, later, *Star Wars* [George Lucas, 1977]); and Wally Veevers (credited for visual effects on *Diamonds Are Forever* [Guy Hamilton, 1971]), had all worked across both the 007 series and popular Hollywood fantasy/science-fiction cinemas. Matte artist Albert Whitlock – who had been hired by Alfred Hitchcock and then recruited by the Walt Disney Studio in the 1950s – also produced background matte paintings for *Diamonds Are Forever*, while renowned special effects artist and designer John Richardson joined for the production of the Oscar-nominated *Moonraker* and went on feature in four of the five Bond films released during the 1980s, continuing his role as the “off-camera Q” (Lee 1988, 4) in *Tomorrow Never Dies* (Roger Spottiswoode, 1997) and *The World Is Not Enough* (Michael Apted, 1999) as miniatures supervisor. However, the Bond series’ achievements in more practical effects traditions are channelled largely through the contributions of veteran modelmaker Derek Meddings and his close industrial relationship with Production Designer Ken Adam. Meddings’ background was building models (often repurposing pre-existing plastic model kits) and mattes/sets for a number of Gerry Anderson puppet-animated television series, including *Four Feather Falls* (1960), *Supercar* (1961-1962), *Fireball XL5* (1962-1963), *Stingray* (1964-1965), and *Thunderbirds* (1965-1966). From *Live and Let Die* (Guy Hamilton, 1973) to *GoldenEye* (his last film before his death in September 1995), Meddings supervised a variety of underwater/flying sequences using scaled miniatures, in-camera effects utilising forced perspectives and matte paintings, and compositing techniques that integrated models with live-action background plates (McGregor 1981a; 1981b).

It is precisely these enduring material traditions of effects production that contributed to the framing of *Die Another Day* as a post-millennial digital detour away from an otherwise successful history of practical special effects, models, and miniatures (despite Richardson’s work as model effects supervisor on the film). In his review of *Die Another Day* for *The Hollywood Reporter*, Todd Longwell noted that “Bond films are famous for keeping it real with live stunts and explosions, along with massive sets enhanced by hand-built miniatures, not CGI” (2002, S-8). Yet by digitising signature elements of the Bond formula (“every-

thing from gadgets, vehicles, elements of explosions, chunks of ice and set and model extensions, to a few CG stunt performers and complete environments”), *Die Another Day*’s strong “CG dimension” aimed to situate 007 firmly within the “digital revolution with a vengeance” (ibid.). However, the increased engagement by the Bond series in computer processing was not simply manifest in *Die Another Day*’s “risible special effects” (Bell 2015, n.p.) and unconvincing digital illusion, but in how Brosnan’s final film also rhetorically offered digital media as part of its narrative preoccupation with technological progress. The invisible car (the Aston Martin Vanquish, a.k.a. the “Vanish”) and experiments with virtual reality headsets (that finally afford Miss Money Penny [Samantha Bond] a romantic encounter with 007) reflect a hyper-consciousness towards the “digital” both in its guise as a persuasive technology of illusion within contemporary filmmaking practice, and as a pervasive plot device that accentuates the series’ longstanding investment in hi-tech gadgetry. As Bond actor Roger Moore proclaimed “I thought it just went too far – and that’s from me, the first Bond in space! Invisible cars and dodgy CGI footage? Please!” (2008, n.p.).

Moore’s comment surfaces perhaps the Bond series’ main paradox. Despite 007’s venerable proficiency with technology and a mastery of gadgets as a signpost to his heroic masculinity, imperial neo-colonialist adventures, and sexual potency, as a franchise the 007 films have historically “fared far worse in dealing with the digital revolution in filmmaking” (Millard 2018, 183). In the case of the earlier *Star Wars*-influenced *Moonraker*, André Millard argues that computer-generated images “transformed the making and the look of action films [...] which forced the Bond films to keep abreast of the technological developments in both space travel and motion picture special effects” (ibid.). The relationship between computer animation and the Bond franchise has certainly been far from smooth. Indeed, the series’ chaotic oil-and-water relationship to digital VFX (rather than more practical “special effects”) has prompted the view – staked largely in response to the “computerized feel” (McCarthy 2002, n.p.) of *Die Another Day* – that the franchise historically holds a “poor record on computer graphics” (Bell 2015, n.p.). Yet if the “multiple digital techniques” in *Die Another Day* marked “a significant transformation in the aesthetics of the series” (Cohen 2016, 108), then they did so by intensifying the franchise’s longstanding, if highly contradictory, engagement with digital effects technologies.

Images and icons of the digital progressively – and somewhat problematically – had already entered into the generic lexicon of Bond films throughout the 1990s, as the series gradually increased its application of CG imagery. The primary home for such technologies was undoubtedly the sophisticated digital

animation of the opening titles (that aligned technology with gender, sexuality, voyeurism, fetishism, and desire), yet the films themselves equally began to experiment with computerised effects. However, the Bond series' turn towards CGI with *GoldenEye* was nonetheless framed by an enduring industrial narrative that sought to strengthen the series' commitment and "devotion to the analog", typically achieved via criticisms made by members of production (miniature effects, special effects, and second unit stunt co-ordinators) at the overwhelming "tendency to use CGI as a result of labor-market pressure" (ibid., 107). In truth, while the pristine digital animation of *GoldenEye*'s CG title sequence (designed by Daniel Kleinman, and animated by the Framestore studio) and use of greenscreen technologies in the climactic duel between Bond (Brosnan) and Alec Trevelyan/006 (Sean Bean) does indicate the series' emergent interest in computer graphics, "the use of traditional special-effects techniques and live-action shootings dominates [...] [the film's] action-scenes" (ibid., 105), with only 140 CGI shots in total.¹ However, "the scope of digital procedures" and "assimilation of digital techniques" would expand significantly in *Tomorrow Never Dies* and *The World Is Not Enough*, with both films more readily exploring digital intermediaries, blue-/greenscreen shooting, CG image reconstruction, digital simulation and composition, and "layering techniques that steadily replaced the in-camera optical effects" (ibid., 107-108). As a result, *The World Is Not Enough* contains a total of 250 CGI shots, though still some way off the 680 used in *Die Another Day*.

The progressive reliance by the Bond series on computer effects in this period to augment model and miniature work was reflexively matched by narratives that were themselves preoccupied with complex and innovative technologies. The rapid development of information technology, sophisticated military science/weapons, surveillance systems, personal computers, mobile telephones, the Internet, and other forms of digital communication between the Timothy Dalton (1987-1989) and Brosnan eras meant the 1990s iteration of the secret agent was required to be altogether more "technologically astute," assuming the role of a "technological maestro who uses his virtuosic skills to alleviate increasingly hysterical millennial anxieties" (Willis 2003, 152-154). Bond's growing "technological democracy" and re-coding as "user" are certainly reflected in Brosnan's four-film tenure, just as information technology became a central plot device for a number of neighbouring Hollywood productions during this period too. For Millard, in 1990s Bond cinema "[c]omputer screens are used more and

1 Framestore would also animate the opening credits for *Tomorrow Never Dies*, *The World Is Not Enough* (with VFX studio Smoke & Mirrors), and *Die Another Day*.

more to tell the story, define the characters, and explain the equipment. What the audience often sees in Bond films are screens in which characters watch other characters on screens” (2018, 183). *GoldenEye*’s plethora of digital maps, screen interfaces, and computer tracking systems all reflect the “technological excesses of Brosnan’s Bond” (Willis 2003, 156). The electronic bank heist on the London stock exchange and broader “hacker” narrative of *GoldenEye* also sits firmly within a cluster of mid-1990s science-fiction features (all released the same year as Brosnan’s debut) that each took as their theme the dangers of cyberspace, and particularly the as-then unknowable world of the Internet. Programmed from something of the same code, *Hackers* (Iain Softley, 1995), *Strange Days* (Kathryn Bigelow, 1995), *Virtuosity* (Brett Leonard, 1995), *The Net* (Irwin Winkler, 1995) and *Johnny Mnemonic* (Roberto Longo, 1995) – as well as sequel *Lawnmower Man 2: Beyond Cyberspace* (Farhad Mann, 1996) that arrived the following year – each comprised an internet-paranoia cycle of cybercinema that predicted an industrial futurism that perhaps would never fully come to pass. These films also anticipate more contemporary speculations on computer-based media and posthuman identity formation, alongside cultural and critical anxieties around the political, ethical, and spectatorial implications of forms of digitally-mediated representation.

These cybernetic sensibilities were further centralised in *Tomorrow Never Dies*. The film’s opening sequence cuts between a Terrorist Arms Bazaar on the Russian border and an MI6 command satellite with its array of consoles, control/communications panels, and television monitors. Directing 007 through a series of surveillance technologies (“Zoom in on that can you?”), the opening sequence both counterpoints the more “analogue” language of chess used to instruct Bond’s movements (“White Knight, show us the Pawns”), but also finds a later parallel in the virtual remote meetings, video playback, digital tablets, control rooms, and computer screens that define the insidious activity of media mogul Elliot Carver (Jonathan Pryce). Even 007’s customised BMW 750iL replete with “all the usual refinements” (machine guns, rockets, GPS tracking system) includes internal voice capabilities as part of its onboard AI system. This particular modification anticipates traditions in what Liz W. Faber has recently termed the gendered voice interactive technology that supports female “artificial intelligent personal assistant” applications (such as Alexa, Cortana, and Siri) (2020, 2). As Bond playfully proclaims regarding the electronic female voice, “I think we’ve met”. However, *Tomorrow Never Dies* equally incorporates a range of digital techniques and motion graphics as part of its computer media narrative, such as the CGI rotating blades added to the helicopter during the motorbike chase with

Bond and Wai Lin (Michelle Yeoh); the post-production compositing of greenscreen elements together with model plates for the underwater sequences; and the virtual extension of the imposing Carver Media Group Network (CMGN) tower in Saigon that augments its architectural monumentality via computer graphics (Bond and Wai Lin's descent down the building's exterior was similarly a greenscreen composite). These imperceptible effects moved the franchise away from the self-reflexively "technological" or "technofuturist" application of CGI in *GoldenEye* that suited its cybersecurity narrative, and more towards the seamless integration of photoreal computer graphics to craft a "simulationist" visual order (Pierson 2002, 101) relying on an authentic phenomenological "perceptual" correspondence (Prince 1996) between spectator and digital image. Provided by the Cinesite and Rushes Postproduction studios, the CGI of *Tomorrow Never Dies* ultimately reflects the progressive shift towards a kind of digital effect previously created in the studio or on location, while anticipating a form of digitally-enhanced "invisibility" that would mark the subsequent Craig era. It was also during this 1990s period that the franchise was regularly adapted into several successful "open world", first-/third-person shooter and role-playing videogame formats, thereby introducing an alternate technological dimension to the franchise's cultural circulation through convincing digital avatars. Ranging from straightforward film interpretations – such as *A View to a Kill* (1985), *The Spy Who Loved Me* (1990) and *GoldenEye* (1997) – to more recent anthology titles like *James Bond 007: Everything or Nothing* (2004), *James Bond: Blood Stone* (2010) and *007 Legends* (2012) that intertextually combine characters from across the franchise's history, the steady stream of titles released since the ZX Spectrum's *Shaken but Not Stirred* (1982) have included eight adaptations released in the 1990s, and another twelve in the first decade of the twenty-first century.²

By the release of *The World Is Not Enough* in November 1999, the interplay between narrative, hi-tech digital gadgetry, and the integration of computer graphics onscreen was further secured. Dated 7/1/99 and featuring reduced storyboard illustrations, original production material for the film (a VFX breakdown sheet created by visual effects producer Mara Bryan [1999]) details the extensive "digital visual effects shots" required for the opening boat chase down the River Thames in London. These include bluescreen effects for Brosnan as he hangs perilously from beneath a hot-air balloon, and face replacement technology for

2 For an analysis of the relationship between the 007 film series and the development of numerous immersive videogame adaptations, including the shifting quality of computer graphics and persuasive simulation of authentic 3D digital character models using real-life physiognomic data, see Stephens (2018).

the stuntwork as 007 subsequently falls from the aircraft down the PTFE plastic-coated glass fibre fabric canopy of the Millennium Dome. The VFX breakdown sheets also reveal how bluescreen processing was used for close-up shots when Bond chases the runaway plutonium bomb through an oil pipeline with nuclear physicist Dr. Christmas Jones (Denise Richards). To complete its digital VFX, *The World Is Not Enough* featured the contributions of six digital effects studios – Cinesite, The Moving Picture Co. (MPC), Smoke & Mirrors, Snow Business International (that specialised in the film’s digital snow effects), The Magic Camera Company, and The Visual Effects Company – as well marking the franchise’s first engagement with Computer-Generated Holography. Twenty-five minutes into the film during the staple M briefing scene, a three-dimensional virtual hologram of antagonist Viktor Zokas/Renard (Robert Carlyle) is projected up from the computerised floor into the diegetic space (the original script describes “[a] huge, transparent 3-D image of Renard’s skull [that] floats in the centre of the room”). As 007 inquisitively circles the digital image – at one point inserting his finger into the hologram to follow the destructive path of the bullet lodged in Renard’s brain – the reflexive spectacle of digital animation gestures to Renard’s truth as a modified “cyborg” villain, fully in line with the technological and mechanical enhancement of several villainous characters across the franchise. These include “Dr. No’s metal hands, Tee Hee’s steel pincers, Jaw’s steel teeth, Klebb’s poison-tipped shoe, and Mr Hinx’s metal thumbnails” (Viol 2019, 7). Yet Renard’s digitised appearance in *The World Is Not Enough* also identifies the diegetic framing of computer graphics as a digital object of fantasy and pleasure, as the hologram becomes formally bracketed as a moment of technological wonder. As MI6 Chief of Staff Bill Tanner (Michael Kitchen) aptly describes it as Bond is transfixed by the virtual image, terrorist Renard’s “only goal is chaos”.

COMPLETELY INCONSPICUOUS?

Popular conceptions of the more recent Craig era – perhaps fuelled by an upsurge in Bond scholarship produced in the wake of *Casino Royale* (see Chapman 2007; Lindner 2009) – have ultimately positioned *Die Another Day* as the unruly culmination of these embryonic explorations into CGI throughout the 1990s. James Chapman’s suggestion that, in the immediate post-9/11 geopolitical climate, the “CGI-heavy” *Die Another Day* “tipped the balance too far towards cartoonish spectacle and excess” (2017, 11), ultimately charges the widespread understanding of *Casino Royale* as a “reboot” with greater impetus. Drawn from the very language of computers, the notion of a “reboot” within filmmaking industries as a specific kind of remake that starts anew “comes from the term for

restarting a running but failing computer system” (Tryon 2013, 90). Within the Bond series’ signature modulations between repetition and difference, continuity and rupture, familiarity and novelty, pastness and futurity, it is therefore a label that explicitly signals how *Casino Royale* was a necessary ideological and stylistic “reset” following *Die Another Day*’s technological excess. Indeed, in an article titled “‘Casino Royale’: Returning to Bond’s Roots” for *Animation World Network*, Alain Bielik notes that Craig’s debut provided the series with an essential corrective, due in part to how “when Pierce Brosnan took over as secret agent 007 in 1995, the saga progressively incorporated digital effects into its arsenal” (2007, n.p.). However, despite the critical and cultural (re)positioning of *Die Another Day* as the Bond franchise’s turning point for integrating digital spectacle, its identity as 007’s technological nadir has crafted something of a false narrative. *Casino Royale*’s revisionist credentials are certainly challenged by its altogether more discreet application of sophisticated digital technologies and computer graphics than its predecessors. In his analysis of the Bond series’ multiple intersections with digital imagery since the mid-1990s, Cohen argues that “while indeed fewer digitally enhanced shots – up to 580 shots were featured versus 680 shots in *Die Another Day*, the previous Bond film – *Casino Royale* still incorporates digital procedures in main action scenes” (2016, 111). The application of digital grading processes to erase “rigs, safety harnesses and airbags” (ibid.) was matched with the use of computer graphics to extend physical sets, compositing the live-action footage with greenscreen technology to manage the horizon lines and perspectives in post-production.

Bringing the Bond series into alignment with foundational digital VFX discourse (Prince 1996; Darley 2000; Pierson 2002) alongside writing in popular effects journals, Cohen identifies the often-invisible role played by a number of digital simulation processes that regularly support the series’ practical stunt work and materialities of the lived body, particularly in the more recent Craig era. While CGI certainly reached its peak with the release of *Die Another Day*, the “back to basics” approach of *Casino Royale* nonetheless required digital imagery to fulfil several of its spectacular action sequences. Bielik explores the contributions of visual effects supervisor Steve Begg and Chris Corbould to *Casino Royale*’s extensive use of miniature effects. At the same time, however, he identifies the necessary turn to computer VFX imagery assigned to a number of VFX vendors and effects studios, including Peerless Camera Co. (430 shots); Double Negative (DNeg) (50 shots); Cinesite (30 shots); The Moving Picture Co. (20 shots); Base Black (20 shots); and Fuzzy Goat (20 shots) (2007, n.p.). All of these

studios had already worked as VFX vendors on *Die Another Day*, where they combined Maya and Houdini software (and its digital lighting/shaders) with Cinesite's "proprietary water-generation and particle-rendering programs" and Richardson's model work as part of *Die Another Day*'s computerised illusion (Magid 2002, n.p.). Perhaps surprisingly, then, *Casino Royale* (580) ultimately contains more CG VFX shots than *GoldenEye* (140) and *The World Is Not Enough* (250) combined.

The acceleration of CGI effects within the recent Bond films has been further reflected in their intensified appearance within trade and effects journals, despite the broader industrial narrative of invisibility and hybridity that has sought to reclaim the corporeal/material in the post-*Die Another Day* era. While Richardson's "full-scale physical effects" and "cleverly integrated miniatures" were the subject of a 1988 dossier by Nora Lee (1988) for *Cinefex: The Journal of Cinematic Illusions* – leading to the journal's recent online VFX "ABC" heralding "J is for James Bond" (Edwards 2014, n.p.) – it is the Craig era that has attracted the most sustained appreciation of series' digital animation. An article by Joe Fordham (2007) for *Cinefex* is titled "Back to Basics – *Casino Royale*," yet sits alongside pieces on the digitally-animated effects sequences and characters from the fantasy film *Charlotte's Web* (Gary Winick, 2006), action adventure *Eragon* (Stefan Fangmeier, 2006) based on Christopher Paolini's 2002 novel, *Night at the Museum* (Shaw Levy, 2006), and World War I drama *Flyboys* (Tony Bill, 2006). Fordham's later article for *Cinefex* on *Quantum of Solace* (2009) similarly discusses the multiple effects studios involved in its 900 digital effects shots, including the labour of British companies DNeg, MPC, Framestore, Machine FX and graphic design company MK12 (who designed the opening title sequence) based in Kansas City. *Quantum of Solace*'s extensive computer animation included the "CG planes" involved in the aerial encounter between Bond's DC-3 aircraft and a Marchetti (animated by DNeg), the rendering of "digitally-generated environments" that used proprietary software Stig and DoubleVision, and "volume carving" that seamlessly composites actors, virtual objects, and textures into one complete shot (Desowitz 2008, n.p.). In December 2012, *Skyfall* was also the subject of an extended feature by online magazine *Computer Graphics World*, which explained how Cinesite, DNeg, and MPC again contributed digital VFX to support the original plates shot in-camera by cinematographer Roger Deakins. *Skyfall* was "the first [Bond] film to be shot digitally, and the first to feature more than 1300 visual effects shots" (Cohen 2016, 104). This included digital modifications to the film's opening chase sequence through (and above) Istanbul's Grand Bazaar, which incorporated post-production greenscreen close-ups of the actors and CG lighting rigs together with the building of wholly "CG environments, a digital double of

Craig, and rig removals done at DNeg by artists using a pipeline based on Autodesk's Maya, Pixar's RenderMan, and The Foundry's Nuke." Light Detection and Ranging (LIDAR) data was also sourced to produce high-resolution 3D digital elevation models (DEMs) of the Bazaar itself (Robertson 2012. n.p.). As Andrew Whitehurst (the visual effects supervisor at DNeg) notes, "[o]ne of the nice things about the Bond movies is the heritage of using as much stunt work and practical shots as possible [...] but I would say we had 200 effects shots in that sequence" (qtd. in *ibid.*).

Perhaps expectedly, the April 2013 issue of *Cinefex* featured a 28-page spread on *Skyfall* complete with interviews with the special/visual effects teams (Fordham 2013), while a 24-page article in the later February 2016 issue spotlighted the digital effects sequences of *Spectre*, as did a number of popular online magazines, including *fxguide*, *Art of VFX*, *Animation World Network* (see Failes 2015; Frei 2015; Hogg 2015). The focus in these pieces was often the work of Industrial Light & Magic (ILM) (*Spectre* was the studio's first Bond feature), MPC (who contributed a total of 300 digital effects), and the London-based Cinesite, who among their 334 CGI VFX shots contributed to the rendering of digital mattes, architectural modifications (including extending vaulted ceilings and ornate columns during the SPECTRE briefing), and the construction of the photorealistic computer-animated mouse that inadvertently aids 007's discovery of a secret room at the Hotel L'Americain. In what was their first Bond film since *Tomorrow Never Dies*, Soho-based VFX studio Rushes also designed 300 motion graphics and short digital animations (totalling over one hour's worth of digital footage) for *Spectre*'s multitude of computer screens, monitors, laptops, mobile phones, satellite tracking systems, and user interfaces "to display various and complex analytical data infographics and adapted news footage" (Burns 2015, n.p.). These computer effects were then played back "live" on set and photographed in-camera in ways that recall the pro-filmic integration of data interfaces within *Moonraker*'s space control rooms (Burgess 1979) and Carver's rotating CMGN logos that play on several of *Tomorrow Never Dies*' television screens.

The difference between the "show" and "tell" of VFX production – between the visual incongruity of computer graphics in *Die Another Day* and the seamless application of CGI in the "revisionist" *Casino Royale* (and follow-up features *Quantum of Solace*, *Skyfall*, and *Spectre*) – might ultimately be considered one of degree, rather than of kind. What is clear, however, is that at the centre of the appreciation of the Bond series' digital effects is the importance of spectatorial *connoisseurship*, and the complex relationship that audiences can (and do) have

with the “seams” or “joins” of VFX. This is because “the mediating presence of a technology involves an ongoing process of negotiation” (Wood 2007, 96), meaning that the intercession of moving image technologies, CG manipulations, and other kinds of digital intermediaries and interfaces within popular filmmaking, might be “frequently invisible within the final product” (ibid., 62). A variant of these scholarly debates is provided by Laura Mulvey, who asserts that the pre-digital rear or back projection technique – as an “aesthetic emblem of the by-gone studio era” – occupies a historically “poignant” example of how the cinematic illusion can be ruptured by the unconvincing “clumsy visibility” of what are evidently processed, composited shots (2007, 3). Similar charges of the false have been levelled at more contemporary digital effects imagery. The destabilising of ontological certainty through CGI’s potential artificiality discloses its truth as a visual sleight-of-hand, as its identity as a *trompe-l’œil* trick cues the sudden awareness of the image’s manufacture. In the case of *Die Another Day*, the film’s “standout” CG sequences are exemplars of this disingenuous “clumsy sublime”, one whose transparent inauthenticity stakes out historical contingency within Hollywood’s desire for ever-more realistic representation. By comparison, the digital’s perceived invisibility in the Craig era has allowed for the shoring up of discrete periods of Bond history along the fault lines of supposed technological paucity. So just as the notion of a skilled “bluff” and “tell” underscores the narrative drama of *Casino Royale*’s signature poker game – involving 007’s (in)ability to detect unconscious signs of doubt, weakness, and pretence expressed by his opponent – the Craig era has sharpened the franchise’s longstanding and troubled engagement with digital effects imagery by keeping its cards a lot closer to its chest.

The myriad ways that computer processing techniques and digital imagery move between invisible “support” roles to a more central, obtrusive conspicuousness (and, crucially, back again) with contemporary blockbuster film production is one of the central predicaments of computer-generated VFX. A number of scholars have spoken of the importance of seamlessness versus visibility or “leakage” (Wood 2007, 25) within the stylistic repertoire of Hollywood effects imagery, thereby nicely reprising the spy genre’s language of espionage (denial, detection, concealment, disavowal, masquerade, mystery, transparency, intelligibility, deception, signification, misdirection). The rhetoric of effects technology also explains what separates Renard’s digital hologram in *The World Is Not Enough* – intended to be understood as a digital asset, or artefact, within a technological demonstration – from the computerised mouse in *Spectre* (developed by Cinesite animator Sandra Guarda, compositor Alex Webb, and creature FX

artist Wiebke Sprenger) rooted in more subtle digital trickery. For William Brown, such a discourse of disclosure is fundamental to the power of digital cinema, as effects imagery often hides behind a rhetorical photorealist front as a way of veiling its presence, and diverting spectators through its apparent imperceptibility. Employing the analogy of the superhero, Brown argues that “[f]or the sake of fitting in, digital cinema might look like analogue cinema (Clark Kent), but it is in fact of a different nature (Supercinema)” (2013, 10). This distinction holds due to digital cinema’s computerised “alter ego” whose difference is frequently masked to “fit in” under the veil of analogue aesthetics (that are equated to the inverse figure of Batman, whose true identity as “ordinary” is hidden by a superheroic exterior) (ibid.). Given the Bond series’ chaotic relationship with computer graphics across the Craig era, this parallel to superheroism becomes an intriguing footnote to Robert P. Arnett’s definition of *Casino Royale* as a remix of the superhero genre through its emphasis on origins and narrative of reinvention, which converge to mark “the arrival of Bond as a superhero” (2009, 8). When taken together, *Casino Royale*, *Quantum of Solace*, *Skyfall*, and *Spectre* are thus collective examples of a cinema whose superhero persona (their digital trickery, or “tell”) are kinds of creative expression, technological manipulation, and ontological hybridity routinely hidden behind the rhetorical front of analogue filmmaking conventions (their everyday persona, or “bluff”).

DIGITAL NEUROSES AND “CHAOS CINEMA”

Where the “superheroic” presence of computer graphics within the Craig era has been able to surface, however, has been in precisely those technological spaces that permit digital media to function as a narrative signifier of Bond/MI6’s technological proficiency and knowledge in a pervasive cyber-culture. One of the most significant roles played by digital intermediaries within the Craig era has been the aestheticisation of his neuroses to visualise the character’s enveloping sense of trauma. For Johannes Binotto, Bond’s “internal contradictions” following the death of Vesper Lynd (Eva Green) at the climax of *Casino Royale* are particularly psychologised throughout the next film *Quantum of Solace* via a myriad of visual strategies, including the overreliance on computer screens and digital graphics that “dislocates both narrative and the character” (2013, 54) by prohibiting any comprehension of the spatial geography. When Bond telephones MI6 HQ to obtain background on industrialist Dominic Greene (Mathieu Amalric), for example, the glass partition separating M’s (Judi Dench) office from the adjacent cubicles transforms into an (inter)active computer screen with swirling digi-

tal graphics that divulge Greene's personal information. The layering of planes of action creates a confusing digital spatial palimpsest, as 007's repressed "internal psychic conflict" (ibid.) becomes transposed onto the flagrantly "superheroic" digital *mise-en-scène* that prioritises computer graphics, moving typography, touchscreen technologies, data files and digital maps, personal profiles, and ID database matches across the screen.

Later, when Bond infiltrates a public meeting held by the Quantum organisation at a performance of Puccini's opera *La Tosca* upon the floating modernist stage at Bregenz, Austria, classical and digital worlds collide as Bond sends his employers back a series of camera images that are similarly run through the MI6 database. As the resulting snapshots pixellate into full resolution against the musical crescendo of Scarpia's number "Te Deum", the sequence's use of "operatic" montage, rapid editing, and shifting perspectives fully captures the "blunt subjective clarity" and isolation of Bond (Citron 2011, 328). As Binotto explains of the film's broader hypermediacy, "[n]ot only is the hero split and traumatized, the whole world has become neurotic," with even "actual presence and mere reflection" becoming irretrievably merged amid the confusion to reflexively evoke the broader crisis of simulation inaugurated by CGI's photorealistic capabilities and indexical illusion (2013, 55). The sudden technological visibility or outflow of digital media onto – and into – the screen interface in several scenes throughout *Quantum of Solace* therefore constitutes a convergence of focal points and spatial markers, while fully identifying the pervasiveness of digital-enhancement within MI6's primary control centre. These moments showcasing the digital image's capacity for movement, manipulation, and plastic transformation also counterpoint (perhaps, even override) the film's more latent effects imagery, which are seamlessly able to pass themselves off as unremarkably analogue in their authentic simulation of indexical reality.³

3 Prior to Brown's "superheroic" theorisation of digital effects, Jay Bolter and Richard Grusin (2000) discussed a process of "remediation" whereby new media technologies simulate or "remediate" older media in the aesthetic pursuit of standards of photorealism as part of their aesthetic project. Andrew Darley similarly proposed the notion of a "second-order realism" to explicate the digital aesthetics of Pixar Animation Studios' computer-animated shorts and its attempts "to produce old ways of seeing or representing by other means" (2000, 83). In each case, the stylistic aptitude of CGI is anchored to its fundamental "pastness" – the graphic recollection of analogue cinema as a lens-based medium now reworked and available in the present thanks to the appropriative qualities of pristine digital imagery.

In “performing” 007’s fractured and disoriented psychological state, the digital neuroses in *Quantum of Solace* therefore works alongside – and is entirely embedded within – what has been understood as a contemporary “chaos cinema” that self-consciously amplifies and “perverts” David Bordwell’s (2002) model of “intensified continuity” in its formal and aesthetic exodus from the classical style and composition. Whereas studio-era classicism offered strenuous illusionism, and “intensified continuity” became its rapid and intricate successor dominating American films after the 1960s, recent “chaos cinema” is altogether more “fragmented, imprecise, and precarious” in its overwhelmingly assaultive qualities and promise of a “sensory overload” (Stork 2013, 7-9). Tied inexorably to “the rise of digital effects cinema and the institutionalization of digital editing equipment” (ibid., 3), such a cinema of chaos – what Steven Shaviro (2010) has elsewhere labelled “post-continuity” to describe a similarly destructive, elastic, and de-naturalised mode of filmic representation⁴ – articulates an aggressive restlessness of film form. Recent Bond cinema has been far from immune to such explosive and intense stylistic sensibilities. Indeed, Matthias Stork goes as far as to utilise both the parkour chase sequence from *Casino Royale* between 007 and bombmaker Mollaka (Sébastien Foucan), alongside the rapid editing patterns within the opening sequence of *Quantum of Solace*, to describe exactly this type of iconoclastic, disjunctive “chaos” cinema; the ways in which the “intelligible presentation of action” supported by “an array of diverging positions and perspectives” (2013, 3-5) provides a dramatic experience of physicality, velocity, and exertion. It is precisely the chaotic visual style of *Quantum of Solace* and its maelstrom of destabilising images that provides anchorage to the film’s stylistic neuroses. Supported by invisible digital touch-ups (removing camera, crew, stunt rigs; adding vehicle dirt and damage), face replacement technologies (Craig’s physiognomy digitally grafted onto the stunt driver), and adding CG car windows (Desowitz 2008. n.p.), *Quantum of Solace*’s opening car chase sequence – which takes places immediately following Bond’s capture of Mr. White (Jesper Christensen) in *Casino Royale* – formally registers 007’s high levels of adrenaline, disorientation, and emotional unsteadiness as a character reeling from both loss (of lover Lynd) and discovery (of villain Mr. White). In this way, the graphic(al) inscription of 007’s emotional state and sense of grief for Lynd within the opening’s aesthetic style also positions *Quantum of Solace* as an example of what Stella

4 As Shaviro argues, a number of “high-budget blockbusters today” demonstrate a new action-movie style in which there exists “a preoccupation with immediate effects [that] trumps any concern for broader continuity – whether on the immediate shot-by-shot level, or on that of the overall narrative” (2010, 123).

Bruzzi calls “men’s cinema”, which examines the interrelationship between masculinity and film style by considering how cinema organises and creates gendered images that extend beyond the presentation of male bodies (2013, 159). The importance of *mise-en-scène* in telling “a man’s story” is reflected in the exchange between screen action and character interiority, and the manner in which “male psychology and introspection [is shown] frequently via a convoluted, layered visual style” (ibid.). In *Quantum of Solace*, the hectic energy of its action sequences and broader technological excess likewise suggest how popular cinema often conveys maladjusted, reflective, fragile masculinity by making the audience feel identification at a corporeal level.

While *Quantum of Solace* usefully articulates the ways in which a digitally “chaotic” *mise-en-scène* becomes a vital component of cinematic masculinity, there is potentially another form of “chaos” in the Bond series that is less tied to the expressive plurality of enveloping digital media. In fact, it is a disorder anchored more to the hidden articulation of digital processing and seamless use of computer effects that seeks to imperceptibly make order out of chaos. Following the film’s traditional gun barrel opening (the first Craig film in which it appears at the start), the opening sequence of *Spectre* comprises a four-minute long take, in which a seemingly unbroken tracking shot depicts Bond’s pursuit of assassin Marco Sciarra (Alessandro Cremona) through the streets of Mexico City. Navigating the revellers of the annual Day of the Dead celebrations, Bond is first picked out by the roving camera as he surreptitiously follows his target. The camera continues to follow behind and alongside 007 and his female accomplice as they next enter the lobby of the Gran Hotel Ciudad de México, ascend several floors via the French *art nouveau* style internal elevator, arrive at their hotel room, before impressively moving out a window and onto the rooftops of the neighbouring buildings located in the Zocalo – the main plaza in Mexico City – while the parade unfolds below. Despite the seamless intimacy of the sequence, there are several “hidden” cuts and six disparate set-ups (or plates) spliced together by the ILM London VFX studio. Carolyn Giardina describes how the digitally-enhanced shot “was accomplished with several meticulously choreographed long takes edited together with shrewdly placed wipes and a smattering of CG (though [cinematographer Hoyte van] Hoytema insists there are no fully CG shots in the sequence)” (2015, n.p.). The sequence also incorporates many further subtractive and additive processes germane to digital image processing, from the erasure or “clean-up” of safety wires (figuratively “supporting” Craig’s performance) and the integration of wholly digital doubles to green-

screen matte projection and the creation of virtual environment extensions (Frei 2015).

Even without such substantial digital intervention, the long take as a phenomenon of editing has often been linked to structural complexity, labour, and precision. In *Spectre* too, the Steadicam and flamboyant Technocrane shots navigate through the space in ways that self-reflexively control distinctions between onscreen and offscreen, background and foreground, and rehearse the long take's stylistic claims towards reflection, contemplation, extended duration, and spatio-temporal authenticity. But the largely invisible digital editing (that comprise *Spectre*'s opening "bluff") allows the film to reproduce the virtues of the long take through the creative freedoms and achievements of digitally-assisted camerawork. Lisa Purse has discussed the role played by "computer-generated images and digital compositing" in providing "the technological conditions for a return to the mobile long take," and the narratological possibilities of a camera that is unencumbered by the limitations of human perception (2017, 221-222). This figurative "unfixing" of humanity has led to popular conceptions of new digital cinema as a mode of filmmaking that works against anthropocentrism and anthropocentric optics – a contemporary inhuman or, perhaps, "posthumanist" cinema that amalgamates real/organic and virtual/biomechatronic elements (in a composite, cyborgian fashion); which emphasises elastic spatial continuity at the same time as it (falsely) stresses continuous and unbroken temporality; and which effortlessly claims for and configures new viewing positions. This reconfiguration of "the frame" and "the shot" as central to a new mode of "posthumanist realism" has presented a digitally-mediated cinema that in its visual logic offers "nonanthropocentric spaces and times" (Brown 2013, 3). Posthumanism's apprehension of – and encounters with – such post-anthropocentric thinking also "leave the human behind [...] [which] only causes it to return in spectral forms to haunt our philosophy, popular cultures, and the arts" (Lummaa 2019, 41). This fits neatly too with the form and function of *Spectre*'s audacious opening sequence, and in particular the "spectral" dimension of the camera's movements through, across, and above spaces and characters. Digital technology as a medium "produces the spectre of physical authenticity" (Riquet and Zdrenyk 2018, 20), and its manufacture of ghostly avatars, virtual objects, and uncanny computer-generated artefacts at the level of production is matched to the ghostly, skeletal figures that populate the film's deathly parade. The digital manipulation of faces (removing of blemishes, fixing expressions, addition of facial masks) during *Spectre*'s opening only adds an additional element to their invaded,

posthuman identities. Furthermore, the floating, ethereal camera that rotates dizzyingly around Bond to interrogate the architectural splendour of the surrounding Mexico City itself becomes a ghostly apparition because its unique ontology remains “not-quite-human” (Lummaa 2019, 41) – it is a sequence caught, trapped or compressed between analogue and digital spaces.

In its free-floating virtuosity, if not its bravura technical precision, the long take of *Spectre* undoubtedly provides an immediate counterpoint to the freneticism of intensified continuity and disorderly chaos that stylistically marks *Quantum of Solace*'s bombastic opening stages. On the contrary, perhaps, *Spectre* discloses precisely how digital intermediaries have enabled filmmakers to move to the other extreme via weightless, fluid camerawork that both registers duration and conquers the space. Yet the digital freedom of the camera in *Spectre* remains foremost a psychologised zone because it, perhaps, registers Bond's professional competency and clarity (that comes with experienced 00-status) as established in the closing moments of the previous *Skyfall*, where the inauguration of the new M (Ralph Fiennes) and revelation of Miss Eve Moneypenny (Naomie Harris) suggests the restoration of narrative equilibrium via the re-establishment of core elements of Bond's narrative formula. *Spectre*'s exploration and evidencing of freedom through its digitally-assisted long take suggests that Bond's personal neuroses that contributed to the chaos of *Quantum of Solace*'s visual style has now ceded, resolved, and been rehabilitated – and, therefore, no longer transferable to the frenzy of the digital.

CONCLUSION: “TAKE A LOOK AT THE WORLD...CHAOS”

Or so proclaims Director-General of the Joint Security Service Max Denbigh (Andrew Scott) to M (Fiennes) at the climax of *Spectre*, looking out onto the digitally-augmented London skyline that seamlessly merges real architecture with a series of convincing digital facsimiles. From the computerised rendering of a ravaged MI6 Building primed for demolition, to the digital exterior of the fictional Centre for National Security Building on the north side of the Thames from which Denbigh surveys the city, *Spectre*'s environments are constituted by chaotic projections and conjoined spaces. The film's opening sequence is therefore indicative of this form of digital chaos, combining in just four minutes numerous times and locations (from Palenque in southeast Mexico to Pinewood Studios in the UK) as well as ontologies (live-action shooting, models/miniatures, computer graphics), with digital editing smoothing out the transitions between its variant constituent parts. Despite such convincing digital re-alignments, this careful layering of environments functions just as “chaotically” as the frenetic

opening to *Quantum of Solace*. *Spectre*'s VFX Supervisor for ILM London Mark Bakowski explains that when the hotel room door of the Gran Hotel Ciudad de México opens in *Spectre* "you're actually looking from Mexico into a Pinewood set and out through a blue screen behind the open balcony door back into a digital matte painting of the view in Mexico City" (qtd. in Frei 2015, n.p.). Yet these conditions of mixed media production are not matched in those of reception, with Maya and Nuke computer software used to "stitch the disparities" (ibid.) between the transitions to create a unified coherent diegesis.

A central element of *Spectre*'s digital chaos therefore lies precisely in its co-existent times and spaces. Recalling the codeword of *Casino Royale*, its opening "bluff" seeks to hide in plain sight its persistent ontological "ellipses" as a way of distracting spectators from the pervasive sense of its incompleteness. Brown's work on "supercinema" alludes to digital media's substantial cultural-aesthetic changes by considering the role played by chaos not just as a symptom of the assaultive, immediate aesthetics of a commercial film style that is "headache-inducing and nauseating" (Stork 2013, 12), but at the level of (dis)continuity. Brown talks of the "chaos aesthetics" of digital cinema largely through a philosophical understanding of chaos theory, and the ways in which digital media remains chaotic because it can involve the ability to represent "the interconnected nature of time and space, across the micro and macro scales" (2013, 105-106). Chaos theory suggests, then, that in "digitally enabled" images and narratives "there is no element that we can discount from contributing to the events that we see in a film" (ibid., 106). With digital effects, these combinatory macro and micro elements speak to a range of effects technologies and processes. Among its armoury of digital VFX, for example, *Spectre*'s opening sequence incorporates both smaller costume enhancements that employed "facial tracking and digi-double replacement" together with the rendering of larger CG crowds "generated to fill the street extension and add a denser population into the existing crowd in the [live-action] plate" (Bakowski qtd. in Frei 2015, n.p.). The film therefore utilises one of digital technology's many "calling cards" and a staple of popular Hollywood cinema's application of CGI, that of the "digital multitude" (Whissel 2010, 91). The multitude combines new forms of image-making (digital split-screen techniques, crowd simulation engines) to virtually reproduce sweeping formations of digital figures. In *Spectre*, the scale of the Day of the Dead becomes a spectacular digital asset or emblem, whose visual pleasure as an ever-expansive group resides in its panoramic reach and recession seemingly far into the urban horizon.

Despite its relative technological invisibility, then, the chaos of *Spectre*'s opening sequence lies in the construction of photographic verisimilitude through the convergence of simulations in several possible combinations. The long take's "chaotic" reality is rooted in how the smallest virtual elements are related to – and inextricably bound together with – the largest, working together as part of the complete dramatic illusion. For Drew Ayers, such CGI/live-action compound images that often imperceptibly populate Hollywood filmmaking "become chimeras, or impossible combinations, of human and non-human forces, imagining a hybrid space in which analogue pro-filmic and digital agents might seamlessly coexist in a posthuman utopia" (2015, 99). The chimera is a mythical figure or phenomena of transgression, ambivalence and tension, a "phantasm" (even, perhaps, a "spectral" figure) that functions as a "utopian fantasy" fully representing exactly how "analogue and digital forces can be easily and unproblematically transferred and exchanged" within popular cinema (ibid., 100). Chimera is also the name given to Sévérine's (Bérénice Marlohe) yacht in *Skyfall*, recalling both the mythical Manticore vessel in *GoldenEye*, but also reflecting the technological, aesthetic, and formal hybridity of a film that – as with all of the Craig-era films – combines disparate sources into one complete organism. As Sévérine herself coldly notes to Bond, "[i]t's amazing the panic you can cause with a single computer". Indeed, the "chimeric" dimension to digital effects/media composites that propose a continuous screen image also works well as a metaphor of the digital, largely because it (dis)embodies the crisis paradigm that has been central to the critical and popular understanding of increasingly digitised technocultures, and the element of dread that envelopes the impact of technology on cinema as a mass media industry. But as a symbol of cunning (certainly within traditions of Christian Art), imagination, and deception, the chimera points more readily to the turbulent, hostile, broken, distorted, and disorderly properties of a digital effects image passing itself off as holistic, rather than simply defining its complex ontology as a simple mixing of media. More than the affective dualism of the two-faced Janus that holds such prominence in *GoldenEye*, the vacillating hybrid monster chimera with its multiple connectivities and "joining of incongruities" (ibid., 108) helpfully defines the scope and spectacle of James Bond's pervasive digital chaos. As 007 walks amid the Day of the Dead celebrations in *Spectre*'s seemingly continuous (yet technologically discontinuous) opening shot, the scene ultimately stands for the ways in which the franchise's chaotic VFX traditions blend technical genealogies at varying levels of visibility. The scene is a turbulent mixing zone of the pro-filmic and the virtual or computer-generated, whose chimerical dissonance and compound identity of

incongruous parts and individual components are all part of the franchise's ongoing game of CGI "bluff" played by a set of films that – like all good secret agents – must keep their true identities firmly hidden behind the most unassuming of pseudonyms.

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