THE CINE-FILES

DOSSIER ON FILM SOUND

The Tinnitus Trope: Acoustic Trauma in Narrative Film

Mack Hagood

Link to film clip in criticalcommons.org: "Opening Explosion and Aftermath from CHILDREN OF MEN"

"You know that ringing in your ears? That *eeeee*? That's the sound of the ear cells dying, like their swan song. Once it's gone you'll never hear that frequency again. Enjoy it while it lasts."

In Alfonso Cuarón's *Children of Men* (2006), this otological lesson is delivered to protagonist Theo Faron (Clive Owen) after his narrow escape from a coffee shop bombing. The speaker is Theo's ex-wife Julian (Julianne Moore), the leader of an underground militia group. The audio-visual perspective is Theo's. Julian stands in an abandoned rail station with a high, vaulted ceiling, addressing the camera/Theo as her men drag him away. As Julian recedes from view, her voice recedes into its own reflections in the empty, reverberant space—its attenuation only amplifying her prediction of oncoming hearing loss.

As one might guess, Julian's cold and poetic diagnosis is great cinema but sketchy otology. In the acoustic trauma associated with a powerful impulse such as an explosion, hearing loss and tinnitus are directly related, but separate, phenomena. Rather than dying during the ensuing days, the affected hair cells of the cochlea undergo an *immediate* reduction in their ability to transduce and amplify sound. The attendant sound of tinnitus comes not from the affected hair cells themselves, but from maladaptive neuronal activity, as the auditory system attempts to compensate for reduced input in the affected sound frequencies. The bad news for Theo is that he has

hearing loss *now*. The good news is that, in the coming hours and days, he may regain much of that loss, which could, in turn, allow the tinnitus to subside. [1]

Julian, however, casts the sound of Theo's acoustic trauma as the dying screams of his biological apparatus. In her monologue, tinnitus is the tragic signal of an unrecoverable loss, a loss that must be borne by the listener alone. Taking in the long Hollywood history of "steel eardrums" and consequence-free explosions, it might seem odd that even a sophisticated [2] action-oriented film would pause to consider the lingering damage from a single and comparatively unspectacular bombing. But as many moviegoers will have noticed over the past decade-plus, the sound of tinnitus as a representation of acoustic trauma has become commonplace—arguably to the point of cliché. [3]

By charting the form and history of the tinnitus effect, we can begin to examine why a mixture of piercing and muffled sound has lately become so useful and salient in narrative film, a question that gives entry to broader issues of cinematic subjectivity and its cultural-historical context. If film audiences share something like Julian's interpretation of acoustic trauma, it may be that cinematic tinnitus successfully sonifies contemporary feelings of loss and unease around politics and selfhood.

The Anatomy of a Trope

Children of Men's opening bombing scene displays the usual characteristics of the tinnitus trope. When the coffee shop explodes shortly after Theo's exit, the soundtrack evokes his damaged auditory perspective through a ringing sound and a reduction of the ambient sound of the city street. A handheld camera visually reinforces this point-of-audition (POA) sound with Theo's unsteady point of view (POV), moving toward the debris and carnage of the bombing and coming to rest on a staggering woman holding her own severed arm. [4] However, sound and vision soon diverge, as the tinnitus effect continues through the subsequent title credit and the next scene, in which the traumatized Theo is shown entering his workplace. Such a schism between aural and visual perspective, which allows us to both inhabit and objectify the protagonist, is common in the cinematic representation of acoustic trauma. As Robert Walker has pointed out in his study, "Cinematic Tinnitus," this audio-visual effect presents both the sound of tinnitus and an outside view of its effects on the sufferer, allowing filmmakers to situate affective states such as pain, shock, dislocation, and alienation into their narratives. In the case of Theo, "his character arc is from an apathetic disillusionment to reluctant hero and eventual saviour," Walker writes, "and the tinnitus is an important part in underlining his initial detachment from society." [5]

In sum, Cuarón's film displays elements that have since become standard in the tinnitus trope: keening tinnital sound(s), low-pass filtration to muffle and reduce ambient diagetic sound, a POA-POV split, and the deployment of these formal elements in the service of manifesting a character's affective state and its outward effects. The only thing unusual about the use of tinnitus in *Children of Men* is that the film reflexively refers to the effect when Julian anticipates and comments upon the tinnitus of Theo.

A Tinnital Timeline

When did these formal elements emerge and find their codification as acoustic trauma? Since the facts around the appearance of the tinnitus trope have yet to be systematically detailed, I have been assembling a timeline by crowdsourcing examples

online and screening suggested films for verification. As the timeline shows, although Arthur Hiller's *The Out of Towners* utilized the effect as early as 1970, onscreen ears remained mostly silent for the rest of the 20th century. [6] The exceptions are few, but include important instances. The archetypal example of attenuated, tinnital sound deployed to represent wartime trauma occurs in Elem Klimov's *Come and See* (1985), after the child-soldier protagonist survives an artillery barrage in a forest. *Come and See* is often mentioned as an influence on Steven Spielberg's *Saving Private Ryan* (1998), which uses low-pass POA sound in its first major battle and the tinnitus effect in the last. But while *Saving Private Ryan* is often mentioned as the early exemplar of this effect in American film, James Mangold's *Cop Land* (1997), not only precedes it, but actually pivots psychologically and narratively on hearing loss and the sound of tinnitus.

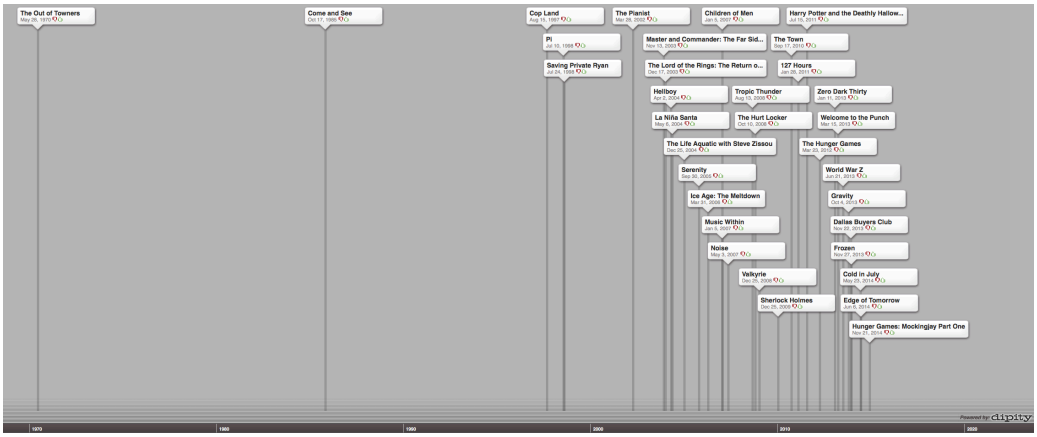

Fig 1: See page 8 for enlargement of Tinnitus trope graphed, 1970-2014.

Nevertheless, it is not until 2003 that the tinnitus trope explodes, appearing in at least two or three movies a year from then on. And although tinnitus can be caused by rather banal factors such as medications, illness (as in 2013's *Dallas Buyers Club*), and age-related hearing loss, it is mainly used in these films as described above, to represent the aural and psychological effects of violence-induced acoustic trauma.

Noise Reduction and Production—Spectral Analysis

So, why has cinematic tinnitus spiked only recently? First, we must address a possible technical barrier proposed in Robert Walker's piece. While Walker states that both technical and cultural contingencies occasioned the representation of tinnitus, his only specific claim about the advent of the effect credits the adoption of Dolby noise reduction in the mid-1970s. This technology allowed sound designers to utilize frequencies above 5-8kHz, which were previously "rolled off" by noise-fighting Academy Curve equalization. "This also happens to be the frequency range of most tinnitus effects," he writes, "thus making them almost technically impossible prior to 1975," because audiences would not "be able to accurately distinguish the intentional noise of a tinnitus effect from poor system performance." [7]

However, while advances in audio fidelity may have expanded the palate of sounds for the representation of tinnitus, history and spectral analysis do not support the idea that Dolby NR made such representation possible. The Academy Curve was no barrier to Hiller playing tinnitus for laughs in the pre-Dolby NR *The Out of Towners* (1970). When Jack Lemmon's George is temporarily deafened by an exploding manhole cover, a pair of tones at 1.6 kHz and 2.3kHz, mixed with the sound of wind, supplant the street sounds of Manhattan. Combined with a shot of a slack-jawed Lemmon shaking his

head, these sounds leave no doubt that we are auditing George's blasted aural perspective. And while a clip of Theo's tinnitus in *Children of Men* contains some faint energy above 8kHz, its primary frequencies are approximately 3.9 kHz, easily reproducible in the Academy Curve days, and 5.1kHz, which might have been somewhat affected, but not rendered inaudible, by the curve.

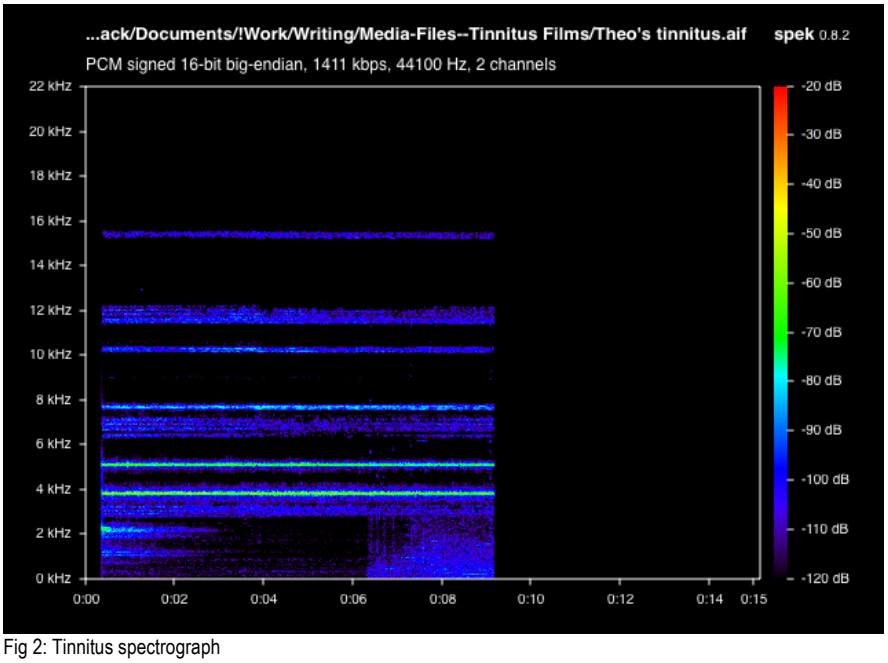

Fig 2: Tinnitus spectrograph

As one member of a sound design web forum told me, the most common approach to representing acoustic trauma today is "to apply a low pass filter to any background audio (the muffled effect) and add a sine wave at about 3khz for the duration of the effect (the tinnitus effect)." While the details vary from film to film, this shorthand for acoustic trauma "works" and has long been technologically achievable, indicating cultural factors behind the trope's recent prominence.

9/11 and the Sound of the Neurological Self

Convincingly accounting for the rather sudden and protracted case of tinnitus in film since 2003 would require a much larger study, one that would widen its scope to connect cinema with the cultural history of acoustic trauma and its articulation with changing notions of subjectivity. While I have not conducted such a study, my own ethnographic and historical research on the prevalence, treatment, and experience of tinnitus indicates some questions for future investigation.

First, how—if at all—do increasing or changing representations of acoustic trauma articulate with changing notions of nation, security, and warfare? Tinnitus is the top disability in American troops returning from Iraq and Afghanistan and untold numbers of westerners have experienced it after terrorist attacks in New York, Madrid, London, and Boston. It does seem plausible that consequence-free cinematic explosions began to strain credulity (not to mention morality) after such attacks, even for those who have not directly experienced acoustic trauma. Tinnitus offers an economical representation of trauma in films that aspire to some level of realism and empathy—and in fact, researchers view tinnitus and PTSD as related. Could a nation's trauma be sounding in the ears of its onscreen heroes?

Second, this matter of traumatized brains raises what is for me a more interesting question about subjectivity: could cinematic tinnitus be signaling a historical contradiction between an ascendant neurological self and the unconscious self of psychoanalysis? As understandings and experiences of self are culturally informed and historically contingent, we would expect that the internal sounds of the filmic subject would change over time. The sound of the individual portrayed onscreen—or internal diegetic sound—includes both sounds of body (which Michel Chion calls "objective-internal sounds") and sounds of mind ("subjective-internal sounds"). Chion defines subjective-internal sounds as "mental voices, memories, and so on." [8] The voice holds a special place among sounds suited to the expression of the conflicts and repressions of psychoanalytic theory. Indeed, remembered voices and voiceover narration are hallmarks of the psychoanalytically influenced *film noir,* often used to construct a tormented male subjectivity in the post-World War II era. [9] In the cinematic interior monologue, Mary Ann Doane notes, the voice signifies "the 'inner life' of the character," and is "the privileged mark of interiority, turning the body 'inside-out.'" [10] However discordant or nonsensical it may become, the internal voice is recognizably human.

But what is the sound of the self as a neuronal network? The proliferation of brain scan technology and targeted psychotropic drugs in recent decades has encouraged a neurological understanding of self, one that has been uneasily embraced by laypeople while never reconciled with conflicting beliefs in a soul or an underlying, inner self. [11] In the screech of tinnitus, the body displaces the privileged voice and undermines the coherence of the self the voice represents, blurring Chion's categories of objective and subjective internal sound. The raw affect of tinnitus has gained cinematic salience in parallel with film and other humanities scholars' increased interest in affect theory, flat ontology, and other affronts to subjectivity as (we think) we've known it.

Does tinnitus express alarm at the contingency and fragility of the self that science has shown us? Julian's speech in *Children of Men* would seem to suggest as much. The *noir*-ish Theo, she indicates, is damaged goods, estranged from himself and others, doomed to lose contact with whatever sounds the world has to offer at 3.9 and 5.1kHz. If his hearing loss is meant to suggest his social isolation, his self-alienation is suggested by a phantom sound of the body, the wordless signal of a short-circuiting neurological subject. We would have heard the voice of Theo's mind in the 1940s—now we just hear the sound of his brain.

Link to film clip in criticalcommons.org: "Julian's Monologue about Tinnitus from CHILDREN OF MEN"

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Notes

[1] The further bad news, however, is that acoustic trauma often entails delayed effects on hearing that do not emerge until years later, while tinnitus may linger even in the wake of minimal damage. For a survey of contemporary models of tinnitus, see Kaltenbach, James A. "Tinnitus: Models and Mechanisms." *Hearing Research* 276, no. 1 (2011): 52-60. A.J. Hudspeth provides an overview of the hair cells' mechanoelectrical transduction and amplification in "How the Ear's Works Work: Mechanoelectrical Transduction and Amplification by Hair Cells." *Comptes Rendus Biologies* 328, no. 2 (2// 2005): 155-62. For a widely cited study detailing changed neuronal activity in acoustically traumatized cats, see Norena, AJ, and JJ Eggermont, "Changes in Spontaneous Neural Activity Immediately after an Acoustic Trauma: Implications for Neural Correlates of Tinnitus." *Hearing Research* 183, no. 1 (2003): 137-53.

[2] Summarizing its critical reception, *Rotten Tomatoes* describes *Children of Men* as "a violent chase thriller, a fantastical cautionary tale, and a sophisticated human drama about societies struggling to live." http://www.rottentomatoes.com/m/children_of_men/ Accessed 12-27-2014.

[3] The trope is already earning its parodies. For example, in a scene from the Comedy Central sitcom *Broad City,* a character momentarily develops tinnitus and vertigo upon realizing she has failed to sign for an eagerly anticipated package.

[4] For more on POA sound, see Rick Altman "Sound Space" In *Sound Theory, Sound Practice*, edited by Rick Altman. New York: Routledge, 1992, 60; Michel Chion *Audio-Vision : Sound on Screen*. New York: Columbia University Press, 1994, 91.

[5] "Cinematic Tinnitus." In Goddard, Michael, Benjamin Halligan, and Paul Hegarty, eds. *Reverberations: The Philosophy, Aesthetics and Politics of Noise*. London: Continuum, 2012, 144.

[6] I assembled this admittedly unscientific timeline through Google searches and by querying academics, sound designers, and other netizens in social media and online forums. A less comprehensive list can be found in the TV Tropes entry "Shell-Shock Silence." http://tvtropes.org/pmwiki/pmwiki.php/Main/ShellShockSilence Accessed 12/31/2014. I have excluded films such as *There Will Be Blood* (Anderson, 2007), which sonically represents sudden hearing loss, but not tinnitus, and *Blackhawk Down* (Scott, 2001), which makes no attempt to represent combat-related hearing loss from a first-person perspective.

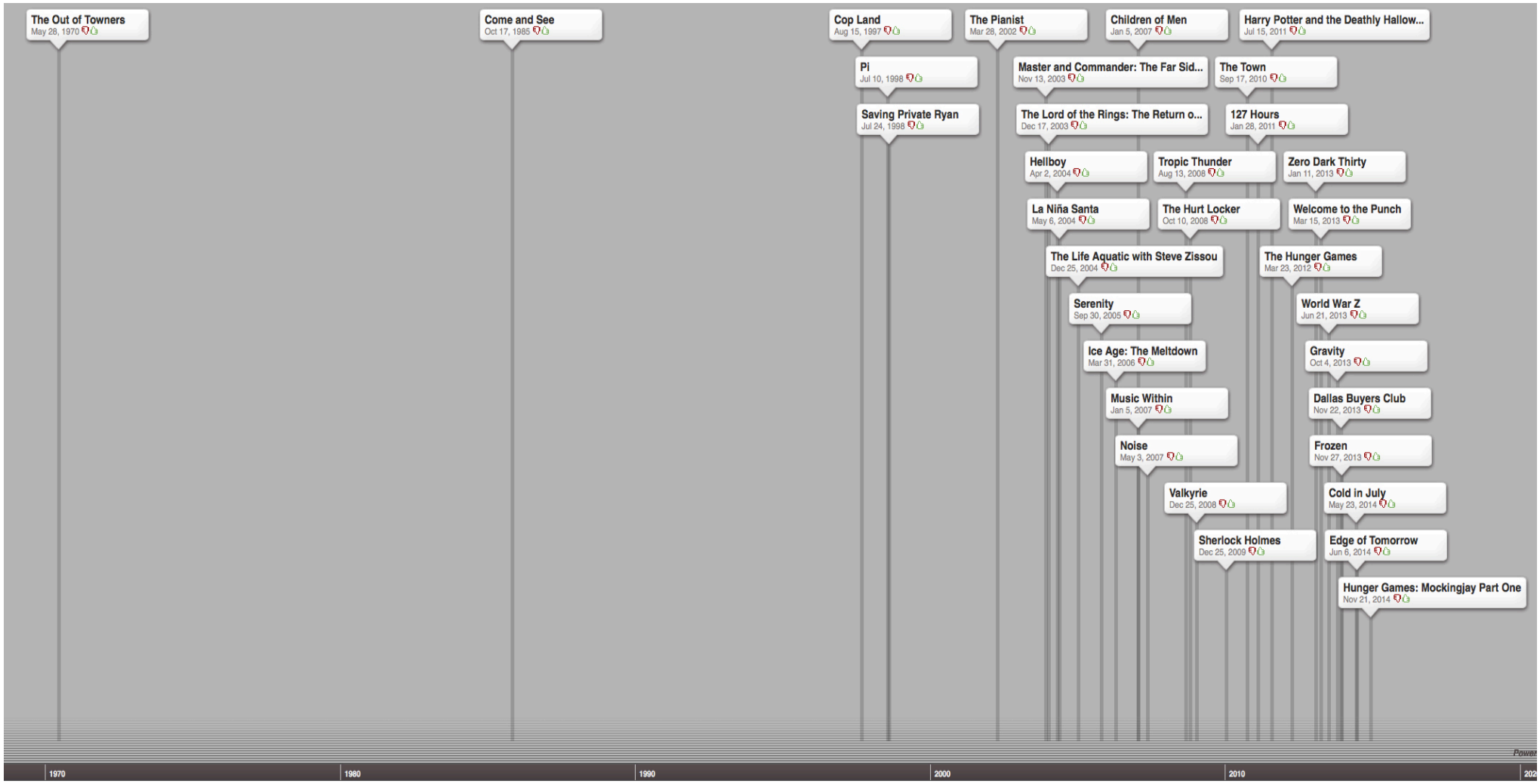
[7] "Cinematic Tinnitus," 140.

[8] Chion, *Audio-Vision*, 76.

[9] See Frank Krutnik, *In a Lonely Street: Film Noir, Genre, Masculinity.* New York: Routledge, 2006, 45-7.

[10] "The Voice in the Cinema: The Articulation of Body and Space." *Yale French Studies* (1980): 41.

[11] For more on the influence of technologies on understandings of selfhood, see Peter Galison, "Image of Self." In *Things That Talk: Object Lessons from Art and Science*, 257-94. New York: Zone Books, 2004; Joseph Dumit, *Picturing Personhood: Brain Scans and Biomedical Identity*. Princeton University Press, 2004.


The Out of Towners
May 28, 1970
Come and See
Oct 17, 1985
Cop Land
Aug 15, 1997
The Pianist
Mar 28, 2002
Children of Men
Jan 5, 2007
Harry Potter and the Deathly Hallow...
Jul 15, 2011
Pi
Jul 10, 1998
Master and Commander: The Far Sid...
Nov 13, 2003
The Town
Sep 17, 2010
Saving Private Ryan
Jul 24, 1998
The Lord of the Rings: The Return o...
Dec 17, 2003
127 Hours
Jan 28, 2011
Hellboy
Apr 2, 2004
Tropic Thunder
Aug 13, 2008
Zero Dark Thirty
Jan 11, 2013
La Niña Santa
May 6, 2004
The Hurt Locker
Oct 10, 2008
Welcome to the Punch
Mar 15, 2013
The Life Aquatic with Steve Zissou
Dec 25, 2004
The Hunger Games
Mar 23, 2012
Serenity
Sep 30, 2005
World War Z
Jun 21, 2013
Ice Age: The Meltdown
Mar 31, 2006
Gravity
Oct 4, 2013
Music Within
Jan 5, 2007
Dallas Buyers Club
Nov 22, 2013
Noise
May 3, 2007
Frozen
Nov 27, 2013
Valkyrie
Dec 25, 2008
Cold in July
May 23, 2014
Sherlock Holmes
Dec 25, 2009
Edge of Tomorrow
Jun 6, 2014
Hunger Games: Mockingjay Part One
Nov 21, 2014
1970
1980
1990
2000
2010