

A decorative graphic of a film strip, showing several frames, curves, and sprocket holes, positioned diagonally across the top right of the page.

Editing and Cognition Beyond Continuity

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Abstract: This article proposes that inquiry into the cognitive complexity of film editing processes could provide insight into how edits affect audiences beyond convincing them of temporal and spatial continuity. Application of two influential theories in cognitive studies of the moving image to this inquiry suggests that editors make some decisions to maximize the smooth transference of their own attention and some in response to their own embodied simulation. However, edited sequences that do not conform precisely to the principles of maximum attentional efficiency or that significantly reshape the cinematographer's "kinematics" (Gallese and Guerra 2012) reveal other cognitive expertise at work. Sequences generated by editors' feeling for rhythmic phrases of movement, tension, and release create unique expressive forms in film. They require artistry of a higher order, rather than following the relatively straightforward rules of continuity cutting, and may have distinctive affective or cognitive impact on audiences.

Keywords: artistry, continuity editing, cognition, film editing, embodied simulation, rhythm, tension and release

This article considers the cognitive complexity of creative decision making in film editing. It asks, would it be productive for cognitive scholars of the moving image to investigate the perceptual, affective, and cognitive impact of editing on audiences by studying the cognitive origins of editing decisions that have visual, emotional, or narrative purposes that are subtler than preservation of continuity?

The cognitive framework in studies of the moving image, as described by David Bordwell and Noël Carroll, "seeks to understand human thought, emotion and action by appeal to processes of mental representation, naturalistic processes, and (some sense of) rational agency" (1996: xvi). Cognitive study of the moving image extends beyond film scholarship to fields including cognitive psychology, cognitive science, and cognitive philosophy. This groundswell of research all contributes to understanding of what we might compress into the question of "how films affect audiences" or "why we cry at the movies."

How a film will affect an audience is also a primary concern of filmmakers, who, in the process of making films, seek to have an impact on spectator's

thought, emotion, and action. Given that filmmakers are trying to affect audiences and that cognitive scholars are trying to understand how movies affect audiences, a sharing of knowledge between scholars and practitioners is mutually beneficial. Having myself benefitted as a filmmaker from explanatory theories put forward by cognitive scholars, I turn in this article to the question of whether more knowledge of what filmmakers, particularly editors, do could reciprocate by contributing refinements, complications, or new research questions to scholarship in cognition and film.

Although this question could be applied to many aspects of creative process in filmmaking including directing, cinematography, production design, sound design, and music composition, this article limits its inquiry to film editing in part because it is my area of expertise but more importantly because it is an area where productive inquiries have laid a groundwork for more refinements in theorizing that could benefit both scholars and practitioners.

This article begins with a consideration of what editors actually do, beyond preserving temporal and spatial continuity. It draws on analyses done of rhythm in film editing in *Cutting Rhythms: Intuitive Film Editing* (Pearlman 2016)¹ to describe the work of editors as cognitively complex artistry of shaping time, energy, and movement, particularly the movement of events, emotions, image, and sound to create cycles of “tension and release” (Pearlman 2016).

Empirical data in support of assertions about editors’ decision-making processes is drawn from a series of online videos created by working editor Sven Pape, posted May to July 2016. Pape uses screen capture technology to record his working process, including screen captures of the editing tools and a thumbnail image of Pape himself as he watches material and makes choices. This technology makes the editor’s transformation of uncut material into a dramatic narrative visible, as it is happening. We see Pape’s decisions as they are being made and hear him articulate the problems he is addressing and the solutions he is conceptualizing and actualizing. These examples support the argument that there are considerations beyond simple continuity that dominate an editors conscious and nonconscious creative processes, and that the edits arising from these more complex considerations have a significant impact on audience narrative comprehension and emotional alignment with characters in film.

With some ideas about editors’ creative processes in hand, the article turns to Tim J. Smith’s (2012) study of the cognitive purpose of the rules of continuity cutting, “The Attentional Theory of Cinematic Continuity.” It builds on Smith’s landmark study on the flow of attention across edits by focusing on an anomaly within the example he uses, and asserts—following Walter Murch (2001) and countless other editors who may not have articulated such a principle but who regularly enact it—that editing might not behave optimally for preservation of smooth transference of attention if artistry of another order is available.

Finally, the article turns to Vittorio Gallese and Michele Guerra's (2012) article "Embodying Movies: Embodied Simulation and Film Studies." Again, an anomaly in an example used by Gallese and Guerra is given particular attention, this time to support a claim for the significance of an editor's embodied simulation (ES) response in their own creative decision making and in their creation of an ES experience of tension and release for an audience.

Cumulatively, this study proposes that while editors cut from what "feels right" rather than from knowledge of a theory of attention or a theory of embodied simulation, things may nonetheless "feel right" to an editor because of their impact on the editor's eye saccades or ES response. However, the rightness of feeling does not necessarily arise from efficiency of transfer of attention or embodied simulation of explicitly continuous actions. Rather, an editor may use time, space, and movement in any number of creative ways to generate rhythmically, emotionally, and narratively expressive sequences. These expressive sequences may in turn have, by design, a more complex impact on viewers than has yet been identified in cognitive studies of the moving image. This finding raises the question: would it be worth studying the editor's cognitive processes in order to learn more about the audience's experience of edits?

Editors' thinking in the edit suite is intuitive, responsive, embodied, and extended thinking about how the mass of moving material in front of them might be pieced together to make a dynamically structured and rhythmically engaging whole.

What Do Editors Do?

Editors shape the film's final structure and rhythm. They modulate hundreds of disparate pieces of film into a narratively and aesthetically coherent experience for an audience. Editors' processes require responsive, embodied, and distributed thinking² about how the mass of moving material in front of them might be pieced together to make a dynamically structured and rhythmically engaging whole.

Film editing expertise, like other forms of expertise, is not necessarily an explicitly or verbally articulated set of skills and capacities. It involves, among other things, memory, practice, training, sensitivity, judgment, creativity, rumination, and, as John Sutton says, "flexible, real-time engagements with the shifting, tricky physical and social environment" (2007: 778).

Editors generally refer to their expertise as "intuitive." In *First Cut: Conversations with Film Editors* by Gabriella Oldham (1992), editors talk about rhythm and editing as "magic" (Sheldon Kahn), "feels right" (Carl Kress), "it's intuitive" (Bill Pankow), "it's intuition" (Paul Hirsch), "having a sense" (Donn Cambern), "you just know" (Sidney Levin), "exclusively in the realm of intuition" (Merle Worth), "an internal sense" (Richard Marks), and "we go by intuition" (Alan Heim).

However, as Sutton concludes in his article on batting expertise, the lack of explicit articulation of kinds of thinking that expertise involves, does not mean that this expertise is somehow innate, or not a form of thinking.

Developing and enacting high levels of skill require us not to cut intellect and emotion off from our embodied, grooved performances, but to achieve and then access unusual flexibility in linking thought and action, knowledge and motion, conceptual memory and procedural memory. (2007: 779)

In other words, the fact that editors rarely articulate the cognitive complexity of their creative processes does not mean that their work is simply a matter of following the rules of continuity editing, or in the more common parlance “cutting out the bad bits.”

Editors’ Shaping of Structure

For the purpose of this article, I define structure as the organization of events. This may be organization into a direct causal chain, or an abstract pattern, or something in between. An editor usually begins shaping a film’s final structure by following the written script, if there is one, or perhaps the scenario if there isn’t a script, or in a documentary perhaps a plan, an articulated intention for structure, a shared idea, principle, or chronology of shooting, or perhaps a fascination with a collection of characters and images.

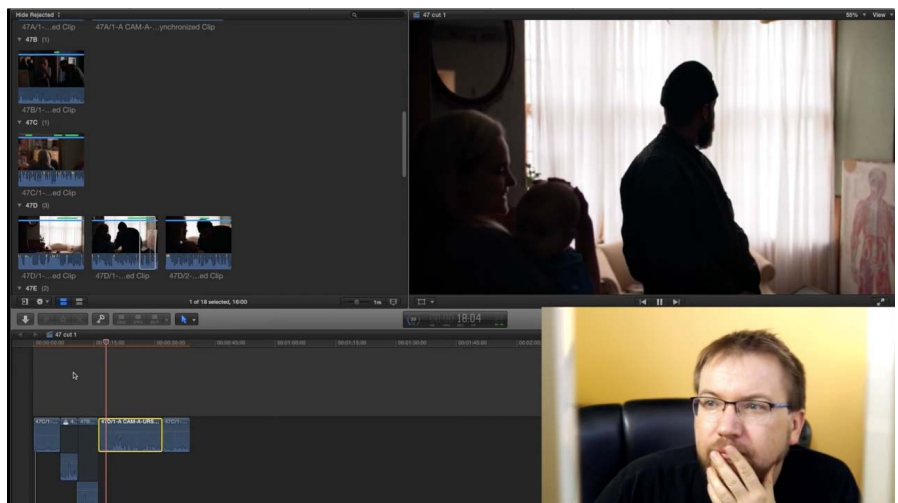


Figure 1. In this sequence of the aptly titled “Should You Rewrite in the Editing Room?” video, Sven Pape (2016b) is exercising his judgment about the structure and rhythm of a scene. We see him, bottom right, thinking through the material’s intentions, strengths, and limitations before rewriting by removing some dialogue and changing the trajectory of the characters’ movement through the scene (© This Guy Edits).

For the purposes of this discussion, I focus primarily on scripted narrative drama—the area that has been most heavily theorized by proponents of cognitive studies of the moving image. When cutting a scripted drama, the editor will usually, in the first instance, put together the film as closely to the script as the actually shot material allows. Scenes are often dropped or changed on set, so the script can't generally be cut together exactly as written. Further, once the first assembly of the script is made, the script is rarely, if ever, looked at again. So, shaping the structure is a creative job. It is not absolutely dictated by script or intention. Rather, it interprets the script with variations in relation to its strengths and problems, and those of the filmed material.³

Editors' Shaping of Rhythm

The definition of rhythm this article builds on is one I developed in my doctoral research: “rhythm in film editing is time, energy and movement shaped by timing, pacing and trajectory phrasing for the purpose of creating cycles of tension and release” (Pearlman 2016: 86). If we take this definition as a starting point, it is possible to see that the shaping of rhythm is necessarily responsive to the captured material rather than the script. It responds to timing, pacing, and trajectory phrasing in the rhythms that performers and directors have created on set. It takes advantage of the substantial scope for manipulating those rhythms to shape the experience of the flow of time and energy between disparate shots and takes. Shaping the cycles of tension and release is not confined to the shot-to-shot links, or even to the scene-to-scene links, but is a substantial aspect of editing a whole film and putting the narrative events in an order that reveals plot points, stakes, and emotions in an appropriately stylized cycle of escalations, complications, and resolutions.

With this understanding of an editor's function, I move now to consider the procedures an editor does and the cognitive problems they pose. To quote one of my own editing teachers, Bill Russo, ASE, an editor does three things: she chooses which shot, where, and for how long.

Selecting Shots

Scripted drama with “coverage” generally has an array of shots captured using the 180-degree system, which makes them suitable for continuity cutting. Coverage, however, does not in itself dictate which shots must be used in order to make the particular continuity of a particular film. In fact, it does the opposite. Continuity style coverage is designed to give the filmmakers, particularly the editor, options in the edit suite—options of which performance or objects in frame she will choose to shape the moment-to-moment structure and rhythm of a scene or film. This kind of coverage might typically include two or three takes of a whole scene in a long shot, a medium or 2-shot, possibly over-the-shoulder shots of each character, and generally a close-up of at least the

key character in the scene if not all characters. It may also include cutaways of objects relevant to the scene or the mood, and point-of-view shots such as the view out a window. “Classical” cutting rules may dictate that the editor starts on the wide shot and then moves to medium, then over-the-shoulder, then close. But “classical” cutting is not exactly the same as continuity cutting, and it is just as common in contemporary cutting to start on a close-up and then move to a wide, or to another close-up, or to anywhere that keeps continuity, roughly, and builds the required tension and releases it appropriately.

The editor’s feeling for required tension and appropriate release is a feeling for rhythm that is often described as instinctive or intuitive and is one

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of the most valued aspects of good editing. It is possible to work competently within the rules of continuity cutting but not achieve any brilliance in the shaping of cycles of tension and release. Neither “classical” nor continuity cutting rules offer any substantive guidance on the shaping of rhythm by selecting and arranging shots, rewriting scenes, and creating juxtapositions of

ideas, emotions or images in the edit suite. An editor will often drop or flip lines of dialogue (see Pape 2016a). She might extend or collapse time. She might use movement of heads or other gestures to attribute point of view where none was designed, make rhymes of movement gestures, phrases of movement energy and dynamics across shots, and more—all without disturbing the rules of continuity. In short, the selection of shots is not an automatic process, and there is unexplored cognitive complexity within it. Shot selection and shaping are not controlled by the rules of continuity editing in even the most generic film. They always involve observation, discussion, “kinaesthetic imagination” (Reynolds 2007), hypothesizing, and trial and error undertaken through embodied and distributed cognitive processes.

Duration and Placement of Shots

Through these same and more cognitive processes, editors decide the order of shots and how long each shot will be on screen. Selecting the duration and placement of shots in a conversation scene could be described in terms of feeling the arc of a movement and choosing whether the full preparation, action, and recovery (see Schmidt 1996) are required for a given movement or whether movement can be usefully limited and combined with another movement trajectory in another shot to have a more expressive rhythm.

Cutting Rhythms (Pearlman 2016: 124) uses tennis as an analogy for the ways in which characters serve and return emotional subtext to each other on lines of dialogue:

Emotion moves back and forth, like a tennis ball in play. But it is the editor who shapes the rhythm of the game. She shapes it by choosing

the shots for the energy they contain, juxtaposing the shots to make a dynamic and credible emotional arc and trimming the shots to the frames on which the energy is optimally thrown and caught.

It is the editor's job to shape the rhythm of this back and forth through selection (or in many cases, exclusion) of lines and performances and through timing and duration of shots used to convey the flow of the actual, emotional, dramatic, or metaphoric "game" the characters are playing. Like selection of shots, there are many, many choices that can be made about these questions of duration and position and still preserve patterns of continuity cutting.

The question is: What can we say about selecting, trimming, and organizing shots to shape structure and rhythm beyond "it's intuitive"? The sections below consider the ways in which the attentional functions of continuity cutting articulated by Smith (2012), and the embodied simulation responses described by Gallese and Guerra (2012) can each be seen as elements in the editor's decision-making process. However, these sections also analyze instances in which the efficient transfer of attention and the embodied simulations of explicitly continuous actions do not fully explicate the editing choices. These instances are used to provide evidence of cognitively complex artistic strategies at work in the process of film editing and offer some explanation of other kinds of expertise at work in editors' decision making.

Attentional Theory: Does It Describe How We Cut?

Tim J. Smith's article "The Attentional Theory of Cinematic Continuity" (AToCC) identifies "the critical role visual attention plays in the perception of continuity across cuts" (2012: 1). The questions for this section are as follows: What aspects of an editor's "instinctual" (Zhou 2016) editing can be illuminated by attentional theory, and can anything be said about editors' embodied cognition in action that might generate new lines of empirical enquiry for the cognition scholars working with film?

The attentional theory of cinematic continuity establishes a cognitive foundation of why continuity cutting works. It explains the dependence that continuity cutting has on the viewer's "perceptual construction" (Smith 2012: 2) by first describing the saccades (rapid, involuntary eye movements) and compensatory head movements that we make in real life to stitch together functional perceptions of the world around us. It then explains how these movements are supported by the use of the editing techniques of which continuity editing is comprised. Using eye-tracking technology, Smith empirically demonstrates one reason why viewers go along with the proposition that on-screen action is playing out in a continuous time and space.

Smith unstintingly acknowledges that the study brings a cognitive studies perspective to knowledge that has "been latent in the filmmaking community

for nearly a century” (2012: 1). This latency is of interest. It points directly to what an editor might describe as “intuitive.” As an expert, the editor makes judgments without at the time knowing why. Perhaps AToCC explains, in part, why these judgments about which shot to use, where, and for how long are accurate, even though the expertise and insight behind them may not be explicitly articulated.

The argument would be that the editors are, at least so far, human. Their saccades are, within general margins, the same as anyone else’s, and they are as unmindful of these saccades as anyone else. So, perhaps when cuts don’t “feel right,” they are causing a slight disruption to their saccades, one that is unnecessary or inappropriate to the story or emotional moment. When they fix the cut that doesn’t feel right, their own eye movements flow to the narrative or emotional point of interest without unnecessary effort.

An excellent example of this can be seen online in Sven Pape’s (2016b) video episode “Should You Rewrite in the Editing Room?” At about twelve minutes into the video, Pape, who is working on the independent feature film *Flesh and Blood* (Mark Webber, 2017), makes a cut from a character’s line in one angle to another’s reaction in a slightly wider shot that reveals the room and both characters. The first version of the cut doesn’t feel right to me as a viewer or to Pape as an editor. There is maybe a second too long at the beginning of the reaction shot, so the reaction feels slightly fuzzy in its emotional content. Pape sees this—or perhaps it would be more accurate to say he *feels* it—right away. Up to this time, he has been narrating his process moment to moment. But he abruptly goes quiet here. He swiftly moves back on his timeline, trims the reaction shot by a second or less, and plays it again. Now the cut works. Pape has moved the cut to a point where the character who is reacting makes a sudden movement to look around the room. The sudden movement now feels impelled by the lines and the situation. Pape has thrown the energy of the speaker to the body of the responder.⁴ My eye now moves immediately to the responder’s movement; it doesn’t get lost or take any cognitive effort for me to find the point of focus.

More importantly, subtext has been created on movement. The abrupt saccade that I make as a viewer parallels the character’s abrupt energy. It allows me to experience the character’s physical movement as an emotional response to his circumstances. He is not just there in continuous time and space; he is uncomfortable there—jittery, changing the subject, dodging. In this case, optimal artistry for creating subtext and emotional valence coincides neatly with the smooth flow of attention.

Another point of interest in this example is that this adjustment takes Pape seconds and occurs in silence. He is exercising his expert judgment, integrating perception and action, and making the scene work by using, in part anyway, his “latent” (Smith 2012: 1) insight into attentional theory of cinematic

cutting. He doesn't talk, and possibly doesn't even consciously recognize that the cut doesn't feel right; he just uses embodied cognition and expertise to fix it.

This example demonstrates that AToCC explains at least some aspect of what editors are doing when they make a cut feel right. They are adjusting the edit so that the saccades of their own eyes flow more directly to the point of interest. This in turn, of course, creates a more appropriate experience for the viewer. It also, interestingly, contributes to the art of editing, not just to its mechanics. In this case, the cut that draws my eye more immediately doesn't just make the pathway of my attention smoother; it adds emotional valence.

However, elevating editing to an art and cutting for maximum efficiency of eye movements are not always exactly the same thing. For example, in Smith's (2012: 20) analysis of a scene from *Blade Runner* (Ridley Scott, 1982), he writes:

The cut between the owl (3) and Deckard (4) is slightly off, meaning that the owl's gaze shift will cue viewer attention in the opposite direction to the saccade required to shift back to Deckard's face. Such a mismatch may result in a violation of a priori continuity. Although the correction saccade required to locate Deckard is so small that it may occur automatically.

The slight "mismatch" is not a mistake. It offers a different kind of editing, one that adds a visual rhythm, an embodied sense of alignment with character, and a fragment of what will later be revealed as a significant subtext. Indeed, I argue that it aims to create (rather than accidentally achieving) "sensorimotor disturbance that could play a role in spectators' different experiences of such edit" (Heimann et. al. 2016: 6).

The owl looks right to left: cut to Deckard (Harrison Ford) in the wrong spot, one that doesn't match where the owl has just looked to, and then Deckard looks right to left in a trajectory that repeats the owl's. This is a movement "rhyme"—a visual trajectory of movement that compares the two figures. It bends but does not break the rules of continuity in order to accomplish three other, more important aims of creative filmmaking than preserving continuous time and space.

Its first creative purpose is to create a movement phrase. Like a dance phrase, a movement phrase created by the juxtaposition of two gestures is a statement of rhythmic idea. This particular simple set of two beats is created by the editor's choice of duration of each shot to emphasize the similarity and repetition of the two movements. It is an example of what I would call "compositions of movement into perceptible and intentionally formed rhythmically expressive sequences.... a series of related movements and grouped emphasis points" (Pearlman 2009: 29–30). Thomas Scherer and colleagues' (2014) and

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Christina Schmitt and colleagues' (2014) descriptions of what they call "cinematic expressivity" in their entries in a volume in the De Gruyter Handbooks of Linguistics and Communication Science series, support this notion that rhythmic compositions are powerful sources of affect. They argue that film and other audiovisual media are "expressive in a way that the images address the audience by unfolding temporally" (Scherer et al. 2014: 2081) and that temporal dynamics "synchronize⁵ with and resonate in spectators' bodies, i.e., their processes of feeling and thinking" (Schmitt et al. 2014: 2097).

The second creative purpose of this cut is to suggest that Deckard and the owl are similarly slightly out of place. Shifting "viewer attention in the opposite direction to the saccade required to shift back to Deckard's face" (Smith 2012: 20) could be a strategic design by the editor. It may have been done to create a miniscule jolt of kinesthetic empathy with Deckard's own disorientation about where he stands, in a sense, in the vast, unfamiliar, and uneasy space he finds himself within. The rhythmic phrase created by the rhyming of Deckard's gesture with the owl's gesture synchronizes the viewer's body with its micro bit of spatial discomfort.

From my own experience as an editor, I would suggest it is unlikely that the editors of *Blade Runner* (Terry Rawlings and Marsha Nakashima) would have created this discomfort consciously, but that does not mean they did it accidentally. When they selected slightly mismatching shots, they followed, I suggest, what felt right not for saccades but for alignment with character. What felt right for the character in this moment was not to have the saccades be too smooth, too seamless. The editors disrupted the rules of attentional efficiency for creative purposes, demonstrating that not all uncomfortable saccades are inappropriate. Sometimes discomfort, particularly when it mirrors in some way the character's own discomfort, his sense of being out of place, his uncertainty about where to look, can be used to good effect.

The third creative purpose of this cut was the only one of the three that could have been scripted. The writer could not script the timing of the cut that makes the rhythmic phrase, nor could the writer script the selection of frames size/angles that creates the mismatch. These are both part of the editors' artistry. But the writer could, and most likely did, script the comparison itself and the subtext it creates. By comparing the owl's behavior with Deckard's behavior, the cut subtextually suggests that they are alike. When this comparison is immediately followed by Deckard's line "its artificial" and Rachel's (Sean Young) response "of course it is," the comparison takes on a subtextual dimension, suggesting that if they are similar, then possibly Deckard is also artificial, something that (spoiler alert) we learn only much later in the film may be true. Here we can see the rules of logical cutting being disrupted for the art of cutting and assert that editing might not behave optimally for attention if artistry of another order is available.

This example of a slightly mismatched cut reveals some aspects of editing processes that could potentially contribute refinements, complications, or new research questions to scholars in cognitive studies of the moving image. Some of these questions are approached by Heimann and colleagues (2016: 5), who note it is “not the continuity of images that is marked as the crucial condition, but of the events and especially actions represented by them.” The cut in *Blade Runner* rhymes the owl’s and the character’s movements and possibly deliberately requires the microscopic discomfort of a “correction saccade” (Smith 2012: 20). It may activate “specialized mechanisms in higher order perceptual processing regions . . . to maintain continuity of action in the face of spatio-temporal discontinuities” (Magliano and Zacks 2011: 1) *for a purpose*. That purpose would be making a point about the character more nuanced than that he is present in continuous time and space. This slightly disruptive cut is one of many examples that could be found to reveal that principles of rhythmic phrasing and kinesthetic empathy that are part of the editor’s creative expertise and decision-making arsenal. Each of these is an area that could potentially be empirically studied and could lead to greater understanding of how movies affect audiences.

Embodied Simulation: The Engine of Instinctual?

This section considers how embodied simulation, as theorized by Gallese and Guerra (2012) in their article “Embodying Movies: Embodied Simulation and Film Studies,” may shed light on what editors mean when they say they cut by what “feels right.” It also looks at whether an understanding of the functioning of editors’ embodied simulation responses in their editing processes could add to the theorizing about audiences responses to movies.

Embodied simulation (ES) theory as explicated in Gallese (2011) and Gallese and Guerra (2012) draws on neurological research to describe aspects of a spectator’s embodied cognitive activity while watching a film. Embodied simulation theory describes the ways in which mirror neurons in spectator’s brains respond to intentional movements, manipulable objects, and space. The theory proposes that a “sensory description of others’ actions, emotions, and sensations” is mapped onto our own embodied “representations of those actions, emotions, and sensations” (Gallese 2011: 197), and this allows us to perceive other people’s actions, emotions, and sensations as if we are performing or experiencing them ourselves.

The ES response, according to Gallese, operates at a precognitive level and occurs whether watching live movement or movement on-screen. In his 2011 article on Embodied Simulation Theory: Imagination and Narrative, Gallese (2011: 197) writes, “Our brain–body systems are equipped with a pre-rational, non-introspective process—embodied simulation—generating a physical, and not simply ‘mental,’ experience of the mind, motor intentions,

emotions, sensations, and lived experiences of other people, even when narrated.” I propose that responses occurring at this precognitive level could be a source of decisions that feel, and are described by film editors as, “instinctive” (Zhou 2016). If this is the case, a fuller understanding of embodied simulation

A fuller understanding of embodied simulation and film requires not only the study . . . into the “cameraman and his kinematics,” but also a closer look at the editor and hers.

and film requires not only the study that Gallese and Guerra (2012: 191) propose, which is into the “cameraman and his kinematics,” but also a closer look at the editor and hers.

The editor’s embodied simulation response precedes and informs the selection of shots that will be experienced by an audience. When Gallese and Guerra describe what an audience does when viewing an intentional movement, they are actually describing a combination of what an editor does—embodying it in simulation in the uncut material, and what an editor creates—the movement dynamics that stimulate the desired audience embodied simulation response.

Consider the example of *Notorious* (Alfred Hitchcock, 1946) given by Gallese and Guerra in “Embodying Movies.” They write: “Hitchcock aims to contact the viewer at a pre-cognitive level exploiting the potentiality of camera movements, and promoting an embodied approach capable of enhancing the suspense effect: before sharing the experiences of the characters, the viewer shares the experiences of the camera” (2012: 200). However, in between the experience of the camera and the experience of the viewer, is, among the bodies and voices of many other collaborators, the guiding hand of the editor making choices about which shot, where, and for how long.

This presence of the editor in shaping an audience’s empathetic responses can be illustrated by adding the word “cut” and inserting one shot that is left out in Gallese and Guerra’s description of the sequence in *Notorious*. My additions to the quotation below are in bold:

Hitchcock lets Alicia walk toward the camera waiting for her close-up on the room threshold. (CUT) Alicia sees Sebastian’s shadow reflected on his bathroom door. (CUT) Alicia, close up, moving slightly toward the direction of her gaze (CUT) The keys are on his desk. The camera gets close to the desk in order to grasp the keys. . . . The viewer is almost ready to grasp the keys, as in a well-done grasping experiment, but Hitchcock decides⁶ to frustrate her potential—and almost accomplished—action by (CUT) showing in the following shot Alicia still on the threshold. (Gallese and Guerra 2012: 200–201)

Is this shot, *Alicia, close up, moving slightly toward the direction of her gaze (CUT)*, which Gallese and Guerra leave out of their description, important? I would argue that it is.



Figure 2. In this brief (thirty-five frames) close-up just before the camera moves forward toward the keys in Notorious (RKO Radio Pictures, 1946), Alicia (Ingrid Bergman) also moves forward and, in the last three frames, drops her eyes down toward the keys. Her movement cues our ES response to the camera's move in the next shot. It is worth noting that the last frame of this close-up (2b) is, compared to the first frame (2a), slightly out of focus. This indicates that the director and cinematographer didn't necessarily intend or plan for this move forward. The editor Theron Warth's decision to put it in reveals something about his thinking. For him, phrasing of the movement trajectory across shots is more important than perfect focus.

The scene is a textbook example of creating a cycle of tension and release, and every shot an editor selects, places, and trims contributes time, movement, and energy, shaped by timing, pacing, and trajectory phrasing to the cycle. This shot is, I would argue, especially important to the embodied simulation of this particular cycle for two reasons: (1) it is a close-up, so we have greater access to the nuances of expression on the face we are purportedly mirroring, and (2) it contains movement of character toward the keys in question, allowing us to surmise that she continues her movement trajectory forward in the next shot that approaches the keys. The trajectory is what we embody in simulation and what allows the film to fool us into thinking that Alicia has gotten close to the keys when in fact only the camera got closer. Without the shot of the slight movement forward that the editor put in there, which the viewer picks up and, in simulation, moves forward with empathetically, the scene would not have the same ES effect or the same cycle of tension and release. Its inclusion suggests that the editor uses his own ES to make decisions on behalf of an audience's future experience of the movement toward the keys. The editor is shaping the flow of movement that will catalyze a viewer's narratively contextualized ES response.

Sven Pape's (2016c) video "The Surprising Upside of Procrastination in Film Editing" provides empirical evidence of the significance of the editor's "kinematics" (Gallese and Guerra 2012: 191) and their influence on the response an

audience will have. In this video, Pape (2016c) shows us brief glimpses of action in the shots he has available to choose from for one “simple scene” of a character, Mark (Mark Webber), leaving home. Pape describes how he watched all of the available shots, whittled the material down to seventeen possible good shots, walked away, and has come back the next day. Then he cuts the scene together rapidly, as we watch.

Pape chooses just three shots. They are all gently floating, handheld, point-of-view shots. We see:

Mark's little brother sleeping (cut)

Mark's mother sleeping (cut)

Mark's hand hovering as he pins a note to the wall—

his hand drops, he leaves frame and the note is revealed.

It says: “Keep going. I love you.”

The three shots make the character's departure a lyrical phrase rather than an expository sequence of strict continuity. They phrase an unsentimental but poignant haiku of the emotions of leaving. Pape's decisions allow an audience to imaginatively resonate with the character's emotions, to “reuse mental states or processes in functionally attributing them to others” (Gallese 2011: 197). But in this case, Pape isn't just reusing mental states and functionally attributing them to others. He is, perhaps, reusing his own mental states to help



Figure 3. In this frame from Sven Pape's (2016c) video "The Surprising Upside of Procrastination in Film Editing," Pape's facial expression reveals him empathetically engaged with the point of view he is shaping. The concern on his face mirrors not necessarily what the character feels but what the audience will feel when taken through his composition of a lyrical moment of departure to the punctuation of the hand dropping and revealing the note (© This Guy Edits).

him *create* the fictional character's mental state. The editing isn't just mind reading; it is mind creating.

Like the slightly mismatched cut in *Blade Runner*, Pape's choices accomplish at least three things. The first is a rhythmic phrase; the second is alignment, through rhythm, with character feeling; and the third is transmission of narrative information. The rhythmic phrase is made by rhyming content, energy, and time. The content of the two sleeping shots rhyme. Mark's hand hovering matches the floating feeling of the shots of sleeping. When it drops and he leaves the frame, the note is revealed as a punctuation point closing the rhythmic phrase.

The effect of this editing is to align us with the character's feeling. We feel he wants to linger, fears he will cause pain, but is impelled to go. The shots selected, timed, and placed by Pape put us in the character's shoes as we see the vulnerable sleeping figures from his point of view. Pape then emotionally blurs the point of view, impressionistically transitioning us from Mark's perspective to that of the characters who will wake and find the note. The kinematics of cinematographer, actors, director, and editor, combined, are experienced as "kinesthetic empathy" (Pearlman 2016) with the character's wistful last look at his family. In this sequence:

*audio-visual images unfold as movement patterns structuring dynamically the process of watching. . . . complex aesthetic figures of soundscapes, light changing, montage sequences, or camera work reveals a certain dimension of movement that realizes itself only in the perception of the spectator. Such an aesthetic addressing of the perceptive, affective, and comprehending activity of the spectator can be understood as **cinematic expressive movement**. (Scherer et al. 2014: 2082; emphasis in original)*

That the sequence transmits the narrative is self-evident, but this could have been accomplished many other ways, and what is important is that Pape has moved beyond simple following rules of continuity to creative expression.

What is going on that makes Pape able to distill the material this way and imagine its form so poetically? Pape (2016c) says he has done it in his head, overnight, and that he thinks this capacity "comes with experience." This is no doubt true, but what are the cognitive processes, and would a better understanding of them reveal anything about the nuances of viewer's cognitive processes when confronted with edits that prioritize rhythm or feeling for movement over spatial and temporal continuity?

Embodied simulation could be one of Pape's low-level cognitive processes and has been shown to be one of viewer's responses, too. However, if Pape is doing the work in his head, overnight, "kinaesthetic imagination" (Reynolds 2007) might more usefully describe this aspect of Pape's expert cognitive pro-

cess when he is not in direct contact with the material. Overnight, he plays out different kinds of movement in his mind's eye, mentally recombining shots until he settles on a sequence that makes us, the viewer, inhabit the character's perspective in a lyrical, nostalgic way.

Dee Reynolds (2007) was writing about the cognitive activity of choreographers when she coined the term "kinesthetic imagination." I am using it here to describe the capacity to remember and mentally recombine moving images into emotionally or rhythmically expressive phrases. However, the study

As in a choreographer's work, the content an editor works with is movement, and the editor's decisions are creative decisions about the selection of kinds of movement and its phrasing.

of dance is highly relevant because, as in a choreographer's work, the content an editor works with is movement, and the editor's decisions are creative decisions about the selection of kinds of movement and its phrasing. The proposition that timing, pacing, and trajectory phrasing have ES and possibly other, more complex kinds of cognitive significance both for editors and audiences is supported by a 2000 study of cognition and choreography. Kate Stevens and coauthors write: "the artistry of movement is in trajectories, transitions, and in

the temporal and spatial configurations in which moves, limbs, bodies, relate to one another. ... In a dynamical system, time is not simply a dimension in which cognition and behaviour occur but time, or more correctly dynamical changes in time, are the very basis of cognition" (2000: 4). Could an empirical test be designed to address the question of the cognitive impact on audiences of "dynamical changes in time" in movies?

These dynamical changes in time are part of what I would call rhythm in editing, and as an editor, I test the question of their impact informally in every film I edit. This testing is, in fact, the process of editing. The first version of the edited film is the first hypothesis about how selection, placement, and duration of shots will affect an audience. The next version is another hypothesis, and so on, through what we call assembly, rough cut, and fine cut. Iterations of edited versions of the same material may number in the dozens sometimes, and these could perhaps be used as data. The hypothesis is that an audience's rhythmic synchronization with the film is a significant source of affect and understanding, and that the editor uses their own body's inherent responses to the movement dynamics to design sequences with which they synchronize appropriately. Editors "physically imbibe the rhythms they see and hear, and shape them to feel right in response to the feelings they have for them in their own bodies" (Pearlman 2016: 79–80). We edit, it doesn't feel right, we go back, recut, and feel again until it does. Each version of a cut reveals the editor's process of shaping the timing, pacing, and trajectory phrasing of the movement of events, emotions, images, and sounds to create an affective experience that goes beyond conformity to the rules of continuity and becomes the art of editing.

Conclusions

This article has proposed that there is a cognitive complexity to creative decision making in film editing beyond creation of the impression of continuity of time and space, and asked if cognitive studies of the moving image could discover more about perceptual, affective, and cognitive impact of editing on audiences by considering the cognitive origins of editing decisions. It has considered this proposition by analyzing two studies by scholars in cognitive studies of the moving image that offer insights into understanding how editors think but also raise many questions.

Tim J. Smith's (2012) "The Attentional Theory of Cinematic Continuity" reveals that the editor, like any human, will have eye saccades and head movements while watching moving images. Extending this observation into a theory, we might say that the editor will make a shot to shot juxtaposition, and if her own saccades are experiencing an unwarranted level of difficulty in finding the point of attention in the next shot, she might say the cut doesn't "feel right." However, it is important to acknowledge, as Smith also does, that the editor may have many other considerations in addition to attention and that her skill in managing these other considerations could be what lifts her editing from a craft to an art.

Editors' phrasing of time, energy, and movement of the events is designed to carry substantive cognitive/affective/perceptual valence. Rhythm has, in these cases, been prioritized over smooth flow of attention, and the "film's rhythm synchronizes the body, influencing the spectator's physical and cognitive fluctuations to follow its own" (Pearlman 2016: 76)

Given these considerations, the editor's artistry clearly involves more than maintaining continuity. Editing is an art of shaping what Vittorio Gallese describes as the "physical, and not simply 'mental' experience of the mind, motor intentions, emotions, sensations, and lived experiences of other people, even when narrated" (2011: 197) Drawing once again on the fact that the editor is a human and that Gallese, through his extensive body of work, has demonstrated that ES is observable in the humans he has tested, it seems reasonable to assert that the editor also has an ES response to moving images. Her artistry arises when using her embodied simulation to support her imagining. In this way, her own "kinematics" (Gallese and Guerra 2012: 191) inform her editing.

Some questions arise: Has an experienced editor's precognitive expertise been trained? Does her kinesthetic imagination develop through practice? In *Cutting Rhythms: Intuitive Film Editing* (2016), I hypothesize, using a theoretical framework developed for dance, that capacities for observation and sensitivity to movement can be strengthened. Sven Pape's (2016a, 2016b, 2016c) videos are data that demonstrate an expert editor has indeed strengthened these capacities through experience. The strengthening of these cognitive capacities would suggest that they are used purposefully, that expert editors develop

these capacities in order to design sequences for cognitive impact beyond simply sustaining the impression of continuity. The question, then, would be: if editors develop skills for making rhythmically expressive movement phrases on purpose (even if implicitly rather than explicitly), are there cognitive responses in audiences to nuanced designs of movement dynamics, and are these what editors are addressing?

To consider this question, I return to the primary concern of filmmakers mentioned early in this article, that of seeking to impact human thought, emotion, and action. The findings of this article are that when editors disrupt rules of continuity editing, disturb the easy motion of eyes, and redefine the raw kinematics captured in camera, they are doing so on purpose. The purpose of the design of movement in editing, beyond continuity, is creation of complex embodied responses. It is part of design to engage audiences with what Yvette Biró (2008) would call the “turbulence and flow” of the world of the film. This “turbulence and flow” refers to the unique experiences of movement and change through which humans and nature express relations and tensions. The expressive design of turbulence and flow is the work of editors responding with their own eye movements, their own embodied simulation, and their own particular expertise in phrasing movement of images, emotions, and events.

Smith’s attentional theory of cognitive continuity and Gallese and Guerra’s embodied simulation theories of cognition and the moving image each make some contribution to understanding how a film editor thinks. However, it seems likely that in addition to ease of attention and reliable embodied simulation, other precognitive, cognitive, embodied, expert, and extended processes are involved in editing a mass of moving images into a coherent and compelling whole. The examples I have described show that principles of smooth attention and the design of movement trajectories in shots often disrupted for the art of cutting. Expert editing does not necessarily behave optimally for attention if artistry of higher order could add to, for example, alignment with character, creation or revelation of subtext, and the moment-to-moment visual pleasures of rhythmically designed phrases of movement. That editors can move beyond the simple creation of continuity to strategize these and other complex affects of cuts demonstrates purposefully developed expertise and cognitive capacities. It follows, therefore, that adding nuance to our understanding of the cognitive work that editors do when shaping structure and rhythm would add to our understanding of the responses of audiences to rhythm, movement dynamics, and the rise and fall of tension and release.

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Notes

¹ *Cutting Rhythms: Intuitive Film Editing* is the second edition and further refinement of ideas first articulated in my doctoral thesis, *Cutting Rhythms: Ideas about the Shaping of Rhythm in Film Editing* (2006) and later revised and addressed to a broader readership in *Cutting Rhythms: Shaping the Film Edit* (2009).

² For more on the specific cognitive operations of film editing processes, see Pearlman (forthcoming).

³ It is beyond the scope of this article to enumerate the countless ways in which strengths of shot material may diverge from intentions and must suffice to say that given that intentions are only thoughts, not material, they are necessarily subject to interpretation, amplification, and variation as they pass through the cognitive and embodied processes of collaborators, including actors, on their way to becoming filmed material.

⁴ For more on throwing the energy, see Pearlman (2016: chap. 7) on “Emotional Rhythm.”

⁵ For more on synchronization, see Pearlman (2016: chap. 4) on “Tension, Release, and Synchronization,” and Scherer et al. (2014).

⁶ While it is true that Hitchcock, in the planning stages of the film, would very likely have decided to frustrate Alicia’s potential, the editor Theron Warth’s sensitivity to his own ES response subsequently contributes to decisions about exactly which take of the performance, which frame of the take, and what order of shots will create the most suspenseful realization of the movement on-screen. At the very least, it would be more accurate (though obviously less practical and ultimately less profitable) to say, “Hitchcock and Warth decide...”

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