Strange Loops and Nonhuman Realities: Complex Narrative Faces the Climate Crisis

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Pre-print version, please cite published chapter

'You can force your story's shape but the color will always bloom upstream,' announces the trailer of Shane Carruth's 2013 film *Upstream Color*, the words appearing one by one against a backdrop of felt-like fabric. The film does succeed in forcing the story's shape; perhaps more accurately, it bends the linearity of narrative progression into a number of looping structures. Viewers familiar with Carruth's debut—the widely acclaimed time-travel film *Primer* (2004)—will no doubt expect confusing, paradoxical, and largely inexplicable twists. Despite the meager budget, *Primer* delivered one of best cinematic renditions of the puzzles of time travel, and one that hasn't gone unnoticed by theorists of complex narrative in film (see Kiss and Willemsen 2017: 140–2). *Upstream Color* proves more difficult to categorize and interpret, even if it remains grounded in the genre of science fiction.

'To describe the plot of *Upstream Color* is an exercise in comical futility,' explains Scott Tobias (2013) in an online review, echoing what has almost become a trope in critical commentary on complex film. Essentially, the film centers on the relationship between two characters, Kris (Amy Seimetz) and Jeff (Carruth himself), who gradually discover that they have both gone through the same, harrowing experience of abduction. The perpetrator—and here is where the plot synopsis waxes trippy—is a character known as the Thief (Thiago Martins), who kidnaps Kris and uses a larva harvested from blue orchids to control her mind. Kris wakes up at home, without any recollection of the recent events but with worms crawling under the skin—one of the film's most memorable moments of body horror. Another character, the Sampler (Andrew Sensenig), enters the scene: he appears to run a pig farm, but he also collects sounds that, when played through large speakers, have the effect of summoning the Thief's victims. Kris thus turns up at the Sampler's farm, where she undergoes a surgical operation that purges her of the parasites. The process involves linking up Kris's body with one of the Sampler's pigs. When she recovers consciousness, Kris seems to have forgotten both the abduction and the Sampler's operation. It is only through her growing intimacy with Jeff that dim memories of those events start surfacing. Eventually, Kris and Jeff kill the Sampler and put an end to the Thief's operations. They also track down the Thief's previous victims; together with them (the 'Sampled,' according to the end credits), the protagonists storm the Sampler's farm and liberate the pigs.

At the same time a love story and an exploration of the uneasy link between consciousness and the material world, *Upstream Color* resonates strongly with contemporary arguments on the interrelation of human subjectivity and nonhuman realities.[1] What interests me in this chapter is Carruth's use of complex narrative form, combined with cinematic style and theme, to evoke a vivid image of human societies' material and cultural entanglement with the nonhuman. The prospect of gaining this kind of insight may well be one of the reasons why certain audience members take interest in complex narrative and are willing to work through its difficulties and paradoxes. When read as an ecological parable, *Upstream Color* explores and exposes the traumas of contemporary society's

instrumentalization of the natural world (symbolically hinted here by the Sampler's pig farm and by the Thief's parasites). We will see that the film deploys a number of what I call 'material anchors' for human-nonhuman interconnectedness in an order that suggests a conceptual movement from a dystopian beginning to a utopian ending. Material anchors are visual images or diegetic objects that stand in for abstract ideas such as human-nonhuman linkage: they serve to 'anchor' the thematic and conceptual dimension of the film to concrete formal devices.[2] I will argue that these anchors guide our understanding of the complexity of the film's storytelling, inflecting the viewer's meaning-making and steering it towards ecological issues.

The aesthetic appeal of *Upstream Color*—and critics have been virtually unanimous in praising the film's boldness—thus sheds light on our position vis-à-vis an environment that, in times of climate change, is being dramatically reshaped by human activities. Understood in this way, the formal complexity of *Upstream Color* is satisfying because it mirrors the material and cultural complexity of humanity's reliance on the natural world. Narrative complexity is thus resolved—or at least addressed—by bringing it to bear on extratextual issues that appear equally puzzling and disconcerting. Of course, arriving at this conclusion requires interpretive effort, which may in itself be perceived as rewarding by certain audiences. There may be a larger payoff, too (although arguing this point lies beyond the scope of this chapter): learning to engage with, and appreciate, the formal complexity of narrative may serve as a form of training that enables audiences to better coexist with the complexity of real-world concerns.

In the next section, I start by building on recent work that has attempted to establish a common ground between narrative (theory) and complex systems theory. The assumption that guides my argument—and which I share with Miklós Kiss and Steven Willemsen's (2017) cognitive approach to formal complexity—is that the puzzles of complex narrative call for interpretation as a means of overcoming, or at least reducing, the audience's disorientation. I focus here on a particularly significant, but largely underexplored, interpretive pathway: it consists in mapping complex narrative form onto the extrinsic complexity of humanity's capture in biological, climatological, and geological processes. We will see that the form of that capture is a distinctively weird or strange 'loop,' and that it involves three features: nonlinearity, multiscalarity, and self-organization. Strange loops abound in Carruth's *Upstream Color* and underlie the film's engagement with ecological themes, as I detail in the final section of this chapter.

Varieties of Complexity

Work on narrative complexity tends to fall into three partly overlapping strands of research. First, there has been a great deal of interest in complexity as a *formal* phenomenon involving strategies that complicate and challenge conventional storytelling techniques—for example, those of 'the classical, unified mimetic plot' in film (Buckland 2009: 5). Complexity is thus defined as a deviation from the expectations that surround various aspects of narrative, and particularly the construction of a coherent plot. Second, work by Kiss and Willemsen (2017) as well as Maria Poulaki (2019) has explored the psychological underpinnings of narrative complexity—that is, how audiences go about addressing the cognitive and interpretive difficulties raised by stories rich in formally complex devices. Finally, scholars like John Pier (2017), Marie-Laure Ryan (2019), and Richard Walsh and Susan Stepney (2018) have discussed the possibilities of narrative vis-à-vis a theoretical—as opposed to predominantly formal—understanding of complexity. This view of complexity is grounded in scientific debates on complex systems. It is from this third approach to narrative complexity that I will take my cue in this section,

though I will return to the formal and cognitive dimensions of complex narrative in my account of *Upstream Color*.

Much ink has been spilled on the definition of complex systems in physics and related sciences. For my purposes, a phenomenon can be said to be complex when it displays three features: nonlinearity, multiscalarity, and self-organization (see Baranger 2000). For a simple illustration of the first two concepts, consider surface tension in fluids such as water (I follow here Terrence Deacon's discussion in Deacon 2006: 127–9). Surface tension is not a property of individual water molecules; it emerges from interactions between a certain number of water molecules, as a function of the *shape* that these molecules tend to take when grouped together. Surface tension does not increase linearly, with one water molecule displaying a certain amount of surface tension, two molecules double the amount, and so on. Rather, it is a property that springs up 'suddenly' (i.e., nonlinearly) after a certain critical mass has been reached. Likewise, surface tension operates differently depending on spatial scale: on the scale of a single water molecule, it doesn't exist; on the scale of a group of molecules, it creates a cohesive force that is responsible for the distinctive shape of a droplet; on the scale of, for example, a pond, it is what enables the insects commonly known as 'water striders' to skip across the water. These features—nonlinearity and multiscalarity—are typical of complex systems. To understand complexity more fully, we need to bring in a third concept, that of self-organization. The molecular interactions producing surface tension remain relatively predictable, and so are the physical arrangements they give rise to (a flat surface, a drop or bead of liquid). In a true complex system, the overall shape of the system changes dynamically and unpredictably over time, but the system doesn't dissolve or break down; it keeps adjusting to external and internal circumstances. This is what is meant by self-organization.

Complexity exists at multiple levels of reality, from snow crystals to the evolutionary pressures that drive natural selection to patterns in the development of urban areas (see West 2017: 21–2). Nonlinearity, multiscalarity, and self-organization are evidently abstract principles with profoundly different manifestations in the physical and social world. Crucially for my argument, the concepts of nonlinearity, multiscalarity, and self-organization also shed light on the complexity of the human impact on the planet in times of ecological crisis.

The Ecological Crisis and Its Narrative Challenges

The 'Anthropocene' is the proposed name for the current geological epoch (Crutzen and Stoermer 2000): it suggests that humanity has become a planetary agent capable of dramatically reshaping the Earth's ecosystems through the burning of fossil fuels and the release of polluting substances that leave a physical mark on the planet's crust (think about the tremendous amounts of plastic piling up in landfills and clogging the oceans). While the term 'Anthropocene' remains, in some respects, controversial (see Simon 2018) and has not been officially adopted in scientific terminology, it drives home the main difference between the current climate crisis and the many fluctuations in the planet's climate that preceded it: only the former can be linked to the activities of a single species over the course of a short period of time (geologically speaking).

More accurately, the ecological crisis is the result of specific technologies and forms of social organization such as advanced capitalism and large-scale industrialization, which have spread from a handful of Western countries to the rest of the world. Thus, famously, historian Dipesh Chakrabarty argues that anthropogenic climate change 'brings into view the collision—or the running up against one another—of three histories that, from the point of view of human history, are normally assumed to be

working at such different and distinct paces that they are treated as processes separate from one another for all practical purposes: the history of the earth system, the history of life including that of human evolution on the planet, and the more recent history of industrial civilization (for many, capitalism)' (2014: 1). I bring up Chakrabarty's 'collision' metaphor in this context because it encapsulates with remarkable precision the nonlinear, multiscalar, and self-organizing nature—and therefore the complexity—of humanity's entanglement with the climate.

Effectively, the ecological crisis reveals that, when they become ingrained in the day-to-day routine of millions of people, simple actions such as driving a car to work can have an enormous impact on the planet's climate. The nonlinearity of this process has to do with the experienced gap between a quotidian and seemingly inconsequential gesture and its dramatic results on a planetary scale (e.g., rising sea levels, increased average temperatures, frequent extreme weather events). If we look closely at the effects of individual choices on the climate, we find a dizzying number of factors that shape our decision of driving to work in a truly multiscalar way: the availability of certain technologies and infrastructure, policies that incentivize the car industry, and—last but not least—a vast set of cultural assumptions and biases. Moreover, climate change is the result of self-organizing behavior as the Earth's climate and ecosystems adapt to the multiple effects of human activities, with devastating consequences for both animal and plant species and, increasingly, vulnerable human communities around the globe. In short, the ecological crisis bears all the hallmarks of complex systems, even as this complexity tends to elude everyday experience (which explains, at least in part, why it is politically and culturally so difficult to develop comprehensive measures against climate change).

What can narrative do vis-à-vis this astounding complexity? Although this question has rarely been framed in relation to climate change as such, narrative theorists hold varying views on storytelling's capacity to capture nonlinear, multiscalar, and self-organizing processes. For instance, in discussing mathematician John Conway's famous 'Game of Life' (a cellular automaton displaying a remarkable degree of self-organization), Walsh argues pessimistically that any 'conceivable narrative of the higher-level behavior [of the system] would . . . misrepresent what is happening in the system, while any description of the system itself, with its multiple simultaneous recursive operations, necessarily defies narrative form' (2011: 75). On the opposite end of the spectrum, John Pier contends that a degree of nonlinearity is necessarily bound up with narrative sequence, so that narrative 'is self-organizing to the extent that, through its exchanges with the outside world, the system itself evolves irreversibly' (2017: 558). In this chapter I seek a compromise between these positions: while I agree with Walsh that complex systems (including human-nonhuman interdependency as it is revealed by climate change) cannot be narrativized as such, individual stories can approximate more or less effectively the triad of nonlinearity, multiscalarity, and self-organization that defines complex systems. In this way, I shift the emphasis from an ontological question (is narrative an intrinsically complex system?) to the possibilities and effects of storytelling (can specific narratives channel the features that underlie complex systems?). In the next section, I will explain why formal experiments are central to the narrative remediation of complexity.

The Form of Ecological Awareness

The collision of histories envisaged by Chakrabarty (2014) resonates with Timothy Morton's concept of 'the mesh,' which evokes 'the interconnectedness of all living and non-living things' (2010: 28)—an interconnectedness brought to the fore by climate change: not only are human societies shaped by the

geological and climatological set-up of their environment, but they have gained the power to *re*shape it in fundamental ways. In itself, the idea of interconnectedness is nothing new: notions of human-nonhuman interdependency already had wide circulation within the deep ecology movement from the 1970s onward (see Fox 1995). What distinguishes Morton's brand of 'ecological thought' is insight into the *strangeness* of this interrelation: 'The mesh is vast yet intimate: there is no here or there, so everything is brought within our awareness. The more we analyze, the more ambiguous things become. We can't really know who is at the junctions of the mesh before we meet them. Even when we meet them, they are liable to change before our eyes, and our view of them is also labile. These beings are the *strange stranger*' (2010: 40; emphasis in the original). Morton's statements are characteristically ambiguous; one way to gloss them is to think about our uneasy intimacy with plastic—a human-made polymer that is ubiquitous in the modern world and that will nevertheless survive us by hundreds of years due to its slow rate of decay. By seeing plastic in this light, we defamiliarize it and reveal its inherent strangeness.

Crucially, this strange interrelation between human culture and the material world takes a specific *form* in Morton's oeuvre. The spatial form of human-nonhuman entanglement is the loop, which already appears in one of the environmentalist movement's most characteristic images, the symbol for recycling. Talk about 'feedback loops' is also common in the science of complexity: the loop is one of the ways in which self-organization manifests itself, and it is plainly a nonlinear figure. In *Dark Ecology*, Morton explores the strange loop-like quality of ecological awareness, which is humanity's growing awareness of being entangled with nonhuman realities: 'Ecological awareness is weird: it has a twisted, looping form. Since there is no limit to the scope of ecological beings (biosphere, solar system), we can infer that all things have a loop form. Ecological awareness is a loop because human interference has a loop form, because ecological and biological systems are loops' (2016: 6). A loop is different from a circle because it is dynamic, it bends around itself in a puzzling fashion: hence the 'strange loops' famously theorized by Douglas Hofstadter (1999), a concept also referenced by Morton (2016: 178). Why does ecological awareness trace a weird loop? Because we realize—if, of course, we ever come to that realization—that our actions produce effects well beyond our intentions, feeding the climate crisis and at the same time being fed by a whole cultural system that supports consumption and (reckless faith in) unlimited growth. Through that loop formed by culture and the material ramifications of our actions, each of us is implicated in climate change in deeply multiscalar and nonlinear terms.

It is significant that one of Morton's concrete examples of the weird loop is 'Terry Gilliam's ecological apocalyptic time-loop movie, *Twelve Monkeys*, [in which] the lunatic who releases the virus that wipes out almost all humans doesn't even open the vial of deadly pathogens himself' (2010: 122). The 'time-loop movie' maps the abstract loop of human-nonhuman entanglement onto a narrative strategy that breaks with conventions of chronological linearity and clear-cut teleology (as would be the case if the lunatic *did* open the vial himself in order to achieve his destructive goal). This observation points to the bridge between formal complexity and the abstract features of complex systems I discussed above: by experimenting with established conventions, narrative can convey the nonlinear, multiscalar, and self-organizing quality of complex systems—including the ecological crisis itself. The question whether narrative is an inherently complex system is thus rendered moot; what matters is that story can evoke, formally and also (as my discussion of *Upstream Color* will reveal) affectively, the main characteristics of complex systems.

The need for such innovative narrative strategies has been highlighted by many commentators on the climate crisis. Indian writer Amitav Ghosh (2016), for instance, has drawn attention to the limitations of the modern novel as a genre geared towards a fundamentally bourgeois notion of 'probability' that does not sit well with the inherent weirdness of climate change. Literary realism, as the novel has practiced it, is starting to show its limits. Hence, earlier forms of narrative—stories that 'delighted in the unheard-of and the unlikely,' in Ghosh's words (2016: 16)—are making a comeback or entering the mainstream, with an ever more intense traffic between genre fiction (e.g., science fiction or fantasy) and literary writing. Examples of this traffic are Jeff VanderMeer's novels—typically discussed under the heading of 'New Weird fiction' (Ulstein 2017)—or works by established literary writers such as Cormac McCarthy (*The Road*), Jeanette Winterson (*The Stone Gods*), or Colson Whitehead (*Zone One*) that draw inspiration from science fiction.

As Ian Watt (1957) argued in his seminal *The Rise of the Novel*, literary realism emerged in conjunction with the industrial revolution and Western modernity—historical processes that are causally implicated in climate change. In light of this complicity between realism and the causes of the ecological crisis, it is unsurprising that doing justice to the current predicament, with its strange loops discussed by Morton, requires stepping *outside* of a realist framework. *Upstream Color* attempts a similar operation within the medium of film, by combining loop-like formal devices with an ecological subject-matter. It builds on science fiction motifs to convey a deeply perplexing view of human-nonhuman entanglement; and it does so by disrupting—at the formal level—the illusory chronological sequentiality and teleological coherence of realism (here embodied not by the realist novel but by classical Hollywood narration). This is perhaps part of what the film's trailer means by 'forcing the story's shape': it suggests distorting the conventions of realist representation and using the viewer's puzzlement to channel a larger insight into the nonlinear, multiscalar, and self-organizing nature of human-nonhuman relations in times of climate crisis. *Formal* complexity is thus put at the service of the more intangible complexity of humanity's entanglement with the nonhuman world.[3] Having introduced these conceptual tools, it is time to turn to a close analysis of Carruth's film.

Looping Upstream

The challenge of piecing together the plot of *Upstream Color* depends primarily on Carruth's unwillingness to engage in any sort of exposition: the most important causal links have to be inferred from the characters' actions. The plot unfolds in fits and starts, with characters disappearing and then making a sudden reappearance later in the story. Jeff, for example, is seen for the first time four minutes into the movie: the editing flips back and forth between images of Jeff running and two boys playing while the character known as the Thief watches them. Jeff only reenters the scene half an hour later, after a sequence focusing on Kris's abduction at the hands of the Thief, who drugs her using worms collected from the petals of blue orchids—a detail whose importance only emerges much later. The Thief appears to be in control of Kris's mind and forces her to sign over to him her house and savings; he won't be seen again until the very end of the film. These gaps and ellipses contribute to the viewer's disorientation, so that—as is typical in 'puzzle films'—the full story can be reconstructed only after multiple viewings, and provided of course that the audience is willing to put in the necessary 'forensic' work.[4]

Despite the difficulty of inferring the plot, the film does tell a reasonably coherent (if certainly perplexing) story. The starting point is the symbiotic relationship between the Sampler and the Thief.

These characters participate in a cycle, which begins with the Sampler, who runs a pig farm, drowning some of the piglets in a river. A series of close-up shots reminiscent of medical imagery show a blue substance seeping from the animals' decomposing bodies and coursing through the water (a scene that is the clearest diegetic justification for the titular 'upstream color'). The orchids that grow on the riverbank absorb this color; the flowers turn blue, attracting worms that the Thief harvests and uses to drug his victims and strip them of all their possessions. The Sampler then tracks down the Thief's victims and proceeds to transfer the worms they have ingested (and that are taking control of their bodies) into one of his pigs, whose offspring are thrown into the river. When, at the end of the film, the protagonists (Kris and Jeff) kill the Sampler, we see that the orchids by the river have white, not blue, petals: the Thief examines them and shakes his head upon failing to find any worms. The protagonists have thus managed to end the partnership between the Sampler and the Thief.

This cycle involving the Sampler and the Thief is only shown once and interspersed with Kris and Jeff's love story, which of course greatly increases the viewers' cognitive workload as they attempt to piece together the plot. The film clearly suggests that this sequence (pigs are killed, the orchids turn blue, the worms are collected, etc.) is not a one-off occurrence, but has taken place multiple times before: it is comparable to a self-organizing feedback loop, with the idea of self-organization being strongly implied by the fact that both the Thief and the Sampler never meet and seem unaware of their reliance on each other's activities. In this way, the cycle at the heart of the film's plot is triggered by human interference in natural processes but remains uncoupled from human intentions: both the Thief and the Sample exploit a dynamic they don't fully understand, just as climate change is shaped, nonlinearly, by minor, unconscious gestures and decisions rather than by a deliberate intention to harm the environment.

The Thief and the Sampler's inadvertent symbiosis thus evokes a deep sense of enmeshment between various domains and scales of reality: the vegetal (the orchids), the animals (the worms and the pigs), and the microscopic (when the blue substance migrates from the decomposing pigs to the flowers), all of which are revealed to be closely intertwined with human life. This is the first strange loop brought into focus by the film. Perhaps the most forceful image of human-nonhuman interconnectedness offered by *Upstream Color* is the sequence in which Kris's body is linked up with a pig's, and we see a long worm, at the center of the shot, being transplanted from the woman to the unconscious animal (see Figure 1). The worm is a vivid and deeply disturbing material anchor for the chain of connection that inspires the film's plot. As I am using the term, a material anchor is a concrete diegetic manifestation of an abstract idea, and something that helps viewers navigate the thematic and formal complexity of certain narratives.[5] In this case, the worm image stands in for the human-nonhuman loop created by the relationship between the Thief and the Sampler.

Figure 1 The interspecies 'transplant' of a parasitic worm in *Upstream Color*.

I am not the only critic to see the loop as the most significant shape traced by the film. Developing a parallel between Carruth's film and Terrence Malick's works, Manohla Dargis notes in a *New York Times* review: 'Mr. Malick's influence also extends to shots of Kris and Jeff walking, whispering and touching that are not moored in a specific time but could be from the past, present or future. In these Malick moments, time becomes as circular as the rising and setting of the sun. . . . Mr. Carruth also expresses this circularity through the editing, skipping through time to create narrative ellipses' (2013: n.p.). Importantly, however, the significance of the loop evolves in the course of the film: when the Thief-Sampler cycle is halted by the protagonists, who liberate the pig farm together with several other victims of the Thief, the film's complex circularity comes to suggest positive affective entanglement and moral responsibility towards the nonhuman. To understand that development, we need to factor in another salient loop that can be encountered at the level of the story: suggestively, it points to the father of American nature writing, Henry David Thoreau.

While Kris's mind is under the Thief's control, he keeps her busy by asking her to transcribe Thoreau's *Walden* into slips of paper. These slips are then folded into rings to form a long chain. It is difficult to overstate the influence of Thoreau's works on both the environmentalist movement and the American imagination of natural landscapes.[6] In this part of *Upstream Color*, however, Thoreau's appreciation of the physical and moral rewards of deepening one's relationship with nature is completely overturned: Kris's mindless transcription is not a gesture of liberation from the shackles of human civilization, but one of submission to the Thief's all-too-human schemes. The paper chain, then, may be loop-like in visible form but it functions antithetically to the other looping images offered by the film: it is not a figure of interconnectivity across the human-nonhuman divide, but a symbol of Kris's bondage and traumatic exclusion from the nonhuman world. It is not a coincidence that Kris recovers the memory of her abduction by reciting, together with Jeff, the lines she had memorized while transcribing Thoreau's work. This gesture involves a reappropriation of Thoreau's central insight into the emancipating value of our connection with the nonhuman.

The ending of the film translates this insight into an embodied reality by evoking two convergent gestures of affectionate entanglement that counter the oppressive Thief-Sampler cycle. The first is the image of Kris and Jeff embracing in the bathtub after barricading in their home's bathroom to keep an unknown evil force (perhaps the Sampler himself) at bay. The two overlapping bodies (see Figure 2) are here presented as a looping structure rich in positive affect, versus the Thief's and the Sampler's horrific exploitations. This circle of tender affectivity is then extended to the nonhuman in the very last shot of the film, where Kris embraces a piglet after killing the Sampler and liberating his animals, much as she had been embraced by Jeff in the bathtub scene. Physical contact translates the abstract insight of the strange human-nonhuman loop into a concrete and emotionally powerful image. The embodied linkage here reaches towards the nonhuman and negates the mindless bondage encapsulated by the paper chain while Kris is under the Thief's control.

Figure 2 Jeff embracing Kris in the bathtub.

To sum up my discussion so far, the film's plot offers three material anchors for the abstract idea of linkage, which appear in the following order: the paper chain, the worm connecting Kris's and the pig's body, and Kris's embrace of both Jeff and the piglet. While the paper chain unambiguously channels human violence, the embrace is a gesture of affective empowerment—a connection that creates a level playing field for human and nonhuman realities (the pigs are freed, just as the Thief's victims are made aware of the abduction they had experienced and then forgotten). The intermediate anchor, the worm, is a more ambivalent image, at the same time repulsive and suggestive of a visceral connection. The material anchors are thus positioned in a sequence that evokes a gradual transition from what can be seen as the dystopian loop of the beginning (involving the Thief and the Sampler) to a utopian and deeply affective vision of human-nonhuman interconnectedness (conveyed by the ending, with the protagonists freeing the pigs from the Sampler's farm).

This conceptual trajectory sheds new light on narrative complexity in *Upstream Color*. As Dargis suggests in the review quoted above, the film's editing tends to juxtapose sequences that the viewer understands to have taken place at different points in the story's chronology, with run-on dialog tying them together.

For instance, roughly an hour into the film Kris and Jeff discover that many of their childhood memories coincide (possibly because the Thief had implanted these memories during the two characters' abduction). However, this twist isn't delivered in a single, spatio-temporally coherent scene, but through rapid back-and-forths between conversations that have taken place—going by the setting and the characters' clothing—at different moments. The effect is that the characters' lives hover in an indistinct time, which is a complexifying strategy that mirrors Kris's and Jeff's own disorientation upon finding out that their most cherished memories might be fabricated. Similarly, a number of lines are repeated (Kris remarks twice 'We should go on a trip,' for example), for no apparent reason other than disrupting the viewer's expectation of linear progression. Self-organization in this film means that the presentation of the story tends to take a circular or loop-like form that partly obfuscates the sequentiality of the narrated events. *Upstream Color* also evokes multiscalarity, with microscopic images (the parasites spreading through Kris's body, the blue fluid seeping into the orchids) being repeatedly interspersed with shots of the characters' human-scale world.

These temporal indeterminacies and scalar shifts contribute to the narrative complexity of Carruth's film (at the formal level) and to the viewer's puzzlement (at the experiential level). Complexity, as argued by Kiss and Willemsen (2017), calls for interpretive strategies aimed at reducing the viewer's puzzlement. More specifically, the film's complex form can be justified by bringing the audience's thematic interests into dialogue with it.[7] The film's difficulty is thus overcome—and its form interpreted—by drawing connections with extratextual realities that appear equally complex and disorienting, such as human-nonhuman relations in times of climate crisis. This mirroring of internal (formal) complexity and extrinsic (ecological) complexity is what makes the interpretive effort worthwhile for certain audiences. My own engagement with *Upstream Color* has explored this possibility by focusing on how the film stages and critiques humanity's painful separation from the nonhuman world. The Thief and the Sampler violently instrumentalize both the nonhuman (the pigs, the worms) and the human (their victims) without fully understanding the vicious cycle they create through their actions. By contrast, the love story between Kris and Jeff moves towards the utopian reintegration of the nonhuman, as is suggested by the pig farm's eventual liberation and by the material anchor of Kris's embrace of a piglet in the final scene.[8] The film thus works through a series of strange loops but ends with a 'virtuous' (if still in some sense weird) loop of affective intimacy with animals, which involves both awareness of interconnection with the nonhuman and a deep sense of ethical responsibility towards it. The film's finale enacts a form of ecological awareness that is clearly indebted to the work of many nature writers, including Thoreau, a towering figure for the environmentalist movement and an explicit source of inspiration for Carruth's characters. What I called material anchors play a key role in this dynamic that brings together the formal and the conceptual, the complexity of narrative strategies and the larger complexity of human-nonhuman relations. The evocation of nonlinear, multiscalar, and self-organizing patterns through narrative form and theme mediates between these meanings of complexity.

Conclusion

Having completed my reading of *Upstream Color*, I would like to circle back to my starting point, the sentence from the trailer 'You can force your story's shape but the color will always the upstream.' We know that Carruth tends to shape his story circularly, but how should we read the second half of that line? My suggestion is that 'upstream' here means something like 'against the grain'; 'color' is a synecdoche for conscious experience, with its perceptual and affective textures so admirably probed by Carruth's cinematography. Repeatedly in the film we see the characters collecting and admiring the

sensory patterns of the material world: Jeff stroking the fabric of an armchair, for instance, or the Sampler recording the sound of stones scraping against a concrete surface. These patterns resist the logic of narrative justification ('your story's shape') and point to the unruliness of Carruth's storytelling, how it toys complexly with circular forms without ever settling on a single, diegetically grounded structure. In that sense, then, *Upstream Color* remains essentially distinct from classic time loop narratives, whose loop-like patterns tend to be more straightforward and diegetically justified.

If, as we've seen above, Morton's discussion of the strange, loopy quality of ecological awareness draws inspiration from Terry Gilliam's time-loop film *Twelve Monkeys*, it seems to me that the multiplicity and instability of Carruth's loops go much further in translating today's ecological crisis into narrative form: while the time loop remains a relatively conventional narrative device, Carruth's vision is both more challenging and more adequate for rendering the complexity of our predicament. Of course, what counts as an 'adequate' form vis-à-vis the climate crisis is in itself a matter of interpretation—of connecting texts to extratextual concerns. My commentary on *Upstream Color* has argued that, in contemporary narrative practices, complex form can hold a mirror up to the complexity of humanity's capture in nonhuman processes. This complexity can be understood as the result of nonlinear, multiscalar, and self-organizing processes—the main features of complex systems, which can be evoked in narrative by way of formal choices. Carruth's *Upstream Color* is an excellent example of that formal operation, but many other instances can be found in contemporary fiction (see Caracciolo forthcoming). That is my main contribution to debates on narrative complexity, including those staged by this volume: the appeal of complexity is sometimes an extrinsic one, and narrative strategies can function as a platform for (re)shaping our thinking and affects about real-world issues. By exposing ourselves to the complexity of narrative form, and by learning to appreciate it, we make significant steps towards developing what political scientist Jens Kersten has called a new 'Anthropocene culture that enjoys complexity' (2013: 52). This kind of cultural training involves, of course, a specific *framing* of complexity, which pushes away from the mere entertainment value of complex narrative—or rather capitalizes on the cognitive pleasure they generate to steer the audience's meaning-making towards real-world issues.

Innovative narrative strategies can evoke humanity's enmeshment with climatological, geological, and biological processes—the 'strange loop' theorized by Morton and probed so forcefully by Carruth's film. In narrative (and again this is an insight that can be extrapolated from *Upstream Color* to many other instances of narrative complexity), the translation of abstract ideas into a story's concrete characters and situations is typically mediated by what I called, here and elsewhere (Caracciolo 2020), material anchors for human-nonhuman interconnectivity. Bringing into focus the cognitive value of those storytelling strategies is an important intervention that complex narrative (and the scholarly study thereof) can make in contemporary debates on the ecological crisis.

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[1] For a number of insightful perspectives on the nonhuman, see Richard Grusin's landmark edited collection *The Nonhuman Turn* (2015).

[2] Linkage is also an 'image schema' in the sense of cognitive linguistics (Hampe and Grady 2005). Image schemata fall halfway between an abstract idea (such as 'connection' or 'cycle') and the concreteness of what I call 'material anchors.' For more on image schemata, embodiment, and film narrative, see a seminal article by Maarten Coëgnarts and Peter Kravanja (2012).

[3] For an extended discussion of the link between ecological form and narrative, see Caracciolo (2019) and the introduction and the first chapter of my *Narrating the Mesh* (forthcoming).

[4] For more on 'forensic' viewership and complex narrative, see Mittell (2015). Based on the user reviews available on the IMDb database, it seems clear that many viewers are *not* willing to engage in this forensic activity, and dismiss the film as confusing after a cursory viewing.

[5] I discuss the concept of material anchors in more detail in Caracciolo (2020). The term comes from Edwin Hutchins's (1995) account of distributed cognition.

[6] See also Buell (1995) on Thoreau's multifaceted relationship with the natural world.

[7] See Caracciolo (2016: 188–9) for a more comprehensive account of this interpretive process.

[8] In Hubert Zapf's (2001) terminology, the film thus shifts from 'cultural-critical metadiscourse' on the violence embodied by the Thief and the Sampler to a form of a utopian 'imaginative counterdiscourse,' with the farm's liberation in the ending.