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CATASTROPHE THEORY AND CHARACTER
TRANSFORMATION IN *THE RED BADGE OF
COURAGE*



. . . the seven elementary catastrophes, and the general catastrophes if we only understood them, are the bricks which nature uses to build its infinite variety of shapes and forms.

— Ivar Ekeland
Mathematics and the Unexpected (1988)

Order is, at one and the same time, that which is given in things as their inner law, the hidden network that determines the way they confront one another, and also that which has no existence except in the grid created by a glance, an examination, a language; and it is only in the blank spaces of this grid that order manifests itself in depth as though already there, waiting in silence for the moment of its expression.

— Michel Foucault
The Order of Things (1970)



Stephen Crane's writings often present characters in challenging environments, such as battlefields and urban slums, and many of these characters experience sudden shifts in behavior or consciousness. Further, Crane seldom provides interpretive conclusions to resolve or evaluate their sudden qualitative changes. In Henry Fleming's responses to the Civil War battlefield, for example, Crane shows several distinct and contradictory patterns of action and awareness. In the early pages, Fleming tries to anticipate his capacity for courage. In the first Confeder-

ate attack, he stands firmly and fires at the enemy; during the second attack, he runs like a rabbit. After his flight, he vacillates between guilt, bewilderment, and rationalization. When Fleming returns to the regiment, he first becomes a fierce fighter, and, then, in a second attack, he leads the regiment while carrying the flag of the Union Army.¹ Fleming's discontinuous patterns of behavior—and his erratic ruminations—appear to be more comprehensible, however, when they are graphed using the models of "Catastrophe Theory" developed by the French mathematician, Rene Thom.

Catastrophe Theory was developed to describe patterns of sudden qualitative change that could not be graphed by the gradual slopes of quantitative mathematics. In physics, for example, there are the "sudden changes of form . . . such as the feathery growth of frost crystals."² In biology, the developmental processes of embryos also include sudden, qualitative transformations.³ Conventional mathematics "could determine the slope of the line at every point *except* the singularity, the 'peak' at which it suddenly changes direction."⁴ Thom developed the seven basic Catastrophes to model such discontinuous events. The simplest of his topographical models is the Cusp Catastrophe (See Figure 1). The Cusp Catastrophe is a plane that has been twisted into three dimensions, so that one edge is a gradual slope and the opposite edge includes a deep, curving fold. Such a three-dimensional model makes it possible to graph relationships between two variables in which there occur both "continuous and discontinuous paths" of change.⁵ More complex Catastrophe models can graph relationships between three, four, and five variables on computer generated topographies of four, five, and six dimensions. We will return to consider these more complex models after examining the usefulness of the Cusp Catastrophe in depicting Henry Fleming's patterns of behavior and consciousness.

E.C. Zeeman has applied models from Catastrophe Theory to issues involving sudden behavioral change. Two of his topographic models are included in this experiment in interpreting the emotional and behavioral patterns found in Crane's novel.

Although *Red Badge* is the center of this discussion, a number of Crane's other works include similar patterns of action. Such characters as Willie Dalzell in "The Fight," Collins in "A

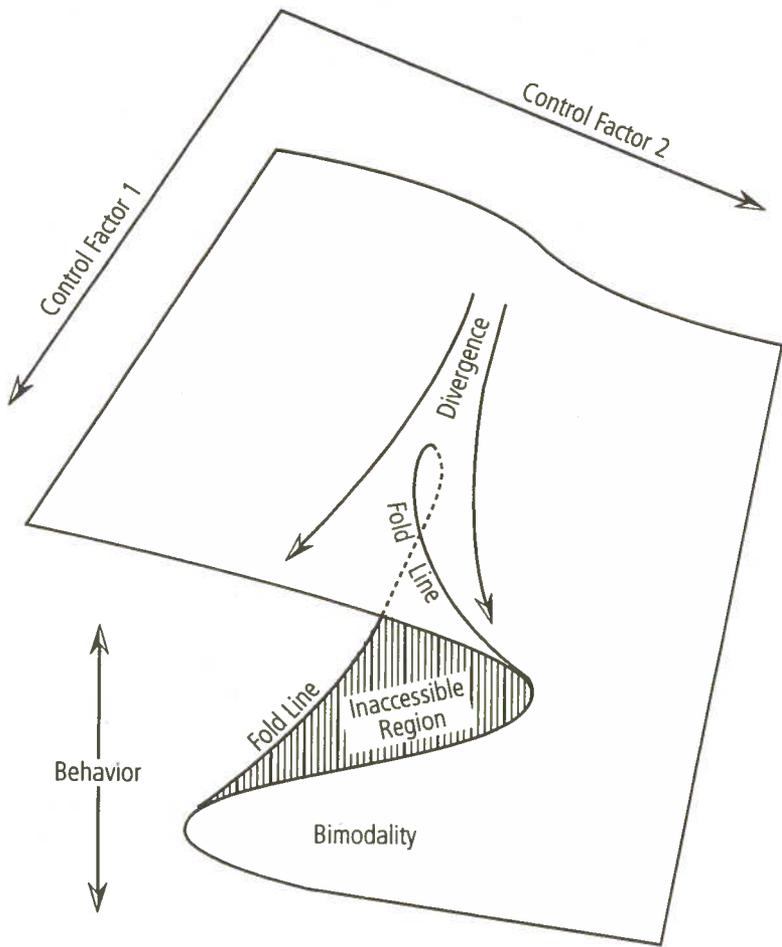


Figure 1: The cusp catastrophe graph

Mystery of Heroism," the visitor to New York City in "The Man From Duluth," the Swede in "The Blue Hotel," and Henry Johnson in "The Monster" all enact sudden, qualitative changes in their responses to perceptions of danger.⁶ These works seem to offer additional opportunities for the application of Catastrophe Theory to Crane's career-long exploration of qualitative changes of behavior. In the actions and thoughts of Henry Fleming, however, Crane presents a particularly rich and varied pattern of transformations.

Imagery found in the first chapter of *Red Badge* suggests that Crane himself was sensitive to the limitation of quantitative mathematics. Fleming, he says, attempts "to mathematically prove to himself that he will not run from battle," but he can reach no solution to this problem:

He was an unknown quantity. He saw that he should be obliged to experiment as he had in early youth. He must accumulate information about himself, and meanwhile he resolved to remain close upon his guard lest those qualities of which he knew nothing should everlastingly disgrace him (8-9).

Henry's mathematics of battlefield behavior assumes that the individual soldier is the major variable, and he can be understood by the linear accumulation of data concerning his personal "qualities." But the broad contours of action in the novel do not seem to provide such data. During the first charge of the Confederates, Henry fires his rifle and holds his ground; in the second charge, he runs "like a proverbial chicken" (31), but the result is not "everlasting disgrace." He returns to his regiment and leads an attack upon the Confederate position.

The novel's depiction of "fight or flight" behavior suggests, in some instances, Zeeman's Cusp Catastrophe entitled "Social Psychology: Crowds and Armies" (See Figure 2). Zeeman defines the two variables as "COHESIVENESS" and "PERCEIVED DANGER." Crane himself introduces these concerns early in the novel. First, the Union soldiers are shown to be struggling toward group cohesiveness in their daily marches and in their discussions of the purposes of their movement, but Crane's concern with group cohesiveness as a significant variable

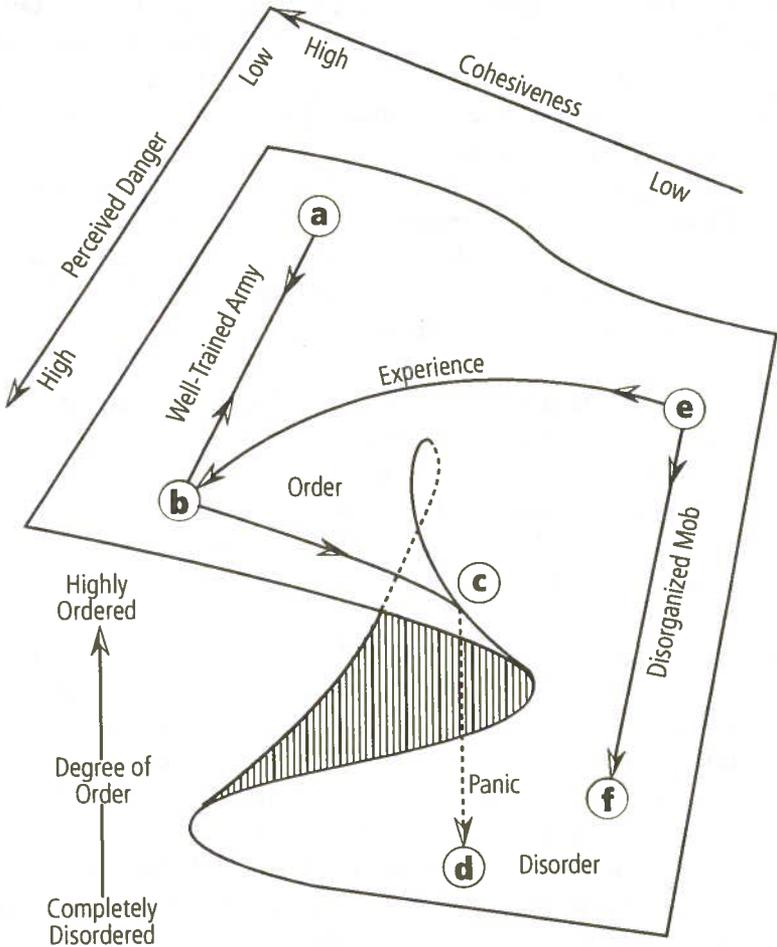


Figure 2: Social order vs. disorder in times of danger

in battle becomes explicit shortly after Henry Fleming tries "mathematically" to prove that he will not run from battle. Henry's old friend, Jim Conklin, identifies the group as a crucial element in his own expectations concerning battle behavior:

. . . if a whole lot of boys started and run, why, I suppose I'd start and run. . . . But if everybody was a-standing and a-fighting, why I'd stand and fight. Be jiminey, I would. I'll bet on it. (10)

Although Henry "was in a measure reassured" by this comment, he may simply be grateful to learn that Jim Conklin also lacks heroic certainty. Subsequent passages show that Fleming continues the attempt to compute his personal fitness for battle. At the beginning of Chapter II, for example, he is engaged in "ceaseless calculations" which lead him to conclude that "he could not sit still and with a mental slate and pencil derive an answer" (10-11). If we assign a moderate degree of cohesiveness to Fleming's regiment as the soldiers march toward the front in Chapter III ("x" on Figure 2), then Henry's fear of being entrapped in "a moving Box" (18) and his desire "break from the ranks and harangue his comrades" (19) can be seen as instances of increasing difficulty in maintaining cohesiveness when perceived danger is minimal but increasing.

Crane demonstrates the value of group cohesiveness when Henry's regiment stands while a company that has gone into battle ahead of them flees through their lines. This incident seems to verify their achieved cohesiveness: "The youth shot a quick glance along the blue ranks of the regiment. The profiles were motionless, carven" (24). The soldiers stand stiffly in position. Fleming himself feels that "heaven would not have been able to have held him if he could have got intelligent control of his legs," but with the others he stands "pale and firm" as the flood of fleeing soldiers runs past them (25).

In meeting the first attack by the Confederates, this rigid cohesiveness develops into a dynamic unity. First, the captain's "endless repetition" of advice holds them in collective anticipation of the moment of firing. Then they become workmen engaged in a task. Henry too "became not a man but a member. . . . He was welded into a common personality which

was dominated by a single desire" (26). One of their number had "fled screaming" when they fired the first volley, but even he had been driven back into the rigid ranks of the regiment. On Zeeman's graph of "Crowd Behavior," the regiment can be placed at approximately "b"—the men have become parts of a machine in incessant motion of firing and unloading. In these first five chapters, then, Crane depicts a "continuous movement" by which Henry's regiment achieves cohesiveness in extreme danger. The regiment's development is roughly parallel to the line labeled "Experience" on Zeeman's graph.

In Chapter VI, this cohesiveness collapses. The captain, whose voice held the regiment together before the first charge, has been killed. The words at the inception of the second Confederate charge are not his calm advice and coaxing. This time, the words are expressions of dismay: "We ain't never goin' to stand this second banging. I didn't come here to fight the hull damn' rebel army" (30). Henry Fleming is wondering about such complaints, and he has lost his mechanical discipline with his rifle when the regiment's cohesiveness disintegrates:

A man near him who up to this time had been working feverishly at his rifle suddenly stopped and ran with howls. A lad whose face had borne an expression of exalted courage . . . was, at an instant, smitten abject. He blanched like one who has come to the edge of a cliff at midnight and is suddenly made aware. There was a revelation. He, too, threw down his gun and fled. There was no shame in his face. He ran like a rabbit.

Others began to scamper through the smoke. The youth turned his head, shaken from his trance by this movement as if the regiment was leaving him behind. He saw the few fleeting forms.

He yelled then with fright and swung about. . . . Destruction threatened him from all points.

Directly he began to speed toward the rear in great leaps. (31)

Crane's depiction of this change in group behavior corresponds to Zeeman's graphing of the descent from "c" to "d" which he labels the "panic" catastrophe.

The namelessness of the characters in this passage contributes to Crane's success in capturing the moment of panic. The first soldier is shown to be "working" with his rifle in the mood, which Crane attributed to Fleming in the first Confederate attack. The second soldier ("a lad whose face had borne an expression of exalted courage") seems to this reader—for a moment—to be an authorial comment on Fleming. Such blurrings of individual identity suggest that this flight from battle is group behavior. Henry is a representative member of the regiment in panic.

But the Panic Catastrophe isolates him. From the end of Chapter VI through Chapter XI, he is an individual struggling to comprehend his moment of flight: he justifies it as an expression of sensitivity and intelligence. Fleming sees himself as utterly disgraced, and so he interprets his flight as a monstrous joke by nature or the gods of war. He does not consider that his individual flight could have been the result of a loss of cohesiveness in the regiment.

Failing to understand his membership in the group as precipitating his flight, Henry can define no relationship to the army. During this time of emotional and conceptual disorder, he meets the dying Jim Conklin, and, significantly, assists him in finding a place to die without fear of being crushed by the moving army. Fleming protects the dying Conklin from the threat of the group. After Conklin's death, however, Henry's desolation is extreme. He raises his fist to utter an oath or a "phillipic," and the chapter ends with the most famous image in the novel: "The red sun was pasted in the sky like a wafer" (44). In the terms of this discussion, the image expresses a moment of extreme isolation at the apogees of "danger" and "disorder" created by Conklin's death. Time and space are collapsed by Henry's loss of conventions for seeing and understanding the world.

After this immersion in desolation, Henry sees a column of advancing soldiers "as a procession of chosen beings," and he believes that "he could never be like them" (48). Throughout this eleventh chapter, however, Henry plays a kind of interior

tape-loop, which includes woe, rationalization, and the construction of imaginary dialogues with his regimental comrades. He is still involved with his relationship to the army.

In Chapter XII, he encounters a band of soldiers fleeing from the battlefield. These soldiers—*who are like him*—impel him to attempt to express his horror, to externalize questions replaying in his mind since his own flight. He is not articulate when he clutches one of the fleeing soldiers: “Why— why— stammered the youth struggling with his balking tongue” (52). In this gesture, Henry is reaching out to rejoin the men of the army. The “answer” to his question, a blow on the head with a rifle-butt, provides the red badge of courage that enables him to return without fear of mockery to his regiment. In a book filled with brilliant renderings of action and emotion, this passage—crucial to narrative development and stunning in its thematic energy and reticence—does not seem to depict a “sudden, qualitative” change in Henry. In the terms of Catastrophe Theory, he is again impelled upon the gradual slope of “experience” toward the reconstituting of “cohesiveness” in his regiment. The “rubber” plane of the Cusp catastrophe provides no “quantitative information” (of time or space) and “the actual behavioral surface . . . may be any distortion of the canonical cusp surface” so long as there is no “singularity more complex than a pleat.”⁷ In its scale and slope, then, Henry’s rejoining of the regiment is distinct from his troubled marching toward the first battle. Upon his return, his fellow soldiers give him food and sympathy, and an “amateur nurse” provides a handkerchief to bandage his wound (59).

On the morning after his return to the regiment, his head throbbing from the Union soldier’s blow, Fleming feels rage. First, he fumes at the Union Army generals (68-9), and then his rage shifts to hatred to the attacking Confederate soldiers:

He had a wild hate for the relentless foe. Yesterday, when he had imagined the universe to go against him, he had hated it, little gods and big gods; today he hated the army of the foe with the same great hatred. . . . It was not well to drive men into final corners; at those moments they could all develop teeth and claws. (70)

The enraged-animal imagery distinguishes this segment of the novel from the rigidity shown at the beginning of the first Confederate attack. Such individual emotion does not appear to be a manifestation of group cohesiveness.

In fact, the imagery suggests a model of Attack Behavior, which Zeeman has drawn from observations by Konrad Lorenz (See Figure 3). When the enemy's attack has been repulsed, Henry's mood of rage persists as the model suggests. Crane says that he goes "instantly forward like a dog who, seeing his foes lagging, turns and insists upon being pursued" (71). Fleming continues to fire even after the enemy attack had ended. Zeeman observes:

. . . we might expect catastrophe theory to be the mathematical language to describe emotion and mood; and it is indeed striking that moods tend to persist[,] tend to delay before changing[,] and then tend to change suddenly.⁸

When Fleming's mood finally subsides, the lieutenant praises him for fighting like a "wild cat," and some of the other soldiers "looked upon him as a war devil" (72). There is a similar persistence of mood in "The Blue Hotel," when the Swede's timid avoidance of conflict is followed by an Attack Catastrophe, and his mood of aggression persists until the gambler kills him.

Henry's subsequent battle behavior is not limited to expressions of fevered hatred of the enemy. The other soldiers are said to gain a "vicious, wolf-like temper" (84) like that which he has shown, but a number of additional elements contribute a richer complexity to the battle behavior Crane shows in Chapters XIX through XXIII. At the beginning of the regiment's first charge, for example, Henry is coaxed by the lieutenant, but his response is a challenge thrown back to the officer, "Come on yerself, then" (79). From this point, Henry's participation in the battle is not that of mechanical or bionic automation. His battle madness fuses hatred of the enemy and resentment at the regiment's being called "mule drivers" (75, 6, 81, 91) and even a hallucinatory emotional investment in the flag:

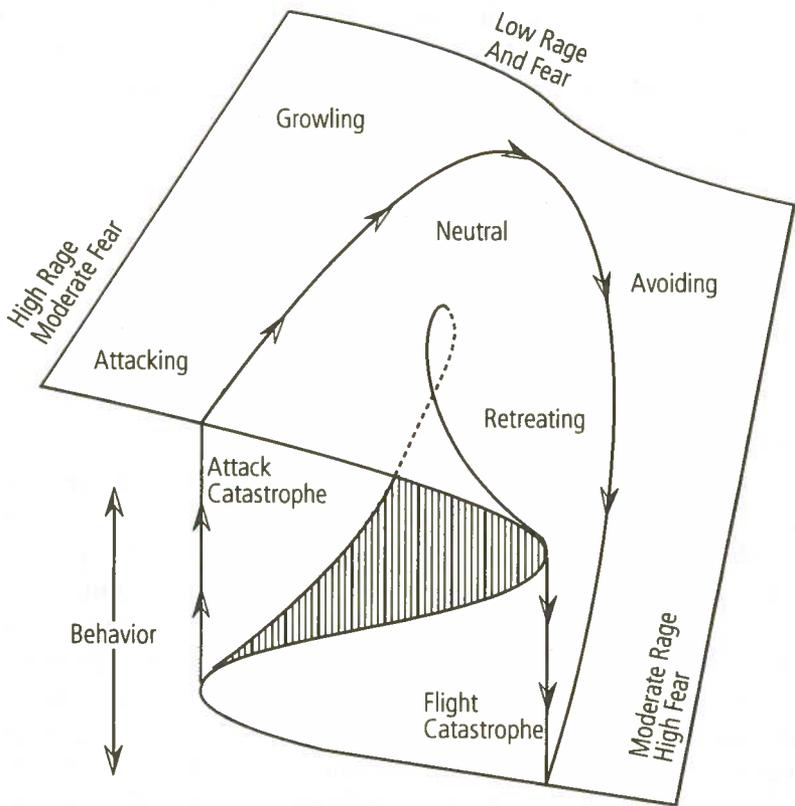


Figure 3: Aggressive behavior in a dog

Within him, as he hurled himself forward, was born a love, a despairing fondness for this flag which was near him. It was a creation of beauty and invulnerability. It was a goddess that bended its form with an imperious gesture toward him. It was a woman red and white, hating and loving, that called to him with the voice of his hopes. (80)

After the flag bearer is shot, Henry wrests the emblem from the dying man and carries it, unarmed, through the ensuing struggles. Crane describes the regiment's final charge as a "paroxysm" rising from exhaustion, and an "exhibition of sublime recklessness" (92). In contrast to Henry's earlier "mathematical" introspection, "there was no obvious questioning, nor figurings, nor diagrams" (92). This last attack appears to be a Catastrophe, a place of qualitative transformation, but neither Henry nor the others in the regiment appear comprehensible in terms of the Cusp Catastrophes, which clarify earlier moments in the novel.

Although this attack includes clear instances of rage, there are numerous additional elements, including exhaustion, "the daring spirit of a savage, religion-mad" (92), and the competitive comradeship which Fleming develops with Wilson. A model of the last attack—which appears to have at least five variables—would perhaps be an Elliptic Umbilic Catastrophe or a Paraboloc Umbilic Catastrophe (See Figure 4). Woodcock and Davis observe that

In complex natural processes, such as the formation of an embryo, there are multiple potentials. . . . As a result, a process which shows cusp behavior at one moment may evolve into a butterfly or umbilic.⁹

Henry's behavior appears to evolve from cusp behavior early in the novel to one of these more complex forms. In fact, the two attacks (beginning on pages 77 and 92) and the repulsing of the Confederate charge (83) suggest that there are at least three such evolutionary changes in the behavior of the regiment in the last battle. The five variables on an Umbilic Catastrophe can be

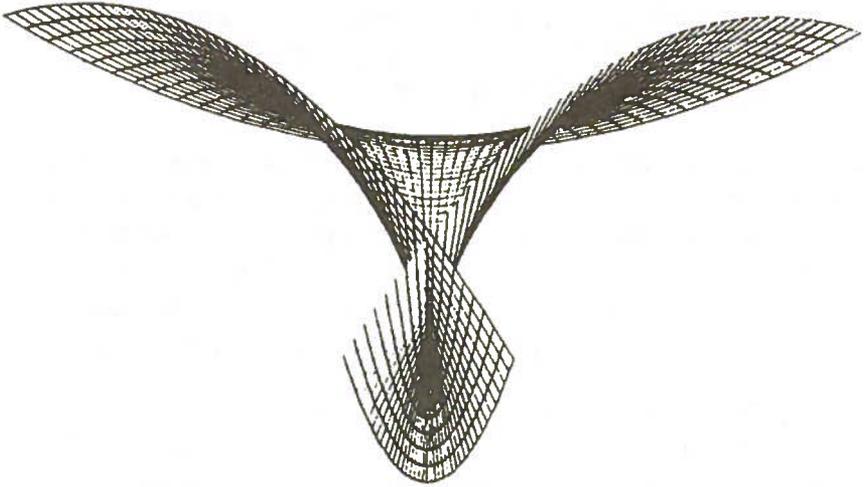


Figure 4a: Projection of the elliptic umbilic catastrophe graph

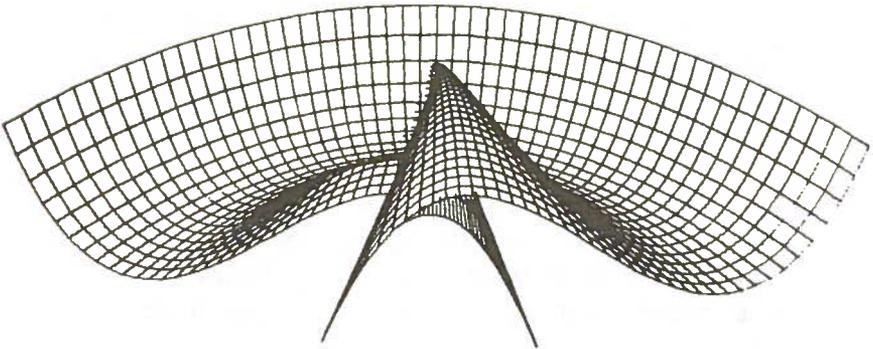


Figure 4b: Projection of the parabolic umbilic catastrophe graph

modeled on a six-dimensional graph, but Woodcock and Davis observe that Umbilic Catastrophes have a "rich" geometry and "do not lend themselves immediately to the relatively 'rough' modeling of the social sciences."¹⁰ The envisioning of the placement and interaction of variables on a six-dimensional graph is, it seems, difficult for the social sciences. Perhaps there is a similar "roughness" in the literary critics' modeling of events in works which depict multiple, interacting variables. Such "roughness" in modeling could generate controversies concerning the structure of complex artistic achievements such as *Red Badge*.

Catastrophe Theory seems to enable us to distinguish the emotional elements in the moments of sudden qualitative change in the novel and comprehend the relationships between these catastrophes and Fleming's unstable ruminations. In the last chapter, he is again struggling for conceptual vindication of his battle behavior, but his modeling is extremely "rough" and Crane does not provide an authorial final judgment or a moral resolution. Such an ending would be inconsistent with the structures of discontinuity that Crane has used to depict the battle experiences of Fleming and the other Union soldiers. One might suggest that neither egotism nor moralism can comprehend the complex interaction of variables in the "courage catastrophe."

Interestingly, the structure of Fleming's battle behavior does parallel the pattern of actions that he observes in the Union Army:

. . . previously the army had encountered great defeats and in a few months had shaken off all blood and tradition of them, emerging as bright and valiant as a new one; thrusting out of sight the memory of disaster. . . . (50)

In his two days of battle, Fleming parallels these transformations. Perhaps, then, the particular pattern of Catastrophes in the novel is Crane's attempt to depict the structure of the experiences of the North in the Civil War. It is certain that, by the time Crane wrote the novel, the North was in retreat from the achievements of the Reconstruction which had followed its victory and had entered "into the awful truth that even in America the eternal environment for man is war."¹¹ Such an interpretation of the

structure of the novel would be consistent with the ambition Zeeman identifies in *Catastrophe Theory*. He quotes Leo Tolstoy's statement concerning his observation of "the individual tendencies of men" in order to depict "the laws of history" in *War and Peace*. Zeeman concludes, "Tolstoi puts his finger on exactly what catastrophe theory is trying to do."¹² Of course, Crane, like his mentor, William Dean Howells, was greatly impressed by Tolstoy's achievement as a literary artist.

In addition to this suggestive correlation between the novel and the structure Henry observes—and Crane may have seen—in the Civil War, the "bright and valiant" moment of Fleming's last attack seems to complete the spectrum of emotional and behavioral possibilities within this world of battle. In this sense, Henry achieves an heroic fullness of being. This is not a personal success. One might say that he has moved across the twisted and evolving planes of sudden transformation under the influence of a rich constellation of conscious and unconscious forces. His awareness at the end of the novel is like that of the survivors at the end of the "The Open Boat" and the two men at the campfire in "The Blue Hotel." When the cowboy and the Easterner attempt to interpret the Swede's death at the end of "The Blue Hotel" (5:169-70) they are as limited and self-serving as Fleming in his attempts to label his battlefield behavior. Even in "The Open Boat," where the correspondent is clearly a depiction of Crane himself, the survivors "felt they could . . . be interpreters" of the "sea's voice" (5:92), but they provide no interpretations. Crane provides only the story. It seems possible that for Crane the images and discontinuous events of his art were the only possible articulations of the human encounter with qualitative transformation.

Although a "roughness" in my spatial imagination limits my modeling of the last attack in *Red Badge*, the topographies provided by *Catastrophe Theory* seem to clarify the patterns of continuous and discontinuous change in the novel. In addition to promising usefulness in reading other works by Crane, *Catastrophe Theory* might prove useful in enhancing our appreciation of other writings characterized by discontinuity. For example, the characters in works by Theodore Dreiser and Jack London experience sudden transformations, which seem comparable to those found in Henry Fleming. Perhaps *Catastrophe Theory*

could provide topographies useful in discussing the issues of determinism within such works and, at the same time, defining their literary complexity and esthetic merit. In these terms, Catastrophe Theory suggest the possibility of an esthetics of literary naturalism.¹³

In addition to clarifying discontinuous structures of plot and character development, Catastrophe Theory might prove useful in describing discontinuities in literary style. Leon S. Rudiez suggests that a psychoanalytic theory of language provides two complex variables:

The signifying process, as increasingly manifest in "poetic language" results from a particular articulation between symbolic [PATERNAL function, social and grammatical restraints] and semiotic [MATERNAL, receptacle, bodily, mysterious] dispositions; it could be termed "catastrophe," given the meaning the word has in Rene Thom's theory.¹⁴

According to this Lacanian definition, "poetic language" is the result of stylistic catastrophes which reflect the claims of the "maternal" and the "paternal" upon the writer's relationship to language. In another example, Julia Kristeva alludes to the mathematics of "catastrophe" in discussing the French writer Louis Ferdinand Celine:

Neither Celine . . . nor the catastrophic exclamation which is his style, can find outside support to maintain themselves. Their only sustenance lies in the beauty of a gesture that, here on the page, compels language to come nearest the human enigma, to the place where it kills, thinks and experiences *jouissance* all at the same time.¹⁵

Kristeva does not define a four-dimensional topographic model on which these three variables (kills, thinks, experiences *jouissance*) converge in "catastrophic exclamation." Nor does she present an example of Celine's style that exemplifies such a verbal "gesture." Nevertheless, the references to Catastrophe Theory by Rudiez and Kristeva indicate possible approaches to intellectual and

emotional issues expressed in Crane's verbal ironies and his other stylistic disjunctions.

But the observations by Rudiez and Kristeva also suggest two additional difficulties in the application of Catastrophe Theory to works of literature. Criticism, which requires topographies derived from data in the social sciences, may be severely limited in the issues of discontinuity and the variables that it can address. On the other hand, criticism, following Kristeva's example, might propose (or impose!) idiosyncratic models derived from the images and events of the literature itself. Such idiosyncratic models—developed from the very data that they are to graph—threaten to create circles of tautology. Nonetheless, such idiosyncratic models might be applied to a variety of discontinuous elements in literature to provide grids that are as useful to critical understanding as the “arch-like” modeling of the structure of “The Open Boat.”¹⁶ Sudden qualitative changes are apparent in the physical, emotional, and historical dimensions of our world. Catastrophe Theory provides topographic models for understanding such changes, and the primary catastrophes are likely to be pertinent to understanding structures intuited by the creative imagination in literature. If the structural qualities of characterization in Crane's highly intuitive *Red Badge* are clarified by this experiment in applying topographic models, then perhaps there are additional critical applications. ☛

NOTES

1. Stephen Crane, *The Red Badge of Courage: An Authoritative Text, Backgrounds and Sources*, 3rd ed., Donald Pizer, ed. (New York: Norton, 1994). Subsequent references to this text are parenthetical.
2. Alexander Woodcock and Monte Davis, *Catastrophe Theory* (New York: Dutton, 1978), 24.
3. Woodcock and Davis, 89-92.
4. Woodcock and Davis, 82.
5. Woodcock and Davis, 47.
6. References to works by Crane other than *The Red Badge of Courage* are to The University of Virginia Edition of *The Works of Stephen Crane*, 10 vols. (Charlottesville: University Press of Virginia, 1969-76). Subsequent references to these texts are parenthetical, by volume and page number.

7. Woodcock and Davis, 57.
8. E.C. Zeeman, *Catastrophe Theory: Selected Papers* (Reading, Massachusetts: Addison-Wesley, 1977), 13.
9. Woodcock and Davis, 57.
10. Woodcock and Davis, 54.
11. David W. Noble, *The Eternal Adam and the New World Garden* (New York: Grosset and Dunlap, 1968), 121.
12. Zeeman, 320.
13. Rene Thom discusses the issue of "determinism" as opposed to "randomness" in "Stop Chance! Silence Noise." *SubStance* 12.3 (1983) 11-21. Thom replies to the collection of responses to his essay in the journal in "By Way of Conclusion," 78-83. These comments might prove useful in discussing "determinism" in literary works.
14. Leon S. Rudiez, "Introduction," Julia Kristeva, *Desire in Language: A Semiotic Approach to Literature and Art*. Thomas Gora, Alice Jardine, and Leon S. Rudiez, trans. (New York: Columbia University Press: 1980), 7
15. Julia Kristeva, *Powers of Horror: An Essay on Abjection*. Trans. Leon S. Rudiez (New York: Columbia University Press, 1982) 206.
16. E.R. Hagemann, "Sadder Than The End: Another Look at 'The Open Boat.'" *Stephen Crane in Transition*. Joseph Katz, ed. (DeKalb: Northern Illinois University Press, 1972). See the modelings on pp. 75 and 81.

FIGURE SOURCES

- Fig 1 on p. 84 (Woodcock and Davis, 46)
 Fig 2 on p. 86 (Woodcock and Davis, 109)
 Fig 3 on p. 92 (Woodcock and Davis, 101)
 Fig 4 on p. 94 (Woodcock and Davis, 56)