



Chet Richards  
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## John Boyd, *Conceptual Spiral*, and the meaning of life

Napoleon came on in the same old way, and we beat him in the same old way.

Boyd, paraphrasing the Duke of Wellington after Waterloo. For the exact quote, see Keegan, 1987, p. 168.

### Where was John Boyd?

Perhaps to fight post-retirement blahs, John Boyd began work on a small contract with NASA to explain anomalies between manned simulations and results of mock air-to-air combat (Coram, 2002). That research influenced a briefing, *New Conception for Air-Air Combat*, (1976a), which is remembered, if it is remembered at all, for introducing the term “fast transient” (Richards, 2012b). Boyd coined the expression to explain not only that mismatch but also other strange phenomena, such as the F-86’s dominance of the MiG-15 in Korea and most recently, the fly-off between the YF-16 and YF-17 to determine the winner of the Air Combat Fighter Competition (Osinga, 2005). One wonders what pilots and engineers thought when Boyd ended *New Conception* with the claim, supported somehow by references to mathematical logic and quantum mechanics, that his new conception also explained the nature of war. Odd though it may have seemed, that claim was substantiated by his next three presentations—*Patterns of Conflict* (1986), *Organic Design for Command and Control* (1987a) and *The Strategic Game of ? and ?* (1987b)—that form the bulk of his *Discourse on Winning and Losing*.

For more than a decade, then, Boyd had immersed himself into the problem of armed conflict, beginning with duels in the sky, progressing through multi-aircraft en-

gagements, and on to the more general problem of war. He considered not only the clash of armies on famous battlefields but also insurgencies conducted by rag-tag guerrillas. He was searching out “invariants,” as he called them, and in so doing he was the first to conclude (on *Patterns* 98) that two seemingly disparate but “extraordinarily successful” (Boyd, 1986, p. 100)\* ways of waging war, land combat fought according to the style of the blitzkrieg (often known today as *maneuver warfare*) and guerrilla warfare, are manifestations of a common philosophy.

Boyd is best known for his work on war, but he had always intended that *Patterns of Conflict* apply to all forms of conflict (Chuck Spinney, personal communication, 5 September 2012), and war did take a back seat in a few sections, most notably the “Theme for Vitality and Growth” (chart 144). In his next two presentations, *Organic Design for Command and Control* and *Strategic Game of ? and ?*, he investigated the nature of orientation, leadership, and strategy. Although these subjects appeal to a much wider audience than soldiers, his treatment of them rested on a strong foundation of war.

By mid-1987, though, he was finished writing about war. What happened? What did not happen was that he felt that he had solved the problem of war for all times. His own philosophy, which he outlined in his only unclassified paper, “Destruction and Creation” (1976b), would make that impossible.

Although he produced no new works on war, he took several years to wind down his interest in the subject:

- He continued working with Marine Colonel Mike Wyly and his group that produced FMFM1, *Warfighting*, in 1989.
- Coram (2002) describes how in late 1990, Boyd was asked by then-SECDEF Dick Cheney to return to Washington to assist with brainstorming on the strategy

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\*Subsequent research has confirmed his opinion. Biddle (2004) examined 46 wars and 382 battles to conclude that “the results display a preponderance of evidence in favor of the new theory [maneuver warfare, although Biddle used a different term] across measures and across databases” (p. 180). Similarly, with regard to guerrilla warfare, Van Creveld (2006) concluded that “attempts by post-1945 armed forces to suppress guerrillas and terrorists have constituted a long, almost unbroken record of failure” (p. 219), and Hammes (2004) generalizes the insurgents’ success to postulate a new “generation” of warfare: “This consistent defeat of major powers by much weaker fourth-generation opponents makes it essential to understand this new form of warfare and adapt accordingly” (p. 3).

for Desert Storm. There has been some controversy over whether this occurred. It did.

- Even though *Patterns of Conflict* was finished in the sense that he didn't produce another dated edition, he continued to polish its concepts. For example:
  - He changed the "Theme for Vitality and Growth," *Patterns* 144, from "insight, initiative, adaptability, and harmony" to IOHAI: insight, orientation, harmony, agility, and initiative.
  - He added a "B" to his "blitzkrieg culture": *Einheit, Behendigkeit, Fingerspitzengefühl, Auftragstaktik, Schwerpunkt*.
  - He despised "principles of war" but offered a set for those who just had to have them: PISRR (Penetrate, Isolate, Subdue/Subvert, Reorient, Reharmonize).

There were other things going on, however, that I believe changed what he considered important in life:

- He helped say final rites over the military reform movement, in which he had played such a central role. Two of his closest associates, Jim Burton and Mike Wyly, retired from the military, and Pierre Sprey turned his attention to his new venture, Mapleshade Records. Bill Lind settled at the Center for Cultural Conservatism.
- He ended his 23-year stay in Washington and moved to Florida in 1989. He was no longer involved in intense, day-to-day discussions in his office at the Pentagon, and he was no longer the ringmaster at Wednesday evening happy hours downstairs in the Old Guard Room at Ft. Myer.
- In 1987 he turned 60. As Coram (2002) points out, this event by itself tends to give one intimations of mortality, a large break in outlook for fighter pilots who, as we all know, consider themselves immortal.
- This was also a time when John began to experience various medical problems, a new experience for someone who had not had a physical since he left the Air Force (Coram).
- Finally, there was the fall of Soviet Union and the disintegration of the Warsaw Pact. Coupled with the rise of nuclear weapons, these events implied that worry-

ing about large-scale conventional war between advanced states was more an exercise in fantasy than serious analysis (van Creveld 1991; Barnett, 2004; Smith, 2005; Richards, 2008).

So after a lifetime of studying it, war as he knew it ceased to exist at the very time that he was experiencing deep changes in his health and life style. It's not hard to understand how he might turn his attention to other matters. He became fascinated by similarities between his blitzkrieg culture and the Toyota Production System, and this led to consultation on the early drafts of what became my book, *Certain to Win* (2004). His foray into business strategy helped convince him that the work he had done on conflict applied beyond war and need not disappear with the fall of the USSR.

With *Conceptual Spiral*, he cut himself loose from war—science, technology, and engineering were now his framework. From my notes of telephone conversations, he started building the charts that compose *Conceptual Spiral* in mid-1990.

### **Where he left off**

The more important fundamental laws and facts of physical science have all been discovered, and these are now so firmly established that the possibility of their ever being supplanted in consequence of new discoveries is exceedingly remote. Nobel Prize winning physicist A. A. Michelson. (1903, p. 23)

In a sense, Boyd returned to where he left off in 1976 with “Destruction and Creation.” That paper says nothing about war but talks about the general problem of survival on our own terms in a competitive world. He insisted that we must always strive to increase our capacity for independent action because, otherwise, constraints on our activities could limit our options and decrease our ability to survive in a way we find desirable. In order to increase our capacity for independent action, we need a set of concepts that describes how the world works, and we use this system of concepts as a mental model for decision-making. He invokes properties of systems originally discovered in mathematics and physics to reinforce his conclusion that no system of concepts can perfectly represent reality. In doing this, he was following well established practice in the sciences. Feynman (1994, pp. 43-44), for example, had observed that science

often encounters "wide principles that sweep across the different laws, ... [that] often extend beyond the range of their deduction."

Because no system of concepts for representing reality can completely describe reality, at some point "we should anticipate a mismatch between phenomena observation and concept description of that observation." (Boyd, 1976b, p. 4) We may succeed for a while, but our ability to continue using our old system of concepts will degrade to the point where we will need to change our model to allow us to predict more accurately the effects of our actions. Such changes can be seen in many areas of human activity, as when Copernican cosmology replaced the earth-centric Ptolemaic system (Spinney, 1998), or evolutionary biology replaced divine creation, or quantum mechanics replaced Newtonian mechanics for sub-atomic particles, or fast transients complemented energy-maneuverability as the fundamental principles of air combat (Boyd, 1976a & 1987b, p. 42), or maneuver warfare replaced industrial age warfare, or lean production replaced mass production.

Where do we get our new system of concepts? Boyd suggested a "dialectic engine," a back-and-forth process of tearing apart old concepts and proposing new ones. So, as our ability to function effectively using the old system of concepts collapses, we begin to construct new systems. One way to do this is to analyze concepts into constituent parts, which are themselves concepts for representing reality, bits of understanding.

The constituents do not have to come from the same "domain"—area of knowledge—that we are working in. One of the key pieces of lean production, for example, came from close observation of American supermarkets (Ohno, 1988).

Eventually someone will have an "aha!" moment by combining various bits of understanding in a novel and elegant way that allows a new synthesis, a new understanding, a new system of concepts for representing reality. This aha! moment may take decades. The process of creating modern cosmology, for example, might be dated from the publication of Copernicus' *De revolutionibus orbium coelestium* in 1543 to Newton's *Principia Mathematica* in 1687. As a result, the equations of the Ptolemaic system, hideously complex although reasonably predictive, were replaced with the elegant simplicity of Newton's laws of motion (Spinney, 1998). As the process proceeds, candidate syntheses must be tested and then rejected, refined, or accepted.

All of Boyd's briefings are examples of this process, that is, they are syntheses built up from elements he gathered from hither and yon—chart 12 of *Strategic Game* lists seven such domains: mathematical logic, physics, thermodynamics, biology, psychology, anthropology, and conflict. Boyd's approach, rather than trying to establish a thesis by marshaling anecdotes, data, quotes, and arguments to support it, or reasoning deductively from some set of fundamental assumptions, produces a product built from the elements he has collected. These products could be considered as the -A models, as in F-15A and F-16A, of the solutions he creates. He does not claim that they are the ultimate answers—that would violate the conclusion of "Destruction and Creation"—and he keeps insisting that it's the method not the product that's important, but he would argue and he did argue that his new conceptions were better than what came before him.

By gathering ideas from apparently unrelated sources, he was following an ancient tradition in military arts. One of his favorite sources, the 17th century samurai Miyamoto Musashi (1982), had advised his students to take some time off from practicing with the sword to cultivate the arts and sciences and to develop some degree of expertise with other occupations. It wasn't to improve their clever repartee at dinner parties.

Occasionally Boyd would let us in on his methods by furnishing a parts list for one of his finished products, the parts coming from the invariants he had discovered during this research. Figure 1, Chart 184 from *Patterns*, shows several of these.

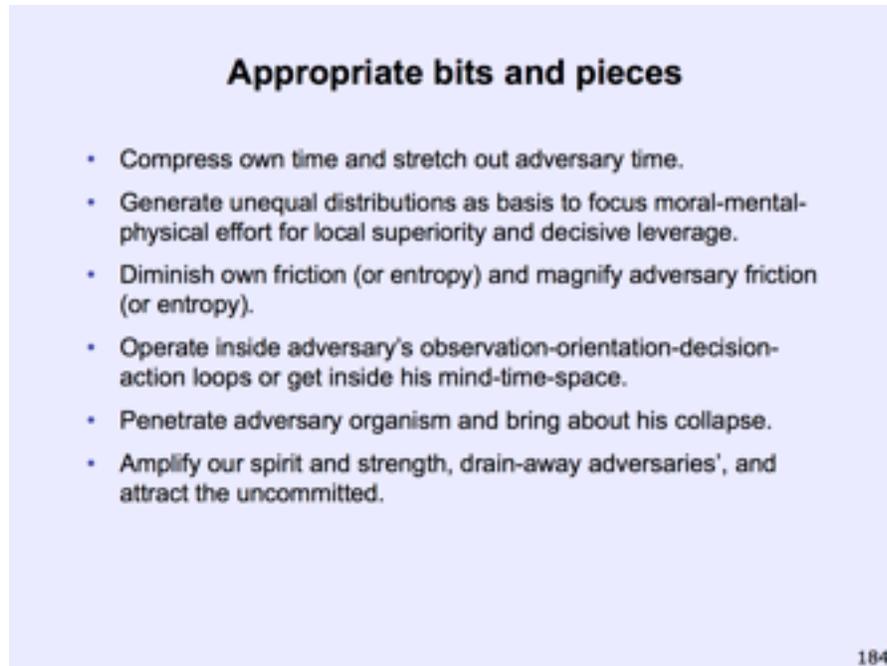


Figure 1. Major Building Blocks of *Patterns of Conflict*.

In *Conceptual Spiral*, Boyd returns to this theme but draws on his years of experience

Patterns 184 suggests that if we're going to produce a "Patterns of XXX" (business, for example) of our own, we should start by collecting "appropriate bits and pieces" from a variety of different fields. As requirement for graduation, MBA candidates should produce and defend their own such collection, along with a trial synthesis.

with the study of conflict. Whereas D&C was so general that it qualified as an exercise in epistemology, which is not a field of interest to many people, *Conceptual Spiral* begins with science and engineering and then passes to how we change our thinking and actions right in the midst of an operation or a sales campaign.

The essence of his synthesis reached all the

way back to *New Conception*:

He who can handle the quickest rate of change survives. (24)

*Conceptual Spiral* completes the task of answering what this means.

### In the grand scheme of things

Chronologically, *Conceptual Spiral* was the sixth element that Boyd included in the *Discourse on Winning and Losing*, followed only by his four-chart *The Essence of Win-*

*ning and Losing* in 1995 with a final revision in January 1996. In later editions of the *Discourse*, Boyd put *Conceptual Spiral* right at the front, with the Abstract, followed by *Patterns of Conflict* (*New Conception* was not included).

Physically, *Conceptual Spiral* is mid-length for a Boyd presentation, shorter than *Strategic Game* (and, of course, *Patterns*) but slightly longer than *Organic Design*. It consists of 38 charts and runs some 2,900 words. By comparison, “Destruction and Creation,” is about 3,900 words not counting the bibliography. Although Boyd did not supply an agenda or outline, as he did for *Patterns*, *Strategic Game*, and to some extent *Organic Design*, the presentation divides naturally into three sections:

- Introductory material, charts 1- 8
- Tables detailing contributions from science and engineering, charts 9-12
- Synthesis, charts 13-38

### **Why did Boyd write *Conceptual Spiral*?**

I am, and ever will be, a white socks, pocket protector, nerdy engineer, and I take a substantial amount of pride in the accomplishments of my profession. Neil Armstrong, (AP, 2012) but could apply as well to John Boyd.

Frans Osinga (2005) did not have a high opinion of *Conceptual Spiral*, suggesting that it is merely an affirmation of “Destruction and Creation”:

Indeed, The *Conceptual Spiral* must be considered the equivalent of the essay, but now offered in a more easily accessible format, and in appearance less philosophical. (p. 260)

Grant Hammond (2001) was more appreciative, perhaps reflecting his involvement with Boyd beginning in 1991. He concluded that *Conceptual Spiral* has an ambitious goal, to answer “How do we go about successfully adapting in the modern world?” (p.168) and observing that the presentation also looks forward to the main theme of his next and final work: “The explanation can be seen as a scientific and theoretical explication of the OODA loop” (p. 174).

Boyd himself considered *Conceptual Spiral* to be a major effort, worthy of the five years of additional reading and thought. The importance of *Conceptual Spiral*, however, may not be obvious from the purpose that he offers:

To make evident how science, engineering, and technology influence our ability to interact and cope with an unfolding reality that we are a part of, live in, and feed upon. (p. 2)

Yawn. People who have associated Boyd with fighter aircraft or maneuver warfare often get no further than this.

Then he repeats a long paragraph from the Abstract that restates the main argument of “Destruction and Creation.” Epistemology, again. This usually gets rid of the rest of his potential readers. What a pity because in the next chart, Boyd claims that when you put these two soporific statements together, something magical happens:

By exploiting the theme contained within this passage and by examining the practice of science/engineering and the pursuit of technology, we can evolve a conceptual spiral for comprehending, shaping, and adapting to that world. (p. 5)

Voila: The Meaning of Life!

### **The meaning of life?**

Boyd would suggest reversing the order of a presentation to see if new insights pop up. He often took his own advice: You may recall that many of the lists in *Patterns of Conflict* reverse their order, sometimes starting with strategy and working down to tactics and sometimes beginning with tactics and working up. This is not a bad way to read any Boyd briefing, although the first time, you should probably read it through from front to back. Please take this as a hint, if it so applies.

Assuming you have already made your first pass, let's begin at the end of *Conceptual Spiral*, where we find that the meaning of life involves insight, imagination, and ini-

tiative, which are necessary in order to “survive and grow” (p. 36). Incidentally, do you buy this? Are they sufficient?

*Conceptual Spiral* ends with “insight, imagination, and initiative” as the prerequisites for survival and growth. With his nearly contemporaneous revision to chart 144 of *Patterns*, however, Boyd suggests that “vitality and growth” demand IOHAI: insight, orientation, harmony, agility, and initiative. He was using both concepts as late as 1992, so it’s not that one replaced the other. Are these two equivalent? Or is Boyd making things more complex than they need to be? Or something else?

As you continue to read back, you’ll find that these three qualities are the results of his “conceptual spiral,” which is the “continuing whirl of reorientation, mismatches, analyses/synthesis and the novelty that arises out of it.” On chart 34, where he makes this claim, there is a table above “insight, imagination, and initiative.” What about the columns of that table? Are insight, imagination, and initiative the column headings for that table? The results of going

down the columns of the table? Something else? Nothing else?

So insight, imagination, and initiative come from a continuing whirl of stuff. Why is that important? Working on back, the “continuing whirl ...” is what allows us to deal with mismatches between our concepts and what the real world keeps throwing at us. Why does the world do this? Mischievous spirits, perhaps? On chart 32, Boyd provides a list of “features” of the world that make mismatches inevitable. He doesn’t claim these are all the things that cause mismatches (“These features include ...”), and mischievous spirits were somehow left off, but he did include the three concepts from “Destruction and Creation.”

### **Mismatchology: A short course**

Boyd’s fascination with mismatches, and the central role they play in progress, dates back at least to “Destruction and Creation”:

On the other hand, as already shown, the increasing disorder generated by the increasing mismatch of the system concept with observed reality opens or unstructures the system. As the unstructuring, or as we’ll call it the destructive deduction, unfolds, it shifts toward a creative induction to stop the trend toward disorder and chaos to satisfy a goal-oriented need for increased order. (p. 7)

A quick comparison between the table of Chart 32 and “Destruction and Creation,” which listed only the three theoretical concepts as causes of mismatches, suggests that Boyd was becoming more interested in the subject of mismatches as time went by. This would be correct.

In fact, the draft of *Conceptual Spiral* dated December 1990 is virtually identical with the final, July/August 1992, edition, with the exception of a new section on the causes of mismatches, charts 29-33 of the 1992 version (see Table 1, below).

Back on chart 14, Boyd’s “grand message” had argued for the inevitability of mismatches by invoking mathematical logic and the emerging science of information theory, reinforcing the theme of “Destruction and Creation.” The new section in the 1992 edition provides specifics for those who need more than theory. Between December 1990 and August 1992, Boyd felt compelled to drive home the point that mismatches are inevitable. My guess, given our conversations of that period, his skepticism of claims that new technology would clear the fog of war from the battlefield, and the Army’s inclusion of synchronization, which requires certainty, into its doctrine, was that he wanted to establish once and forever that such certainty was impossible, both practically and in theory. Clausewitz’s friction will always reign supreme and not only on the battlefield.

Table 1

*Material Added to Illustrate the Inevitability of Mismatches*

December 1990	July/August 1992
1-25	1-25
26	New title; edited last bullet (dated 1/1991)
27	Deleted
28	27
29	28
	29 (Maybe So)
	30 (More Pointedly)
	31 (Response)
	32 (These Features Include)
	33 (Underlying Message)
30-34	34-38
Sources (includes the sources from Patterns, with additions)	

It is just as well that mismatches are inevitable because they supply energy for the conceptual spiral.

The presence and production of mismatches are what sustain and nourish the enterprise of science, engineering, and technology, hence keep it alive and ongoing—otherwise there would be no basis for it to continue. (p. 23)

Mismatches drive change, and, through the process he describes in the remaining charts of the briefing, spawn the insight, imagination, and initiative that make survival on our own terms possible in “an unfolding and often unforeseen world of many bewildering events and many contending interests” (1987b, p. 58).

Boyd had a syllogism that summed up his fascination with mismatches:

Without anomalies, there would be no mismatches
Without mismatches, there would be no crises
Without crises, there would be no desperation
Without desperation, there will be no change

Figure 2. Boyd's Philosophy of change.

These sentiments, which date from 1989, express his frustration with what he saw as America's inability to understand and to adapt, as evidenced by the rapid decline of its manufacturing prowess and the demise of the military reform movement. He once told me that he considered himself a "committee of one, if need be, to make that evident" (Personal communication, March 4, 1989). *Conceptual Spiral* may be read as a product of that effort.

Boyd found a most practical use for his science of mismatches in his "M&M strategy," for "motherhood and mismatches." By "motherhood," he meant making our actions correspond to the moral code we are expected to uphold, and "mismatches," means handing your opponents rope and publicizing how they hang themselves with it, that is, how they violate the moral code they claim or are expected to uphold. This strategy is quite useful in politics and bureaucratic warfare, and in these arenas it often works better than trying to destroy opponents by operating inside their OODA loops. Spinney (2008, ¶1) illustrated a common M&M pattern in "How Obama Won":

The basic goal of an M&M strategy is to build support for and attract the uncommitted to your cause by framing a "motherhood" position—i.e., a position no one can object to, like the mythical "motherhood, apple pie, and the American way"—and then inviting your opponent in to repeatedly attack it and, in so doing, smash himself to pieces at the mental and the even more decisive moral level of conflict.

Boyd explained the theory behind the strategy in *Strategic Game*, particularly pages 47 and 49 and in the section “Moral Design for a Grand Strategy,” pages 53-57.

But it gets more interesting. Boyd generalized his M&M strategy and melded it into the physical-mental-moral scheme to yield six ways this game can be played (Personal communication, April 11, 1989):

M&M between:	Level of Conflict		
	Moral / Values	Mental / Ideas	Physical / Actions
Situations			
Actions			
Ideas			

Figure 3. Six Ways to Play the M&M Strategy.

The way to read this chart is that at the physical level, you can execute an M&M strategy between actions (ours and our opponents’) and the situation. That is, you could go to great lengths to ensure that our actions match-up with (are appropriate for) the situation while while exploiting actions of the opponent that do not. At the mental level, you can play ideas against actions and ideas against the situation, while at the moral level, you can play values against ideas, values against actions, and values against the situation. Add all these up and you get six ways to play the M&M game. Boyd also observed that the physical, where most militaries operate, is the easiest to understand but only provides a sixth of the total potential. The mental can be the quickest and provides a third, but the moral is the most powerful, and Boyd would point out the 3:1 relationship between moral and physical, as Napoleon had suggested. Boyd created this chart to illustrate the richness of the M&M approach, not to define a dogma; as Sun Tzu observed when discussing the apparently simplistic *zheng / qi* concept, “the

Visibly acting according to the generally accepted code of right and wrong, while publicizing violations by our opponents, is an example of the {morals/values}::actions M&M strategy. Can you find examples for the other boxes?

variations are endless ... who could exhaust them?" (1988, p. 95). Boyd would end his discussion of M&Ms with "And you should be able to come up with others."

### What's really novel about *Conceptual Spiral*?

Up to this time, my intention had been to secure Grand Gulf, as a base of supplies, detach McClelland's corps to Banks, and cooperate with him in the reduction of Port Hudson. The news from Banks forced upon me a different plan of campaign from the one intended. ... I therefore determined to move independently of Banks, cut loose from my base, and destroy the rebel force in rear of Vicksburg and invest or capture the city. Grant, 1982, p. 258.

As shown in Table 1, the "mismatches are inevitable, so get over it" section begins on chart 29. Why is this section more than just an elaborate restatement of Murphy's Law? What does it have to do with science and engineering? The part of the presentation that connects mismatches to the rest of *Conceptual Spiral* is so important that, in contrast to the presentation itself, he does provide an outline for it in chart 19.

With that in mind, let's continue working back. We first come to a short sub-section, just two charts, 27 and 28, that form the heart of *Conceptual Spiral*. Here's chart 27: "What bearing does all this have on Winning and Losing?"

We're talking about the *Discourse on Winning and Losing*, after all. Boyd's answer is shown on the next chart, and this chart is the one to retain if you don't remember anything else about *Conceptual Spiral*.

Chart 28 insists, summarizing the section beginning at the outline chart (19), that what keeps *Conceptual Spiral* from being just the briefing version of "Destruction and Creation" is its emphasis on *novelty*. That 1976 paper doesn't contain the word. In *Conceptual Spiral*, however, Boyd makes the claim that the dialectic engine not only enables science and engineering but harnesses the concept of novelty to produce tactics and strategy in a conflict:

However, the analytical/synthetic process, previously described, permits us to address these mismatches so that we can rematch thereby reorient

our thinking and action with that novelty. Over and over, this continuing whirl of reorientation, mismatches, analyses/synthesis enables us to comprehend, cope with, and shape as well as be shaped by the novelty that literally flows around and over us. (p. 28)

The word “novelty” occurs only five times in *Patterns*, and three of these are in his definition of “maneuver conflict.” But if you read that briefing carefully, the importance of handling and generating novelty is woven throughout. For example, when Boyd was briefing chart 82, which seems to be a simplistic diagram of blitzkrieg tactics, he would quote the German General Hermann Balck (1979) as saying:

Never do the same thing twice. Even if something works well for you once, by the second time the enemy will have adapted. So you have to think up something new. (Balck, p. 42)

The trick is that you have to be able to “think up something new” against an intelligent and resourceful opponent, which generally means quickly. As if he wanted to ensure that his readers drew this conclusion, Boyd put a vivid description of the need for creativity under fire into the “wrap up” section of *Patterns*:

Ability to simultaneously and sequentially generate many different possibilities as well as rapidly implement and shift among them permits one to repeatedly generate mismatches between events/efforts adversary observes or imagines and those he must respond to (to survive). (p. 176)

Boyd’s appreciation for novelty grew as he mulled over the ingredients for success in conflicts. Boyd’s close associate, Pierre Sprey, credits Boyd’s conversations with General Balck (1979a & 1979b) as planting the seeds that led to Boyd’s fascination with innovation, novelty, and the importance of rapid, intuitive decision-making (Personal communication, September 23, 2012). Thus the elements of maneuver conflict that appear in the September 1981 edition of *Patterns*, for example, do not include the concept of novelty, but by 1986 it was there (p. 115). Perhaps it was not until he began to compose *Conceptual Spiral*, though, that Boyd realized how the term “novelty” encapsulated so much of his strategy.

So a military force has no constant formation, water has no constant shape: the ability to gain victory by changing and adapting according to the opponent is called genius.

Sun Tzu, *Art of War*, p. 113

Keeping in mind the importance of novelty, as summarized in chart 28, we still need to understand Boyd's argument for how an "analytical/synthetic process" generates it and allows us to cope with it. If you continue working backwards, you'll come to a short section on science and engineering, charts 24-26. Note that chart 26 is the summary chart for his discussion of science and engineering. If that's all there were to *Conceptual Spiral*, that is, if it were only about "making evident" some point about science and engineering, it would end here. The first paragraph of Chart 25, though, by inserting "analysis and synthesis" into the processes, provides the connection between science and engineering and any human activity:

{W}ithout the intuitive interplay of analyses and synthesis, we have no basic process for generating novelty, no basic process for addressing mismatches between our mental images/impressions and the reality they are supposed to represent, and no basic process for reshaping our orientation toward that reality as it undergoes change.

This paragraph summarizes the relationship between novelty and analysis & synthesis, which is also the mechanism that allows us to reorient. If you continue reading backwards, you'll see that Boyd maintains that what science and engineering produce is novelty itself. So we have the essence of Boyd's argument in this section, that science and engineering produce novelty, the critical process that performs this feat is the "analytical/synthetic process" essentially as described in "Destruction and Creation," and this process also enables us to "reshape" our orientation.

The relation between the conceptual spiral and orientation is worth some deep thought. Can we conclude that the conceptual spiral *is* orientation? It's not that far-fetched because orientation, like the spiral, is an active process involving analyses and synthesis and driven by interactions with the environment (Boyd, 1987a, p. 15; Osinga,

2005, pp. 236-237). At the least, the term “reorientation” should be read as shorthand for “reshaping one’s dynamic orientation process.”

By spotlighting analysis and synthesis, *Conceptual Spiral* completes the definition of “orientation” that he floated in *Organic Design*. *Conceptual*

*Spiral* is not only Boyd’s pean to novelty but also to analysis and synthesis, and the section from chart 19 to chart 28 wires them all together.

Boyd’s inclusion of “intuitive” on chart 25 is not incidental because the ability to make intuitive the actions we need to survive is central to his philosophy. In fact, the Abstract, from which he extracted the “Key Message,” chart 4 of *Conceptual Spiral*, begins with a sentence that Boyd did not include in the presentation:

To flourish and grow in a many-sided, uncertain and ever-changing world that surrounds us suggests that we have to make intuitive within ourselves those many practices we need to meet the exigencies of that world.

How does this work? Summarizing the theme of *Conceptual Spiral*, along with what we know from Boyd’s other works, what we need to “make intuitive” could include drawing upon *Fingerspitzengefühl* to select actions from our implicit repertoire all the while keeping the “analytical/synthetic process” in gear so that we can “think up something new” and handle our opponents’ novelty with equanimity (Richards, 2012a). This is quite a bit different than “reach into your bag of tricks and pull out the first one that strikes your fancy,” which is how intuitive decision making is sometimes imagined. And selecting actions by formula or recipe—one hesitates to call it “decision making”—no matter how quickly will not be enough.

It is important to point out, however, that Boyd’s scheme is not all that different from descriptions of intuitive decision making, such as recognition-primed decision making, that also involve mental simulation (Klein, 2000).

At this point, I’ll stop working backwards and you can take over.

Charts 24 and 25 seem to be considering orientation as a set of images, our mental picture of the universe. However, Boyd’s definition of orientation begins with “orientation is an interactive process of many-sided implicit cross-referencing projections, empathies, correlations, and rejections.” Note “process,” not “picture.” So what does “reshaping” mean?

## Thriving with the spiral

*Kum yali, kum buba tambe.*

(He is tricky, so I will win by being tricky too). Carolina low country version of a longer Bantu saying. Obi, 2008, p. 109.

Hammond summarized Boyd's philosophy of life as: "Learning to think well and quickly is the first prerequisite of survival: quite simply, innovate or die." (182) This is a powerful observation because it reinforces that "operating inside the OODA loop" as usually understood—acting more quickly than our opponents—is not enough.

A deeper understanding, however, of "operating inside the OODA loop" shows the concept to harmonize nicely with *Conceptual Spiral*. Let me cite just a couple of examples from *Patterns* 132, which is the only place where Boyd defines the phrase. Going down the right-hand column, the very first item is "Probe and test adversary to unmask strengths, weaknesses, maneuvers, and intentions." In other words, conduct scientific

Perceptive readers may note an inconsistency or even a paradox. On the one hand Boyd often insists on the need for quickness. On the other hand, in *CS*, he says we also need to keep thinking, keep our analytical/synthetic process going. Can we do both of these at the same time, especially in high tempo conflict, when stopping to think might be the last stop you ever make? Boyd would say that that you want to get your opponent to call "Time out!" but there are no times out in war.

experiments on your opponent. To Boyd, intelligence is an active, analytical/synthetic process in keeping with the theme of *Conceptual Spiral*.

Then, a little further down, "Select initiative (or response) that is least expected." As General Balck insisted, this requires something the opponent has not seen before or used in a way that the opponent has never seen you do. Creating novelty, in other words.

Such a capability, which Boyd called "building snowmobiles" (1987b), is Boyd's philosophy in a nutshell, as crystalized in the "Revelation" to the *Discourse*:

A winner is someone—individual or group—who can build snowmobiles, and employ them in an appropriate fashion, when facing uncertainty and unpredictable change.

So “making intuitive within ourselves those many practices we need to meet the exigencies of that world” is descriptive, but we need to make intuitive not only how we use our existing repertoire but also make intuitive our ability to create new repertoire under the stresses and uncertainties of the real world. That’s the message of *Conceptual Spiral*.

### **Grace under fire**

As with the M&M strategy, this is practical advice for competitors in a variety of fields. As Vandergriff (2006) summarized it:

{A}daptability refers to the process of adjusting practices, processes, and systems to projected or actual changes of environment, e.g., the situation or the enemy. (44)

Boyd’s theory emphasizes the importance of the ability of leaders to think. By-the-book answers to specific well-known situations are not good enough. It is the ability to think that allows a leader to take the knowledge from personal experiences, education, and training and adapt it to the imperfect information of the present situation to arrive at a timely, sound, and workable solution to that situation. (48)

Those of us who have endured military training remember that occasionally our instructors would throw in something unexpected, just to see what we would do (or perhaps for their own amusement). What Vandergriff is proposing, and he and the Army are developing methods for, is moving this ability to think on our feet to front and center—essentially, how to employ the conceptual spiral on the battlefield—and making it the focus of leadership training from the beginning. Leaders in other fields may find ideas in Vandergriff’s work.

### **Is *Conceptual Spiral* an example of the conceptual spiral?**

This raises a final question: *Conceptual Spiral* recommends that we use the “continuing whirl of reorientation, mismatches, analyses/synthesis and the novelty that

arises out of it” to produce insight, imagination, and initiative. Is the presentation itself an example of that method at work? It had better be because the “Key Passage” from the beginning of the presentation quotes the Abstract as saying that the entire *Discourse* is an example of the process. Even a quick glance shows that *Conceptual Spiral* follows the pattern of its sister briefings: A section of bits and pieces across a variety of domains followed by increasingly complex syntheses. And if that isn’t enough, Boyd couldn’t resist pounding the point home one last time:

Without the interplay of analyses and synthesis, one can evolve neither the hypothesis or design and follow-on test, nor the original "Simple-Minded Message," nor this presentation itself. (26)

### **Epilogue: The Essence of Winning and Losing**

About three years after the completion of *Conceptual Spiral*, and with a final revision only a year before his death, Boyd produced his last work, the four-page briefing *The Essence of Winning and Losing*. Although abbreviated, *Essence* is a major effort, a “big squeeze,” as Boyd called it (Hammond, 2001, p. 188). Boyd was well aware that his time was limited, so he polished and polished and polished. I recall discussing for weeks whether the arrows into genetic heritage should be solid, dotted, dashed, or invisible lest Boyd be accused of closet Lysenkoism.

On the first page, Key Statements, he works his way from our implicit repertoire through analysis and synthesis to orientation—those who have grasped *Conceptual Spiral* may experience something approaching satori—and ends up with the OODA loop. Well, actually, he doesn’t proclaim *the* OODA loop, but concludes that one needs OODA loops that “encompass” the earlier material on that page. Then, instead of a figure entitled “The OODA Loop,” he produced an “OODA ‘loop’ sketch.” leaving you room to come up with your own, so long as it meets the requirements at the bottom of the Key Statements page. Please don’t make it more complex than this one.

Note that “analyses / synthesis” now appears inside the Orientation box, the result of *Conceptual Spiral’s* completing the definition of orientation begun in *Organic Design*.

Don't overlook the "Insights" at the bottom of the sketch. They imply that any distinction between orientation and the entire OODA "loop" is arbitrary. This statement will repay considerable pondering. For one thing, it reinforces Boyd's insistence from *Organic Design* (1987a, p. 15) that orientation is a process. For another, it suggests that the three fundamental process of Boyd's framework—the OODA "loop," orientation, and the conceptual spiral—are simply different ways of thinking about the same paradigm for survival, vitality, and growth. Given this insight and the importance of maintaining orientation in a conflict, we can synthesize an expanded concept of "operating inside the OODA loop": Make intuitive our ability to conduct experiments on our opponents and to act upon our updated knowledge more quickly than our opponents and more indistinctly and with more irregularity. Note carefully that this definition, with its emphasis on opponents, applies to war and similar forms of conflict. I have already mentioned that it is less useful in politics, where the M&M strategy is more powerful, and it must be applied carefully to business, where one has competitors instead of opponents and where the customer is the focus.

More than any other of Boyd's works, *Conceptual Spiral*, taken together with *The Essence of Winning and Losing*, will repay the effort you put into it. As Grant Hammond invited his readers, and which serves as an excellent description of what a "Boydian" might be:

The test of success and the real advantage of the method comes not in reading about it but rather in employing it. ... Hence, you have a responsibility to play with it, to work out with it, to examine it, to reflect upon it, to improve it, to amend it, to grow with it ... Remember, the conceptual spiral is insight, imagination and initiative. Good luck and happy idea hunting. (p. 174)

To which I would only add a couple of suggestions: Cast your net wide—remember those seven domains from *Strategic Game*—and keep trying out syntheses. Analysis finds the pieces, but if you want to win, you'll need a working snowmobile, not just a bunch of parts.

**About the author**

Chet Richards was an associate of the late Col John R. Boyd, USAF, from the mid-1970s until Boyd's death in 1997. He contributed to "Destruction and Creation," and to Boyd's last two briefings, *Conceptual Spiral* and *The Essence of Winning and Losing*. He is the author of four books, including *Certain to Win: The Strategy of John Boyd Applied to Business* (2004), which was influenced by Boyd's comments on its early drafts.

Dr. Richards is adjunct professor of strategy and quantitative methods at Kennesaw St. University, holds a Ph.D. in mathematics, and is a retired US Air Force colonel. He is a founding Fellow of the Lean Systems Society.

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