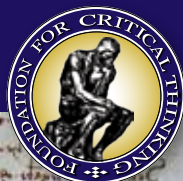


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The Nature and Functions of
**CRITICAL &
CREATIVE
THINKING**



**Richard Paul &
Linda Elder**

Letter to the Reader

To the untutored, creative and critical thinking often seem to be opposite forms of thought — the first based on irrational or unconscious forces, the second on rational and conscious processes; the first undirectable and unteachable, the second directable and teachable. There is some, but very little, truth in this view. The truth in it is that there is no known way to generate creative geniuses, or to get students to produce novel, ground-breaking ideas. There are manifestations of creativity that we do not fully understand. The same is true of forms of criticality. Yet there are ways to teach simultaneously for both creative and critical thinking. To do so requires that we focus on these terms in practical, everyday contexts, that we keep their central meanings in mind, that we seek insight into how they overlap and interact with one another. When we understand critical and creative thought truly and deeply, we recognize them as inseparable, integrated, and unitary.

We believe that creative thinking, especially, must be demystified and brought down to earth. For this reason, we deal with it in this guide not only in terms of its highest manifestation (in the work of geniuses), but also in its most humble manifestations (in everyday perception and thought).

In learning new concepts, in making sense of our experience, in apprehending a new subject field or language, in reading, writing, speaking, and listening, our minds engage in full-fledged (though commonplace) creative acts. To understand how and why this is so, we need not appeal to the esoteric, the recondite, or the arcane.

To live productively, we need to internalize and use intellectual standards to assess our thinking (criticality). We also need to generate — through creative acts of the mind — the products to be assessed. That minds create meanings is not in doubt; whether they create meanings that are useful, insightful, or profound is. Imagination and reason are an inseparable team. They function best in tandem, like the right and left legs in walking or running. Studying either one separately only ensures that both remain mysterious and puzzling, or, just as unfortunate, are reduced to stereotype and caricature.



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Contents

Part I: The Very Idea of Critical and Creative Thinking

The Inseparability of Critical and Creative Thought

Criticality assesses; creativity originates. 4–8

Thinking That Grasps the Logic of Things

All thought involves systems of meanings. Thinking should assess what it creates. 8–9

Reasoning as a Creative Act

Every genuine act of figuring out anything is a new making, a new series of creative acts. 9–10

Creative Genius — an Exception?

History teaches us that great minds require cultivation and committed intellectual work. 11

Language as a Guide

Genius is better understood in relation to talent, giftedness, aptitude, capacity, ability, and intelligence. 11–12

The Narrow-Minded Genius

Genius is often specialized, limited to particular intellectual domains 13–14

The Interplay Among Inborn Gifts, Environment, and Self-Motivation

Aristotle, Beethoven, Curie, Da Vinci, Galileo, Michelangelo 14–18

The Questioning Minds of Newton, Darwin, and Einstein

Newton, Darwin, and Einstein exemplify the importance of questioning and commitment in developing genius. 18–20

Creativity—Not Mystified

Creativity is best understood in simple everyday thought. 20–21

The Elements of Thought

Thinking is better understood and assessed when its elements are identified and analyzed 21–24

Intellectual Standards

Only when we construct and use intellectual standards can we effectively assess thinking. 24–26

Critical Thinking Applied to the Arts

Creative production must be critically assessed. 26–29

Part II: Critical/Creative Thinking and the Foundations of Meaningfulness

Figuring Out the Logic of Things

In thinking critically, we take command of the meanings we create.....30–32

Learning Concepts and Language

To learn concepts and use language, we must create them through mental acts.....33–34

Critiquing Human Thinking

To think well, we must routinely critique our egocentric tendencies and transform irrational thinking into rational thinking.34–36

Learning Academic Disciplines

To learn a discipline, we must create its system in our minds and critically assess the systems we create.36–37

Questioning

To conceive and formulate fruitful questions, we must call upon both creativity and criticality.....37–38

Reading, Writing, Speaking, and Listening

Reading, writing, speaking, and listening are all dialogical, requiring multiple acts of assessment and creativity.38–45

Conclusion 46

PART I

The Very Idea of Critical and Creative Thinking

The Inseparability of Critical and Creative Thought

The critical and creative functions of the mind are so interwoven that neither can be separated from the other without an essential loss to both.

— Anonymous

Criticality assesses; creativity originates.

For several reasons the relationship between criticality and creativity is commonly misunderstood. One reason is cultural, resulting largely from the mass media's portrayal of creative and critical persons. The media frequently represent the creative person as a cousin to the nutty professor, highly imaginative, spontaneous, emotional, a source of off-beat ideas, but often out of touch with everyday reality. The critical person, in turn, is wrongly represented as given to fault-finding, as skeptical, negative, captious, severe, and hypercritical; as focused on trivial faults, either unduly exacting or perversely hard to please; lacking in spontaneity, imagination, and emotion.

These cultural stereotypes are not validated by precise use of the words critical and creative. For example, in *Webster's Dictionary of Synonyms*, the word "critical,"

when applied to persons who judge and to their judgments, not only may, but in very precise use does, imply an effort to see a thing clearly and truly so that not only the good in it may be distinguished from the bad and the perfect from the imperfect, but also that it as a whole may be fairly judged and valued.

In *Webster's New World Dictionary*, the word "creative" has three interrelated meanings:

1) creating or able to create, 2) having or showing imagination and artistic or intellectual inventiveness (creative writing), and 3) stimulating the imagination and inventive powers.

Accordingly, **critical** and **creative** thought are both achievements of thought. Creativity masters a process of making or producing, criticality a process of assessing or judging. The very definition of the word “creative” implies a critical component (e.g., “having or showing imagination and artistic or intellectual inventiveness”). When engaged in high-quality thought, the mind must simultaneously produce and assess, both generate and judge the products it fabricates. In short, sound thinking requires both imagination and intellectual standards.

Throughout this guide we elaborate on the essential idea that intellectual discipline and rigor are at home with originality and productivity, and also that these supposed poles of thinking (critical and creative thought) are inseparable aspects of excellence of thought. Whether we are dealing with the most mundane intellectual acts of the mind or those of the most imaginative artist or thinker, the creative and the critical are interwoven. It is the nature of the mind to create thoughts, though the quality of that creation varies enormously from person to person, as well as from thought to thought. Achieving quality requires standards of quality — and hence, criticality.

In this guide, then, we explore the interdependence of criticality and creativity, exemplifying this interdependence at the most complex level of thought (that of genius) as well as the simplest level of thought (that of making sense of ordinary objects in everyday experience).

We also explore a corollary theme: that all creation of meaning tends toward systems of meanings rather than existing in the mind as unconnected atomic particles. This is integral to the nature of thought itself. The construction of any meaning assumes other meanings and implies yet further meanings (which in turn imply still further meanings). When attempting to understand any meaning, humans naturally seek to place it in a cluster of meanings, however partial their understanding might be. When they attempt to understand an idea as a thing unto itself, it doesn't take root in the mind. It doesn't connect to the systems of meanings within the mind. In short, for humans to think well, we must think within systems. We must create systems of meaning and assess our creations for accuracy, relevance, and adequacy. More on this point later.

Let's begin with some fundamentals. First, ***all thinking is not of the same quality***. High-quality thinking is thinking that does the job set for it. It is thinking that accomplishes the purposes of thinking. If thinking lacks a purpose — if it is aimless — it may chance upon something of value to the thinker. But more often it will simply wander into an endless stream of unanalyzed associations from one's unanalyzed past: “Hotdogs remind me of

the most learned and scientific as well as the most inspired and daring of draughtsmen, and from boyhood to extreme old age never ceased to practice with pen, chalk or pencil... Michelangelo's poetic style is strenuous and concentrated like the man. He wrote with labour and much self-correction; we seem to feel him flinging himself on the material of language with the same overwhelming energy and vehemence with which contemporaries describe him as flinging himself on the material of marble — the same impetuosity of temperament combined with the same fierce desire of perfection (pp. 362-368).

The Questioning Minds of Newton, Darwin, and Einstein

Newton, Darwin, and Einstein exemplify the importance of questioning and commitment in developing genius.

Let's take a closer look at the thinking of three of the greatest minds in science history: Newton, Darwin, and Einstein. What Newton, Darwin, and Einstein had in common was not some set of inexplicable or esoteric qualities but, rather, down-to-earth excellence in the art of questioning and an uncommon doggedness in pursuing deep answers to the questions they raised. A close examination of their intellectual development does not suggest mystery but, instead, the importance of focusing on what is fundamental

and significant in a subject. Through skilled deep and persistent questioning, they redesigned our view of the physical world and the universe. The questions they raised and the manner in which they pursued these questions embodied the very essence of critical and creative thought.

Isaac Newton⁴

Uninterested in the set curriculum at Cambridge, Newton at age 19 drew up a list of questions under 45 headings. His title, *Quaestiones*, signaled his goal: to constantly question the nature of matter, place, time, and motion. His style was distinctly non-esoteric: to slog his way to knowledge. For example, he “bought Descartes's *Geometry* and read it by himself. After two or three pages, when

4 All quotes from *Newton: The Life of Isacc Newton*, by Richard Westfall (New York, NY: Cambridge University Press, 1993).

he could understand no farther, “he began again and advanced farther and continued doing so till he made himself master of the whole.”

When asked how he had discovered the law of universal gravitation, he said: “By thinking on it continually, I keep the subject constantly before me and wait till the first dawns open slowly, by little and little, into a full and clear light.” This pattern of consistent, almost relentless questioning, this combination of critical and creative thought, led to depth of understanding and reconstruction of previous theories about the universe.

Newton acutely recognized knowledge as a vast field to be discovered: “I don’t know what I may seem to the world, but, as to myself, I seem to have been only like a boy playing on the sea shore, and diverting myself in now and then finding a smoother pebble or prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.”

Charles Darwin⁵

Like Newton and Einstein, Darwin had a careful mind rather than a quick one: “I have as much difficulty as ever in expressing myself clearly and concisely; and this difficulty has caused me a very great loss of time, but it has had the compensating advantage of forcing me to think long and intently about every sentence, and thus I have been led to see errors in reasoning and in my own observations or those of other.”

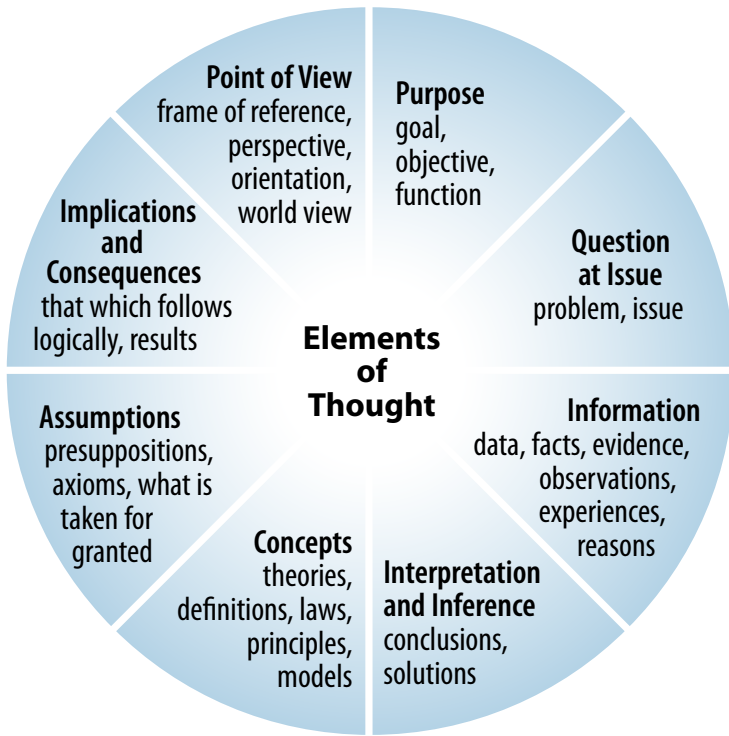
In pursuing intellectual questions, Darwin relied upon perseverance and continual reflection, rather than memory and quick reflexes. “I have never been able to remember for more than a few days a single date or line of poetry.” Instead, he had “the patience to reflect or ponder for any number of years over any unexplained problem. . . . At no time am I a quick thinker or writer: whatever I have done in science has solely been by long pondering, patience, and industry”.

Albert Einstein⁶

For his part, Einstein, did so poorly in school that when his father asked his son’s headmaster what profession his son should adopt, the answer was simply, “It doesn’t matter; he’ll never make a success of anything.” In high school, the

5 Quotes from *The Autobiography of Charles Darwin*, ed. by Francis Darwin (New York, NY: Dover Publications, 1958).

6 Quotes taken from *A. Einstein: The Life and Times*, by Ronald Clark (New York, NY: Avon Books, 1984); and *A Variety of Men*, by C.P. Snow (New York, NY: Charles Scribners and Sons, 1967).



Here are each of the creative acts implicit in analytic thought.

1. **Purpose, goal, or end in view:** Whenever we reason, we reason to some end, to achieve some purpose, to satisfy some desire or fulfill some need. One source of problems in reasoning is traceable to defects at the level of goal, purpose, or end. If we create goals that are unrealistic or contradictory to other goals we have, the reasoning we use to achieve our goals is problematic.
2. **Question at issue (or problem to be solved):** Whenever we attempt to reason, there is at least one question at issue, at least one problem to be solved. One area of concern for the reasoner therefore should be the creation or formulation of the question to be answered or problem to be solved. If we are not clear about the question we are asking, or how the question relates to our basic purpose or goal, we will not be able to find a reasonable answer to it, or an answer that will serve our purpose. As

sometimes considered creativity within the arts can become so esoteric that its defense and critique border on the unintelligible.

It is easy to satirize the radically subjective use of art standards by those who pretend to artistic sensitivity and judgment while lacking depth of understanding. Consider the following discussion from Woody Allen's movie *Manhattan*. In this scene, Isaac (Woody Allen) and his girlfriend Tracy meet Isaac's best friend and his "intellectual" girlfriend, Mary.

ISAAC: We were downstairs at the photography exhibition. . . incredible, absolutely incredible!!

MARY: Really, you liked that?

ISAAC: The photographs downstairs. . . great, absolutely great!! Didn't you?

MARY: No, I really felt that it was very derivative. To me it looked like something straight out of Diane Arbus, but had none of the wit.

ISAAC: Really, you know, well we didn't like it as much as the Plexiglas sculpture, that I will admit. I mean there. . .

MARY: Really, you liked the Plexiglas, huh??

ISAAC: You didn't like the Plexiglas sculpture either? . . .

MARY: Ugh, that's interesting, nuh I ugh. . .

ISAAC: Well, it was a hell of a lot better than that steel cube; did you see the steel cube?

TRACY: Oh, yeah that was the worst.

MARY: Now that was brilliant to me, absolutely brilliant.

ISAAC: The steel cube was brilliant?

MARY: Yeah, to me it was very textural. You know what I mean? It was perfectly integrated, and it had a . . . a marvelous kind of negative capability. The rest of the stuff downstairs was bullshit.

PART II

Critical/Creative Thinking and the Foundations of Meaningfulness

Figuring Out the Logic of Things

As we said at the outset:

Creative thinking, especially, must be demystified and brought down to earth. For this reason, we deal with it in terms of its highest manifestation in the work of geniuses, and also in its most humble manifestations in ordinary run-of-the-mill perception and thought.

In learning new concepts, in making sense of our experience, in apprehending a new subject field or language, in reading, writing, speaking, and listening, our minds engage in full-fledged (though commonplace) creative acts. To understand how and why this is so, we need not appeal to the esoteric, the recondite, or the arcane.

In this spirit, let us discuss how the mind operates when figuring things out, how it creates meaning in its everyday functioning, and how that meaning must be assessed for quality.

To say that something is meaningful is to say that it can be understood by use of our reason, that we can form concepts that accurately — though not necessarily thoroughly — characterize the nature of that thing. Only when we have in some way conceptualized a thing can we reason through it. Because nature does not provide us with innate ideas, we must create concepts, individually or socially. Once conceptualized, a thing is integrated by us into a network of ideas (because no concept can stand alone) and, as such, becomes the vehicle for many possible inferences.

In thinking critically, we take command of the meanings we create.

For example, the way I conceptualize marriage guides the conclusions I come to about whether to marry a specific person, and then, later, whether I think my marriage is working, and whether, perhaps, I should seek to dissolve the marriage. Similarly, the way I

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