Leonardo da Vinci and Thinking Techniques for Writers

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Leonardo da Vinci (1452-1519) was an outstanding artist, a brilliant scientist, a creative inventor, a talented musician (both a singer and an instrumentalist), and a superb observer of the world around him. Given his many accomplishments, most historians would list Da Vinci at or near the top in any list of geniuses in human history.

This view of Da Vinci's talents is the basis for Michael J. Gelb's *How to Think like Leonardo da Vinci: Seven Steps to Genius Every Day* (New York: Delta Trade Paperback, 2004).

My purpose in the following newsletter article is to use Gelb's book as an departure point for discussing several of Da Vinci's creative principles, especially those that would assist writers of complex technical documents (such as those prepared for the National Environmental Policy Act(NEPA)). Here are the major principles (or techniques) I discuss in this newsletter:

1. **Foster your innate curiosity about life and about related learning skills (especially your ability to record and to interpret complex information).**

2. **Rely on your visual skills to guide your creative abilities.**

3. **Use many and innovative sources for relevant information, including data from all five senses: sight, sound, taste, smell, and touch.**

4. **Accept uncertainty and debatable conclusions as a benefit, not a problem.**

The preceding principles are not direct quotations from Gelb's book; instead, they are adaptations of several of Da Vinci's seven principles. Gelb discusses Da Vinci's principles on pp. 47-259, a lengthy but useful chapter. In the following newsletter, I cite only a few sections or pages from Gelb's text. I have limited specific references because **my main purpose is to focus on documentation principles.** I am not writing a comprehensive review of Gelb's book.

By contrast, Gelb's purpose focuses on seven of Da Vinci's general principles for desirable human mental processes. His stated principles and associated exercises are practical, and most people would consider them worthwhile, even enjoyable. As with any serious and disciplined activity, Gelb's exercises become useful only if a person commits the time needed for practicing the exercises.

The paperback edition of Gelb's book includes a new preface along with a reprint of the text from the original Delacorte Press edition, published as a hardcover in 1998. Gelb's book opens with a short initial survey of Da Vinci's life and accomplishments (pp. 1-45). However, the major section of the book (pp. 47-259) analyzes seven of Da Vinci's creative principles. Gelb defines each principle and then lists practical suggestions and simple exercises for individuals

who want to improve their intellectual horsepower (or even the mental habits of your children!).

I encourage anyone interested in Da Vinci's life and his creative but useful principles of thinking to a buy Gelb's paperback. Its current list price is $17.

1. **Foster your innate curiosity about life and about related learning skills (especially your ability to record and to interpret complex information).**

Da Vinci was extraordinarily curious from his earliest years. Gelb on p. 50 quotes Da Vinci as wondering early (perhaps in teen years) about things he observed in nature. He wondered why seashells were to be found on the tops of mountains. He was fascinated by the circular ripples a stone makes when hitting still water. He noticed that the sound of thunder arrived much later than the first glimpse of lightning in the distance.

These and many other observations and questions were what Da Vinci recorded in his ever-present journal. As Gelb notes, all records of Da Vinci's life show that he kept a detailed journal from his youth until his death. Gelb on p. 57 says that some 7000 pages of Da Vinci's journals survive. And Da Vinci likely created an additional 7000 pages because thousands of pages are known to have been lost.

If you haven't seen samples of Da Vinci's journals, take time for a quick Internet search. A number of listed sources contain sample pages, but a good one is the Wikipedia article on Da Vinci. From Wikipedia or from other Internet sources, notice the mixture of text and visuals in Da Vinci's journal pages. As an artist, Da Vinci was always sketching things he saw or creating designs for his many proposed inventions. For example, Gelb on p. 52 reprints a Da Vinci sketch of a helicopter. It is amazing that Da Vinci could visualize such a device nearly 500 years before technology allowed for its creation. Da Vinci also drew designs for parachutes centuries before flight became possible.

Gelb suggests to his readers that they nurture their innate curiosity about everything, from the natural world around them to interpersonal skills. Gelb also recommends that individuals keep daily journals, where they can record all sorts of information. See newsletter suggestion 3 below for more information about sources of information. An ongoing journal is just one such source.

I recommend individual curiosity about thinking processes, especially as it applies to how individuals discover ideas and record them. And in today's technical culture, curiosity should include questions about how technical contributors can most efficiently collaborate to create high-quality professional documents. I link curiosity to document creation because I think we are still discovering how individuals write. And we are still developing skills and tools for enabling teams of writers to create documents.

Writing as an Individual Skill

Even if you are a skilled writer, I know that you cannot explain exactly how ideas form in your brain and how they get recorded on the page. The mental processes remain a mystery. Thus, writers often say that they don't know exactly what they are going to say until the words and sentences appear in their minds and they then record them on the page/screen.

So let me suggest that from the perspective of a single writer, you ask yourself some questions:

1. **How much planning do you do before you start to write? What sort of planning works best for you?**

2. **As you write, how closely does your text match the projected content in your planning?**

3. **If new ideas or side issues appear as you are writing, how do you handle them? Write about them immediately or flag them for later development?**

4. **As you watch yourself write, what inefficiencies or dead ends occur? Do these block your creative flow or merely slow you down?**

5. **What physical conditions help you write? Your favorite desk? Mozart playing in the background? Your most productive time of day (or night)? The scent of gardenias in the room?**

The preceding questions should encourage you to be curious about your mental processes. In Shipley workshops, I often find that writers are so busy writing that they don't take time to ask themselves what works and what doesn't. In fact, many writers who receive an assignment turn to their computer and begin to grind out text. This approach likely parallels how many of us were taught.

In our schooling (and in anecdotal accounts of how many professional wrote decades ago), writers were encouraged to dump their ideas out as fast as possible. Review and revision came later. Such an approach was not efficient (unless a writer honestly had no clue what the content of a document would be). For example, if you rapidly dump 10 pages only to decide later that you only need 3 pages; your writing process is inefficient**.**

But such a writing process often was the norm until writers began to use computers in the 1970s. In pre-computer publishing, well-known authors wrote initial drafts of 400, 500, or more pages. Then their publisher's editor worked with them to pare down their drafts (resulting in a published work of only 200 or 300 pages). Such editing may have produced high quality documents. And anecdotal accounts record that novelists and even nonfiction often admitted that their original drafts were indeed drafty and too rambling. Note that efficiency is not even a consideration.

In technical and scientific publications, however, this traditional writing process was not and is not efficient.

Writing as a Team Process

Efficiency is important when a team of writers is responsible for a document. Team writing is increasingly the norm in many technical and scientific documents. In such documents, efficiency becomes a concern because teams are often working against tight deadlines and other organizational constraints.

Too often such teams of writers rarely take time to consider just how they are going to coordinate their work for increased efficiency. In my 30 years of consulting on team-written documents, I have seen only a few instances where a team of writers clearly assessed their writing processes. This gap in team curiosity is why Shipley consultants increasingly are recommending that a lessons-learned session occur when a team completes a complex document. And an early coordination meeting for a team of writers would also be a valuable team planning step.

Here are some questions about writing that a team might ask in any strategy session dealing with the team's writing process:

1. **What project and document givens should all contributors be aware of before they begin to contribute ideas and text?**

2. **How detailed is the team's vision of both the project details and the associated documents? Does such a vision include projected page counts, all headings and subheadings, and graphics?**

3. **How are details of the initial vision (from question 2) communicated to the team members? The team' s managers? Other interested and affected parties?**

4. **How carefully is the vision coordinated with the team's projected schedule? Are early and ongoing reviews included in the schedule? How frequently will the team meet to review each member's progress on key project milestones?**

5. **Are team reviews properly focused on well-defined (written!) quality standards? How are review observations given to team members? How are such observations resolved and tracked?**

6. **What interpersonal skills are helping the team make progress? Are any desirable skills missing? How are missing skills affecting the team's successful work on the project and its documentation?**

7. **What are the institutional barriers confronting the team and its goal of an efficient team process?**

8. **How will lessons learned by the team be communicated both to the future team members and to the team's managers?**

In my work with dozens of teams, I have only seen a handful of lessons-learned lists (essentially answers to the preceding team questions). Such a list should be a routine

deliverable for any team working on complex and scientific task. Without it, each team begins anew to create an ad hoc approach to complex documentation questions.

So, contributors to a complex and technical approach need to develop a healthy curiosity about what writing skills are important, both as individual writers and as team members responsible for their share of text for a document.

2. Rely on your visual skills to guide your creative abilities.

As a superb painter, Da Vinci had exceptional visual skills. These skills appear throughout his journal. Thousands of pages have sketches from nature and detailed conceptual designs for all sorts of inventions (like the helicopter in the sketch Gelb chose for p. 52 of his book). Da Vinci also used journal pages to record thoughts, key quotations, and data of all sorts. Then, as appropriate, he would draw arrows, circles, and other connecting lines to show how a quotation related to one or more concepts or ideas.

His journal pages are maps, showing how one concept links to one or a dozen other concepts. Gelb describes this process as "mind mapping." (Gelb records that the term "Mind Mapping" is a registered trademark, with rights held by the Buzan Organization.) While the term may be protected, the basic ideas are little different from the thoughtful doodles that many folks have used as they work through a problem or make a decision. Imagine, for example, someone trying to decide between two very similar automobile models. They initially record both names on a single sheet; then they begin to list contrastive features, perhaps with arrows linking related ideas. Next, come similarities, with phrases recording subtle differences.

The result is a map of the person's thought processes. Notice that this map is not a linear, structured outline as taught in the schools. Outlines, if appropriate, come after the discovery step reflected in this map.

A mental map of two competing viewpoints takes on the shape and structure of its content. A conclusive benefit of one auto model might have a picture of a light bulb, with rays of light moving away from it. Other visual symbols and embellishments would be possible. Of course, most of us who would generate such a figure do not have Da Vinci's artistic skills. Many of Da Vinci's informative content maps were outstanding artistic creations. For instance, Da Vinci studied seashells as a model for the design of the curve in a spiral staircase. The sketched seashells became memorable as artistic efforts, not mere utilitarian illustrations.

As in the preceding example, Da Vinci's journal pages often show him combining artistic sketches with conceptual information. Such combinations reflect both left-brain and right-brain content. The left-brain information is analytic and structured, while the right-brain content is visual and impressionistic. The advantage of such merged information is that it strengthens the resulting conceptualization. Also, a person is more likely to remember a complex concept if it appeals to both sides of the brain.

Our visual memories are often much stronger and more lasting than concepts expressed only in words. We often remember a graphic as appearing in the lower right-hand page or 5

screens back in a computer site. These are strong spatial memories. Da Vinci's approach powerfully communicates by using both modes of thought.

As a more recent example of a technique similar to Da Vinci's, Evelyn Wood was a popular teacher of reading skills in the 1960s. I never was in one of her sessions, but a good friend was. A major technique of Wood's was to do a graphic map of content when a document was particularly difficult to read and to remember. As my friend described the process, Wood suggested starting in the middle of a blank sheet with a major concept (perhaps the purpose of the document). Then as a reader discovers new points in the text, these would be recorded around the center point, often with arrows, stars or other visual ways to highlight key information. Wood was decades ahead in drawing on both left-brain and right-brain thinking. And Da Vinci was centuries ahead!

Gelb (p. 174) lists other great thinkers, besides Da Vinci, who used graphic note- taking techniques similar to the mind mapping discussed above: Charles Darwin, Michelangelo, and Mark Twain. Notice that Da Vinci is the earliest to practice such note taking and to practice it so extensively (as in the estimated 14,000 pages in his journals).

Parallels with the Shipley Storyboard Approach

Gelb's discussion of mind maps first caught my attention because it is similar to the use of storyboards in the planning of complex documents. A storyboard is essentially a visual map of the pages needed for a document, often a complex sequence of maps. Storyboards are useful both for a simple 3- or 4-page brochure and for documents with several hundred pages.

A storyboard usually starts with an appropriate number of blank sheets (or page-like squares drawn on a whiteboard). Next writers add projected headings and subheadings—key topics. Along the way, contributors insert arrows, circles, and graphics (not completed, but merely outlined as place holders). A full, fairly detailed storyboard becomes a usable and useful picture of the document to come. It is primarily a right-brain product, but it has left-brain information in its headings, subheadings, and textual notes.

A good storyboard is messy. Remember that messy is good! After all, a storyboard is a work in progress, with false starts, dead ends, and other intellectual diversions. And remember, creators of a storyboard should not worry if their mental rambling does not have the sophistication of Da Vinci journal pages.

Several earlier Shipley newsletters discussed and illustrated the storyboard approach to complex documents. See newsletters 61 (November 2008), 56 (July 2007), and 52 (August 2006) on the Shipley Group website.
(http://www.shipleygroup.com/environmental/index.html?pg=news)

3. **Use many and innovative sources for relevant information, including data from all five senses: sight, sound, taste, smell, and touch.**

Principle 3 expands on the curiosity in principle 1, as discussed earlier in this newsletter. Da Vinci's curiosity meant that he was often recording information from many sources, especially the five senses. But as principle 2 suggests, sight was understandably the primary tool for a painter such as Da Vinci.

Da Vinci was willing to accept information from many sources, both expected and the unexpected. For example, Gelb on p. 95 comments that Da Vinci studied birds in flight, especially the movements of their wings and the placement of feathers. Only recently, with advanced motion picture techniques, have Da Vinci's observations and conclusions about bird flight been verified.

Writers today need to be open and honest about all sources of information. A legal feature of the National Environmental Policy Act (NEPA) is that comments and suggestions from all parties have a role in the resulting impact analyses. NEPA practitioners need to remember that even the most unusual comment or suggestion may have its grain of truth.

I am reminded of an conversation many years ago, when a Forest Service manager commented that he had taken the time and trouble to calculate the details of an action alternative that his NEPA team wanted to reject as unreasonable (thus outside the range of reasonable alternatives). The manager said that some quick calculations showed that the unreasonable alternative was not unreasonable at all. The NEPA team was foreclosing its options based hasty initial impressions and received truth.

In Da Vinci's approach to knowledge, all perceptions and their interpretations are subject to challenge and to analysis. Consider Da Vinci's well-known exploration of human anatomy. Even as late as the fifteenth century, medical practitioners were relying on centuries-old and unproven theories from Greek philosophers about human (and animal) physiology. In fact, human dissection in the fifteenth century was viewed as unusual and an activity not approved of by religious authorities. But Da Vinci is reported to have dissected upwards of 50 human bodies and innumerable animals. One of his dissection techniques was to look at a physical organ, such as the liver, all perspectives—the top, bottom, and the sides. Of course, he usually took time to sketch what he was seeing.

Many of Da Vinci's tentative conclusions about human anatomy and physiology have only been verified by medical science in recent decades.

Da Vinci was always interested in what all five senses could tell him. This emphasis on the senses is a major topic in Gelb's book (especially pp. 94-141). Gelb lists a number of simple, yet powerful exercises for awakening and strengthening a person's five senses. These exercises alone would make Gelb's book a valuable personal resource.

Recall that investigations of human learning have traditionally suggested that intelligent and creative individuals rely on more rich sensory data than ordinary people do. Also, the presence of rich sensory data may help ordinary people to enhance their performance of everyday tasks. On pp. 138-139 Gelb cites an instance where a corporation enhanced its

workers' productivity and overall effectiveness by creating a sensory-rich environment for its workers.

4. Accept uncertainty and debatable conclusions as a benefit, not a problem.

Let me begin with study of skillful teachers conducted nearly 50 years. (In fact, I no longer have the publication details about this study, but its primary conclusions remain interesting to me. And its conclusions seem to be true, based on my personal experience.) The study dealt with two sample groups of teachers. The one group had talented teachers, ones judged to be skillful and effective mangers of classroom interactions. The second group included teachers with fewer classroom management skills. Many in this second group were newer and thus more likely to be inexperienced.

The talented teachers differed from their less-experienced colleagues in one critical way. During the ebb and flow of classroom conversation, the talented teachers had many more management strategies available to them at any given time. They were also able to describe their process as involving a reasoned choice between competing management strategies. The study's analysis described the talented teachers as capitalizing on the ambiguities that existed when several strategies were possible. Ambiguities were a benefit.

In contrast, the less experienced and newer teachers had far fewer options when students challenged points or suggested going in a different direction. Their choices were limited but their clearer options did not lead to better decisions. In many cases these newer teachers jumped to their first and only option without having the thoughtful benefit of choosing a less-obvious option.

As described in the study, talented teachers were able to balance competing demands and useful management strategies. The talented teachers capitalized on ambiguous conditions and uncertain strategies. In the world of the talented teachers, ambiguities were a benefit. Gelb in his book on Da Vinci cites on p. 163 a study by the American Management Association that had results similar to the preceding study of teachers. According to Gelb, the AMA study showed that the most successful managers had "a high tolerance for ambiguity." Gelb goes on to argue that ambiguities are more likely today, given the increased technical and scientific complexities. So today's workers and technical specialists must learn how to deal with an increasingly complex world.

In the world of NEPA compliance, ambiguities and uncertainties are common. Almost every proposed federal action has impacts that are unclear and uncertain. As the Council on Environmental Quality (CEQ) directs, agencies should be honest in their identification of "incomplete or unavailable information" (Section 1502.22 of CEQ Regulations). With such clear guidance, NEPA practitioners should identify honestly and describe clearly situations where ambiguous and uncertain decisions are necessary. In such cases, the obvious uncertainties, well described, are a clear legal benefit because they help an agency speak convincingly about its choices between competing proposals.

A Final Example: Da Vinci's Principles and the Practice of Medicine

National Public Radio recently had a short feature on medical decisions, especially those related to the diagnoses. The study recorded that the average medical doctor spent only some 10 or 15 seconds listening to a patient before jumping in with a diagnosis. The study went on to conclude that the most effective doctors were those who listened to their patients, often listening far longer than the 10- or 15-second average. (The preceding information is from my memory of the NPR feature; I could not locate the original study.)

This medical study parallels the four Da Vinci strategies I discussed in the preceding newsletter. Here are some parallels:

- Effective doctors are curious enough to listen well and not rush to a diagnosis.

- Good diagnostic doctors draw patient information from both verbal statements and how the patient sounds, looks, and feels (and maybe even smells).

- A good diagnosis likely reflects an ambiguous balance between the known and the uncertain. And a doctor has to continuously reassess uncertainties.

- Effective doctors are effective visual communicators, often using sketches to explain a medical diagnosis to a patient.

As these parallels suggest, any honest intellectual effort clearly relies on Da Vinci's general principles. It is such universal principles that Michael J. Gelb records and discusses in *How to Think like Leonardo da Vinci*.

Note: if you are interested in purchasing Michael J. Gelb's *How to Think like Leonardo da Vinci* you may go to your local bookstore or online at http://www.amazon.com/How-Think-Like-Leonardo-Vinci/dp/0440508274