

# Writing As A Survival Skill: How Neuroscience Can Improve Writing In Organizations


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## ABSTRACT

*This article looks at the apparent paradox between the demand for strong writing skills and the lack of colleges of business that require their MBA students to complete writing courses. In the past, most approaches to teaching writing proved inadequate in producing graduates with the ability to write clearly, effectively, and efficiently. This article examines the implications of neurocognitive research on the reading process for the teaching of writing and ends with a set of 16 guidelines for teaching MBA students how to write well - principles that reach far beyond those specified in the SEC's plain language guidelines.*

**Keywords:** Writing; Neuroscience; Reading; Teaching Writing; Plain Language; Writing Skills

## INTRODUCTION: WRITING TO SURVIVE

 Even as recently as ten years ago, the business world still had the means for inept, reluctant, or simply lousy writers to hide. Before the advent of email and iPhones, prior to the rise of the Internet as a major conduit for information, people could still enjoy robust careers in the corporate world without worrying about issues like tone, organization, the correct use of standard written English, or how to use a semicolon without looking semiliterate.

Now, of course, those halcyon days are long gone - days of technical writers who churned out most of the writing and secretarial staff who brushed up misspellings and erased punctuation errors prior to sending out corporate missives. Today, Bill Gates and Warren Buffet send out their own emails unseen and untouched by secretarial staff. To complicate things still further, a new population of investors, courtesy of 401ks and 403bs, now wants to read investment prospectuses written in something like readable English sentences. By 1998, the SEC was already requiring the use of its Plain English Handbook for creating clear Securities and Exchange Commission disclosure documents (Smith, 1998). The Clinton Administration was quick to follow suit, requiring all documents and applications by Federal agencies to employ plain language. Four years later, the Sarbanes-Oxley Act would further cement plain language use as part of its program of disclosures and corporate accountability (Sarbanes-Oxley, 2002).

Today, clear, efficient, and effective writing is central to corporate efficiency and productivity. According to 2004 US Department of Labor estimates, employers spent an average of \$22.13 in writing a typical client letter (US Bureau of Labor Statistics, 2005), which, in the case of one Minneapolis company, resulted in more than \$66,000 per day in writing costs. When Key Bank hired an outside writer to overhaul their call center procedures, the company slashed its call center procedure by ten pages, with the streamlined procedures saving the bank as much as \$72,000 (Tyler, 2003). When the US Department of Veterans Affairs rewrote its form letters, the VA support center reduced calls from an average of 1.5 per letter to fewer than .3 - changes which saved the department an estimated \$40,000 each year for a single letter (Egan, 1995). Badly written documents diminish productivity (US Bureau of Labor Statistics, 2005), hinder communications between organizations and members of teams (Sauer, 1993; Winsor, 1993), lead to lawsuits (McCord, 1991), and even to the failure of complex systems, as evidenced by the history of miscommunication between NASA and engineers at Morton Thiokol that ultimately led to the

Challenger disaster (Winsor, 1993). Moreover, poor quality writing can have tangible costs. One HMO had a policy for third-party payments for injuries that was so incomprehensible a judge ruled against the HMO's ability to collect third party payments from the insured on the grounds that the policy was so badly written that no one could understand it (Tyler, 2003).

With so much at stake, clearly, strong business writing skills are not simply a requirement for success in businesses but are actually vital to the survival of most managers (College Board, 2004). Meanwhile, students' scores on the written portion of the GMAT have declined, sliding from an average of 4.7 out of 6 on the essay in 2007 to 4.4 in 2010 (Middleton, 2011). Some MBA programs, including those at Stanford, the University of Rochester, and Northeastern University, have reacted to employer dissatisfaction with poor communication skills by hiring writing coaches. Other programs, like Wharton, have increased course offerings. While data is scanty and dated at best on the number of programs offering compulsory writing courses as a central aspect of the MBA course curriculum (Bogert and Butt, 1996), many programs fold writing into other courses or offer writing courses that are pass/fail (Middleton, 2011). Moreover, the programs that require at least one writing course as part of the MBA compulsory core curriculum remain in the minority, largely due to students' perceptions that "soft skills" like writing are less important to prospective job applicants than the quantitative skills MBA programs foreground (Mangan, 2007).

### **WHY SO FEW MBAS RECEIVE GUIDANCE ON WRITING**

However, two other reasons account for the dearth of core MBA writing courses, even aside from low demand from MBA students themselves: the costs of instruction and the problems with the teaching of writing itself. First, any writing course is, by its nature, resource-intensive, requiring at least several hours of responses to student assignments from an instructor or grader. This requirement, in turn, whittles the number of students any single writing course can accommodate with a single instructor to a maximum of 60-70 students, if the instructor has the assistance of several graders, or fewer than 30, if the instructor teaches alone. Second, unlike every other course in the MBA curriculum, written communication lacks a tangible, agreed-upon knowledge base.

Most scholarship on the genres of organizational writing tends to agree on basic characteristics of classes of documents like memos, negative and positive messages, and feasibility reports. However, the actual knowledge base on teaching writing is, truth to tell, painfully thin. Until the 1970s, virtually all instruction on writing depended on more-or-less watered-down formulae derived from classical rhetoric (Knoblauch & Brannon, 1984). While the principles of rhetoric have some applicability in teaching students how to organize an argument, they are inadequate for virtually every other aspect of teaching writing, as they were based on ancient principles for helping speakers persuade listeners in oral, not written, arguments. As a result, rhetoric can teach us little about word choice, tone, or optimal structures for sentences, let alone how to convey potentially incendiary information to an audience of hostile stakeholders. From the 1980s onward, the teaching of writing has been dominated by a shift in emphasis, from document to writer. This pedagogical shift resulted in writing courses that focused almost entirely on the stages involved in writing - so-called *process writing* - including brainstorming, outlining, drafting, and revising. Unfortunately, the process writing approach held that practice made perfect in writing but failed to provide any tangible suggestions for how writers should choose words, form sentences, or organize paragraphs to ensure their clarity and readability. This current emphasis in teaching writing is at least partially responsible for the hand-wringing of many administrators at top universities nation-wide over the failure of their writing programs to produce students capable of writing clearly and to the demands of business and industry (see, for example, Bartlett, 2003).

Despite these limitations, the need to teach managers - in fact, students in all fields within colleges of business - to write well remains paramount. In 2005, the Fortune 500 companies alone spent more than \$3 billion in simply training employees how to write in clear, correct English (O'Neil, 2005). At the same time, employers are increasingly using strong communication skills as a factor in hiring decisions, including companies like DISH Network, which requires job applicants to complete a memo, following a brief the company provides. As a result, colleges of business need to ensure that their MBAs receive training in writing for a variety of audiences and contexts. Moreover, writing courses need no longer rely entirely on process writing, general genre guidelines, or lore about writing and the business world because the knowledge base integral to teaching writing has existed in plain sight for at least a decade.

The reasons for this curious oversight are almost immediately obvious. The best knowledge base for teaching writing lies not in English, or communication, or even rhetoric but in neuroscience. For the past twenty years, neuroscience researchers have mapped the way our brains process written language, determining, for instance, how long readers take to identify individual words (Posner & Pavese, 1998; Perfetti, 1999) and why some sentences or even entire paragraphs require re-readings (Norman, Kemper, Kynette, Cheunge & Anagnopoulos, 1991). Yet the difficulties are nearly insurmountable for lay readers in penetrating the thickets of jargon and technical terms, let alone comprehending individual studies that rely on comprehensive understandings of how both the brain and imaging technologies work. Perhaps we can't blame communication faculty for not dipping into *Cerebral Cortex* or *Human Brain Mapping* for guidelines on teaching writing. Nevertheless, its difficulty notwithstanding, the literature on the cognitive process of reading provides a clear-cut picture of what makes for sentences that can be read quickly, with minimal effort, and recalled clearly. For the first time, we can draw on neuroimaging studies for understanding how to write about even the most complex material, using paragraph organization, sentence structures, and word choices that ensure readers will absorb the contents of any document quickly and efficiently.

### **NEUROSCIENCE AND THE PROCESS OF READING**

The earliest studies of the reading brain were driven, not by any desire to facilitate better writing or even to understand how our brains process written language. Instead, researchers first grappled the mysteries of the reading brain to understand how they might build computers capable of reading text. Fortunately, when the vogue for Artificial Intelligence waned, researchers began using neuroimaging techniques to scrutinize the processes behind reading. Researchers were aided by electroencephalograms (EEGs), which measure low-level changes in electrical currents generated at the scalp and excel at capturing processes that last as little as 300 milliseconds (ms), as well as more sophisticated imaging technologies like functional MRIs (fMRI) that offer superb resolution but cannot capture activity lasting less than several seconds (Friston, 1998; Hagoort, Brown & Groothusen, 1993; Kutas & Schmit, 2003; Rosen, Buckner & Dale, 1998).

Reading, these studies revealed, entails at least three phases of cognitive processing: lexical, syntactic, and inferential. The first, lexical processing, starts as readers recognize individual words and assign them a fixed meaning, based on familiarity with the word from prior encounters. Skilled readers will take as little as 300 ms to identify individual words - evident in the length of pauses in their eye movements, known as saccades (Posner & Pavese, 1998p; Perfetti, 1999). However, the speed of eye movements depends entirely on the context surrounding the word. The more specific the context, the more constraint placed on the individual word, and the fewer meanings we're likely to attach to it (Huckin, 1983; Perfetti, 1999). Our uncertainty stems from the indeterminacy of most languages, where a single word may have as many as twenty different denotative meanings. In English, this indeterminacy is magnified by the language both assigning multiple meanings to single words and using multiple words to express a single meaning. Further, the indeterminacy of written English is also compounded by its use of single words as multiple parts of speech. For example, *writing* can act as a noun, verb, or even an adjective, just as the word *rebel* can also act as a noun, verb, or adjective: *The rebel* [noun] *rebels* [verb] by giving a *rebel* [adjective] yell. While spoken English distinguishes between the noun and verb through pronunciation - we say *REbel* for the noun but *reBEL* for the verb - written English provides us with no such helpful cues.

As a result, the lexical phase of processing is always dependent upon the second phase, syntactic processing, because we can only assign meaning to many words based on their position in individual sentences (Michael, Keller, Carpenter & Just, 2001). Just as in lexical processing, readers use surrounding words to anticipate how the sentence will structurally play out: which word is acting as the grammatical subject, which, the main verb, which, the object (Perfetti, 1999). Our labeling words according to their anticipated role in the sentence structure is based on the most common configurations, which readers anticipate based on encounters with tens of thousands of other sentences. In English, readers expect to see the main noun of any sentence precede the main verb. Readers similarly expect to see the verb relatively early in the sentence, since verbs in English tend to occur soon after the subject, rather than towards the ends of sentences, as they do in other languages (Pinker, 1994; McWhorter, 2001). The default order for English sentences is *subject-verb-object*. For this reason, sentences that defy readers' expectations about sentence structure are difficult to process and frequently require re-readings (Norman, Kemper, Kynette, Cheung & Anagnopoulos, 1991). Sentences like this example, which appeared in a 2006 issue of *The New Yorker*, almost always require re-reading because the sentence appears initially to conform to our expectations about English syntax, then confounds them:

*What those of us who know Agee's criticism almost by heart read over and over, however, is the reviews that appeared in The Nation (Denby, 2006).*

This sentence, known to linguists as a *garden path* sentence, misleads readers into incorrectly identifying the verb as *read* until they stumble across as the sentence's actual primary verb - *is*. In this case, the sentence's structure is further complicated by its using a lengthy string of words - the 15 words that make up the sentence's opening noun clause - as the grammatical subject where readers expect to see a single word acting as the subject. Because this sentence embeds most of its complexity to the left of the verb, linguists also refer to this as a *left-branching* sentence. Not surprisingly, the challenges posed by garden path and left-branching sentences have been observed in neurocognitive studies to cause increased cognitive activity and slowed comprehension, as well as re-readings (Hagoort, Brown & Groothusen, 1993; Just, Carpenter, Keller, Eddy & Thulborn, 1996).

A good portion of the act of reading thus involves both recall - of word meanings and various syntactic arrangements - and prediction. We use our long-term memories to identify words and types of sentence structures, but we also use this recall in the service of prediction which can only be confirmed when we completely read the sentence. Even in garden path sentences, readers tend to read through the majority of the sentence before realizing it fails to gel grammatically. Predictions about the sentence's probable structure - always performed unconsciously until proven incorrect - begin when we identify the grammatical subject and end after we identify the verb (Ferreira & Clifton, 1986; Pinker, 1994; Huckin, 1983). As a result, readers can read easily and quickly sentences where the grammatical subject occurs relatively close to the beginnings of sentences, usually no more than seven words after its outset (William, 1990). Further, readers have also demonstrated faster reading times and better recall when the verb follows the subject closely (Michael, Keller, Carpenter & Just, 2001), as well as when the sentence structure follows the basic *subject-verb-order* common to most English sentences (Pinker, 1994; McWhorter, 2001). Finally, readers tend to read most efficiently and rapidly sentences that rely on familiar words and which place restrictions through context and sentence structure on the words' meaning (Garnham, Oakhill & Johnson-Laird, 1982; Brown & Fish, 1983; Kemper, 1983; Zwann 1996).

## **NEUROSCIENCE AND WRITING - CLARITY**

This clear picture of readers' cognitive processes also provides us with clear-cut implications for what makes for writing clarity. We perceive writing to be clear when the features of sentences most readily accommodate the processes we use to comprehend written language. Studies of the first two levels of the reading process offer us several principles we can convey for writing clear sentences:

1. Prefer familiar, commonly used words to the unfamiliar
2. Place subjects close the beginnings of sentences
3. Place verbs close to the grammatical subjects, then introduce modifiers.

However, to achieve maximum clarity in writing, we must also consider the final stage of reading: inference processing. Words are more than simply signs for things. Together, words represent propositions, declarations, complex arguments about the world. In the final, inferential stage of processing, our minds translate nouns and verbs into actions with implications, abstract concepts, even theories (Kintsch, 1992; Zwaan, Langston & Graesser, 1995). For example, even the short sentence, *Information wants to be free* offers a challenge. To make sense of this apparently simple sentence, we have to envision a scenario, one that will clarify exactly what *free* means here. Does *free* mean liberated, as in *free of boundaries*? Or does it mean without cost, as in *free of charge*? If the information is embedded in a discussion of the limitations of, say, distributing on-line libraries to the Third World, we would unconsciously assume *free of boundaries*; but if the sentence cropped up in a paragraph, as it originally appeared in Stewart Brand's *The Media Lab: Inventing the Future at MIT*, that involved the values and costs of information, we'd fix on *without cost* as the meaning of *free*.

## **THE MOST COMPLEX STAGE OF READING - INFERENCE PROCESSING**

As even this simple example illustrates, the three phases of processing interact nearly simultaneously and seamlessly. Once readers identify words and their meanings, relative to their function in the sentence's structure,

they confirm the accuracy of their assumptions by measuring these identifications against the contents of their long-term memories (Just & Carpenter, 1987; Perfetti, 1999; Michael et. Al., 2001). Our memories, however, also enable us to compare what we read to our knowledge of how things in the world operate. These memories enable us to build inferences that help us make sense of sentences, to translate words on a page into ideas, into, say, an account of the Enron scandal or a prediction of fourth quarter earnings. To build inferences, we rely on as many as five categories to turn sentences into comprehensible and familiar scenarios: time, space, actor, cause, and intention (Zwaan et al., 1995).

Consider, for instance, the following sentence and the inferences it obliges us to make - if you can:

*The slackening of demand for business air travel, coupled with rising costs of fuel, have put extraordinary demands on our company's finances. With regrets, we must begin staff reductions.*

Nearly everyone who reads this sentence will assume that the second sentence results from the conditions described in the first. Yet the two sentences lack both linguistic and logical links to make explicit any causal relationship. Readers, however, assume that sentences that follow each other also contain events that follow one another, what cognitive psychologists have called the *iconicity assumption* (Fleischman, 1990). Moreover, readers appear to be hard-wired to perceive even distantly related sentences as causally linked, the product of a tendency to perceive events as causally related (Heider & Simmel, 1944; Michotte, 1963) that researchers have noted in infants as young as six months (Leslie & Keeble, 1987).

However, to arrive at the logical leap from downturns to lay-offs, we need a mental model, or schema, to provide us with a framework enabling us to connect falling revenues with downsizing. Even something as central to our perception as causation needs to be embedded in a schema to be comprehensible (Schank & Abelson, 1977; Rumelhart, 1986). As one art historian waggishly suggested, there's no such thing as an immaculate perception (Gombrich, 1960). To understand what we're seeing, we need schemas - even to realize that distant object appear smaller than closer objects, even though they may be, in fact, the same size. If this notion seems somewhat far-fetched, consider the case of Virgil, the blind massage-therapist in Oliver Sack's *An Anthropologist on Mars*. Virgil, blind from age three, successfully undergoes eye surgery and regains his vision in his 50's. Virgil, however, has no visual schemas to order the chaotic visual jumble that now appears before him - to comprehend what he sees, he uses his hands, much as he did when he was blind (Sacks, 1995). As in documented cases, ranging back as far as 1728, of patients who regained their sight even as teenagers, Virgil was unable to coherently organize the blurs that he saw as faces. Like the other patients before him, Virgil ended up living a life virtually unchanged from the one he experienced without sight, as helpless as a blind man to negotiate the world according to what his eyes registered (Gregory, 1987).

Similarly, schemas inform our daily perceptions and decisions, shaping our responses to information, sharpening our predictions and their results (Schank & Abelson, 1977). When I.A. Richards decided to experiment with his undergraduates' expertise in interpreting poetry, he removed the titles and author's names from poems and distributed them to his students. However, these seasoned scholars in English literature remained perplexed by what they read, stymied and inaccurate in their interpretations - much to Richard's disgust, which triggered his creation of a quasi-scientific, rigorous method for interpreting literature (Richards, 1991). However, by removing the titles and names of famous poets, Richards also removed valuable schematic clues that his readers needed for syntax- and inference-level processing, setting them the task of interpreting complex pieces of writing without knowing what they were reading. Imagine trying to understand any complex piece of writing - a feasibility study, a shareholders' report, an article from *Science*, a play by Harold Pinter - without having any knowledge of who wrote it or for what purpose. You'd expend a good deal of energy casting around for likely schemas to throw into the breach, then hastily revising your guesses and trying on other schemas. In the meantime, while you were attempting this feat of guesswork, your ability to make sense of what you're reading becomes minimal, and your ability to recall what you read, practically nil.

As a result, schemas are key to the process of comprehending written language, but writers need to cue schemas, to provide overviews and linguistic triggers that signal specific schemas to readers, who will then comprehend what follows with relative ease. Research has established that, while causation is central to human

perception, readers nevertheless read sentences more efficiently when overt causality is present (Brown & Fish, 1983). Furthermore, reading subjects' processing speeds increased still further when the sentences they read contained verbs that concretized attributed causality to a character in a sentence (Green & McKoon, 1995). The more concretely sentences indicate connections between elements in space, time, intention, or causation, the better readers' comprehension (Zwaan et al., 1995; Zwaan, 1996).

These findings, along with others (Just, Carpenter, Keller, Eddy, and Thulborn, 1996), also point to significant gains in processing speeds and comprehension when readers encounter actively constructed sentences over passive sentences. In active construction, the syntax of the sentence also preserves the order in which events unfurled, which also conveniently hews to our iconicity assumptions about the descriptions of events following their chronological order (Fleischman, 1990). In an active sentence, the actor originating the action is the grammatical subject; the main action corresponds to the main verb; the result is the object toward the end of the sentence: *The managers laid off employees and closed the branch to realize a cost savings*. However, in a passive sentence, the chronological order is either reversed or jumbled. The sentence begins with an outcome, usually as the grammatical subject, followed by a verb that merely represents a state of being, while the actor is either only implied or embedded in a prepositional phrase - the grammatical equivalent of a throwaway item: *The branch was closed and the employees laid off by the managers to realize a cost savings*. In passive sentences, the iconicity assumption is disrupted, causation leached from the sentence, and relationships between actors and events scrambled.

Despite the considerable challenges passive construction foists on hapless readers, however, it has long served as a staple of both academic and business writing. For starters, because it obscures agency, passive construction can make events seem like Acts of God. The managers didn't lay anyone off, layoffs just sort of happened, but passive construction has never served as much of a screen for protecting managers and researchers from public scrutiny or questions. Moreover, journalists, editors of scholarly journals, and the rise of plain language initiatives have begun to displace passive construction from its position as the default mode for sentences. However, the gains in readability of active sentences stems as much from the ease of reading active construction as it does from the way in which it also creates clear-cut relationships between actors and events, triggering schemas, and making inference-generating a relatively easy task.

Ultimately, we perceive writing to be clear when it uses familiar terms, hews to the default subject-verb-object order of conventional English sentences, and employs active construction, rather than passive. Moreover, since reading involves prediction - about the meanings of words, about their function in the sentence's grammar, about the sentence's meaning - readers will also perceive writing to be clear when writers minimize the use of pronouns as grammatical subjects. Since pronouns are noun surrogates, they lack intrinsic meaning and gain determinate meaning only when we can locate their referent. A pronoun that crops up in mid-sentence is one matter, since its referent is accessible at the outset of the sentence. However, a pronoun subject at the outset of the sentence has two immediate strikes against it, as far as clarity is concerned. First, readers must guess which noun in the preceding sentence represents its referent, which increases both their cognitive processing load and reading time. Second, if the referent is the entire sentence or the pronoun has multiple candidates for referents, readers must backtrack to nail down the meaning of the subject since we can only predict where the sentence is headed and identify the main verb once we've correctly nailed down the grammatical subject. Worse, sentences that begin with *it* - as in *It is remarkable to note the similarities between these two management styles* - have no true referent. *It* is simply a convenient way of beginning a sentence without ensuring that each word has a determinate meaning, which makes for both inefficient writing and difficulties in processing the sentence's meaning.

So, we can add to the first three principles of clarity:

4. Prefer active construction to passive
5. Prefer actors or concrete objects to abstractions
6. Prefer active verbs to passive
7. Avoid using pronouns as grammatical subjects.

## **BEYOND PLAIN LANGUAGE - CONTINUITY AND COHERENCE**

Plain language initiatives have made some inroads into making managerial writing and business writing generally more readable, but plain language rules tend to remain both nebulous and limited. In their most comprehensive incarnation, *A Plain English Handbook: How to Create Clear SEC Disclosure Documents*, plain language guidelines (Smith, 1998) lack an articulated knowledge-base that both grounds its edicts and provides a means for MBAs to understand how clarity is the product of word choice, sentence structure, and schematic cues. More significantly, plain language guidelines begin and end with clarity, remaining mute on the two categories of effective writing which are, if anything, more influential than clarity: continuity and coherence.

Clearly, based on what we already know about schemas and inference-processing, the more tightly sentences hang together, the more readily and easily readers can identify schemas and put together coherent interpretations of what clusters of sentences mean. However, poor continuity wreaks havoc on a reader's ability to identify a schema and make sense of sentences. Moreover, a lack of continuity significantly increases cognitive demands on readers, requiring them to forge connections between sentences that sometimes are linguistically unrelated. Take another look at one of the examples I introduced earlier:

*The slackening of demand for business air travel, coupled with rising costs of fuel, have put extraordinary demands on our company's finances. With regrets, we must begin staff reductions.*

In a memo to flight attendants and gate agents at a major air carrier, the connection between the first and second sentences, which is wholly implied, would be immediately clear. However, what if the recipients of the memo were, instead, reservations desk staff at a boutique hotel? For these readers, the gap between the two sentences becomes a veritable gulf, one requiring the readers themselves to supply the missing connections between the two. Moreover, as we've already seen from scrutinizing each stage in the cognitive process, reading itself is a demanding act. Reading is, cognitively speaking, hard work, even when we're wholly unconscious of working. But, when we're aware we're working at understanding a document, the cause is generally a lack of coherence lousy clarity, or poor continuity.

As cognitive psychologists discovered in the 1980s, strong continuity considerably speeds reading times and boosts comprehension. In particular, referential continuity - the sharing of terms across sentences - significantly trims reading times (Garnham, Oakhill & Johnson-Laird, 1982). The strongest links between sentences rely on sequencing information, by introducing in the first third of one sentence a reference to the content of the last third of the preceding sentence (Huckin, 1983; Gopen & Swan, 1990; Williams, 1990). The following sentences, written by an MBA student in one of the University of Florida's Professional Writing courses, are tightly linked by sequencing:

*All Five Forces have a direct affect upon the banking industry. Many of these forces apply directly to the growth of the industry during the past several decades. Prior to this period the banking industry basis of operation was limited to within state borders. As deregulation was occurring within the banking industry banks started branching into newer markets.*

The second sentence is tied to the first by its shared mention of *forces*, the subject of the preceding sentence, while the third sentence is linked to the second by the shared reference to a set time period. Finally, the last sentences use the definition of deregulation and the term itself to bind them together.

Where sequencing proves difficult, writers must supply other links, ensuring that readers understand, prior to tackling the next sentence, how the forthcoming sentence relates to the one preceding it. Since prediction is the engine that enables reading comprehension, the more solid the cues readers encounter at the outset of a sentence, the better their predictions and understanding - and the briefer their reading times (Huckin, 1983). Writers can bridge gaps between sentences with something as simple and as brief as a single transition. Transitions like *since*, *for*, *because*, and *as* signal causation, while *and*, *also*, *too* inform readers that the sentence's content will be merely additive to the content of the preceding sentence. Stronger transitions like *however*, *but*, and *nevertheless* alert readers to a hedge or even a turnaround in the direction of the argument contained in the preceding sentence. Even transitions as apparently as insignificant as *first*, *second*, and *finally* enable readers to track the separate sentences

adding up to a multifold declaration, list, or argument. For transitions to be effective, however, writers must place them early in any sentence's structure, as readers make better predictions when transitions arrive early, before the subject or at least prior to the verb. Transitions that appear at the ends of sentences, in contrast, arrive so late in the readers' processing of the sentence that they obviate their benefits (Garnham, Oakhill & Johnson-Laird, 1982).

### **Priming and Emphasis**

Finally, two last areas in neurocognition also have considerable impacts on the speed of reading and on the clarity of recall: priming. By exposing readers to words briefly, then reintroducing the words later in a document, experimenters found readers boosted their recall (Park, Gabrieli, Reminger, Monti, Fleischman, Wilson, Tinklenberg & Yesavage, 1998; Vernon & Usher, 2003). Perhaps more significantly, readers' recall of material in priming studies existed independently of their comprehension of the text itself (Nicolas, 1998). Even subjects with damage to their memory, such as Alzheimer's patients and amnesiacs with damage to the hippocampus, displayed equally strong effects associated with priming (Park et al., 1998; Wagner, Stebbins, Masciari, Fleischman & Gabrieli, 1998; Basqué, Sáiz & Bowers, 2004).

Priming obviously exerts strong effects, making its function suitable to boost the continuity and coherence of writing in two areas. First, writers can boost the continuity of sentences by using common grammatical subjects scattered throughout the paragraph, both reminding readers of the common thread in a paragraph's themes but also using priming to remind readers of prior occurrences of the same term. Second, priming can exert an even more powerful influence on paragraph organization. By introducing readers to the main concept in a paragraph at its outset, the priming effect ensures that readers begin processing specific details within the paragraph relative to the paragraph's overall meaning. Furthermore, by introducing the paragraph's primary ideas in its opening sentences, writers ensure readers make better predictions in the inference-processing phase of reading. If I know from the opening sentences that a paragraph is going to cover corporate malfeasance, I can better make connections between the cases of Enron, WorldCom, and Adelphia than I would if I merely encountered the three clustered together and had to ponder what they had in common: corporate mismanagement, shredded documents, bloated C-level salaries, or unimaginably lousy accounting practices.

Priming also interacts with emphasis or stress, the placement of words that determines how easily reading subjects recall content. Emphasis generally falls most heavily on the last quarter of a sentence, paragraph, or document (Huang, 1986; Baqués, Saiz & Bowers, 2004) - one reason why most reports save their recommendation sections for the very end. Secondary emphasis tends to fall on the first quarter, hence the importance of executive summaries and introducing primary claims and content at the outset of paragraphs. Because topics generally require far less space to merely articulate and far more space to adequately flesh them out, readers comprehend paragraphs most quickly and easily when they encounter a series of paragraph topic sentences in the first third of the paragraph, followed by further description, analysis, and argument (Williams, 1990). In complex paragraphs, writers can rely on the strength of the paragraph's stress position - the very last sentence - to remind readers of the primary points they should recall from the paragraph (André, 1975).

So, we can add further items to the earlier clarity principles to arrive at a comprehensive set of guidelines for clear, effective, and efficient writing:

8. Link sentences together with sequencing, by introducing at the outset of sentences references to the contents of the last part of the preceding sentence
9. Use transitions to foster greater continuity between sentences
10. Tie sentences together by relying on common grammatical subjects throughout the paragraph
11. Introduce the primary ideas and main argument for a document in its opening paragraphs to aid readers' prediction and comprehension of what follows
12. Roll out the primary topics of paragraphs in the opening sentences
13. Use the remaining two-thirds of paragraphs to adequately flesh out topics with definitions, analysis, and argument
14. Since topics take at least one sentence to introduce and at least double that number to substantiate, avoid writing paragraphs shorter than three sentences



15. In complex paragraphs, use the last sentence to recapitulate the concepts you want readers to recall from the paragraph
16. Introduce recommendations, calls for action, and the main or strongest points in any proposal or analysis at the end of the document, in the final one or two paragraphs, to ensure readers recall these items most clearly.

## CONCLUSION

These 16 principles for writing clearly and effectively form the basis of the writing courses in the Center for Management Communication at the University of Florida's Warrington College of Business. Since these principles introduce students to a structural sense of how written language works and is processed by readers, MBA students enjoy a systematic grasp of what makes writing readable. Further, we focus on each category with separate assignments - one for clarity, one for continuity, another for coherence - ensuring that our students tackle the use of the principles sequentially, gradually building to assignments that require them to use clarity, continuity, and coherence together in the writing of memos, analyses, reports, proposals, performance reviews, and case studies. Finally, to underscore the difference in writing that relies on these principles and writing that ignores them, we require students to re-examine memos they write in the first minutes of the first day of class, to compare their writing samples from the end of the course to those from the beginning, and to critique the shortcomings of that initial writing sample. Most of our MBA students are appalled at the quality of their writing prior to completing the course. Some are indignant that, as one student noted, "No one taught us this a decade ago." Still others note that the course not only helps them produce better work in their other MBA courses but also considerably enhances their writing in the workplace.

As several decades of process-based writing instruction have revealed, simply writing, receiving feedback, and revising are insufficient to produce MBAs with writing skills equal to demands of the workplace. Instead, colleges of business can offer courses that teach future managers how to write clearly and effectively by using these guidelines, based on research on neuro-cognition, to understand how readers actually process written language. Our students have - and doubtless will continue - to thank us.

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**NOTES**