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Mnemonics and Bacon*

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Abstract

This essay is mainly to investigate the influence of mnemonics on the formation of the scientific method on the part of Bacon. The article proper is largely laid out in two main parts. The first part, by briefly surveying the works of Plato, Aristotle, Cicero, Quintilian, and Augustine, traces the genesis of mnemonics in the West, particularly the characteristic tendency in classical mnemonics to associate things to be memorized with specialized images and to position these images in a particular space. Based upon the conclusion reached in the first part, the ensuing part attempts to show that mnemonics, as being cognate with rhetoric, exercises an indirect but unmistakable influence on the scientific method in its budding stage. Bacon is not particularly interested in whether mnemonics can help people acquire dazzling memorization skills, and what really arrests his attention is the service mnemonics can possibly render: enhancing our ability in classification. This essay also adduces the example of Giordano Bruno, an older contemporary of Bacon and, more significantly, one of the precursors of modern science, to demonstrate that Bacon might not be an isolated case in his time in terms of the effort to generalize principles of classification from artificial memory. In trying to expound the extent of the prevalence of mnemonics around Bacon's time, the second part also touches upon how Matteo Ricci and Giulio Aleni introduced classical mnemonics to seventeenth-century China.

Keywords: Bacon, memory, mnemonics, rhetoric

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1. A Brief Overview of Classical Mnemonics

This essay aims first to provide an overview of memory in the history of ideas and, thence, deals with how mnemonics helps mold Bacon's scientific method. In an age that has witnessed many great strides in human technology of storing up information, it is difficult, if not impossible, for modern readers to envision that mnemonics played a significant role in Western civilization before the advent of printing. Indeed, the intertwining between memory and rhetoric dates back to ancient Greece. Mnemosyne, the goddess of memory and remembrance, represents "the necessary rote memorization to preserve history and sagas" before the invention of writing, and is accordingly depicted as the mother of the Muses.[1] What arrests our further attention is that in Greek mythology Mnemosyne is also represented as the inventor of language and words.[2] For example, in Plato's *Critias*, Critias says that "But besides the gods and goddesses whom you have mentioned, I would specially invoke Mnemosyne; for all the important part of my discourse is dependent on her favour, and if I can recollect and recite enough of what was said by the priests and brought hither by Solon, I doubt not that I shall satisfy the requirements of this theatre" (529).[3]

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1 I learned of this source from http://www.theoi.com/Titan/TitanisMnemosyne.html.

2 Ibid.

3 Caplan devotes a useful discussion of Mnemosyne's varied profiles in ancient Greek literature. According to Caplan, the earliest characterization of Mnemosyne as the mother of the Muses dates back to Hesiod's *Theogany*, wherein Mnemosyne is portrayed as the daughter of Earth and Heaven (Caplan 200). In his study of the making and recitation of epic, Chen similarly mentions the importance of "Mnēmosunē" for Homer (38); that is, in invoking the Muse, the poet entreats for, besides inspiration, a tenacious memory as well to recite his creation (103). In the Homeric *Hymn to Hermes*, the son of Maia "honors Mnemosyne in his song first among all the gods" (Caplan 200). For several other Greco-Roman deities associated with memory, see Caplan, p. 200. It should be further noted that the term "Homeric" should not mislead us to think that these Homeric hymns are composed by the creator of *Iliad* and *Odyssey*. The earliest reference to the Homeric hymns comes from Thucydides, who ascribes these hymns to Homer. These hymns are "Homeric" in that they share the same epic meter (dactylic hexameter), dialect, and style with *Iliad* and *Odyssey* (Rayor 1). These poems are "hymns" because they are devotional songs sung in honor of gods, "usually at a contest held as part of a religious festival or of some other solemn occasion" (Athanassakis xiv). Today the authorship of these Homeric Hymns remains a moot question. Interested readers can see Athanassakis, pp. xiii-xvii, and Rayor, pp. 1-13.

(1). Simonides, Cicero, Quintilian, and *Rhetorica ad Herennium*

Another link between memory and rhetoric in Greek mythology can be found in the story of Simonides.[4] A nobleman from Thessaly named Scopas, the winner of a boxing contest, one day holds a banquet, and as one of the invited guests Simonides is commissioned to compose a panegyric in honor of the host. Because a portion of this poem digresses to eulogize Zeus' illegitimate twin sons, Castor and Pollux, the miserly host grumbles to Simonides that he will pay only half of the honorarium agreed on beforehand, and that Simonides can ask for the remainder from the twins. Later someone comes into the banquet hall and informs the poet that two young men waiting outside would like to meet him. However, when Simonides leaves the banquet and steps outside the hall, he cannot spot anyone. At the instant Simonides steps outside, the roof of the banquet hall collapses and crushes the host, as well as all the other guests, to death. All the corpses are horrendously mangled, but Simonides remembers the seat arrangement of every single guest so that he can faultlessly relate it to those who intend to collect their relatives' dead bodies.

It is, however, worth our attention that the aforementioned story of Simonides as the inventor of mnemonics is not preserved in any extant Greek manuscripts, but set down by Cicero in his *De Oratore* (Yates 18).[5] According to Yates, Cicero relates this story to discuss memory as one of the five elements of rhetoric and to describe the mnemonics of "places" and images adopted by Roman orators (18). Another two classical treatments of mnemonics—*Rhetorica ad Herennium* (*Rhetoric for Herennius*) and Quintilian's *Institutio Oratoria*—are at once treatises on rhetoric.[6]

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4 Simonides (6th century-5th century, B.C.E.), whose birth and death cannot be accurately dated, is a Greek poet whose poetry is no longer extant except for some fragments allegedly authored by him. Plutarch ascribes the aphorism "painting is silent poetry and poetry painting that speaks," which inspires Lessing's *Laocoön*, to Simonides (*The Oxford Classical Dictionary* 1409).

5 In addition to Cicero, Quintilian several others have their own accounts of the story about Simonides as the inventor of mnemonics. Cicero's and Quintilian's versions are the most complete ones. There are, however, some discrepancies over the name of the winner of the boxing contest, and it is interesting to note that the divine twins, Castor and Pollux, are also famous for their pugilistic skills (Small 276). It is Yates' pioneering *The Art of Memory* that engages my interest in the history of mnemonics. I am also greatly inspired by Rossi's excellent treatment of the vicissitudes of the art of memory before and in Bacon's time in his *Logic and the Art of Memory: The Quest for a Universal Language*.

6 *Rhetoric for Herennius*, the earliest extant work on all the five aspects of rhetoric, had been considered Cicero's work through the Middle Ages (Kennedy 121). It is Jerome, the foremost contributor to the formation of the Vulgate Bible, who ascribes the authorship of

Since the Greek sources *Rhetorica ad Herennium* draws on, which *per se* are treatises on rhetoric, are all lost, the historical uniqueness of *Rhetorica ad Herennium* speaks for itself (Kennedy 123; Yates 21). This unknown author of *Rhetorica ad Herennium*, following Aristotle, suggests that an ideal orator possess the following elements: inventio, dispositio, elocutio, memoria, and pronuntiatio. And in mnemonics what matters the most is *locus* and images, and a *locus* is "a place easily grasped by the memory, such as a house, an intercolumnar space, a corner, an arch, or the like. Images are forms, marks or simulacra of what we wish to remember" (Yates 22).[7]

It should also be noted that the role of memory in rhetoric is not restricted to the fivefold scheme mentioned in the preceding paragraph. The connection between memory and rhetoric can be investigated from other angles. The author of *Rhetorica ad Herennium*, for example, contends that memory occupies a significant role in the tripartite definition of wisdom (*prudentia*). Wisdom, it states, is tantamount to "intelligence capable… by a certain judicious method, of distinguishing good and bad" (III. ii; 162). A parallel idea can be found in *De Inventione*, where Cicero defines wisdom as the caliber to distinguish the good from the bad (II. lii; 327). And the essential elements of wisdom are memory, intelligence, and foresight; memory, suggests Cicero, is "the faculty by which the mind recalls what has happened" (II. lii; 327).[8] Yates indicates that Cicero's definition of wisdom in *De Inventione* serves as a significant precursor in molding what later becomes known as "the four cardinal virtues."[9] When elaborating on the four cardinal virtues, both Albertus Magnus and Thomas Aquinas adduce Cicero's definition of prudence, and, more importantly, it is the prestige associated with the name "Cicero" that rivets medieval scholars' attention to the art of memory (Yates 20).

(2). Plato, Aristotle, and Wax Tablet

Rhetoric for Herennius to Cicero (Wilkins 51). Now the authorship of *Rhetoric for Herennius* remains an inconclusive question. For useful discussions, see Kennedy, pp. 121-26, and Wilkins, pp. 51-56.

7 In addition to *locus* and images, architecture is also closely connected with mnemonics. For the connection between architecture and mnemonics, see Mary Carruthers' excellent treatment in *The Craft of Thought: Meditation, Rhetoric, and the Making of Images, 400-1200* (Cambridge: Cambridge UP, 1998), pp. 7-24.

8 Whereas intelligence is the faculty "by which it [the mind] ascertains what is," foresight is the faculty "by which it is seen that something is going to occur before it occurs" (*De Inventione* II, lii; 327).

9 The four cardinal virtues are prudence, justice, fortitude, and temperance.

One recurrent metaphor can be spotted in all the three Latin works introduced in the preceding section: All liken the inner pressing of images on memory to the markings on a wax tablet. The possible reason for this analogy is twofold. First, this metaphor attests to the prevalence of wax tablet as a writing device in ancient times. Second, this metaphor is indicative of an inherent link between ancient mnemonics and contemporary theories of memory (Yates 50). The metaphor of wax tablet can be traced back to Plato's *Theaetetus*. In conversing with Theaetetus, Socrates says: "I would have you imagine, then, that there exists in the mind of man a block of wax, which is of different sizes in different men; harder, moister, and having more or less of purity in one than another, and in some of an intermediate quality" (254). This tablet, adds Socrates, is a gift of Memory [sic], the mother of the Muses:

> When we wish to remember anything which we have seen, or heard, or thought in our own minds, we hold the wax to the perceptions and thoughts, and in that material receive the impression of them as from the seal of a ring; and that we remember and know the image lasts; but when the image is effaced, or cannot be taken, then we forget and do not know. (*Theaetetus* 255)

From a tripartite conversation among Cebes, Simmias, and Socrates in *Phaedo*, we are told one of Socrates' favorite precepts: Knowledge is simply recollection (213). Though Socrates defines recollection as "a process of recovering that which has been already forgotten through time and inattention" and makes no mention of the term "association," he suggests that recollection generally refers to one's ability to derive the understanding of someone or something from some other person or something else (214). That is, even though the term "mnemonics" might never cross Socrates' mind, the preliminary techniques of mnemonics have already been prefigured by Socrates. For example, Socrates finds out that people might remember their lovers at the sight of the lyres belonging to their beloved: "Do not they, from knowing the lyre, form in the mind's eye an image of the youth to whom the lyre belongs?" (214)

The advent of writing, for Socrates, will blunt our memory. The intertwining between writing and memory is reminiscent of a notable episode in *Phaedrus*, where Socrates and Phaedrus trade ideas about the essence of writing and its detrimental effect on the faculty of memory.[10] In *Phaedrus*, the young Phaedrus, an enthusiastic

10 Anyone with a certain familiarity with Derrida's works will not fail to recognize the importance of this story in Derrida's speculation on the dialectical relation between speech and writing. See Derrida, "The Filial Inscription: Theuth, Hermes, Thoth, Nabû, Nebo" and "The Pharmakon," in *Dissemination* (Chicago: U of Chicago P, 1981), pp.

admirer of the famed rhetorician of that time, Lycias, intends to recite a speech of Lycias to Socrates. What is interesting is that while Phaedrus has readied himself for reciting Lycias' speech to Socrates from memory, Socrates, glimpsing a roll under Phaedrus' cloak, insists that Phaedrus "read" the speech verbatim since he has a manuscript at hand: "Much as I love you, I would not have you suppose that I am going to have your memory exercised at my expense." To which Phaedrus responds, "Enough; I see that I have no hope of practicing my art upon you" (433). This passage is significant in that even though Phaedrus feels a little sullen over being prevented from showcasing his memory (his art), before long he still reverts to his art in his dialogue with Socrates.

Whilst the whole dialogue between Phaedrus and Socrates is generally centered upon the essence of love, near its end the conversation digresses into a discussion on writing. Socrates tells Phaedrus that in Egypt there was an old man named Theuth, who was noted for his wisdom and was the purported inventor of many arts such as arithmetic, calculation, geometry, astronomy, draughts, dice, and, most importantly, the use of letters. At that time the king of Egypt was the god Thamus, and he tried to appraise each invention when Theuth presented the inventions to him. When they finally came to the letters, Theuth claimed that these letters could make the Egyptian people wiser and enhance their memories. Thamus, however, thought otherwise: "For this discovery of yours will create forgetfulness in the learners' souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves . . . they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing" (*Phaedrus* 484). These qualms about writing are not a unique case. At least a similar resonance can be heard in Emerson though the target of complaint is not altogether identical. In an essay entitled "On Memory" Emerson writes: "Plato deplores writing as a barbarous invention which would weaken the memory by disuse…. If writing weakens the memory, we may say as much and more of printing. What is the newspaper but a sponge or invention for oblivion?" (99)

With only slight variations, the metaphor of wax tablet can also be found in Aristotle. In *De Memoria et Recollection* (*On Memory*), Aristotle contends that the way experience leaves an image in our memory is not unlike that people "make an impression with a seal" ($450^{a}31$-32). Thus, memory, writes Aristotle, does not occur in those "who are strongly moved owing to passion, or time of life, no memory is formed; just as no impression would be formed if the movement of the seal were to impinge on running water" ($450^{b}1$-3). Similarly, Aristotle obviously believes that the

84-94, pp. 95-117.

"imprint" nature of memory can help explain why the memory of infants and of the aged either teeters or falters because they are in "a state of flux, the former [infants] because of their growth, the latter [the aged], owing to their decay" (450^{b}7-8). Aristotle continues his argument and comes up with the conclusion: "both those who are too quick and those who are too slow have bad memories. The former are too moist, the latter too hard, so that in the case of the former the image does not remain in the soul, while on the latter it is not imprinted at all" (450^{b}8-11). The author of *Rhetorica ad Herennium* also mentions wax tablets when elucidating the concept of "backgrounds": "For the images, like letters, are effaced when we make no use of them, but the backgrounds, like wax tablets, should abide" (III. xviii; 211).

Carruthers, however, alerts us that the image of wax tablet is by no means uniquely Greco-Roman, since it can also be found in, for example, Proverbs:[11] "Let not loyalty and faithfulness forsake you; bind them about your neck, write them on the tablet of your heart" (3:3). Both Carruthers and Draaisma point out that the sway of this array of interrelated images, such as "imprinting," "write upon," or "wax tablets," could still be keenly felt long after the wax tablet had given way to codex and other writing materials. For example, while investigating the nature of light and how the human eyes receive light, Thomas Aquinas writes: "Aristotle finds an apt example of this in the imprint of a seal on wax. The disposition of the wax to the image is not the same as that of the iron or gold to the image; hence wax, he says, takes a sign, i.e. a shape or image, of what is gold or bronze, but not precisely as [sic] gold or bronze" (172).[12]

Actually, the notion of memory as an integral ingredient of wisdom dissected in the previous section is no less salient in Aristotle. For example, for Aristotle a good memory, together with other elements such as good parts, receptiveness, quickness of intuition, is conducive to excellence in virtue (1362^{b}23-24). In *De Memoria et Recollection*, Aristotle reminds us of the essential correlation between memory and imagination: "It is apparent, then, to which part of the soul memory belongs, namely the same part as that to which imagination belongs. And it is the objects of imagination that are remembered in their own right, whereas things that are not grasped without imagination are remembered in virtue of an incidental association" (450^{a}22-23). Sorabji's gloss on this passage runs as follows: "in its own right (kath'

11 Carruthers notes that the trace of Greek influence on Proverbs is easily recognizable (29).

12 As for the metaphor of memory as the apparatus to record words in the soul, Caplan enumerates more examples, which include passages excerpted from Aeschylus ("The unforgetting tablets of thy mind"); Shakespeare ("the table of my memory"); Longfellow ("leaves of memory"). See Caplan, pp. 213-14.

hauto), but in virtue of an incidental association" (79). In a more direct fashion Caplan explains the crux of this passage; Aristotle simply points out a fact that must be familiar to today's readers: Things bearing necessary associations are more easily recollected (203). Furthermore, these laws of association, similarity, contrast, and contiguity are at work not only in mnemonics but also in the theory of style, since these laws involve the use of simile, metaphor, and contrast (Caplan 204). For sophists such as Protagoras, Gorgias, or Hippias, memory had long been an important device to further their already dazzling skills of improvisation (Caplan 206).

More contemporary evidence for the pervasiveness of mnemonics in the ancient world can be adduced in Aristotle, who explicitly refers to artificial memory on different occasions in his corpus. Indeed, the best ancient reflection on the psychology of memory is contained in Aristotle's works, especially *De Memoria et Recollection* and *De Anima* (*On the Soul*).[13] According to Aristotle, the states of mind run, in chronological order, as follows: perception, memory, experience, and, last, a principle of skill and of understanding (*Posterior Analytics* $100^{a}4$-8).[14] Similarly, in *Topics* Aristotle advises that concerning those questions of most frequent occurrence people should always be ready to put them into memory: "For just as in a person with a trained memory, a memory of things themselves is immediately caused by the mere mention of their 'places,' so these habits too will make a man readier in reasoning, because he has his premises classified before his mind's eye, each under its number" ($163^{b}28$-31). In this sense, it is interesting to note the correlation between *locus* and *topoi* here because it is quite possible that the title of Aristotle's *Topics* derives from the "places" in mnemonics (Yates 46).[15]

Yet it should be clarified that Aristotle begins his treatise on memory by differentiating memory (remembering) from reminiscing (recollecting). Memory, Aristotle avers, is essentially related to the past (*De Memoria et Recollection* $449^{b}14$), since it makes no sense if one claims that he or she is remembering the present. On the other hand, recollecting is "neither the recovery nor the acquisition

13 This judgment is rendered by Léon Robin: "All that was best in orthodox psychology [of memory] down to the end of the XIX century is contained, in sum, in a few pages of Aristotle" (301).

14 Aristotle, in *Posterior Analytics*, defines perception as "a connate discriminatory capacity" ($99^{b}35$). As for "a principle of skill and of understanding," Aristotle's definition is as follows: "Of skill if it deals with how things come about, of understanding if it deals with what is the case" ($100^{a}8$-9).

15 Both the Latin word *locus* and the Greek word *topoi* mean "place" in English.

of memory" ($451^{a}19$-20). Couched in layman's terms, recollection is a "being reminded" and involves "one thing putting us in mind of another" (Krell 13). In a word, for Aristotle, having a good memory cannot be equated with being good at recollecting: "For the persons who possess a retentive memory are not identical with those excel in power of recollection; indeed, as a rule, slow people have a better memory, whereas those who are quick-witted and clever are better at recollecting" ($449^{b}6$-9).[16]

(3). Augustine

St. Augustine in his *Confessions* expresses an unreserved accolade on the faculty of memory and makes a profound meditation on the mystery of memory.[17] For example, in Book X Augustine writes: "Great is the power of memory, exceeding great, O my God—an inner chamber large and boundless! Who has plumbed its depths?... A great admiration rises upon me; astonishment seizes me….And men go forth to wonder at the heights of mountains, the huge waves of the sea, the broad flow of the rivers, the extent of the ocean, and the courses of the stars, and omit to wonder at themselves" (154).[18] Indeed, Augustine is captivated with one of his friend's astonishing memory. Once Augustine asks this friend named Simplicius what the penultimate lines in each of Virgil's works are, Simplicius, without the slightest hesitation, waltzes through this challenge (Augustine 1956: 358). It is noteworthy that as in Cicero's discussion of memory, Augustine, impressed with his friend's bent for memorization, believes that *locus* and images play important roles in the functioning of memory: "And I enter the fields and roomy chambers of memory, where are the treasures of countless images, imported

16 A short but useful account of the nuance between remembering and recollecting in the light of Greek etymology is provided by Richard Sorabji, p. 35.

17 In a very short article entitled "Memory and Confession" (〈記憶與懺悔〉) Sher-shiueh Li points out the interdependent relationship between memory and confession: But for memory, how can we capture the past in the flux of time? Conversely, people would feel conscience-stricken when they try to recall a regrettable past (376). It is worthwhile to note that though Li illustrates his argument mainly by the example of *The Journey to the West* (《西遊記》), he mentions Augustine's *Confessions* at the outset of his article.

18 Augustine's wonderment at the infinite immensity of memory finds an echo in the writings of Giulio Aleni (艾儒略): 「聖奧斯定云，涉記乃浩大之淵，不知何等，乃有無涯容受。亦深窈，亦顯明，難以言語揣摹」(240). I owe an anonymous reviewer of an earlier version of this essay for the reference to Aleni's works. An Italian Jesuit missionary, Giulio Aleni (1582-1649), following in Matteo Ricci's (利瑪竇) footsteps, arrived in China in 1609 and, thence, embarked on his missionary work (Pan 6).

into it from all manner of things by the senses" (*Confessions* 152-53). Lines later Augustine makes it clear that it is the images of things, not the things themselves, that are stored up in memory (153). Augustine goes further in claiming that many more branches of knowledge (literature and rhetoric included) are "taken from the memory": "And yet are not these all that the illimitable capacity of my memory retains. Here also is all that is apprehended of the liberal sciences, and not yet forgotten—removed as it were into an inner place, which is not a place … For what is literature, what skill in disputation, whatsoever I know of all the many questions there are, is so in my memory" (154). What arrests our attention here is that what occurs to Augustine first, as far as memory is concerned, is literature and skill in disputation. That is, this quotation again displays the link between memory and rhetoric.

Despite Augustine's exuberant reflection on memory, the essence of memory remains a recondite enigma to him. The mysterious essence of memory more eludes Augustine when he juxtaposes forgetfulness with memory in his attempt to elucidate memory: "I name memory, and I know what I name. But where do I know it [forgetfulness], except in the memory itself? Is it also present to itself by its images, and not by itself?" (*Confessions* 158). On the essence of forgetfulness, Augustine remarks that "But when I remember forgetfulness, there are present both memory and forgetfulness—memory, whereby I remember, forgetfulness, which I remember. But what is forgetfulness but the privation of memory? How, then, is that present for me to remember, since, when it is so, I cannot remember?" (159). Then Augustine reiterates his experience of being spellbound by the inscrutability of memory: "Great is the power of memory; very wonderful is it. O my God, a profound and infinite manifoldness" (160).[19]

2. Mnemonics and Bacon

For most modern readers, the prevalence of mnemonics before the advent of printing is imaginable. However, a question naturally rises: Could mnemonics retain its glory after printing made access to knowledge not only possible but also easy? That is, if people want to read anything they think of, they have easy access to whatever they want. Generally speaking, mnemonics has been gradually superseded and sidelined by printing since the fifteenth century. Though the decline of

19 For a more detailed discussion of how Augustine conceptualizes memory in the empirical sense, see Gerald O'Daly's *Augustine's Philosophy of Mind* (Berkeley: U of California P, 1987), pp. 131-51.

mnemonics had been an unstoppable tendency in the wake of the growing wide prevalence of printing, it played a constituent role in the formation of Bacon's scientific method in the seventeenth century.

(1). Ricci and Aleni

Before we investigate Bacon's own ideas of memory, a particular mention of Matteo Ricci's works can give us a glimpse of the extent to which ancient, classical mnemonics still remained strong around the threshold of the seventeenth century. Though Italy and England are geographically and, more crucially, religiously apart, the ensuing overview of Ricci's art of memory will reveal that classical mnemonics proposed by Quintilian and in *Rhetorica ad Herennium* was then still a fundamental part of the standard curriculum in the Catholic world. Ricci arrived in China and fell to his missionary work in 1583. With an unusual caliber for language learning, before long Ricci became fluent in Chinese and could converse with average Chinese people effortlessly. To promote his missionary work, Ricci began to cultivate local Chinese scholars and to seize every opportunity to showcase his mnemonics to his Chinese acquaintances at drinking parties. It was reported that Ricci could recite, in their entirety, the passages from Chinese classics impromptu assigned to him (Zhu 141; Spence 3-4). This spectacular feat quickly turned Ricci into a luminary in Nanchang,[20] and many Chinese officers and literati earnestly invited Ricci to the banquets held in their residences, and finely wined and dined him. When Ricci's reputation reached the governor of Jiangxi, Lu Wangai,[21] Lu sent for Ricci to coach his three sons in mnemonic techniques.[22] Ricci, feeling honored but also beset by Lu's sincere invitation, decided to spell out his art of memory in a slim book entitled *Ji fa*.[23]

Ricci begins his *Ji fa* with a general survey of the nature of memory, and Plato's and Aristotle's influence on him is unmistakable. For example, like Aristotle Ricci believes that images are imprinted on our memory, and that this "imprint" nature of memory can help elucidate why the memory of infants fares ill and that of the aged degenerates. For Ricci, the brain of the child is too soft to keep the imprint intact; on the other hand, the gradually hardening brain of the elderly is no longer

20 江西南昌

21 陸萬陔

22 To pass the advanced government examination entails memorizing volumes of Chinese classics.

23 《記法》or《西國記法》. The only extant original copy of Ricci's *Ji fa* is now housed in a library in Paris (Zhu 142).

conducive to the imprinting of images. Thus, both children and the aged have difficulty memorizing things and, therefore, are prone to forgetfulness (2001: 143-44). Though Ricci does not specify the sources of his conceptions of memory, we, in the light of the striking similarity between Ricci and Aristotle, can hardly avoid the conclusion that Ricci is greatly indebted to Aristotle for the notion of memory.

Likewise, Ricci is well aware of the tradition emanating from Simonides and accordingly credits the invention of mnemonics to Simonides.[24] To remember things, Ricci emphasizes that each item be given an image, and that we should assign a place for everything we try to remember. While mnemonic skills made up an integral part of the curriculum Ricci received at the Jesuit College in Rome, two overriding influences on Ricci's guidelines for constructing memory edifices were Quintilian and *Rhetorica ad Herennium* (Spence 5). In her monograph on Giordano Bruno (1548-1600), Rowland clearly points out that the art of memory made up an essential part of grammar-school education in sixteenth-century Italy, and that seminary students would harness mnemonic skills to memorize different kinds of theological works, including the Scriptures, sermons, and canon law, to hoard up preaching materials or to spiritually exercise themselves (62). Echoing Quintilian and *Rhetorica ad Herennium*, Ricci foregrounds the import of assigning different places to the images of the things we intend to memorize. Ricci indicates that these places generally fall into three sizes in accordance with the number of things one would like to memorize: "If you are going to use a great many [images], then let the buildings be hundreds or thousands of units in extent; if you only want a few, then take a single reception hall and just divide it up by its corners."[25]

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24 The original passage is as follows: 「古西詩伯西末泥德嘗與親友聚飲一室，賓主甚眾，忽出室外，其堂隨為迅風摧崩，飲眾悉壓而死，其尸齎粉，家人莫能辨識。西末泥德因憶親友坐次行列，乃一一記而別之，因悟記法□創此遺世焉。」(2001: 146). The box represents a smudged and, therefore, illegible Chinese character (2005: 6).

25 Here I follow Spence's translation (9-10). The following passage excerpted from Ricci's Chinese original can shed more light on the importance of architecture in his mnemonic system and, more importantly, his indebtedness to Quintilian and *Rhetorica ad Herennium*: 「凡記法，須預定處所，以安頓所記之象。處所分三等，有大，有中，有小。其大則廣宇大第，若公府，若甍宮，若寺觀，若邸居，若舍館，自數區至數十百區，多多益善。中則一堂，一軒，一齋，一室。小則室之一隅，或一神龕，或倉櫃座榻。……用多，則廣宇千百間，少，則一室可分方隅，要在臨時斟酌，不可拘執一轍」（2001: 148）. A parallel argument can be found in Aleni: 「西國有習之者，法雖不一，各有訣焉。大概先在心中，備一宏大之宇。或為曾熟遊，或為暫所

Though Ricci, on the whole, remains a loyal disciple of classical mnemonics as revealed in *Ji fa*, he sometimes modifies traditional techniques to facilitate his missionary work in China. For example, the author of *Rhetorica ad Herennium* reminds the reader that when faced with a surfeit of images it is desirable to put marks at regular intervals: "And that we may by no chance err in the number of backgrounds, each fifth background should be marked. For example, if in the fifth we set a golden hand, and in the tenth some acquaintance whose first name is Decimus, it will then be easy to station like marks in each successive fifth ground" (III. xvii; 211).[26] However, always mindful of his mission to convert the Chinese to Catholicism, Ricci suggests that his Chinese readers can insert a Chinese character 十 at every tenth memory image.[27] The Chinese ideograph 十 proposed in Ricci's mnemonic tract for Chinese readers, notes Spence, is at once a reminder of the decimal system and, more importantly, of the profound symbolism intimated by the cross (23).

The foregoing vignette of Ricci, who is nine years Bacon's senior,[28] is meant to note the fact that on the threshold of the seventeenth century classical mnemonics still remained vigorous and retained a firm foothold in the training curriculum of Jesuit missionaries. Some people might demur, arguing Ricci's and Aleni's cases are only an isolated, singular piece of evidence falling shy of being a compelling proof that Bacon is also aware of classical mnemonics. This argument is certainly justifiable, but it should be emphasized again that the mnemonic techniques Ricci instructs to the Chinese amply demonstrate that classical mnemonics, typified by Quintilian's treatise and *Rhetorica ad Herennium*, still retained its momentum on the Continent of the sixteenth century. Spence proffers several other examples wherein mnemonics came under attack. The thinkers or writers mentioned by Spence, including Cornelius Agrippa, Erasmus, Melanchthon, and Rabelais, either discredit the usefulness of these mnemonic devices or bitterly berate that these mnemonic structures, rather than enlighten people, will eventually stifle their development in

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假設。其中殿廡樓臺，堂館亭榭，園林池沼，峭壁浮屠，無奇不備，無珍不錯。或半生成，半粉制，如穴中塑像，山頂立亭，各部署而排列焉。」(285-86).

26 The number of fingers on a hand is used as a reminder of the number "five," and the Latin word "decimus" means "tenth." Aleni, in his elucidation of mnemonics, also mentions the use of a "golden hand": 「然此法之妙，亦不全在乎多，而在乎熟。轉念之間，即億誰首誰次，本位毫釐不差。又或每排五象，即間一金掌。」(287).

27 「又不論虛實，序成行列，編成字號，如每至十所一號，記一十字，總記幾十幾號，以便查考，以便聯絡應用，庶免紊亂。」 (2001: 148).

28 Matteo Ricci (1552-1610); Francis Bacon (1561-1626).

intelligence (Spence 12). For example, in *Of the Vanitie and Uncertaintie of Artes and Sciences*, Agrippa's undisguised contempt for mnemonics comes at full blast: "It is a shameful thinge, *and* a shameless mannes propertie to set out in al mens sighte, the readings of many thinges, like as Marchantes do theire wares: whereas in the meane while the howse is emptie" (qtd. in Spence 25).[29]

(2). Prenotion, Emblem, and Place

When we speak of the correlation between memory and Bacon's works, we might think of Bacon's partition of all human knowledge into three different realms: history, poetry, and philosophy. In "A Description of the Intellectual Globe," Bacon argues that the demarcation into history, poetry, and philosophy is based on three different faculties the three realms respectively entail: "History answers to memory, Poetry to imagination, and Philosophy to reason" (97). According to Rossi, Bacon's treatment of memory in *The Advancement of Learning* is, on the whole, not at odds with the Renaissance conception of memory (1968: 207). Thus, it is beneficial to have a basic understanding of the intellectual climate around Bacon's time. The statistic that *Rhetorica ad Herennium* passed through about twenty editions between 1470 and 1569 (Rossi 1968: 208) suggests that the topological mnemonic system initiated by Quintilian and *Rhetorica ad Herennium* still retained its momentum in the first half of the sixteenth century. And as Rossi suggests, the tripartite themes of contemporary mnemonic works are "the notion of an encyclopedia of knowledge, the idea of an artificial memory laying foundation for a 'perfect science,' and the concept of an art of memory as a way of expelling ambiguity and establishing 'order and coherence' in arguments" (1968: 208).

Though mnemonics was still at work in the corpuses of Bacon, Descartes, and Leibniz, it had transformed itself from "a method of memorizing the encyclopedia" to "an aid for investigating the encyclopedia and the world" (Yates 355). Bacon himself was undoubtedly aware of a few mnemonic skills. In John Aubrey's biographical sketch of Bacon, we encounter the following depiction: "Over this Portico is a stately Gallerie, whose Glasse-windowes [sic] are all painted: and every pane with several figures of beest [sic], bird, or flower: perhaps his Lordship [Bacon] might use them as Topiques for Locall memorie [sic]" (14).[30] Besides, frequent,

29 As for Spence's brief discussion of Erasmus, Melanchthon, and Rabelais, see Spence, pp. 12-13.

30 John Aubrey (1626-1697) is best known for his "vivid, intimate, and sometimes acid" sketches of his contemporaries, which appeared as *Lives of Eminent Men* in 1813. The source of the information in this note is *The New Encyclopedia Britannica*, Vol. 1, pp.

explicit references to "collection of loci" and "artificial memory" bear eloquent testimony to the fact that Bacon is not entirely unfamiliar with contemporary art of memory (Rossi 2000: 103). One occasion where Bacon mentions memory is *The Advancement of Learning*, in which he regards memory, together with writing, as a means to retain knowledge (397). This passage is significant because it is a seventeenth-century counterpart of Socrates' depreciation of writing. The merit of writing, says Bacon, lies in the fact that it can help digest and preserve knowledge in a sound "disposition" and "collocation" (398). However, it is interesting to note that in Bacon's passages we can also trace the misgivings among his contemporaries about the possible disservice writing might do to memory because for them writing causes "a retardation of reading, and some sloth or relaxation of memory" (398). Bacon does not altogether deny the validity of this complaint, but he still attaches great importance to writing, since it "assureth copie of invention, and contracteth judgment to a strength" (398). On the other hand, Bacon indicates that his coevals do not fully understand to what extent memory can contribute with regard to the retention of knowledge (398). In general, Bacon frowns upon the mnemonics of his time, and suggests that memorization skills should undergo necessary improvements before they are actually put into practice: "An art there is extant of it; but it seemeth to me that there are better precepts than that art, and better practices of that art than those received" (398). People might be spellbound or dumbfounded by varied dazzling displays of those with prodigious memory,[31] but, admonishes Bacon, the extant mnemonics is still not applicable in serious matters (398).[32]

Memory, for Bacon, generally falls into two categories: natural memory and

690-91.

31 The examples Bacon furnishes include "repeating a great number of names or words upon once hearing, or the pouring forth of a number of verses or rhymes *ex tempore*, or the making of a satirical simile of every thing, or the turning of everything to a jest, or the falsifying or contradicting of everything by cavil" (398).

32 In *De Augmentis*, Bacon pours his undisguised contempt on Lullian *ars memoria*, by which, Bacon argues, only the gullible would be hoodwinked: "And yet I must not omit to mention, that some persons more ostentatious than learned have laboured about'a kind of method not worthy to be called a legitimate method, being rather a method of imposture, which nevertheless would no doubt be very acceptable to certain meddling wits. The object of it is to sprinkle little drops of a science about, in such a manner that any sciolist [sic] may make some show and ostentation of learning. Such was the Art of Lullius: such the Typocosmy traced out by some; being nothing but a mass and heap of the terms of all arts, to the end that they who are ready with the terms may be thought to understand the arts themselves. Such collections are like a fripper's or broker's shop, that has ends of everything, but nothing of worth" (454).

artificial memory, and artificial memory is built on two notions: prenotion and emblem. Prenotion, according to Bacon, helps orient us toward what we want to seek in mind and reduce the odds of going astray when faced with a plethora of information (*The Advancement of Learning* 399). By contrast, the function of emblem is to convert things to sensible images so that we can retrieve them more easily when necessary: "Prenotion dischargeth the indefinite seeking of that we would remember, and directeth us to seek in a narrow compass; that is, somewhat that hath congruity with our *place of memory* (author's emphasis). Emblem reduceth conceits intellectual to images sensible, which strike the memory more" (399). This passage on emblems resonates with those ancient treatises on mnemonics in that the primacy of visualization stands out in both cases. Cicero, for instance, is explicit in his stress on the importance of the visual in memory: "The most complete pictures are formed in our minds of the things that have been conveyed to them and imprinted on them by the senses, but that the keenest of all our senses is the sense of sight." (*De Oratore* II. xvii; 357). In *De Augmentis*, Bacon reiterates the importance of prenotion: "Prenotion is the principal part of artificial memory. For in artificial memory we have the places digested and prepared beforehand; the images we make extempore according to the occasion. But then we have a prenotion that the image must be one which has some conformity with the place; and this reminds the memory, and in some measures paves the way to the thing we seek" (436-437). That is why Bacon contends that "order also manifestly assists the memory" (437). Similarly, Bacon is no less explicit in equating images with emblems:

> For what is sensible always strikes the memory stronger, and sooner impresses itself than the intellectual…. And therefore it is easier to retain the image of a sportsman hunting the hare, of an apothecary ranging his boxes, an orator making a speech, a boy repeating verses, or a player acting his part, than the corresponding notions of invention, disposition, elocution, memory, action. (437)

It is worthwhile to note that while the preceding quotation is to emphasize the advantage of visual images (emblems) in mnemonics, Bacon also touches on the five elements of traditional rhetoric. In *De Augmentis*, Bacon points out the indissoluble connection between emblems and "places." If the main function of emblems is to reduce "intellectual conceptions to sensible images" (437), the images are supposed to be closely connected with "places." In the opening chapter of her *The Art of Memory*, Yates gives an excellent overview of the general layout of ancient mnemonics, which bears close conformity to Bacon's emphasis on images and "places." Yates points out that the initial step is imprinting an array of "places" or *loci* on memory, and that as a mnemonic place system a building compares

favorably with other places (3).

Quintilian proffers a lucid exposition of how a building can help people store up and retrieve memory. For Quintilian, the formulation of an array of places as an aid to memory entails a building which should be as spacious as possible. This building, which can be a real or imaginary one, is supposed to contain forecourt, living room, bedrooms, parlors, together with all the statues and ornaments usually expected of the aforementioned rooms. The subliminal connection between *loci* in a commodious building and memory, according A. E. Middleton, can still be hazily recognized in some English phrases used to divide a discourse, such as "in the first place" or "in the second place."[33] In *Rhetorica ad Herennium*, we can find a similar but more detailed description of "places":

> The artificial memory includes backgrounds and images. By backgrounds I mean such scenes as are naturally or artificially set off on a small scale, complete and conspicuous, so that we can grasp and embrace them easily by the natural memory—for example, a house, an intercolumnar space, a recess, an arch, or the like. An image is, as it were, a figure, mark, or portrait of the object we wish to remember; for example, if we wish to recall a horse, a lion, or an eagle, we must place its image in a definite background. (III. xvi; 209)

What is remarkable about the backgrounds in this quotation is that they are, not surprisingly, likened to wax tablets: "For the backgrounds are very much like wax tablets or papyrus, the images like the letters, the arrangement and disposition of the images like the script, and the delivery is like the reading" (III. xvii; 209).

All the foregoing discussion of the connection between "place" and memory might give rise to a question: why place? Rephrased in another way, the question is while we are wont to define memory temporally—recalling things of the past—how can "place" secure a significant role in our conception of memory? Edward Casey's observation sheds some light on this issue from a phenomenological perspective. For Casey, the link between memory and "place" is "at once intimate and profound" (183). Casey starts his argument by reflecting on why the spatial aspect of remembering has not received the attention it deserves. He alerts us to the fact that more often than not a memory is either "of a place itself (e.g., of one's childhood home)" or "of an event or person in a place," and to be placeless in one's remembering is "not only to be disoriented; it is to be decidedly disadvantaged"

33 A. E. Middleton, *Memory Systems, New and Old* (1888). I learn of Middleton's work from Carroll Cadmen, "Memory, the Warder of the Brain," *Philological Quarterly* 18 (1939): 65.

(183-84). Following Aristotle, Casey contends that the principal action of "place" is "containing," and that "container" in Greek is *periechon*, meaning literally "a having" or "holding around" (186). Casey continues his argument by pointing out that the overriding characteristic effect of "place" is "maintaining or retaining" rather than "dividing or dispersing" (186). This "retaining" effect is observable in such idioms as "marching in place," "having a place of your own," "that's a nice place to be," or "getting in place," since, contends Casey, all these expressions hinge on "place's peculiar power to hold or keep in" (186). Summarizing his phenomenological investigation of the correlation between memory and "place," Casey reaches the following conclusion: "Memory is naturally place-oriented or at least place-supported. Moreover, it is itself a place wherein the past can revive and survive; it is a place for places, meeting them midway in its own preservative powers, its 'reservative' role" (186-87).[34]

(3). Memory, Tabulation, and Classification

On a general level, Bacon, though not satisfied with contemporary mnemonics, still believes that mnemonics can be applied to concrete situations and, more importantly, to the formulation of scientific methods. However, the interconnection between mnemonics and the Baconian method cannot be sufficiently appreciated unless understood in the context of Bacon's "classification of logic" (Rossi 2000: 117). In *The Advancement of Learning*, Bacon contends that there are four "intellectual arts," which are categorized according to their respective ends: art of inquiry or invention, art of examination or judgment, art of custody or memory, and art of elocution or tradition (384). Bacon goes further by dividing invention into two types; the first is concerned with arts and sciences, and the other speech and arguments (384). As for the invention of sciences, Bacon in turn subdivides it into two aspects and terms them "experiential literata" and "interpretatio naturae" respectively.[35] And in *De Augmentis* he writes:

> For a man might as well attempt to go through the calculations of an Ephemeris in his head without the aid of writing, as to master the

34 The adjective "reservative," which, notes Casey, is meant to encompass the connotations of "preservation," "reservation," "holding in reserve," and "being reserved," is a coinage by Casey (341).

35 According to the gloss provided by the editors of *Collected Works of Francis Bacon, experiential literata* refers to "the method of inquiry which precedes from one experiment to another by a kind of natural sagacity," whilst *interpretatio naturae* means the method "which proceeds from experiments to axioms, and thence by the light of the axioms to new experiments" (389).

> interpretation of nature by the natural and naked force of thought and memory, without the help of tables duly arranged. But not to speak of the interpretation of nature, which is a new doctrine, there can hardly be anything more useful even for the old and popular sciences, than a sound help for the memory. (435)

Regarding the quoted passage in the preceding paragraph Rossi contends that by subsuming the art of memory into his "new logic" Bacon incorporates concepts previously anchored in traditional rhetoric into what he calls "the interpretation of nature" (1968: 212). What Bacon intends to emphasize is that despite the radical discrepancy between "art of discourse" and the scientific method, they concur at least in one thing: In "art of discourse" a plethora of terms and arguments need to be recollected, while in the case of the scientific method a multitude of examples, similarly, have to be recalled in the process of reasoning (Rossi 1968: 212). That is, if proper recollection and rearrangement of preexistent ideas, which definitely require the exertion of memory, are essential for a coherent, persuasive argument, the art of memory is expected by Bacon to provide practical assistance in scientific investigations: "The aids to memory (*Ministratio ad Memoriam*) fulfil the following mission: from the confusion of particular instances and the bulk of natural history a given history is selected, and its elements are disposed in an order such as to enable the mind, according to its own capacity, to work upon" (*Partis restaurationis secundae delineato*; qtd. in Rossi 2000: 119). Rossi is quite assertive in the claim that the notion of *tabulae* (tables) is one of the essential concepts conducive to Bacon's formulation of his scientific method (2000: 120). If the function of *tabulae,* as mentioned earlier, is to reduce the inchoate jumble to a more tractable organization, Bacon, in a certain sense, equates *topica* with *tabulae*. (Rossi 2000: 120). In "Cogitata et visa," Bacon revisits the pressing importance of tables: "The first thing which one must do is set out the tables of invention, that is, the former for a legitimate investigation of clearly defined arguments, which is to say a particular matter ordered appropriately for the work of the intellect" (qtd. in Rossi 2000: 120-21). In the same article we find Bacon reiterate the importance of tables: "He [the interpreter] thought that this mass should be reduced and digested into Tables and regular order, that the Intellect may be able to act upon it" (qtd. in Martin 156). In the preface to *Inquisitio legitima de motu*, Bacon sketches out the function of the *topica* and carefully differentiates between two types of tables.[36] Rossi points out

36 The first type includes "those which collect together the most evident facts and refer to a particular object of research," and the second "those which have the more important task of aiding the intellect to understand 'that which is hidden,' penetrating into the 'form' of things" (Rossi 2000: 121).

that in his writings Bacon, assuming that the world is rife with convoluted paths and delusive appearances always ready to bewilder human beings, displays a tendency to liken the universe to a labyrinth or a forest (2000: 121).[37] A parallel comparison of the universe to a labyrinth laden with distracting pitfalls or to a bewildering forest can be found in the preface to *The Great Renewal*:

> The fabric of the universe, its structure, to the mind observing it, is like a labyrinth, where on all sides the path is so often uncertain, the resemblance of a thing or a sign is deceptive, and the twists and turns of natures are so oblique and intricate. One must travel always through the forests of experience and particular things, in the uncertain light of the senses, which is sometimes shining and sometimes hidden. (Bacon 2000: 10)

It is this kind of apprehension that makes methods all the more urgent for Bacon (Rossi 2000: 121). In a word, if one of the primary tasks of methods is to bring some order into the hitherto chaotic reality, the art of memory can serve as a useful assistance in the elimination of confusion.

As for the use of tables in the elimination of confusion, Bacon's further discussion can be found in the second book of *The New Organon*. The subtitle of *The New Organon*—Aphorisms on the Interpretation of Nature or on the Kingdom of Man—bears eloquent testimony to the fact that Bacon devotes this monograph to proposing an important but overdue undertaking: the interpretation of nature. Bacon in the first place suggests that the task of human science "is to find for a given nature its Form, or true difference, or causative nature or the sources of its coming-to-be" (2000: 102). Then Bacon deplores the benighted and lethargic state of current human knowledge, and claims that those currently pursuing the profession of science should be held responsible for the lamentable status quo (102). The title *The New Organon*, it needs to be noted, is derived from Aristotle's work on logic, "the 'Organon' or 'Instrument for Rational Thinking'" (Jardine 2000: xii).[38] On several occasions in *The Advancement of Learning* Bacon argues unambiguously that Aristotle's logic is

37 It is interesting to note that a similar sense of misgiving is also found in Descartes, who, therefore, calls for a method to prevent himself from tumbling: "Nevertheless, like a man who walks alone in the darkness, I resolved to go slowly and circumspectly that if I did not get ahead very rapidly I was at least safe from falling" (14).

38 In her *Francis Bacon: Discovery and the Art of Discourse*, Jardine points out that Bacon considers *The New Organon* "a logic" in the sense that "it is to provide the universal tool for a complete understanding of all those things which are accessible to human reason" (1).

outmoded for the "modern" pursuit of knowledge.[39] Thus, a new method or "organon" is urgently needed. Apart from *The New Organon*, in the second book of *The Advancement of Learning* Bacon similarly urges a new direction to tie in with the advent of a new age: "But the principal of these is direction… and Salomon [Solomon] excellently setteth it down, *If the iron be not sharp, it requireth more strength; but wisdom is that which prevaileth;* signifying that the invention or election of the mean [sic] is more effectual than any inforcement or accumulations of endeavours" (322).[40] Moreover, when Bacon expounds the second part of *The Great Renewal*—The New Organon, or Directions for the Interpretation of Nature—we encounter the following description: "And the art which we apply (which we have chosen to call Interpretation of Nature) is an art of logic, though with a great difference, indeed a vast difference" (2000: 15).[41] To sum up, what Bacon tries to institute in *The New Organon* for his ambitious project, as Jardine puts it, is a "methodological infrastructure" (2000: ix).[42]

If *The New Organon* is aimed at superseding Aristotle's method emanating from syllogism, then the most distinctive difference between Bacon and his precursor is the former's emphasis on first-hand observation of the natural world.

39 Bacon's aspersions on Aristotle and the logic bearing his name began to take shape in his teens. William Rawley, one contemporary of Bacon's, mentions in his *Life of Bacon* that "Whilst he was commorant in the university [Cambridge], about sixteen years of age… he first fell into the dislike of the philosophy of Aristotle; not for the worthlessness of the author, to whom he would ever ascribe all high attributes, but for the unfruitfulness of the way; being a philosophy only strong for disputations and contentions, but barren of the production of works for the benefit of the life of man; in which mind he continued to his dying day" (4). Gaukroger, however, contends that this account cannot be taken at face value, and that the dislike displayed in this quoted passage acts more as a juvenile dissent against the hegemonic dogma represented by Aristotle (39).

40 The adage in italics is from Ecclesiastes (10: 10).

41 The other five parts are as follows: First, *The Divisions of the Sciences*; Third, *Phenomena of the Universe*, or *A Natural and Experimental History towards the foundation of Philosophy*; Fourth, *The Ladder of the Intellect*; Fifth, *Forerunners, or Anticipations of Sound Philosophy*; Sixth, *Second Philosophy*, or *Practical Science* (Bacon 2000: 14).

42 Jardine, however, cautions that though most modern accounts of *The New Organon* tend to consider it an innovation in purely formal methodology, Bacon's active involvement in current applied sciences is attested to by many passages in it (xviii). Jardine indeed reminds the reader that a correct understanding of *The New Organon* hinges on the cognizance that *The New Organon* is stimulated by "a strong commitment to technical scientific instruments" (xii).

While Aristotle's system focuses on certainty and can "reliably derive conclusions which were logically consistent with an argument's premises," Bacon's is meant to "investigate the argument's premises themselves" and advocates direct observation of the natural world in its raw state (Jardine 2000: xii). Accurate, shrewd observation and carefully-conducted experiments are necessary prerequisites to the scientific consideration of any subject: "Directions for the interpretation of nature comprehend in general terms two parts: the first for drawing axioms from experience; the second on deducing or deriving new experiments from axioms" (Bacon 2000: 109). Scientists prior to Bacon, Jardine argues, largely construe observation and experiment as tools to test the validity of a prediction derived from deductive reasoning, yet Bacon anticipates that the process of collecting, classifying, and dissecting the abundant information garnered from the natural world can help conceive a truly revolutionary scientific theory (2000: xv).[43]

As mentioned in the previous paragraph, in *The New Organon* Bacon contends: "Directions for the interpretation of nature comprehend in general terms two parts: the first for drawing axioms from experience; the second on deducing or deriving new experiments from axioms" (109). Moreover, "The former is divided three ways, i.e. into three kinds of service; service to the senses, service to the memory and service to the mind or reason" (109). Bacon continues this argument by elucidating why "drawing axioms from experience" hinges on the use of tables: "A natural and experimental history is so diverse and disconnected that it confounds and confuses the understanding unless it is stopped short, and presented in an appropriate order. So tables must be drawn up and a coordination of instances made, in such a way and with such organisation that the mind may be able to act upon them" (109). That is, whether in rhetorical discourses or in scientific investigations, when faced with a multitude of discrete instances a proper organization such as tabulation or classification is absolutely desirable, and memory can lend its due succor in this process. For example, a scientist trying to interpret nature may first pen down the findings in tables, from which he or she may extract more fundamental principles at a later time (Wallace 156).

For Bacon natural memory falls short of being a qualified device for scientific research unless it is supplemented by "artificial memory," which counts on a sound

43 This by no means indicates that observation and experiment did not exist in pre-Baconian "sciences." Kuhn, for example, argues that many passages in Aristotle's writings are not unlike those in Bacon's in terms of their shared emphasis on close observation (41). He, however, notes that there exist essential differences between experiments practiced by seventeenth-century scientists and those undertaken by ancient and medieval scholars. For more details, see Kuhn, pp. 41-43.

grasp of "topics" (Rossi 1968: 214). In this sense, we are entitled to say that here Bacon's idea is similar to those in the topological mnemonic tradition dating back to Quintilian, and that Bacon's associating memory with *loci* is by no means a coincidence. In *The New Organon*, Bacon explains why "places" can help improve our memory:

> 'Places' may be either places in the literal sense, such as a door, a corner, a window and so on, or familiar and well known persons, or may be anything at all (provided they are put in a certain order), such as animals or herbs; also words, letters, characters, historical persons etc., though some of these are more suitable than others. Such 'places' give remarkable assistance to the memory, and lift its natural powers. (142)

The gist of this passage is that "places" as a mnemonic device can help us more easily locate the goal we seek for without being drowned in a flood of instances and data. Bacon terms this process "curtailment of the unlimited": "For when one attempts to recall something or bring it to mind, if he has no prior notion or conception of what he is looking for, he is surely looking, struggling and running about here and there in a seemingly *unlimited* space" (142). Indeed, different versions of the concept "prenotion" can be found in the works of Ramus, Melanchthon (1497-1560), Rosselli, Romberch, and Gratarolo (Rossi 1968: 214). Despite the pronounced discrepancies in the respective scopes and *foci* of these works, all these thinkers attach considerable importance to "places" as a means of orientation in the otherwise disconnected and chaotic field. For example, for Melanchthon *loci* "advise us when material is to be sought or generally as to what should be selected from the great heap available and in what order it should be classified" (qtd. in Rossi 1968: 214). To sum up, Bacon does not explicitly address how to improve contemporary art of memory, and the assistance he expects of mnemonics in the interpretation of nature is for the most part concerned with the classification of things. And it is no coincidence that the concepts frequently mentioned in Bacon's discussion of mnemonics, such as order and arrangement, are also useful in the classification of things, which, for Bacon, is amongst the most fundamental essentials in his new science.

In view of the importance Bacon accords to classification, a brief survey of how Bacon classifies the whole of knowledge in *The Advancement of Learning* will shed more light on this key concept. The attempt to chart the whole of knowledge, Bacon tells us, is to map out an atlas of knowledge and to serve as a compass to orient explorers of knowledge: "I will now attempt to make a general and faithful learning perambulation of learning, with an inquiry what parts thereof lie fresh and waste, and not improved and converted by the industry of man; to the end that such a

plot made and recorded to memory may both minister light to any public designation, and also serve to excite voluntary endeavours" (328). Two aspects concerning the classification of knowledge should be noted, however. First, this kind of ambitious undertaking can date back to Aristotle (Gaukroger 18). The second dimension is more noteworthy: In the sixteenth and seventeenth centuries there was no dearth of all-encompassing works that aspired to formulate a comprehensive classification of knowledge (Gaukroger 18-19).[44] In the second book of *The Advancement of Knowledge* Bacon invariably divides a certain domain of knowledge into several parts at first, and continues the process by dissecting each division into finer partitions. A typical example proceeds as follows: "The knowledge that concerneth man's body is divided as the good of man's body is divided, unto which it referreth. The good of man's body is of four kinds, Health, Beauty, Strength, and Pleasure: so the knowledges are Medicine, or art of Cure; art of Decoration, which is called Cosmetic; art of activity, which is called Athletic; and art Voluptuary, which Tacitus truly calleth *eruditus luxus*, [educated luxury]" (370).[45] Despite the diversity in his compartmentalizing the universe of knowledge, Bacon alerts us that all branches of knowledge are, in essence, interconnected, since if these particular bodies of knowledge are not "nourished and maintained from the common fountain," they are bound to become "barren, shallow, and erroneous" (367).

For Bacon, in the invention of arguments one of the difficulties issues from the failure to efficiently handle the overwhelming multitude of information swarming toward us at a stroke; similarly, in scientific studies, one of the thorny problems is how to organize the facts we collect. Therefore, Bacon suggests that mnemonics can serve as a possible solution to this knotty problem in the interpretation of nature:

> The memory-aids perform the following function: they help one to draw up a particular history whose parts are disposed in a particular order from the immense multitude of particular facts and from the mass of general natural history. . . . Firstly, the things to be investigated for a given problem should be set out in the same way that one sets out topica. Secondly, one should set out how, and at which moment, the research will be integrated and the preceding pages or tables transposed into new

44 Gaukroger enumerates several attempts, some of which might strike modern readers as amusing. Della Porta's *Magia Naturalis*, for example, contains many realms usually considered not serious enough, such as "the art of beautifying women" (Gaukroger 18). For other instances, see Gaukroger, pp. 18-19.

45 The cases mentioned in the second book of *The Advancement of Learning* are abundant, and the variety of the realms under discussion is staggering. To avoid tedium, I have selected only one case.

tables. (*Partis restaurationis secundae delineato*; qtd. in Rossi 2000: 119)

From Bacon's *Partis Instaurationis Secundae* Rossi sums up the correlation between Bacon's conception of mnemonics and his logic of scientific knowledge, and how the former conditions and catalyzes the latter. In a word, Bacon intends, though unsuccessfully with today's hindsight, to transform the collection of "rhetorical *loci*" into a collection of "natural *loci*" (Rossi 2000: 123). According to this line of reasoning, we may safely conclude that the art of memory, though appearing antiquated for modern people, did wield a subtle influence on Bacon's formulation of the scientific method if we acknowledge that the success of a scientific study hinges on proper classification in the first place.

Conclusion

From the previous analysis, it is warranted to conclude that for Bacon the art of memory acts more as a general roadmap in organizing and categorizing information than as an array of practical skills to memorize as many things as possible. However, as Yates suggests, how Bacon improves the art of memory or whether he has employed energy to the betterment of mnemonics is unclear (358). What we do know hitherto is that Bacon tends to regard mnemonics as a highly potential device that can help organize and classify things and, eventually, facilitate scientific inquiries. Regarding this aspect, Yates also claims that Bacon intends to transform contemporary art of memory into a method of classification (358).

However, it is noteworthy that Bacon was far from the sole case in his time in terms of the effort to generalize principles of classification from the art of memory. We can draw on Bruno's case to shed more light on the intriguing relation between mnemonics and classification in the formative years of modern science. Remembering, indicates Rowland, is Giordano Bruno's (1548-1600) chief profession; in other words, Bruno earns both his living and his repute by tutoring "artificial memory" (62). His mnemonic techniques basically hinge on a simple principle that has been mentioned several times earlier: associating words with images. Bruno, also deeply embedded in the heritage bequeathed by classical orators, exercises his art of memory primarily by mentally constructing imaginary architectures. As Rowland points out, Bruno always keeps reminding people that his skill is the outcome of constant and sedulous exercise, and that anyone with ordinary intelligence can attain the skill through considerable practice (64).

The particular mention of Bruno's prodigious memory here is not to pore over the technical details in his mnemonics. The crux of this reference is to foreground the importance of mnemonics in Bruno's conception of classification and to

demonstrate that this concern is also true of Bacon.[46] In *On the Shadow of Ideas* Bruno expresses his conception of artificial memory as follows: Artificial memory is essentially an application of thought to "presenting, modeling, noting, or indicating in the likeness of painting or writing, in order to express or signify" (qtd. in Rowland 123).[47] That is, the art of memory, when construed as an assistance in classifying things, groups thoughts into what Bruno calls "a distilled and developed order of conceivable species, arranged as statues, or a microcosm, or some other kind of architecture . . . by focusing the chaos of imagination" (qtd. in Rowland 123). Here we can spot the noteworthy similarity between Bruno's and Bacon's notions of mnemonics in that both Bruno and Bacon hanker for an immanent order through classification.[48] Bruno, in a certain sense, tries to elevate the status of mnemonics to a higher level by conferring a halo on it: "a technical extension or ordered reserve in the imaginative faculty, consisting in species of receptacles that flow in from the windows of the soul, divided into different parts, to receive all things seen and heard and retain them according to the pleasure of the soul" (qtd. in Rowland 125). All in all, though it is impossible to do full justice to Bacon's conception of mnemonics, perhaps we can borrow Rowland's words which are originally meant to summarize the real spirit of Bruno's art of memory to encapsulate what service Bacon believes mnemonics can render to the interpretation of nature: "to order sense perceptions, imagination, and ultimately, understanding to reflect the basic harmony of the world itself" (125).

46 Both Bruno's first extant publication, *De umbris idearum*, and his swansong, *De imaginum*, are on mnemonics (Gatti 176).

47 I am indebted to Ingrid D. Rowland for her illuminating introduction to Bruno's life and works in her *Giordano Bruno: Philosopher/Heretic*, since only a small portion of Bruno's works have been translated into English.

48 Gatti explicitly points out that Bruno is a "precursor of a Baconian investigation into natural causes outside the sphere of metaphysics and theology" (1).

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記憶術與培根

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摘 要

本文主旨在於探討記憶術對培根（Francis Bacon）科學方法的影響。正文大致上可分為兩個部分。第一部分藉由檢視柏拉圖、亞里斯多德、西塞羅（Cicero） 、昆體良（Quintilian）及奧古斯丁等人的作品簡述西方記憶術的起源及其與古典修辭學的關聯。這一部分特別著重古典記憶術中將想要被記住的事物用特別意象編碼並將其依序安置在特定空間（如想像的建築物）的特殊面向。以第一部分所獲致的結論為基礎，第二部分則試圖說明在培根的時代雖然印刷術的逐漸興起使得記憶術日益過時，記憶術對培根所提倡的新的科學方法產生間接的影響。簡言之，培根並不特別看重記憶術是否可以幫助一般人擁有令人目眩神迷的記憶力，而引起其注意力的則是記憶術可以增進人類分類的能力，而分類能力正是人類在試圖觀察、紀錄並進而解釋自然時其中一項重要工具。另外本文也援引與培根大約同時代的另外一位西方科學的先驅布魯諾（Giordano Bruno）的例子說明從記憶術尋求分類的法則，在十七世紀的歐洲培根並不是唯一的例子。此外本文在說明記憶術在培根時代的流傳程度時，也討論了在第一部分所提及的古典記憶術曾經藉由利瑪竇及艾儒略傳入十七世紀的中國。

關鍵詞：培根　記憶　記憶術　修辭學

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