MENTAL IMAGERY

(The College and Contemporary Cognitive Science)

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Homecoming Lecture

September 1985

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I am very much alive to the fact that this is Homecoming weekend-- homecoming not only for the alumni but also for me. I've been gone from St. John's far and long-- as far as Delaware and as long as a year. So I look on the place where I've spent exactly half my life as an astronaut in outer space looks on the very small planet which is home. That, together with the nature of tonight's subject prompts me to indulge in five minutes worth of looking backwards.

When I came to the college well over a quarter century ago, I entered a fresh and heady world of learning, leaving behind what I felt, rather than understood, to be a hide-bound, dreary academia, the academia of the decade after the Second World War. The college, then only existent in Annapolis, was less than a third the size it is on this campus now, and it had a kind of guardian spirit, a philosopher king, as one might say (provided one said it with a smile), in Jacob Klein, the Dean. It was conveyed to me that he had described me as behaving like a fish in water, and that was just how I felt-- like one who was disporting herself in her element, to whom understanding came as she breathed. I am recounting this largely for the freshmen among you. For as it may for you, it turned out for me that one cannot glide along in freshman glory forever-- there followed the notorious sophomore slump bringing sophomore sobriety and with it a second beginning, the exchange of a weightless exhiliration for a better-anchored interest. One can't be forever tumbling about in one's element;

the time comes when the thronging intimations of truth have to be turned into precise questions and problems. The program itself offered the way: twenty-eight hundred years' worth of commentary on fundamental questions, not excluding the question whether these are always the same or subtly or even cataclysmically different in different ages.

So, like most of my colleagues at the college, I paid only very passing and largely aversive attention to the contemporary state of affairs. (I mean intellectual affairs since ignoring politics for very long is what a citizen does at her peril.) At the end of tonight's lecture I mean to make a principled argument for living in isolation from "current thinking", from vogues and trends, for long stretches of time. Nonetheless, a moment eventually came, and happily an opportunity too, for catching up. I simply felt a certain avidity to know what the world was saying. I did a lot of reading, but of course I haven't begun to master the matter-- no one could, anyhow. Yet I think I have certain inklings concerning at least one area and its associations which I'll come to in a minute.

Let me, though, repeat to you in the largest and vaguest terms my first impressions: Our contemporaries have verve and sophistication. Quite a few of the best are, not to mince words, charming (or not so charming) smart-alecks. Their intellectual mode has explicitness, precision and often a kind of purity. All the possibilities which used to remain obtusely unconsidered in the mid-century have been articulated and worked over. The engine of invention has been producing faster and faster, and the mill of rational speech has been grinding finer and finer. I hear that there is a Chinese curse: "May you live in exciting times" and also a Greek counter-curse: "May you hear nothing new". Well, we're

afflicted in the way of China and blessed in the way of Greece-- at least on the face of it.

I want to claim right away that this condition of affairs can't help but draw in the college. It may and ought to affect the program in only a limited way, but I think it might put us in a new position vis-à-vis the intellectual world which I want to sketch out in a broad and somewhat undigested way later on. Consequently my lecture will have two parts, which I will call, with grand simplicity, Psychology and Philosophy, the first to set out what I learned this past year and the second to be a sort of coda of conclusions for us. So then:

I. Psychology

Again, I must begin with a bit of intellectual history, both personal and public. For a decade now my thoughts have circled about the theme of the imagination. In fact, I have collected so much stuff that my ideas are beginning to sink under its weight-- the time has come to carve out some conclusions. As for the theme itself, I have been drawn to it along several approaches-- and, as I've learned, when all roads lead to Rome, to Rome one must go.

One of these approaches is bookish. The imagination plays the role of the missing mystery in a number of philosophical texts, by which I mean that a faculty by that name is given a central task while its operation is left sanguinely unexplained. As Kant says, it is: "a hidden art in the depth of the human soul." I might say here what is, broadly, meant by imagination in the philosophical sense: It is a faculty which presupposes that somehow or another two worlds of objects are present to us, one of

which seems to us to be outside, the other inside ourselves. The inner world, in turn, appears to consist of two realms, one of which, though lacking a certain feature of "thereness" which belongs to the external world, has at least one characteristic apparently and yet elusively in common with it: it is shaped and colored and, in short, space-like; the other realm is non-sensory and word-like. Philosophical texts have much to say on the role the imagination plays in cognition, that is, in knowing. Lately they have said quite a bit about the unintelligibility of imagining, but what has rarely been confronted head-on is the question: "How is such an ability possible?" And that is what intrigues me.

Another approach is through politics. The imagination is a puzzle not only as a universal cognitive capability but also as a general human gift which may be abused either through hyperactivity or desuetude. I've become convinced that most political catastrophes are connected to a fault in imagination: the inability to imagine accurately the minute daily detail which any large vision might entail. So I became interested in what one might call "imaginative coherence", or the projective powers of the imagination.

The third and last approach I'll mention is through the fact that the imagination is usually regarded as the source of made-up realms such as dreams and fictions. Since by my reckoning I spend about 62.5% of my day betwixt the one and the other of these, I wanted to learn something about the power that is behind these non-existent and all-important worlds. But tonight I haven't got much to say about that topic.

In search of a clue to my theme I set about reading the shelves of the excellent research library at the University of Delaware where I am teaching. It turns out that there is a new and burgeoning science called

cognitive psychology and in it a fiercely embattled area called mental imagery. The title of tonight's lecture, "mental imagery", betokens the translation into the new science of the old mystery concerning inner, space-like representations ("re-presentations", as opposed to the original external presentation, though our juniors are about to learn that most philosophers of the seventeenth and eighteenth century think that representations are all we have).

The newness of the science that studies mental imagery is expressed in the fact that most of what I am about to report to you was published within the last five years. That it is indeed a science can be seen from its method: It tortures nature, as Kant puts it, or teases out the facts, as psychologists like to say, by simple but clever experiments. As for the slippery and intriguing business of turning a philosophical question into a scientific problem-- what changes the issue undergoes on the way and which endeavor ends up guiding which-- I hope to say something about that at the end.

To introduce cognitive psychology and to explain its special interest in mental imagery, in what actually goes on when we see images before the mind's eye, I must one last time go backward to give you a thumbnail sketch-- written on a tiny thumb at that-- of the history of psychology.

The state of psychology represented a considerable part of the afore-mentioned intellectual dreariness of the mid-century. In the half-century which lies between about 1910 and 1960 the discipline was dominated by two schools, a soft one and a hard one, so to speak. The former was psychoanalysis. Freud proposed as a provisional theoretical framework-- ultimately reduceable to biology-- a model or topography of the soul, in which the most extensive territory was assigned to the

unconscious, a pandemonium of anti-social passion, which a skillful analyst might nonetheless tease out into the open and render less harmful. Although its founder did not think of psychoanalysis as primarily therapeutic, it eventually became almost wholly the province of psychiatrists. The imagination played a role in psychoanalysis since the interpretation of dreams was thought to give access to the unconscious. However, the interest was in establishing a symbolic interpretive vocabulary for therapeutic use, and that turned out to be scientifically soft, that is to say, not extensively amenable to verification. At the same time the imaginative agency that did the dream work, that turned the passions into symbolic representations, was not itself a central subject of study. The interest in their symbolism suppressed the interest in the images. (Freud also had a theory of the origin of imagining in infantile wish-fullfilment hallucinations.)

The hard school was behaviorism. It was very much driven by what post-Freudian psychologists refer to as their irrepressible "physics envy". Its crude but forceful tenet was that to be a science, psychology must deal with what is verifiably observable. Therefore internal events, being *ipso facto* unobservable and at best known through the unverifiable reports of introspection, were excluded from its field of inquiry. No event is more internal than a mental image, and so Watson, one of the founders of the school, uttered his notorious dictum directed at reports of "reminiscence-imagery": "Touching, of course, but sheer bunk". Sir Arthur Eddington summarized this mind-set, which at once bedevils and buoys up the sciences, in a sarcasm which might well stand as the epigraph of this lecture: "What my net can't catch isn't fish".

In the sixties both empires waned, psychoanalysis because as a theory it was unverifiable, as a therapy it was expensive and as a world view it

had become established. Behaviorism, on the other hand, choked by the huge accumulations of quantified experimental results unlevigated by any interesting overall theory, more or less died of tedium, though its method, too, had seeped into general opinion.

But mainly it was a new and vigorous interest that usurped their place, the interest in cognition, in the temporal stages of learning in childhood and in the patterns and processes of cognitive events in adults. Piaget, who pioneered the former investigation called "genetic epistemology", had long had a special interest in the imagination because he thought of it not as a congenital ability but as a symbolizing function developing in the second year of infancy, intermediate between mere perception and rationality and responsible for the first interiorization of representation.

The concern with imagery in adult cognition sprang from several sources. One was a recollection of the fascinating imagery studies undertaken by experimental psychologists in pre-behavioral times. Another was the spectacular new discipline of Artificial Intelligence, the attempt to write programs which would, when run (sometimes rather incidentally) on computers, simulate human cognition. Cognitive functions involving figurative features turn out to be both rather recalcitrant to simulation and theoretically intriguing. The effort fed a very old philosophical debate concerning the distinction between space and thought, for which the contemporary computer terms-- I will just throw them out for the moment-- are given by the pair "analog" and "digital".

Yet another source of the new interest in images is the burgeoning new brain science. The gist of the problem here is that, contrary to earlier expectations, the brain events which appear to be the accompanying conditions of, or to mediate, the cognitive function of imagining show absolutely no evidence of any formations of the sort that used to be

called "engrams," formations analogous to the imagery reported by subjects. That is to say, there are no pictures in our brain, although the whole scientific community, with no significant exception, suppose that in some, often rather sophisticated, sense cognition is just brain states and events. (Note, therefore, that when I spoke before of computers merely simulating cognition and brain events merely mediating it, I was speaking far more conservatively than do most cognitive psychologists.)

The most pertinent source is, finally, philosophical, not however insofar as the imaginative faculty is acknowledged but precisely insofar as it is denied. In this century was written the first full-scale thematic treatment of the imagination that I know of in the history of philosophy, namely by Jean-Paul Sartre. He was inspired largely by Edmund Husserl, who founded phenomenology, a philosophical school which is interested in the description of experiences as experiences. However, it is not that work which most cognitive psychologist take account of but rather Ludwig Wittgenstein's scattered and, above all, Gilbert Ryle's systematic attack on the possibility and significance of cognition through mental imagery.

Ryle's Concept of Mind is one of those bold books which mask the obscurity of their position by the hard-hitting clarity of their opposition. What Ryle attacked is what he identified as the essence of Cartesianism, namely the very idea of internal mental representation which I spoke of before: the notion that we have something-- ideas, thoughts, symbols or pictures-- in or before our minds. What Ryle found absurd in mental representations, and so rejected on logical grounds, was that they required a mind's eye, a mental mannikin before which to appear; he dubbed it "the ghost in the mind's machine". What he objected to in the interiority of mental representations was their lack of public

evidence; here he followed the methodological requirements of the behaviorists-- but he went further, converting the requirement of observability into a conclusion of non-existence. It's Eddington's fishy argument all over: What my net can't catch, just isn't. Naturally, mental images were included in this annihilation.

I want to interject here a comment on the attitude of students of cognition toward ordinary experience. Their method-driven mode sometimes makes them cavalier about what they nowadays call "folk psychology", meaning everybody's natural suppositions, for example the distinction we all ordinarily make between ourselves and our bodies, and, most to the point, the fact that we all just do seem to see pictures in our head. For my part, no theory is plausible which, yielding to mere logical squeamishness, fails to begin by honoring and to end by grounding what we naturally say and believe.

This, happily, is the hypothesis of the book from which most of what now follows is taken (from it, I should say, with the aid of about six-hundred and sixty-six other texts). The author is Stephen Kosslyn, a cognitive psychologist at Harvard. The title of the book, published in 1983, is, pertinently, Ghosts in the Mind's Machine. Its impetus was the sense that, Ryle notwithstanding, we do have and also use mental images, and that methods might be devised for teasing and tricking truths about them out of subjects-- in short, to make mental imagery somehow observable by devising experiments which would make the protocols of introspection more reliable. (I should say here that Kosslyn has succeeded in developing a detailed theory of the structures and processes underlying mental imagery, but it would go too far to try to describe it tonight.)

The problem proposed itself in three parts. The part investigated first was: do people use mental imagery in solving some problem? If the answer was yes, the question: "do people have mental images?" would have been implicitly answered. The second part was to determine what the distinctive features of such imagery might be. The third part, which shaded confusingly into philosophy, was to determine the essential nature of such imagery. You might think these are plain enough questions, but to ask them clearly and to answer them productively turns out to be a, possibly bottomlessly, complex business.

The first problem, then, whether people have mental imagery, was attacked by Galton a century ago by the naively empirical method of sending round questionnaires to great men, asking them to describe their breakfast tables. It was partly the surprising response of a number of the scientists among the respondents that sent the subject into eclipse--they claimed not to have such imagery. No one regards this result as very significant nowadays; experiments presuppose that subjects can and do follow the order: "Visualize (or imagine) x"; the result of the experiments is taken further to corroborate the assumption. In the seventies Alan Shepard and his associates devised a series of experiments designed to reveal the mental representations of subjects by seeing if they actually used imagery in doing certain tasks.

(I want to note two items on the way. First people under the constraints of an experiment are called "subjects" by psychologists. It is obviously a major question whether a subject is coextensive with a full human being. Second, in order to avoid the distracting bustle of visual aids, I shall choose from a horde of experiments those most easily describable in words, and I shall omit some of the complicating control

features.)

Shepard presented the subjects with pairs of pictures of somewhat complicated three-dimensional block shapes. In half of the pairs the two shapes were slightly different, in the other half they were the same, though differently oriented, at increasing angles of rotation. The subjects were asked to look at the pictures and then to judge whether each pair included different or identical shapes. The hypothesis was that the response time would be a linear function of the angle of rotation, that is to say, subjects would take longer to answer in proportion as the second member of the pair was farther rotated from the original. The results startlingly confirmed the hypothesis, and were interpreted to mean that the subject mentally performed a rotation on the second member of the pair to see if it would be brought into coincidence with the first, taking twice as long for a doubly large angle. Consider how remarkable it is that the participants, who had been looking at mere drawings, apparently did the mental rotation of the depicted solids not flatly in the picture plane but through mental space, mimicking depth-perspective.

(I want to point out here that "reaction times" is the bread and butter of cognitive psychology, used in boring cases to festoon with numbers a dull fact no one disputes, but in interesting ones to make cognitive processes reveal themselves. It means, of course, that in the most telling cases subjects are required to report on some <u>kinetic</u> aspect of <u>pre-given</u> imagery. Since it seems to me that when most itself, most absorbing, our imaginative capacity tends to <u>self-produced</u> <u>timeless</u> tableaus and transformation, it follows that the imagery processes clocked by cognitive psychology are characteristically of a narrowly mundane sort-- but that is the price to be paid for hard results.)

It is the second part of the problem, concerning the distinctive marks of mental imagery, to which Kosslyn addressed himself. Here much ingenuity was required first to articulate the features which an internal image _might_ display and then to devise experiments to make them manifest themselves. Kosslyn, too, fell back on the very hypothesis attacked by Wittgenstein and Ryle, the notion that our imagery has something depictive, something picture-like about it.

Let us stop to see what in our experience of imagining might drive us to the picture analogy. First of all, people do in fact experience themselves as viewing their images "in their heads." --Much as they inspect scenes and portraits and still-lives outside, they seem to be gazing on appearances in inner space. (In fact, there is a curious and beguiling theory that the earliest art images are cave paintings because caves serve as a physical representation of the black internal space that appears when the eyes are shut.) Furthermore, they don't think that the landscape or persons or objects themselves appear but their likeness or image, just as happens in a picture. That's after all, exactly why we call it "imagining". Not to be what it represents is the hall-mark of any image, be it on mirrors, reflecting pools or photographic plate, as you can read in Plato's _Sophist_. And finally, mental images share with artificial images the fact that they are shaped by and imbued with the author's knowledge and feelings, and sometimes even more: It seems somehow to be possible to imagine and to paint what the eye of perception has never seen.

Guided by some such considerations (and helped by the new field of visual information processing), Kosslyn could frame a first precise question: Do we actually scan our interior images? To elicit an answer he devised the following double-checked experiment. Subjects were shown

a picture of an island containing seven unevenly distributed features, a rock, a tree, a beach and so on. They were to inspect it until they could hold it before their mind's eye, and fixing on a given location, they were to determine whether or not a certain announced feature was on the island by making an imaginary black speck move to it at top speed, and when it had arrived, they were to press a button. The reaction times bore out Kosslyn's expectations. The little speck took proportionally more time to reach more distant features. Subjects were evidently passing mentally over the intermediate distance, that is to say, mentally scanning their images.

To explain the double check part of the experiment I have to begin to say something about an old battle of latter-day gods and giants that rages in cognitive psychology. These days the antagonists are called "imagists" and "propositionalists", or, for fun, "iconophiles" and "iconophobes". The former claim that we both have images and use them cognitively along with propositional thought. The latter (whose chief proponent is Zenon Pylyshin) argue either that we don't have them, or that if we have them we don't use them-- that they are merely along for the ride, "epiphenomenal," and that all cognition is propositional. I won't attempt to be precise about what is meant by "propositional" (except that it implies not-figurative and non-spacial representations), but let Kosslyn's double-check indicate the distinction. After having had his island experiment criticized by the propositionalists because, they claimed, reaction times could have been the same had the subjects run through mental lists of features rather than scanned their mental images, Kosslyn simply instructed a second group of subjects not necessarily to use images but just to answer as quickly as possible, on the supposition that seven features could easily be kept in mind as

a list. Lo and behold, reaction times were indifferent to the distances of the features from base. Apparently the task could be done either by scanning mental images or by consulting a word-like mental list.

Next Kosslyn investigated the mental image as object. First he posed a rather startling question suggested by the picture analogy. As opposed to sculpture in the round, picture images, be they mirror reflections, newspaper photographs, paintings or wax impressions, are all manifested on a medium: silvered glass, newsprint on paper, paint on canvas, wax. The question became: Do mental images have a medium which underlies all imagery in general? What is the inner picture plane like? For example wax takes impressions differently if it is dry or soft (here Kosslyn cites Plato's Theaetetus where the mental medium is compared to a wax tablet), and paper can be coarse or fine grained. Does the mental medium too set a limit on the resolution of images? If so, it would underwrite the picture-likeness of the imagery, since pictures are distinguished from their real originals precisely by the fact that we can expect real objects to offer almost infinite prospects of detail, bounded only by the acuteness of our sight, whereas a picture has an inherent limit of resolution past which we are no longer looking at the images it carries; for example, a human being can be inspected down to the pores of the skin and beyond, while a newspaper photo presently dissolves into mere dots.

To test the grain of the mental medium, subjects were asked to commit to memory pictures of a rabbit next to an elephant and of a fly next to a rabbit, so that the larger animal would in each case take up most of the mental space. They were then asked to report the features of the large and the small animals. The latter took consistently more time, as if the small features were harder to see, or as if the viewers had to zoom in on them. Since many people have a favorite familiar rabbit while few have a favorite

fly, they were also asked to look at a tiny rabbit next to a large fly, lest they be reporting features from mere verbal memory. Again the tiny animal's features took longer to make out. Kosslyn concluded that the mental medium had a definite grain which makes small objects harder to discern-- perhaps somewhat dubiously since the result might be equally attributed to the resolving power of the mental eye. But then he didn't consider the mind's eye to be an organ of sight, as we will see. (I must inject here a doubt I feel about Kosslyn's procedures, which is that he always has subjects memorize objects which are pictures to begin with, that is, he works with mental images of real images. There may be a predisposing factor in that, but let us set it aside for this lecture.)

Again the propositionalists demurred, claiming that subjects were not inspecting mental images but verbal-like lists of features. They would look at the larger animal, which also had more features, first and store its description in their short term memory. (Short term memory is the kind of memory where we "keep", say, telephone numbers we have just looked up between the book and the dial.) Now experiments have shown that the short term memory can hold only plus or minus seven items. Consequently the small animal's features had simply been crowded out, and subjects would have to dig into their long term associative memory files, where general coherent knowledge about flies is stored, to answer questions about them, and this would take longer.

Again Kosslyn devised a double-check. When subjects are asked without a picture whether cats have claws they can answer just as immediately as when asked if they have heads. In fact, claws which are spatially small, have as much associative memory strength as heads which

are comparatively large, but when subjects are asked to answer the question by inspecting a mental image, they nonetheless take longer to ascertain the presence of claws than of a head. The medium does seem to obscure small features, and furthermore, in general, we seem to be able to solve memory tasks in two ways, through mental images and through verbal registration. (Ask yourself, for example, how many windows there are in your house. Most people answer by taking a mental walk through the place. Now wait five minutes and ask yourself again. Usually the answer will come in a word-- fourteen in my case.)

Finally, Kosslyn considered, a medium has a size and a shape. For real pictures these are given by the dimensions of the frame. For our perceptual window on the world the size is given by our angle of vision and the shape by the fact that our eyes are set horizontally side by side-- consequently our visual field is roughly elliptical. To measure the size of the field-medium, Kosslyn had subjects mentally walk toward memorized images of animals of various sizes, a rabbit, a dog, a cow, until they overflowed the mental field. The subjects then placed a real tripod at a distance from a real wall which they judged equal to the mental distance of overflow of each animal. That distance, it turned out, increased proportionally with the size of the animal. The angle of sharp central mental vision, was calculated with a little trigonometry to be rougly 25°, similar to that of the perceptual field. Furthermore, subjects were to imagine walking toward a foot-long ruler held first horizontally and then vertically. The vertical ruler overflowed the field sooner than the other, showing that the inner medium, too, is roughly elliptical in shape.

Most people suppose that seeing and imagining have similarities. That they can be confusingly alike was shown in a famous experiment made

by Perky in 1910 on the eve of the great eclipse of imagery studies and replicated more recently in improved format. She seated subjects before a screen in a well-lit room and asked them to project the mental image of, say, a banana on the screen. (There seem to be animal and vegetable psychologists.) Unbeknownst to them she projected a faint slide image on the same place. Subjects declared themselves a little surprised that while they were thinking of the banana as lying on its side, they kept imagining it as standing on end, but no one caught on. Kosslyn considers her results as well as his to indicate that perceiving and imagining share certain cognitive processes: For him that means, of course, that they share brain mechanisms, (his book has the subtitle "Creating and Using Images in the Brain"), those namely which take place well behind the organs of visual perpception, as suggested by the fact that people who lose their eye-sight in youth continue to have mental images.

So much for a small sampling of the experiments and their results. Now comes the serious business, the effort to say what all this might amount to, in itself and for us.

II. Philosophy

I hope I have not left you with the impression that the so-called propositionalists have been repulsed. All the conclusions have been called in question, though for my part, I'm persuaded by the design itself of Shepard's and Kosslyn's experiments that introspection can be tricked into yielding disciplined, hard information about internal, that is, psychic, states and events while the results indicate first, that we have an internal space-like receptacle which resembles in some respects the medium of pictures and in others the field of perception, and second, that the images therein

are cognitively effective, that they are at least sometimes used in the act of knowing and are not merely epiphenomena-- idle accompaniments of cognition. That's what I am persuaded of, but as I mentioned, in cognitive psychology the battle continues to rage-- some say ad nauseam. I think, however, that the combatants show good instincts in carrying on, because although within cognitive science it may be that as the formulations become more and more refined the issue becomes more and more obscure, and perhaps finally recalcitrant to experimental resolution, from the philosophic point of view the question won't go away.

Before summing up what, in rock-bottom terms, that question is and why it matters, let me just quickly run through some of the subsequent perplexities concerning the imagination. There is the great dual question about the relation of perception and imagination: could we perceive if we didn't imagine?; can we image what we haven't perceived? Then we might ask whether we inspect our mental images passively or whether in beholding them we are actually producing them. Then there is the question of the difference between real images and imagination-images: what is the distinction between perceiving an image such as a portrait, and imagining a perception, such as the visualization of a friend's face? Then we can ask about composition of images: are they wholes made of parts?; for instance, can they fade in sections or are they fragilely integral, generated and lost as a whole?; and in general, how sturdy or evanescent are they? Are they altered piecemeal or by so-called blink transformations? Do they obey compositional laws like the "law of good form" proposed by the Gestalt psychologists? And since mental images, whatever else they are, are somehow images, there are all the questions about the way they mix being and non-being first raised in Plato's Sophist and now treated in logic under the heading of fictional or non-existent objects. These are the

enticing inquiries which would come next.

But for now let me state the two terms which seem to sum up the debate, as I said, in the most rock-bottom and revealing way, namely: depiction vs. description (Ned Block). The pictoralists say that some of our mental representations are picture-like. Aristotle's famous remark that "the soul never thinks without images" would seem to be the founding dictum of this camp. (Though that has been doubted, in fact by Martha Nussbaum, who lectured here a couple of years ago, in her commentary on the De Motu Animalium.) The descriptionalists claim that all our mental representations are language-like, that our inner representations although about the world are never like it.

I am now going to conclude by trying to show what matters about this controversy and how it might affect us in particular.

First, you might think it was pretty obvious that the debate would drive its proponents smack into such questions as: what is depiction? What can it be but the representation of an object as a space-like image (not, by the way, necessarily visual)? But what is representation, what is space, what is an image? Well, the psychologists mostly do what I've done tonight, skirt around these questions. But when the moment comes to take them up a student of this program should be way ahead. What is the inner point of the sophomore study of analytic geometry, for instance, but to think about just these issues? There is a picture on one side of the text and an equation on the other. The diagram is spatial and figurative and appears to image something. The equation consists of letters and signs and seems to symbolize something. Are they two manifestations of the same object which they represent differently? Is the equation closer to words or to logic than the figure is? What is the difference among figure, symbol and word, and what difference does that

difference make? A successful sophomore mathematics tutorial cannot help but be a rather deep introduction to the depiction-description debate. In fact, come to think of it, our study of Apollonius already offers a prime introduction to the issue: Remember the propositions where figure and words jibe at the beginning and at the end, but in between you are required to follow letter manipulations, which are geometric nonsense (or are they?) while on the other hand, Apollonius' very understanding of his curves as conic sections can't be adequately rendered in symbols (or can it?).

Images, however, are only a subheading of the category representation, and mental images come under mental representations in general. Cognitive psychologists are one and all committed to the existence of mental representations-- else what would their experiments be forcing into the open? But as I mentioned way back in this lecture, students of philosophy in this century have taken to attacking the whole notion of representation. Recall that the title of Kosslyn's book Ghosts in the Mind's Machine was intended as a rebuttal of Ryle's attack on mental representations, images, of course, in particular. Kosslyn could take this position because he thinks he has solved the very problem of that mind's eye before which the images appear whose necessity made mental imagery an absurdity to Ryle. Of course, the mind's eye is just a sub-problem: all mental representation requires a self, or subject or, derogatorily, a "homunculus", before whom the representations are present, and that fact always leads to bottomless difficulties-- though, in my opinion these are mysteries we'll just have to live with. I mentioned earlier on that Artificial Intelligence, or computer simulation of cognitive processes, was one of the impulses behind the new study of mental imagery; Kosslyn was able to construct a computer model of his theory, and it is indeed through a

computer analogy that he means to dispose of the question: "what or who watches the pictures of the mind?" The answer is simply that the imaginal medium of a computer, the display screen, is actually an array of dots, and that the computer's central processing unit, the analogue of the mind's eye, can "interpret" the imagery because it is immediately translatable into words and numbers like: there is a dot in row 5, column 7. So a computer can both generate and read images without benefit of a mind's eye. "Good-bye homunculus" is Kosslyn's chapter heading for this solution.

Now, to my mind, it is both a surrender and an evasion (though, I should add, Kosslyn seems to know exactly what he is doing-- I just can't make out his explanation), it is a surrender of the notion that imagery has some ultimate cognitive independence or value, because it implies that an image is only what is called an "emergent" whole, or as he says: a display "does not have to <u>be</u> a picture to function as one". That is to say, the image emerges from non-figurative elements, namely from dots marking coordinate positions. Furthermore the interpretation, so called, of the image, the computer simulation of its comprehension, is nothing but just the stored matrix of these points expressed in words and digits, or even in digits only. In short, images are at the bottom "digital", and not "analog", a pair of terms from computer science which I've mentioned before, referring to discrete word-, digit-, or symbol-like representations as opposed to continuous, figurative or space-like representations. What we know when we apprehend an image is finally its algebra, just as Descartes first implied in his <u>Geometry</u> which, as I mentioned, we study so carefully for that very reason.

The evasion in Kosslyn's solution to the mind's eye perplexity is simply this: As he explicitly says, <u>cognitive science is not competent to deal with experience</u>, with the conscious sense we have of our cognition,

(although Dennett has tried to provide cognitive science with a theory of consciousness). As a science it is bent on turning the interior into an exterior, on making inner processes observable, and consciousness is hopelessly and recalcitrantly and essentially interior. (It is this conscious experience to which the phenomenological school of philosophy which I mentioned before specifically attends.) Consequently, the computer analogy simply circumvents the perplexing sense we have of an inner vision-- an evasion which is practiced throughout the Artificial Intelligence community, only that generally the "what my net can't catch isn't fish" principle is in full force. What is evidently possible, though hellishly complex, is to devise equipment and programs which will "perceive" simple scenes, and image them, or put images having the established features of mental imagery on the display and read them off-- an accomplishment which is then hypothesized to give insight into human imagining.

If you think about it, what the fish principle does is to put philosophy under the domination of science-- with the whole-hearted concurrence of what might be called the hard-nosed branch of academic philosophy. The cognitive scientists decide what method of theorizing will keep their inquiries within the concerns of science, and then more or less knowingly move to exclude from being what their canon excludes from notice-- that after all is just what it means to turn human beings into experimental subjects. And they do this without let or hinderance, not to say with the connivance, of a large part of the contemporary academic philosophical community. For the contest about who asks the questions has been won by the scientists, in this case the cognitive scientists ("Cognitive Science" being the overall name for "Cognitive Psychology", "Artificial Intelligence", "Information Processing", and

so on), and they sit inside calling the digital tune, while the professional philosophers skulk at the windows making comments. This state of affairs can't help but eventually arouse our community's anxious interest, because, while our program is built on the trust that the important questions are perennially the same however diverse the attempted answers, the capitulation of philosophy to science makes urgent the question of questions I mentioned in the beginning, namely whether the terms of the questions themselves may be transformed radically and beyond translation from age to age. For science itself, by its very progressive nature, undergoes periodic revolutions which appear to some to consign the old problems and terms to irreducible incommensurability with the new ones, and perhaps philosophy should reflect this discontinuity. We could do the intellectual world a great service by rousing ourselves to a rigorous debate with the very clever contemporary proponents of this point of view.

Lest I seem to have gotten away from the significance to us of the imagery debate, let me quickly show how it fits in. On the one hand there is a bunch of terms like "imagistic", "pictorialistic", "analogous" and "analog". On the other there is "propositional", "descriptional", "symbolic" and "digital". As we have seen, even the scientists who have devoted themselves to discovering the precise characteristics of mental imagery soon abscond into the camp of those who believe that all cognition is finally to be characterized by the second complex of terms, although somehow the first keeps intruding itself on experience. Why is the battle so drawn out while underneath the profession is so unanimous? The chief reason is this: Human experience may speak for the significance of our imaging power, but the underlying impulse of cognitive scientists is to turn the mental into the physical (forgetting, by the way, that their heroes, the physicists, are meanwhile busy turning the physical world into

an intelligible one). Specifically they expect to explain all cognitive processes in terms of the sort of logical functions which can be realized as a physical machine, be it computer or brain. Now as I mentioned, brain science apparently has at present no evidence that well accommodates picture-knowing, although there are basic facts of the brain's functioning which would lend themselves to the "digital" cognition. So it is plain that the impulse in cognitive science would be to explanations in those terms.

Now I have a deep-felt though not yet very well-grounded suspicion that it is our imagining capacity which will turn out to be the impregnable center of our embattled humanity-- embattled, because it appears to be infernally difficult to articulate in principle the difference between the activity of a perceiving and reasoning human being and the behavior of a sophisticatedly programmed machine, that is if the factor of self-consciousness or inner experience is disallowed, while the purely and precisely rational argument for hanging on to what I might as well call the soul, are confoundedly elusive. We might talk about that in the question period.

My inklings that the imagination will be crucial in finally distinguishing human cognition from its computer simulation do have some evidence and some arguments in their favor. The evidence is chiefly in claims from critics of the Artificial Intelligence project that it will come to its limits in capturing just those functions which have analogue character. The arguments I can only gesture toward by bringing up, belatedly, a pair of pertinent terms which is conspicuously missing from the imagery debate: imagination and intellect. It is one of those old thought complexes whose meaning is supposed to be hopelessly inaccessible to us once its transformation into the current terms has been accomplished.

Well, since I can believe that only for a minute at a time, I think there is a world of light to be gotten from carefully retranslating the debate into these terms, since we can then re-ask (without ignoring the new contributions of cognitive science) old but unanswered questions concerning our strange double power to bring the looks of this world into ourselves while leaving its stuff outside, and to bring forth within us figures which were never of the outer world and yet can act potently on it. One of the chief boons will be that the traditional pair, unlike the contemporary set, is not an opposition but a conjunction, and that whenever imagination and intellect are considered as equally and unseverably necessary to knowledge, reflection on thinking, reasoning, acting intelligently, takes on a very different coloration than when the faculty of imagery is regarded as an analytical embarrassment. What I mean is: to my mind what the contemporary intellectual world needs most urgently is a revision of its mode and its understanding of rationality.

Early on I described the thinking of our more interesting contemporaries as being smart, precise, pure. That begins to catch its flavor, but of course not the serious impulse behind it, which is, to think of thinking as essentially analytic and formalistic, symbolic, logical rather than analogical. I am using somewhat opaque buzz-words because I have not yet quite come to grips with what is going on, except for a sense that sweet reason requires the curbing of this rampant rationality, requires, if I may put it this way, a logically legitimate way of respecting the mysteries.

Now I can imagine that it might be one of our students who is destined to work out such a revisal, having been prepared for the task by a program which does not segregate works of the imagination from works of the intellect and which contains many texts honoring-- and also despising-- the appearances in a way wholly different from that of current cognitive

science-- a way in which our environment is not understood as a source of information to be processed but as a world of figures sending us significant looks and speaking to us in intelligible tongues.

And in general, it is because of the temporal cosmopolitanism of the program, its intention to make a serious attempt at empathy into radically diverse human possibilities, that the St. John's program can be a protection against the regimented seduction of the bubbling Babylon which constitutes our contemporary intellectual world; were I a child's mother I would not wish to send it out there unprepared in some such way, because for all its vaunted multiplicity and its vigorous polemics, the marchings and wheelings of opinions take place in amazingly close formation-- as is perhaps not so surprising considering the temporal parochialism of university training. When I said in the first couple of minutes of this lecture that I hoped to give reasons for maintaining distance from "current thinking", enticingly brilliant though it be-- practically I suppose this means clearing only a very modest and very deliberately designed space for it in the program-- I had in mind mainly this phenomenon of homogeneity. It has recently been given a sophisticated rationale under the heading of "the social justification of belief" by Richard Rorty, (who lectured here a couple of years ago) and has been joyfully taken up by para-scientific disciplines such as Anthropology (Geertz) and Educational Studies (Bruffie). "We understand knowledge," Rorty says, "when we understand the social justification of belief," meaning that knowledge arises not from taking in and testing for oneself what the world has to give, but from devising language for obtaining the concurrence of the community accredited to judge, while learning means being absorbed into that society which carries on the pertinent, essentially terminological conversation. To me this view of a community of learning seems like

philosophy's self-imposed revenge for its voluntary subjection to science, for it is modelled on the current philosophy-of-science-view of science as a social construction (which, by the way, apparently infuriates practicing scientists, insofar as they pay it any mind.) Now this college is not only a program but also the community designed for the study of the program, and those of our students who were self-aware members of the former should make peculiarly discerning judges of the pervasive and potent view I've just described. For the community Rorty projects is a spatially scattered league of competent professionals whose largely written communications are aimed at the fixation of shared belief, while St. John's is a living community of people of carefully guarded amateur status who converse with each other face to face, to save their souls, and, standing somewhat apart, prepare for four years to grapple with a present that has been twenty-eight hundred years in the making.

To conclude: Under these circumstances it is not so surprising that, while in the sciences hopes are high, the dominating philosophical mood is, according to temperament, either a rage for finis-writing or a lugubrious nihilism-- a zealous anticipation of an end to philosophy which is no consummation but either a self-destructive bang or an unravelled whimper of mere endless argumentation. But I imagine that some of us can think of an understanding of philosophy by which it escapes these ignominies. If philosophy is directed wonder then we need not follow the lead of the sciences in asking only warrantably pursuable questions or abandon answers because their complete formal justification proves elusive. Then we are permitted to assume that when something arouses such wonder in us it is given to us, first and last, as wonderful, however relentlessly we may work it over in between.

A practical illustration: Close your eyes and summon the image of some attractive shape-- an elegant object, a familiar face, a significant scene. When you have it before your mind's eye, ask yourself, perhaps vaguely at first but then more pointedly, what might have to be true for that wonder to occur. How could such an inquiry, refreshed by frequent recurrence to the inner experience itself, peter out into mere argumentation? It seems to me to consist of continual beginnings, impulses toward a truth which is just out of sight.