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From "Doubt Uncertainty Possibility Desire"

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# From Doubt Uncertainty Possibility Desire

## Mary Caponegro

*— Every shoot and every fruit is produced above the insertion (in the axi) of its leaf which serves as its mother, giving it water from the rain and moisture from the dew which falls at night from above, and often it protects them against the too great heat of the rays of the sun.*

— Leonardo Da Vinci

*Set yourself to describe the beginning of man when he is created in the womb.  
And why an infant of eight months does not live.*

Interventional treatment of the fetus before birth has been applied in such life-threatening conditions as hydrocephalus (fluid buildup in the brain) and hydrophrosis (a blockage of the urinary tract). The computer-enhanced image illustrates injection that passes through abdomen, uterus and into fetal bladder.

*What sneezing is.  
What yawning is.*

A picture made with ultrasound in the sixth month of pregnancy shows the face of a healthy fetus with mouth open in a yawn. "By this point the fetus does just about everything it will do after birth," said Dr. Christopher Merritt of New Orleans, who obtained the image. "It yawns, blinks and even sucks its thumb."

In the year 1473, Leonardo assists his master Verrocchio with the painting *The Baptism of Christ*, in which two angels kneel together beside a standing, praying figure whose feet and ankles are submerged in water. The angel on the left, painted with astounding delicacy and fineness, by the apprentice, far surpasses the angel on the right, by the master. This moment is said by many in Verrocchio's and other Florentine studios to be the beginning of Leonardo's painting career.

Probing painlessly, sonography uses sound waves to look within.

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It is also the moment, in a sense, of my birth, although my actual birth was a decade later, for the angel painted by my master, Leonardo, bears an uncanny resemblance to my perpetually youthful self, whom he would discover on the streets of Milan at age ten, twenty years after executing that depiction, and rescue from poverty by taking into his home and training as servant, pupil, protégé, whatever term you choose. Labels matter little. My given Christian name, for example, is Giacomo, but you will know me by another name, with which my master rechristened me. Frankly, though – I'm accused of lying all the time *ma questo sincero, senti: I don't give a shit about painting. It makes me yawn.*

In trouble before birth, Joseph Ward was found to have a tumor growing in his throat that forced him to keep his mouth open inside the womb.

Somewhere, in what had been up until then a near perfectly harmonious community of some one hundred trillion cells, a normal cell becomes a cancer cell.

*Trembling.*  
*Epilepsy.*  
*Madness.*  
*Sleep.*  
*Hunger.*

My master eats no meat, and I, today, eat only candy: some aniseed sweets I was craving, and who would be so cruel as to take candy from a little boy? (A boy, moreover, with the appearance of an angel.) All right, I admit that I stole the money he had put aside to make my jerkins with. Have you never had a craving?

*Sensuality*

To spy on the brain in action, PET scanners watch the way brain cells consume substances such as sugar. The substance is tagged with a radioisotope brewed in a small, low-energy cyclotron.

His name for me, *Salai*, means limb of Satan. As to which, the name or my behavior, is chicken and which is egg, I cannot say. I leave to you.

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. . . stating which part of it is formed first, and so successively putting in its parts according to the periods of pregnancy until birth and how it is nourished, learning partly from the eggs laid by hens.

He says I break his heart when I make mischief. But he has never thrown me out or threatened to.

*The heart of itself is not the beginning of life but is a vessel made of dense muscle vivified and nourished by an artery and a vein as are the other muscles.*

The heart of the system is a piezoelectric crystal 1) that converts electric pulses into vibrations that can penetrate the body. The sound waves are reflected back to the crystal, which reconverts them into electric signals. Echoes from the fetus are translated into faint signals, which are processed by the computer into a video image 3).

*When women say that the child is sometimes heard to cry within the womb, this is more likely to be the sound of wind which rushes out. . . .*

What about your mother, master? Who sang to you and gave you milk?

To generate a US image, a transducer in the shape of a small rodlike microphone is placed in contact with the surface of the body. A signal of high frequency in the range of 2 to 10 MHz (millions of cycles per second) is transmitted through the skin. . . . The time delay between sending the pulse and receiving the reflection determines the depth of the target.

*Why the thunderbolt kills a man and does not wound him, and if the man blew his nose he would not die.*

How many profiles can you list? My master has a handsome collection of noses, but not all of them handsome, capito? Are you in a bulbous mood today? Lunedì, aquiline; martedì, straight; mercoledì, pointed; giovedì, concave; venerdì, snub; sabato, round; domenica, regular? Shall we review? Take a deep breath and then take up your pencil.

*It is impossible to breathe through the nose and through the mouth at the same time. The proof of this is seen when anyone breathes with the mouth open taking the air in through the mouth and sending it out through the nose, for then one always hears the sound of the gate set near to the uvula when it opens and shuts.*

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A padded compression plate is lowered from above and gently squeezes the breast to facilitate better imaging of the entire breast. The patient is told to hold her breath as views are taken of each breast.

*Because it hurts the lungs.*

The radiologist in this case is looking for a pulmonary embolism (a clot in the lung's blood supply). Ten percent of cases of pulmonary embolism are fatal, so quick detection and therapy are usually of urgent concern.

*My master hops from patron to patron to keep us fed. But every time one of them dies, he takes an interest in that particular disease and seeks to understand its workings, thus adding new distractions to his painting projects. If he were quicker with his work, this wouldn't be a problem. Perhaps they died of waiting, I say, surely there's a cure for that: just make art, Leonardo!*

The classic form of Kaposi's sarcoma is rare and tends to strike men of Italian, Mediterranean and Eastern European Jewish heritage from their fifties to their eighties. It also occurs as an endemic form in African men.

*Figure to show from whence comes the semen.  
Whence the urine.  
Whence the milk.*

Lurking deep within the lobes and ducts of the breast, abnormal cells are detected by mammographic screening. In the color-enhanced image to the left (side view of a breast) the small black dot surrounded by a contour of colors indicates a malignancy.

*"I fed you with milk like my own son," you complain, in a voice that deserves the accompaniment of your infamous lira da braccio, ready to break into sobbing. You make it sound as if I sucked it straight from your tit. Let's get it straight; are you my mother or my master?*

*Whence come tears.  
Whence the turning of the eyes when one draws the other after it.  
Of sobbing.*

*Stop bawling! Send me home. Go find a wife; go have your own son.*

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To get a firsthand idea of just how difficult (but very rewarding) the film interpretation process can be, I traveled to Rochester, New York, to spend a day with Dr. Wende W. Logan, one of the busiest mammographers in the country. Her patients call her "Eagle Eye" for her ability to see things that others cannot.

*The light, or pupil of the human eye, on its expansion and contraction, increases and decreases by half its size. In nocturnal animals it increases and decreases more than a hundredfold in size. This may be seen in the eye of an owl, a nocturnal bird, by bringing a lighted torch near its eye, and more so if you make it look at the sun.*

From the back of a great swan, my master says, a man shall someday fly, and so he builds and treats and smears and plans: with pine upon lime, feather on canvas, sized silk; fashioning platforms and rudders and cables and windmills and undercarriages and something that looks like a giant shoe, the last of which is of least use to me as I cannot steal it to sell to the shoemaker for aniseed sweets. What will be next? Madonna! It's another original contraption by Da Vinci, get out of the way; stai attento, vai via! before it crashes against the palace wall!

*Then you will observe the pupil which previously occupied the whole eye, diminished to the size of a grain of millet.*

The smooth patches of skin that characterize Kaposi's are described by doctors as nodules, plaques and macules; they vary in size from that of peas to that of large coins.

There are many kinds of breast cancers, Dr. Logan told me. Some are as small as fine grains of sand that "pepper" an area of the breast.

*With this reduction it compares to the pupil of man, and the clarity and brightness of objects appears to it of the same intensity since at this time they appear to man in the same proportion because the brain of this animal is smaller than the brain of man.*

The planning of 3-D treatment uses new techniques such as the "Beam's Eye View." It is as if the human eye were placed at the exact position of the origin of the radiation and watched where it went.

*Sight is better at a distance than near at hand with men who are somewhat advanced in years because the same thing transmits a smaller impression of itself to the eye when it is remote than when it is near.*

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What do you want from a street urchin? You always seem surprised that vulgar things should issue from these cherub lips? But you don't know the viler things the Milanese say. (All eyebrows raise immediately, of course.) Everyone knows I'll never make a painting on my own, that these wasted hours of instruction only allow you to gaze in my angelic eyes. But in the master one cannot excuse incompetence. It doesn't take much talent, Zio, it doesn't take a second sight or even a trained eye to see that the painting you've been working on for years still isn't finished yet. Just like the one before it, and . . . . shall we name names, and dates?

*All things seen will appear larger at midnight than at midday and larger in the morning than at midday.*

Shall we begin with March 16th, 1478, at St. Bernard's Chapel: the absent altar painting, which despite the receipt of twenty-five florins (and some persuasion on your father the notary's part) you never created – this first adult commission a striking contrast to your first work as a child, when your alacrity sustained the stench of decomposing animals in your room as you assembled a dragon's face so fierce your father sent you straight away to study with Verrocchio, ostensibly to mine your talent subito – but I think otherwise: your father was afraid of keeping such bizarre imagination in his own house, alive inside his little bastard, what's more! In any case, the Madonna, in maturity, did not sustain your inspiration in the same way. Admit it, you prefer a dragon to a virgin!

*The wrinkles or folds of the vulva have indicated to us the position of the gatekeeper (portinario) of the castel which is always found where the meeting of the longitudinal wrinkles occurs. However, this rule is not observed in the case of all these wrinkles but only in those which are large at one end and narrow at the other, that is, pyramidal in shape.*

The opening of brothels is no deterrent, is it, for the Florentine perversion known in certain studios, so prevalent in fact it needs no mention. And yet there is sufficient interest from my master to design a brothel so discreet that clients have at their disposal secret staircases to exit, enter. Artisans might climb such stairs, if only with intent to draw, observe and draw still more into the night. Perhaps he'll slip himself between the putta and her client,

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then whip out his pen: "Per piacere, Signorina, open, if you would, your thighs; my study lacks a female organ and I must, if only in duty to nature, be thorough."

The epidemiology of cervical cancer is extensively documented (*The Walton Report*, 1982). Increased incidence is associated with early intercourse, multiple sex partners, early pregnancy, large families, low socioeconomic status and poor personal hygiene. It is rare in nuns and Jewish women. . . . Three types of viruses are commonly associated with cervical cancer: herpes simplex type 2 (HSV2), cytomegalovirus and papilloma viruses.

But how peculiar it looks, master: this souvenir you sketched: like an unadorned aperture: a lipless mouth, no fleshy rim to feel the sensation of a kite's tail tapping, tapping, gently tapping. More like the mouth of a cave.

*The woman commonly has a desire quite the opposite of that of man. This is, that the woman likes the size of the genital member of the man to be as large as possible, and the man desires the opposite in the genital member of the woman, so that neither one nor the other ever attains his interest because Nature, who cannot be blamed, has so provided because of parturition. Woman has in proportion to her belly a larger genital member than any other species of animal.*

It has occurred to me at last, master, the formula for finishing that you lack. There is no mare, no donna to dispel fatigue, and thus few paintings ever proceed beyond the inevitable impasse at which you weary yet again of the brush.

*For I once saw a mule which was almost unable to move due to the fatigue of a long journey under a heavy burden, and which, on seeing a mare, suddenly its penis and all its muscles became so turgid that it multiplied its forces and to acquire such speed that it overtook the course of the mare which fled before it and which was obliged to obey the desires of the mule.*

A stand-alone, dedicated machine (a "mule") may be assigned the task of testing all new software coming into the firm. The security measures applied to the mule must be impeccable because the consequences of an undetected infection on this machine will be severe: all incoming software will be infected. Physical security is also essential: access should be limited to the mule's operator, and the machine should be locked when not in use.

Non importa, obviously you have no time to cultivate these conventional appetites and perceptions. Already you must make up



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for lost time. Into every Milanese ear it has been whispered that the coating you put on the wall of the Santa Maria della Grazie is as water to the walnut oil with which Christ and the apostles are painted; thus they are destined to fade and peel, already disappearing. You might have spared yourself the effort of The Last Supper. There will be no feast on the table for posterity, Leonardo.

*Thus the liver becomes desiccated and like congealed bran both in color and in substance, so that when it is subjected to the slightest friction, its substance falls away in small particles like sawdust and leaves behind the veins and arteries.*

The positrons collide with the electrons, and the two annihilate one another, releasing a burst of energy in the form of gamma rays. These rays shoot in opposite directions 1) and strike crystals in a ring of detectors 2) around the patient's head, causing the crystals to light up.

As ever, against convention, you allowed Judas a halo – after procrastinating over a year before arriving at his proper face, while receiving two thousand ducats as annual salary (non c'e male) – because such distinctions were too crude for an artist of your sophistication, preferring to mark the traitor by posture and expression. I, however, if you like, could piss the nimbus round the traitor's head to make it apparent to the philistines who can't discern these subtleties. I'm just trying to make myself useful, as you've taught me.

*That sound which remains or seems to remain in the bell after it has received the stroke is not in the bell itself but in the ear of the listener, and the ear retains within itself the image of the stroke of the bell which it has heard, and only loses it by slow degrees, like that which the impression of the sun creates in the eye, which only by slow degrees becomes lost and is no longer seen.*

For a long time, maybe twenty or thirty years, the cancer cell divides again and again. Even when the descendants number in the billions, the body exhibits no readily apparent sign or symptom of what has by then become a semi-independent mass with its own blood supply.

I suppose you acquired your taste for preposterous projects from the first of Verrocchio's you witnessed: the gilded ball and cross atop the bell tower of Santa Maria del Fiore in Firenze, long before my birth. Giotto, who had made the bell tower itself, you wrote,

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was not content merely to emulate his master. Nor are you, Leonardo, except in taking on ridiculous ambitions, which you, moreover, often can't bring to fruition. (As for me, allora, I have better things to do than emulate you. But here's a secret your Salai will never whisper in your ear: he wishes he could steal some of your perseverance. I am ashamed that nothing seizes my attention, except demanding your attention, any way I can.)

The Doppler effect was first explained by the Austrian physicist Christian Johann Doppler in 1842, and refers to the change in the frequency of sound as an object moves in distance and velocity from a given point. If you are transmitting sound waves through a blood vessel, the way the sound is returned can signify subtle changes in blood flow.

*If a man jumps on the points of his feet his weight does not make any sound.*

Dr. Kaposi reported that, until death occurred, the most persistent symptom for which his patients required treatment was "the feeling of tension and pain in the hands and feet."

*I'll jump up and down and stamp my feet until you tell me who that woman in our house is, with a name I've never heard before. The new housekeeper is all you'll say. Where did she come from though? From Vinci? Boys I am accustomed to in your house but a woman, this is something new. Is she your mother, this Caterina? The mother of my bastard master? I'll shake the house, I'll hold my breath until my face turns blue! Chi e la donna nuova? Dimmi!*

*Write why the campanile shakes at the sound of its bells.*

*Where flame cannot live no animal that draws breath can live.*

In this case, a radioactive gas makes a picture after the first breath; more pictures are obtained after several minutes of inhaling and after the gas mixture has been exhaled and the patient is breathing room air. (Embolism, pneumonia, asthma, bronchitis, emphysema and even cancer can be diagnosed by perfusion and ventilation scans. Radiation here is again at a very low level.)

*I say that the blue which is seen in the atmosphere is not its own color, but is caused by the heated moisture having evaporated into the most minute imperceptible particles, which the beams of the solar rays attract and cause to seem luminous against the deep intense darkness of the region of fire that forms a covering above them.*

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Researchers say severe childhood sunburns and teenage sunburns are more than twice as likely to lead to skin cancer.

The new image is displayed on a TV monitor and each density is assigned a color. As an example, pure black can be changed to blue, pure white can be displayed as bright orange. Other colors can fill in the intermediate densities; assignments of color can be arbitrary or standardized.

*I say that the pink my master wears is silly, and I say he's a sissy, but if he wants to dress me up in green velvet ribbons and silver cloth and parade me all around Milano with him, why should I object? Why not be pretty as a picture for the painter?*

Every element of a virtual world is a design decision. What colors, shapes and sounds should you use? What effects will your choices have on the user? How do you make something appear realistic, and does that really serve your purposes? How do you structure an application when you can make it do anything you want? How do you guide users when they can do anything they want — or anything might happen?

*How the first picture was nothing but a line which surrounded the shadow of a man made by the sun upon a wall.*

Although it is likely that breast cancer has been around since man first scratched on the wall of his cave, the real thrust of organized research in this country began only in 1970.

Man has progressed from cave painting to canvas to camera and now to machine vision.

*I am sick of your lines, figures, your studies, your instructions; Io, Giacomo, Io, Salai, sono stufi! Sick of your bodies, your elegant insufferable doodles, dappertutto ogni pagina, your limbs and bones and lines, your wombs and vessels. Voglio vomitare. Capisci? I want to puke! And you do not deserve to know, but I am jealous of your grotesque faces, grim cadavers, for I believe at times they fascinate you more than I do, than my bland beauty. It is obscene to be so drawn to beauty as my master is, in all and in its most peculiar forms. Bellezza is his mistress; I am merely his inadequate apprentice. I want to leave this place, this post I never asked for, and crawl into a cave.*

I was curious about the omission of breast cancer from the cave and wall scratching of primitive man, and most of the authorities I asked about this said it was probably because women died of other cancers long before they reached the vulnerable breast-cancer age.

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You accuse me of rudeness, but how polite is it to stalk a face il tutto girone? I've seen you follow some poor unsuspecting jaw or brow or nose, fixing your eyes upon that arbitrary face until surrender. How many victims, for instance, did you seize in the Borghetto before Judas was filled in? L'Ultima Cena senza l'ultima testa per tante mese – ridicolo!

*What nerve is the cause of the eye's movement and makes the movement of one eye draw the other?*

*Of closing the eyelids.*

*Of raising the eyebrow.*

*Of lowering the eyebrows.*

Try closing one eye and picking a point on an object within two to three feet of you. Now, starting with your finger on the tip of your nose, try to touch the point on the object. Try doing the same thing with both eyes open. In the first case, it's difficult to judge if your finger has traveled far enough or not. In the second case, your finger moves rapidly to the spot without hesitation. The same holds true for similar tasks in the virtual world.

*Of shutting the eyes.*

*Of opening the eyes.*

You roll your eyes at me affecting indignation. But we both know I get away with anything – almost. We both know it is our destiny that we be strangely linked, like breath to flame, like hand to kite. Your destiny is to be always seeking flight, and mine: to pull you down to earth, to make you roll in dirt, or worse. This game depends on your participation. You remain eternally enamored of possibility, and I, at every moment, your desire's doubt.

*Why as the image of the light of the candle diminishes when it is removed to a great distance from the eye the size of this light does not diminish but it lacks only the power and brightness of this radiance.*

The radiologist can alter brightness and contrast, and zoom into specific areas, magnifying as well as reducing image size.

Sometimes I wake to find my master staring over me. I spit on him. Must I endure your probing when I'm still asleep? Couldn't you ask permission? Your face in innocence, he says, is all I wanted, as he sketches, before you distort its sweet natural expression with

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your vile grimaces. I want to hold the startling beauty of your fair radiant eyes, no less than when the sun from darkness rises. It's too early for poetry, caro Zio, I'll close these heavy lids again and turn my back on you, OK? If you can't bear to leave, just sketch my ass.

Radiologists have been studied for longer than any other defined population to assess the late effects of exposure to ionizing radiations received as a consequence of their occupation.

*Of raising the nostrils.  
Of parting the lips with teeth clenched.  
Of bringing the lips to a point.  
Of laughing.  
Of wondering.*

The most natural of expressions on the mysterious face of the woman on the balcony, do you recall it? I promise I will never tell the world how you contrived it with a band of revelers and musicians in the studio daily provoking Monna Lisa, Francesco del Giocondo's wife, to curve her lips ever so slightly, enigmatically, nearly imperceptibly. . . . And did you finish even so? Four years went by with brushstrokes missing from the robes and landscape, left for your pupils to be responsible for – O don't look at me, I wouldn't dare, all are aware I do not work to excellent effect. But don't think I'm complaining, I'd prefer you be occupied with these interminable labors or join her singing revelers than that you serenade me in my bed!

Like the director of a chorus, an MR scanner conducts the "singing" of hydrogen atoms within the human body. The scanner surrounds the body with powerful electromagnets. Supercooled by liquid helium, they create a magnetic field as much as thirty thousand times stronger than that of the earth.

*Let the earth turn on which side it may, the surface of the waters will never move from its spherical form, but will always remain equidistant from the center of the globe. Granting that the earth might be removed from the center of the globe, what would happen to the water?*

Couldn't we just once play an ordinary game, as children do? – not a perspectograph, not strange inventions, not artist's tools, not rotting creatures (*sempre qualcosa schifo*), not something to learn from or marvel at – but something simple, divertenta, as even my poor father found the time to use with me, and with my sister?

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Spinning like tops, the protons normally point in random directions. A. But inside the scanner's magnetic field B they align themselves in the direction of the field's poles. Even in alignment, however, they wobble, or precess, at a specific rate, or frequency. The stronger the magnetic field, the greater the frequency.

*In reading right to left his never-ending notes, sometimes with the assistance of a mirror, I feel as when my sister and I would grasp each other's hands and spin around until we were so dizzy we would fall. We laughed then, now I scratch my head and blink instead. But ogni tanto I wonder what would become of little Giacomo were Leonardo suddenly to cease creating. What would my waters have to crash against without his earth?*

When the scanner excites these protons with a radio pulse timed to the same frequency as their wobbling, it knocks them out of their alignment.

*My master confided to me that as an infant in the cradle he felt the tail of a kite against his lips, and I at a slightly more advanced age often feel the tip of a pen or a silver-point pencil (it's true I've stolen one or two from other of his pupils) or brush, always scratching or stroking uncomfortably near to my skin. Absurd, you say, a tactile sense so sensitive, but my master has said, the greater the sensibility the greater the suffering, and I may as well use that to my advantage with him. For the gala festivities of the many pageants he has prepared, Leonardo has created an animated heaven and a cannon that spews forth a flaming actor; for the Masque of the Planets, the first that I observed, he made a giant egg surrounded by signs of the zodiac. In each he tries to include me, put me on display. I do not mind the admiration, for which, in preparation, Leonardo takes his brush and paints my lips; the bristles tickle me.*

Cancer therapy can cause dental and oral complications so severe they can compromise cancer treatment and recovery, dental experts said today in recommending that cancer patients get thorough oral examination before treatment.

*But other times, art bruises little Giacomo. Cruel master, I am quick to say on these occasions, keep my fine apparel, give me back to poverty. Dove e mio povero padre? Poor father had no soldi, and no schola, not a learned man but decent; at least he*

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left me in peace. Signor Caprotti, al meno un uomo normale, I miss you! Why did you steal me from him, cradle snatcher? And you call me a thief! Wait . . . come back. I didn't mean it, master. Please come back and sing to me.

*This plan of mine of the human body will be unfolded to you just as though you had the natural man before you. The reason is that if you wish to know thoroughly the parts of a man after he has been dissected you must either turn him or your eye so that you are examining from different aspects, from below, from above and from the sides, turning him over and studying the origin of each limb; and in such a way the natural anatomy has satisfied your desire for knowledge.*

Master, put aside your studies; why must you wonder about everything? Come sing to your Salai. Please don't stay away.

The current conventional techniques of 2-D radiation therapy employ multiple radiation fields aimed at the tumor from various angles built in a single plane of the body. . . . With the aid of specialized computer programs, we can precisely reconstruct the 3-D configuration of the tumor, look at it from any side and geometry, define its borders and determine its relationship to other organs.

By this time some tiny "gangs" of cancer cells have broken away from the original mass and have started thriving colonies in the brain and in the lungs, places to which the "colonists" were carried by the bloodstream.

*The rumbling of the cannon is caused by the impetuous fury of the flame beaten back by the resisting air, and that quantity of the powder causes this effect because it finds itself ignited within the body of the cannon; and not perceiving itself in a place that has capacity for it to increase, nature guides it to search with fury for a place suitable for its increase, and breaking or driving before it the weaker obstacle it wins its way into the spacious air; and this not being capable of escaping with the speed with which it is attacked, because the fire is more volatile than the air. . . .*

The Department of Defense has long used image enhancement in evaluating aerial pictures in camouflage detection, and more recently this equipment has been applied in medical imaging.

Kaposi's sarcoma, it turned out, was probably the most important single clue to the discovery of AIDS in New York in 1981, and it remains an integral part of the baffling investigation of its cause, cure and prevention.

AUTHOR'S NOTE

"Doubt Uncertainty Possibility Desire" is a collage consisting of materials assembled by the author from the following sources: *The Notebooks of Leonardo da Vinci*, compiled and edited from the original manuscript by Jean Paul Richter, Dover; *Medicine's New Visions*, by Howard Sochurek (1987), Mack Publishing Co.; *Dimensions of Cancer*, by Charles E. Kupchella (1987), Wadsworth Publishing Co.; *Breast Cancer*, by Rose Kushner (1975), Harcourt Brace Jovanovich; *Cancer Risks and Prevention*, edited by M. P. Vessey and Muir Gray (1985), Oxford University Press; *Virtual Reality*, by Ken Pimentel and Kevin Teixeira (1995), McGraw Hill; *Managing Computer Viruses*, by Eric Louw and Neil Duffy (1992), Oxford University Press; and *The New York Times*.

The only voice of the author's creation is that of the fictional apprentice Salai.

The different systems of indentation serve as a guide to the reader in distinguishing the voices: Salai's passages are indented in the fashion of conventional paragraphs, each of Leonardo's lines is indented to form a wider margin and the "found material" is not indented, with one exception.

The title, "Doubt Uncertainty Possibility Desire," derives from the Italian subjunctive mood, the *conjunctivo*, which is used to express hypothetical conditions and convey expressions of emotion, doubt and uncertainty.