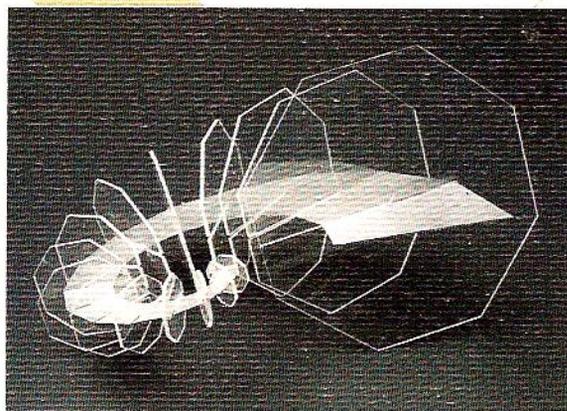


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Anne Tyng | *Number is Form and Form is Number*

Interview by Robert Kirkbride

On November 11 and 13, 2003, Robert Kirkbride interviewed Anne Tyng, Fellow of the American Institute of Architects and a member of the National Academy of the Arts on the potentials of geometry and number in architectural practice. Through such examples as Pascal's Triangle and her "Super Pythagorean Theorem," Dr. Tyng asserts that geometry is not only a metaphor for thought and the creative process, it is a spatial demonstration of how the mind generates associations by the combination, or layering, of pattern and chance.



Anne Tyng and Robert Kirkbride

**Robert Kirkbride (RK):** Through a long career of building, teaching and writing you've proposed remarkable relationships among geometry, historical architectural forms, the creative process and cycles of psychological individuation. What are basic principles you've discovered between geometry and architectural form?

**Anne Tyng (AT):** In thinking about form, there are so many layers that you can deal with—from, let's say, points to linearity, to planes, and then to three-dimensional forms. It's endless. You realize that number is a tremendously important tool, and you can almost say that number is form and form is number. The clustering of number gives scale, and also the sequences of number is a process. There is an endless array of possibilities in relating numbers to form. It is a language that people have to know in order to be an architect.

**RK:** What do you mean by that?

**AT:** We use letters to make words and words to make sentences and sentences to make some sort of story. We can do the same thing with number: one example is the Fibonacci sequence. In another example, what fascinated me about Pythagorean notions [is] that number is really shape—they saw it as shape. By using corresponding groups of dots rather than representative images, you get the sense that number has shape of its own—it's triangular, it's oblong, it's square...



Fig. 1. Triangular, oblong and square Pythagorean numbers. For the Pythagoreans, number was not represented by such symbolic forms as Arabic numerals (the number “3” for example) but rather as clusters of points. “Certain numbers were triangular,” notes Dr. Tyng, “such as 1, 3 and 6. Oblong numbers were even, being generated by the summation of even numbers as the areas of rectangles, such as 2, 6, 12, 20... Some numbers, like 6, were both triangular and oblong, making them magical in the eyes of the Pythagoreans.” As such, numbers evoked qualitative as well as quantitative associations. Drawing Robert Kirkbride.

**RK:** And because it has a grammar of shape, number lends itself to a grammar of space, architecturally?

**AT:** Exactly. It enables one to think proportionally in very simple terms. Three dots by five dots can signify a room that is thirty feet by fifty feet, or sixty by one hundred. Many architects don’t understand scale at all. Sometimes they’re lucky and get something really good, but intuition needs that information [provided by geometry]. Very often students have said that they didn’t want to learn too much about geometry because [they feel] it might upset their creativity.

**RK:** Here, then, is a question that vexes me. If such numerical ratios as the divine proportion may be traced within us as well as around us—found within human physiology as well as in the spirals of a pine cone—then why would one person be “intuitively better” at determining scale and proportion than another?

**AT:** That’s a huge question—I don’t know that I can answer that one! [Laughs] Some people simply have developed that sense from a very young age because of interest or a tendency that they inherit...it’s hard to say what’s behind it, but I think you can certainly become more aware of scale. I can remember one student who did a project where the windows were so out of scale with people—without realizing it. And she also didn’t differentiate between a space that was supposed to be intimate and another that was supposed to be more monumental...

**RK:** Did a desire to sharpen facility with scale and proportion inform ideas behind your course *Forming Principles*?

**AT:** Yes. For example, while a cathedral evokes immensity, it’s never too big of a mouthful. You can eat it in increments without swallowing the whole thing. This is very different from today’s buildings, which typically employ repetition.

**RK:** And your idea that students design and build a set of children’s building blocks...

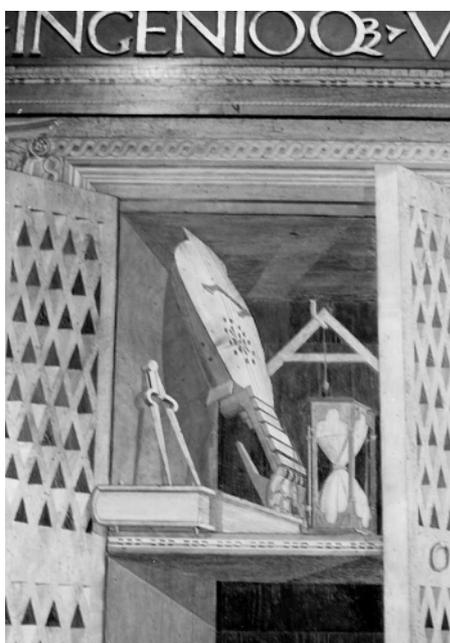


Fig. 2. Image of measuring instruments depicted in the Gubbio studiolo. In the Gubbio studiolo (1476-83), one of two small meditation chambers created for the Duke of Urbino and his son, there are several emblems that point to the significance of architecture and geometry for education. The set-square/level and divider, instruments of the architect and geometer, were believed to conduct natural talent toward well-tempered, ethical action. The term “Ingenioq,” located above, represented innate genius or ability, as compared with experience and training. Likewise, the musical proportions embodied in the cittern, an instrument strung with metal wire to better sustain pitch for impromptu performances, assist the grace of the body through dance, as recommended by Plato. Photo Robert Kirkbride.

**AT:** A set of building blocks governed by the permutations of the golden section and the five Platonic solids...

**RK:** ...was it your desire to have young architects make these forms to gain tangible experience with proportion and universal forms, by breaking them down into component building block units?

**AT:** They would have to think in a three-dimensional way, using a three-dimensional sense. In other words, fitting stuff together... Some people have a great gift for that and they figure out puzzles very quickly. You have to exercise that skill if you don't have it and even if you do have it the whole point is that you may not know that these forms exist. It is an enlargement of your building vocabulary. If you know of these forms, then you're not going to build a pentagon the way the Pentagon is built in Washington.

**RK:** And why would you not want to do that?

**AT:** It's simplistic. It's a two-dimensional pentagon, extruded from plan. If you knew about a pentagon three-dimensionally, you would then have more thoughts about seeing it that way. If you have a big building, you have to have things within things within things... And the room shapes, what do you do about the room shapes? They all have to have acute or obtuse angles? You need to think in terms of the form as an asset to your solution—how you can fit things within things...

**RK:** And how does geometry assist in that process?

**AT:** In going from point to linearity, to planes and three-dimensional form, there are certain possibilities in three-dimensional space. This leads one to the five Platonic solids, the only regular forms possible in three-dimensional space, in which all faces are the same and the angles at which the faces meet are the same. If tossed, a cube or any of these forms would have an equal chance of landing on any one of its faces. If you played with dice on Mars, they'd have to be one of those shapes. Over time, humans have tried to connect these solids to one other, from the Pythagoreans, ancient Egyptians and Greeks up through Luca Pacioli and [Johannes] Kepler, who considered [and later rejected] their nesting to demonstrate the calculable orbits of the planets. In *Timaeus*, Plato talks about how "only three may thus be compounded," referring to the simple solids of cube, tetrahedron and octahedron. The simple solids fill space by themselves: you can nest an octahedron at the center of a tetrahedron that is nested, in turn, within a cube. All of these forms are related by the square root of 2. But one can go further. Using the divine proportion, the complex solids (the twelve-sided dodecahedron and twenty-sided icosahedron) may be generated from the simple solids. An icosahedron may be nested within the octahedron, and the dodecahedron may be built-out from a cube. It's a very elegant family of forms that expresses probability. It's a three-dimensional probability matrix...

**RK:** Can you explain some of the relationships you've discerned among geometry, probability and the creative process?

**AT:** To most people, probability is a statistical method of determining whether something is more or less probable, but they're not interested in it in terms of the creative process, let's say, or in terms of the evolution of form, which are similar—I think—in terms of the principles behind them. If you take Pascal's triangle you have what people have thought of as an oddity—the fact that you can create the Fibonacci sequence... Each diagonal in that triangle, whether from right to left or left to right, will add up to the Fibonacci sequence. So the further you go [down into] the Pascal Triangle, the closer you get to the Divine Proportion...

**RK:** Is this the interdependence you've often described [in your writing and teaching] between randomness and order, creativity and entropy? As more probabilities are created through Pascal's Triangle, more permutations are generated...

**AT:** ...in other words, you're being opened to more and more possibilities of time and space...

**RK:** ...and yet, the underlying continuity or structures become increasingly precise...

**AT:** If you take Pascal's Triangle as a creative process, what you're doing is tossing a coin for head or tails. And if that event has two possible outcomes, it's a very basic mathematical thing. It's binary... You keep repeating this binary toss, and as you do you accumulate [data]... And the key word is accumulating. You don't just get the bright idea without going through the process of accumulating random possibilities. So the accumulation of that repeated event of either/or finally builds up to all these different possibilities, and if you take the sums of those... In other words,

each toss is a moment in time. Space is the horizontal component [in Pascal's Triangle]. Because you're adding up all of your tosses with each line, you then are open to more and more possibilities in time and space. That's one aspect of creativity, I think, that a computer does not offer—the idea that you plow through all the possibilities before you are able to have that synthesis occur. You can't make it happen like turning on a faucet; it occurs spontaneously, with some sort of solution to whatever the problem is. The brain is instantaneous and can go as fast as a computer if not quicker, because the computer needs to have stuff put into it in order to get to this business [of decision making], whereas you're not consciously aware of feeding stuff into the brain. The brain takes what it wants. It selects. It's always either/or—I'm choosing this, I'm choosing that—and it's built up out of that either/or choice in the synapses of the brain, and the connective thing is an instantaneous shortcut through the brain. So when you get a solution, you get a solution quickly.

**RK:** So, does the Fibonacci diagonal through the Pascal Triangle offer a metaphor for cutting across the matrix of space and time? Or the matrix of the brain—generating unexpected, lightning quick associations?

**AT:** I think it's an actual, physical thing that goes on, you might call it *sliding* thought. You have people talking about horizontal thinking...

**RK:** ...lateral thinking...

**AT:** ...lateral thinking, thank you, as opposed to sequential thinking...but the sliding thought is the thing that you do when you're daydreaming and there is not a purpose in what you're doing...it happens spontaneously...because somehow the information has a way to connect with itself... So, the student's notion that knowing too much is going to hurt creativity—it's exactly the opposite, because you need to feed creativity, it has to feed on information.

**RK:** Students in particular, and perhaps people in general, may be intimidated by the range of possible solutions to a given problem, architectural or otherwise, and seem to limit the field of choices as early in the design process as possible so as not to be overwhelmed. Your example of Pascal's triangle suggests that the opposite may be true: as one entertains more possibilities, more details, more data—going deeper into the Triangle—a single, more well-rounded solution becomes evident, a procedure perhaps comparable to integration in the calculus. Is this an example of how geometry and number provide a metaphor for the design process—one that might stave off the sense of being overwhelmed and console us during inevitable moments of doubt?

**AT:** Well I think that's absolutely true. It's very well put, actually. I think, however, that Pascal's triangle is not just a metaphor for it [the design process], I think it really is a process of what happens. Probability is a process in itself. [In a design project] you start with the challenge of a problem and then you look to precedents and history, and then you give up attachment to any specific forms or spaces. You have to give up ego, some control. Out of that, what the Pascal Triangle shows you is that there is a mathematical proof of synthesis out of randomness. So it's more than a metaphor, it's a proof.

**RK:** Part of the complexity of the design process is, of course, that it engages the skills and limitations of others who are often beyond one's control. For example, despite receiving glowing press in recent years, ecologically sound design often encounters inertia on the local, municipal level—precisely where approvals are ultimately determined. Too often it's easier for official agencies to follow established habits—even if they are bad habits—than it is to entertain that there might be another simpler and better solution. Although sustainable design applies common sense, its advocates must overcome protracted, counterintuitive decision-making habits...

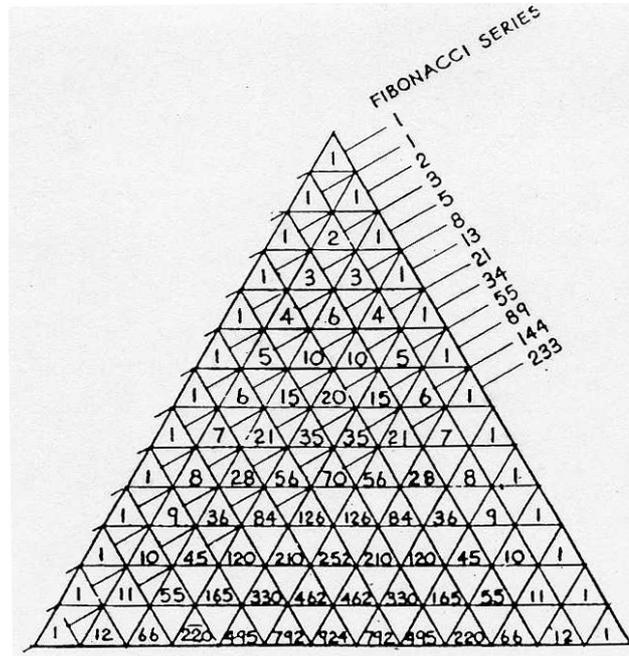


Fig. 3. Pascal Triangle and its diagonal summations. “Blaise Pascal discovered (c. 1650) his triangular table of probability, some 450 years after the similar ‘Chinese Triangle’ was conjectured to have been known to Fibonacci, but there is apparently no evidence that either Pascal or Fibonacci found the Fibonacci series in the sums of its diagonals.” (A. Tyng, “The Universe Plays Dice...” unpublished manuscript). Drawing Anne Tyng

**AT:** The problem is that we see things as independent facts. If you take the Pythagorean Theorem, the sum of the squares of two sides equaling the square of the hypotenuse, that is remarkable in and of itself. But the idea that you can have a progression of overlapping triangles, related by the Fibonacci sequence, you see a totality to the individual facts that you are learning. It becomes less overwhelming. That’s why having the students build a set of blocks covers a broad range potential forms. Then you’re containing it within a small, simple container... To achieve that in built form enables students to understand these relationships in a way that they would not have otherwise. If number has shape the appreciation of geometry and proportion becomes architectonically palpable.

**RK:** What are the worst misuses or abuses of geometry that you’ve encountered—or misconceptions about geometry and architecture?

**AT:** I think is very important to maintain the idea of abstraction in terms of number. In other words, not to get hung up on something being a magic number. People do that a lot and then they don’t go any further with it, they don’t explain it or explore it... There was a man who was totally enraptured with the divine proportion. He *designed* in the divine proportion. And *that* is a mistake. His work was absolutely static, it was very boring. It didn’t have the vitality you would get if you didn’t start with the divine proportion. It’s as if he was trying to take the end of the creative

process as the beginning of his design. And that was a mistake, because you eliminate all of the rich possibilities along the way.

**AT:** You can see this sequence in the growth of a plant from bilateral to rotational to helical to spiral, you can see it in the human fetus... Many, many species have similar forms at those stages of development...

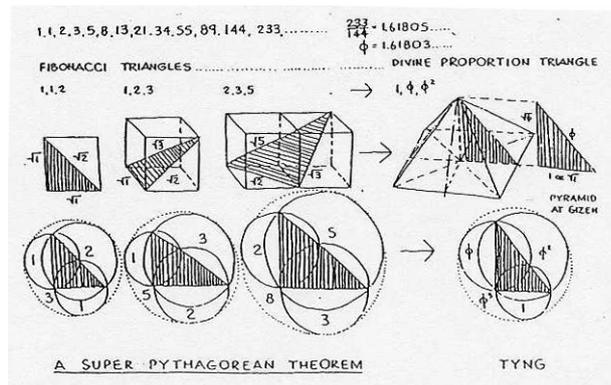


Fig. 4. The Super Pythagorean Theorem. “A ‘Super Pythagorean Theorem’ is found in a Fibonacci-divine proportion overlapping additive sequence of circled sides of right-angled triangles. Circled sides have the same relative areas to each other as squared sides. As in numbers or quantity, the right-angled triangle’s Pythagorean theorem is seen as a two- and three-dimensional overlapping containment of process when sides are circled (or sphered) in a ‘Super Pythagorean Theorem,’ rather than the traditional squaring of sides. The first Fibonacci triangle—half a square cut on its diagonal—the ‘1, 1, 2’ triangle with sides circled can all be encompassed by a ‘3’ circle that also encompasses the hypotenuse of the ‘1, 2, 3’ Fibonacci triangle, which, in turn, with all its circled sides is encompassed by a ‘5’ circle. Again the ‘5’ circle encompasses the hypotenuse of the ‘2, 3, 5’ triangle, which, with its circled sides, is encompassed by an ‘8’ circle—an overlapping sequence of Fibonacci triangles toward the precise divine proportioned ‘1,  $\phi$ ,  $\phi^2$ ’ triangle with sides encompassed by a ‘ $\phi^3$ ’ circle. The two-dimensional overlapping triangulated Fibonacci relationships also define three-dimensional close-packed spheres within spheres, with Fibonacci to divine proportion fit of spherical surfaces within spherical surfaces. The Super Pythagorean Theorem of circled or sphered sides plays a significant role in atomic and molecular structures, offering variations of size and quantity of bonded and non-bonded contact radii of atoms for molecular building blocks” (A. Tyng, “The Universe Plays Dice...” unpublished manuscript). Drawing Anne Tyng

**RK:** You’ve disagreed with certain aspects of D’Arcy Thompson’s writings on the role of the golden section in biological growth and form. Can you explain why?

**AT:** I believe he had a fear of the fuzzy mysticism surrounding numbers like the divine proportion, leading him to downplay relationships [such as the Fibonacci series in the fir-cone] which, in his own words, “stare us in the face.” He was right to be cautious, though, because many people *do* lose an objective handle on their [the numbers’] numinous qualities.

**RK:** It seems that we are constantly seeking ways to connect complex geometries to human habits, but elegant entrances to geodesic domes are few and far between. Meanwhile, Greg Lynn, while

employing tenets of “blob architecture” in his church in Queens, discovered that no matter how “randomly” he attempted to place the processional aisle, the computer program kept centralizing it. Where is the edge between objectively appreciating and subjectively literalizing such captivating geometries as the golden section and the shape-shifting prowess of computer software? Le Corbusier explored the divine proportion through his “modulor”...

**AT:** Except that he based it on a six-foot British policeman instead of asking “well, what size opening can people walk through, including very pregnant women and very tall basketball players.” That’s a problem, because there are people taller than six feet, and there are people fatter than other people... So he was doing exactly what someone does when [he/she] uses the divine proportion too literally in designing. He was doing it in a different way, he was using the Fibonacci series and applying it—establishing his own Fibonacci series. And of course when you do that, you’re taking a very profound and universal principle and you limit it.

**RK:** Which is possibly part of the reason why he eventually abandoned it and banished its use from his atelier.

**AT:** Well, he should have...

**RK:** Reflecting on your article in *Zodiac 19*, published in 1969, one notes the remarkable collection of people in that single issue (yourself, Safdie, Neumann, Kiesler, Fuller). The works presented spanned the globe and cultures. Why has that approach [to architectonic geometry] not sustained a hold in popular consciousness? Were the geometric forms too raw? Was it an early, perhaps too literal stage of experimentation with technology and geometric formalism?

**AT:** I think you’re hitting the nail on the head there: it was what you might call raw geometry. It was not really integrated yet. For many years, architects did not consider Bucky Fuller to be related to architecture, though he was keen to be considered an architect. But also I feel it is due to over-specialization, something that is currently happening in schools. What’s enjoyable about architecture is that you do have to draw upon a number of different disciplines. Urban planning, which appears to be everything to everybody, is now broken into many parts and pieces that aren’t rigorously investigated in its pieces and parts... In a recent piece I wrote on the Philadelphia School, I was trying to show how in the 1950s there was a great synthesis—we didn’t think of traffic plans of the city as not being related to architecture. And we worked at various scales—large areas of the city, individual houses... There was not the differentiation [in architectural engagement] at the time; there was a broad and exciting atmosphere... But architecture has changed and become quite fragmented. It’s the way the schools teach it—they invent new disciplines and degrees. So there’s a question of what to do with all of these branches that have gotten out of hand... I think we’re at a point—I keep saying this—that we *must* be at a point, of rebirth or renaissance, at which things are synthesized and not even further differentiated and specialized...

**RK:** Is it possible that the rebirth is occurring or has occurred somewhere else in the world?

**AT:** I suppose it’s quite possible.

**RK:** Many firms, not only larger firms, now send their design files overseas electronically—to Hong Kong, Singapore—maintaining a twenty-four hour studio with a work force at a fraction of the cost...

**AT:** But you lose something.

**RK:** What do you lose?

**AT:** Well, for example, my recent experience of trying to get service for my computer: I'm put on a telephone to India. Now, how are they going to help me? It's just another sort of process, like the menus that you're fed on the telephone... It's such an imposition. You don't have the direct person-to-person—we've lost something there. Although we have the technology to do this stuff, the instant connection to someone isn't there.

**RK:** Do you think that directly influences our ability to think, communicate and, as you were saying about the brain, to form unlikely connections? If you reduce the number of interactions with [others], how can that help the brain?

**AT:** It doesn't. It compartmentalizes your choices. You're fed the choices. The [Pascal] probability triangle is *you*, choosing to throw the dice.

**RK:** Whereas with phone interface, the menu of choices never *quite* fits your needs...

**AT:** Never!

**RK:** So let's return to your notion of an individual's cycle of creativity and her/his relationship with the collective as the unpredictable with the predictable... I'm reminded of Lucretius's argument in "On the Nature of Things"; without a "clinamen" (a swerve) to the structure of the universe, he asserts, nature would not have made a thing. It's the exception, veering off the laminar flow of atomic particles, that makes things live, generating possibilities. Samuel Coleridge associated the clinamen with free will, and Alfred Jarry [father of 'pataphysics, godfather of surrealism] followed suit. There's a fine line, it seems, between personal choice and impersonal chance. To what degree does each of us exert this unpredictable swerve? If neural associations cut across space and time in unpredictable and unique ways, absolutely personal and original, can we reconcile this with a universe formed, in your words, as a toss of the dice? Do we really have free will?

**AT:** You can use the tossing of the dice as an example of your selective view of the world. If you see something, and someone else sees the same thing, but you choose to observe one thing about it and another person chooses something else about it to remember, you're each processing a different choice... The living form is a product of going through this cycle from individual elements, predictable either/or choices, to something that is less and less predictable and more and more random. The order is inherent in collective relationships, in [which] you have that possibility of linking up all of that information into a matrix... Recently there was a lecture where someone was working with "layering" computers. They had three computers whose maximum efficiency was .62. Well now, the divine proportion is .618, so I said "well, instead of trying to aim for 100% efficiency, maybe this [the divine proportion] *is* the optimal efficiency." I'm not sure I successfully conveyed my point, but what's important is that we have this potential for input of the unpredictable, which is a precious thing...

**RK:** When you approach a construction site, how do you reconcile the elegant phenomena of the golden section with the messiness of human relationships and the building site? How does the Fibonacci series fit into an economy built on 2 x 4's, 4 x 4's and 4 x 8's?

**AT:** I said before that designing in the divine proportion is not the answer, or even designing with the conscious purpose of reaching it, is not really what you need to do. Like everything you do in your life, you don't necessarily consciously determine the direction of your life. But somehow

there's always a consistency that crops up and follows on what you've done before, even if there was no plan to do it that way.

**RK:** If it were possible to identify a common thread in your work, what would it be?

**AT:** Well, I've always been interested in why we have changes in stylistic preference, historically. What lay behind that? In *Forming Principles* I wanted to expand the concept of the creative process by drawing comparisons between recurring cycles of stylistic empathy and cycles of psychological individuation.

**RK:** How is this manifested, architecturally?

**AT:** There seem to be correlations among cycles in the history of architectural styles, phases in personal creativity and individual projects—a cycle that moves between public and private, extroversion and introversion, simplicity and complexity. Beyond formalistic parallels I've previously drawn [in the *Zodiac 19* article], it relates to architecture in the sense that you are identifying levels of scale within yourself, [as well as to] your family, your schoolmates, professional associates... Architecturally, you can say, there is the individual house, within a row, that is part of a square—Wellington Square in London, for example. Those squares have an identity in themselves, and if you live there you tend to identify yourself with them... In London, you have the Roman city within the larger city; you find a sequence of villages and parks with architectural features such as Nash's apse-like Crescent... From a city, you compile different scales of association within yourself and, as your experiences broaden, you connect [these architectural features] to deepen levels of your consciousness.

**RK:** It's interesting how the Arts and Crafts movement was absorbed by and tuned to various cultures—England, the Netherlands, Finland. In Eliel Saarinen's Helsinki, for example, such architectural ornament as Juniper branches, snails and owls served as cultural and civic reminders of Finnish flora and fauna. Around 1900, the recasting of national identities across Europe was infectious, as demonstrated through architectural ornament and international expositions. Following the World Wars, however, this enthusiasm for architectonic figuration appears to wane. Do you recall Lisa Ronchi [an Italian architect and program coordinator for Fulbright Scholars at the American Academy in Rome]?

**AT:** Yes, of course!

**RK:** She's among several European architects I've known who, in reflecting on their training during and immediately following World War II, were thrilled with the emergence of Le Corbusier and the International Style, primarily because it allowed them to throw away the templates and French curves they had been using for tired ornamental flourishes... The arrival of "Pere Corbu" and his compatriots enabled young designers to cast off stylistic trappings that represented [for that generation] centuries of war and nationalistic agendas...

**AT:** At Harvard, after the coming of Gropius and Breuer, they threw out all of the exemplary ornamental plaster casts.

**RK:** Literally?

**AT:** Literally. In main hall coming into the architectural school.

**RK:** That's certainly throwing the baby out with the bathwater, especially in light of the recent work of such scholars as [Mary] Carruthers and [Lina] Bolzoni, who have pointed up the tremendously ancient and rich tradition of architectural mnemonics, in which physical ornament

furnished commonplace practices of education and memory training. From their research one might speculate that the failures of the architectural profession in the second half of the twentieth century—at least in the popular mind—were not stylistic, per se, but rather due to the trivialization, if not erasure, of the physical equipment for that well-established tradition. Historically speaking, ornament [*ornare* —to prepare] was not merely subjective appliqué, it was equipment for making thoughts. How do you feel that geometry might equip our buildings to equip our thoughts?

**AT:** Well, there are some things, such as triangles in pitched roofs, which are less self-consciously there, that tie a building to the site. The greatest architecture is somehow in touch with those universals without consciously intending to be, and without being literal...

**RK:** Are there other notions that you consider essential for an architectural education in geometry?

**AT:** I believe that integration is a very exciting idea. That's what creativity is, of course. We are integrating stuff that hasn't been seen quite that way before... I believe it was Newton who said "I stand on the shoulders of others." In a way, creativity can be overinflated in terms of what the individual does. You're lucky if you have insights and form connections... but they don't belong to you. It's something that can enlarge you—that there are things out there that are bigger than you—but they don't belong to you. The elegance of probability is that it can be a safety net to catch chaos. It is really a process that builds up randomness, and out of that randomness you have a spontaneous simple order again. You can see it at minute scale in the deoxyhemoglobin molecule, and at much larger scale in the Dumbbell nebula.

**RK:** There are those, possibly, who might be a bit overwhelmed with the scale and nature of intersections you've drawn in your research. Do you ever doubt the elegant interconnectedness of your theories?

**AT:** Well, it's all there. I think there's an integrative thing within you that wants to find connections... connecting all the things you're interested in, in a way that makes sense.

**RK:** It seems you're implying that as one navigate[s] everyday life—forming associations among geometry, psychology, architecture—you're generating a mathesis of your own, by the steady accumulation of decisions made all day, every day. It recalls your description of Pascal's Triangle. Do you believe that this occurs on the scale of an individual's life? Would you suggest that as one forms associations among seemingly random topics, events and personal experiences, that one approximates a more well-rounded image of self?

**AT:** Creativity has to do with resilience, maybe, discovering how to turn suffering into a creative source. What pulls you through catastrophe is a creative project of some kind. You have to get to a depth of resources within yourself; doing that brings up creative potentials. In going to deeper and deeper levels of the unconscious, you can be overwhelmed by the possibilities and never arrive at self-understanding. Fearfulness is a perfectly valid feeling as you go to deeper levels of the unconscious in your design process... However, knowing that the more randomness you encounter will bring you closer to possible synthesis is a comforting thought. The interesting thing about the psychic cycle and the creative process, and evolution even, is that if you have built up understanding of the different forms of nature, you discover there are so many possibilities you never considered before. It only comes about because you're there to look into the unconscious and you're absorbing negative things into yourself and addressing them, not ignoring them. One admits, for example, that one has the capacity for evil, but may choose not to do it, rather than to deny it altogether. Ultimately, the levels of the unconscious that you encounter and identify can

strengthen because you aren't intimidated by them. In the creative process you're doing this as well by trying different schemes as you open yourself to more and more possibilities. By identifying those possibilities and bringing them into consciousness, you develop your creativity enormously.

*Fine*

*About the interviewee and the interviewer*

A Fellow of the American Institute of Architects and a member of the National Academy of the Arts, Dr. Anne G. Tyng has explored the potentials of geometry through her architectural practice and 27 years of teaching at the University of Pennsylvania and Pratt University, following 29 years of collaboration with Louis I. Kahn. After studying microbiology at the Radcliffe Institute, Dr. Tyng graduated from the Harvard School of Architecture, and later completed her Ph.D. with the guidance of Buckminster Fuller at the University of Pennsylvania. Through such examples as Pascal's Triangle and her "Super Pythagorean Theorem," Dr. Tyng asserts that geometry is not only a metaphor for thought and the creative process, it is a spatial demonstration of how the mind generates associations by the combination, or layering, of pattern and chance.

Robert Kirkbride, PhD, is director of studio 'patafisico and a fulltime faculty member of Parsons School of Design, where he coordinates Thesis Year in the Product Design Department. His investigations include environmental design, architecture, furniture, installations and scholarly research, and have been exhibited and published widely. Kirkbride has been a visiting scholar at the Canadian Centre for Architecture and architect-in-residence at the Bogliasco Foundation (Genoa, Italy). His dissertation on memory and architecture (McGill University, 2002) recently received the Gutenberg-e Prize from the American Historical Association and will be published by Columbia University Press. He is a member of the 2004-05 Editorial Board of the Nexus Network Journal.