Neuroplanning:
Neuroscience, Contemporary Architecture and the Historic Urban Context

The purpose of this whole conference is to increase the room for debate in a field which has too often been narrowed by its focus on a simple opposition between conservation and innovation. My own contribution will be based on the argument that many of the assumptions made by those on both sides are in urgent need of reexamination inh the new light shed on the design of, and response to, architecture by the latest neuroscience. In a moment I will present some of that knowledge, before going on to consider its relevance to urban planning in a historical context. Central to my argument is the claim that because neuroscience changes our understanding of the history of architecture in the past, it must also change our view of architectural planning in the future.

First, though, in order to begin destabilizing the assumptions that currently inhibit discussion, I want to ask a simple question: 'How many of you know the origin of the dollar sign?' **slide** Not many. I have asked this question of audiences of hundreds in the United States, and, surprisingly, even in the home of the almighty dollar, only one or two people have known the answer. Here in Andalusia, such ignorance is only slightly less surprising, because this is where the symbol has its roots, its origin as an emblem of the Emperor Charles V being plainly visible on the outside of Seville's town hall. **slide** There a ribbon with the inscription *Plus Ultra*, 'Beyond', joins two columns representing the two mountains at the entrance to the Mediterranean, the so-called 'pillars of Hercules', the Rock of Gibraltar and Jebel Mousa. This emblem was used in an abbreviated form on imperial medals and coins in the Americas **slide**, and from there it was taken over by the infant United States, which went on to give it a new authority, all its own **slide**.

You may well ask why I bring up this obscure fact. My first answer is that it reminds us how lazy we are, how we often fail to reflect on some of the most important features of our visual environment. My second is that, once we do reflect on its significance, we can start to appreciate a new, unconscious, dimension to the trauma of the destruction of the World Trade Centre on 9/11. **slide** The Twin Towers not only housed some of the United States premier financial institutions, they also recalled the two verticals of the sign that was emblematic of the United States' economic power **slide**. This may seem a strong claim, but my third and final point is that the recognition that this is so is supported by modern neuroscience. Everything that we see passes up the optic nerve to the visual area at the back of the brain, **slide** where it is processed by comparing it to everything we have seen before. In this way anything we look at which shares properties with something we have earlier looked at with attention is liable to elicit a similar response, often without us being conscious of it, and this is especially likely to be the case if it carries similar associations. Thus, given that when people looked at the twin towers they necessarily unconsciously thought of money, many will, without realizing it, have also thought of the dollar sign. Perhaps, indeed, that association was already there, consciously or unconsciously, in the minds of the buildings' patron and/or architect?

Another example of the way looking at one thing may affect our response to another is provided by the classical column. Because, since our birth, humans have always given particular attention to the standing human figure, once columns were invented by the Greeks, they and their successors including

Renaissance Spaniards, could not stop themselves unconsciously crediting the column with human associations, which explains why they called the top element of a column a capital from Latin *caput*, 'head' because it too crowns a vertical element, the body. A classical capital doesn't look like a head but it activates the neural networks laid down by looking at the topmost element of the body. This is why Sevillian sculptors in the early sixteenth century found it natural to equip these two with crowns **slide**. Probably nobody discussed what was being done. They didn't need to. Because everyone had been regularly exposed to the vertical forms of both bodies and columns, they shared the same neural formation.

This concept of neural formation is so new and so central to my argument, that I must briefly summarise the rules by which it is governed. The most important of these are those governing neural plasticity, that is the way the connections between the hundred billion nerve cells or neurons, like these, in our brain change during our lives **slide**. Thus, while it used to be thought that the brain's structure hardly changed after birth, we now know that these myriad connections are constantly growing and falling away. Importantly too this process follows regular principles. Thus everything we feel, think or do requires us to use a different set of neural connections and the more we repeat a particular feeling, thought or action, and the greater the attention with which we do so, the more those particular connections strengthen. If we don't repeat it, or repeat it with less attention, the connections on which it depends will die back. Nothing illustrates this principle better than the time it takes us to learn a language or the rapidity with which we can lose precise control of a demanding new musical instrument if we don't practice. But you will also experience neural growth and decay even during this lecture. If you listen attentively new connections will form. If you don't they wont. And keep this image in mind, since in order to understand the whole message of the lecture it will be helpful to think of what happens in the mind in neural terms. The subtlety of the links I am trying to establish is only really comprehensible if we think of our minds as made up of the flexible interconnected networks you see here.

It is hard for us to grasp the way all our experiences cause changes in our neural connections, but the extent and the speed of the process can be confirmed using the new technologies of brain scanners and electron microscopes. **slide** Here, for example, we can see how the part of this monkey's brain dealing with sensation in the fingers became greatly enlarged after he was encouraged to repeatedly touch with the tips of the middle three, and parallel findings have been made in relation to similar areas in the brains of concert violinists. We may find it easier to appreciate such changes in relation to the motor areas, because we are used to the way muscles increase in size with use, but the same principles apply in the intellectual domain. This is well demonstrated by this graph **slide** illustrating the way the posterior hippocampus of London taxi drivers has become enlarged as a result of intensive study. The Posterior Hippocampus **slide** is the part of the brain concerned with spatial memory, and in those who successfully passed the test for knowledge of London's exceptionally complex street layout, an increase in the number of connections has caused its mass to become twenty percent greater than that of those who failed it. Interestingly too there was a corresponding decline in those individuals' capacity for visual memory, probably because the more they relied on the map in their heads the less they needed to remember the appearance of landmarks, those features on which the rest of us depend for our navigation. I hope you are already starting to see how the latest neuroscience greatly enriches discussion of planning issues. Once we realize that a London taxi driver's experience of his city causes his brain to develop in ways very different from those of the rest of us, it is clear that planning decisions should at least acknowledge the divergent processes of neural formation affecting different groups. I am not suggesting that planners should scan peoples' brains before they make their decisions about architectural interventions. I am only recommending that they appreciate the extent to which each of us is equipped with different resources because we have had different experiences, and that they understand the neuroscientific reasons why that is so. It is doing this which makes someone a 'neuroplanner'.

Something else a neuroplanner should understand is why people around the globe react differently to optical illusions. After all it used to be thought that such responses were universal, but as the anthropologist Melville Herskovits and others have revealed, not only do we all see illusions differently, but there are clear neural reasons why this is so. Take for example the so-called Muller-Lyer illusion. Although the two vertical lines in this slide **slide** are of the same length everybody in this hall will see the one with acute angles at the end as shorter than the one where the angles are obtuse-and that will remain true however often or critically we look. Others, though, see them differently. Aboriginal Australians, for example, and the San people in South Africa, although they have had much less training in geometry than we have, see the lines for what they are, the same length. And we now know the reason why. In each case a difference in visual exposure has caused a difference in neural formation. People like us are brought up in cuboid spaces with cuboid furniture **slide** in which lines closer to us end in acute angles and those further away in obtuse; so to help us adjust to this situation neural processes in our brains shorten any line ending in an acute angle and lengthen any that end in one that is obtuse. The brains of people like the Aborigines, who live in deserts and have never experienced cuboid spaces, don't need to make the compensation and so they see the lines correctly. And what is true of this illusion is true of many others. The way each community sees the world is shaped by their particular experiences. Thus both we and the Aborigines share a similar response to this illusion **slide**, seeing the length of the vertical line as greater than that of the horizontal because in both our environments we are used to seeing roads **slide** and paths **slide** stretching into the distance. People brought up in the rain forest, by contrast, who have never had such an experience, see the vertical and horizontal lines for what they are, the same length. So here again neuroscience complicates the planner's judgement. We dont realize it, but we all see the world in different ways. In a normal European context we are not talking about differences as extreme as those between desert and rain forest dwellers, but still someone brought up in Seville will see the world differently from someone brought up on a farm in the Guadalquivir plain or in the Sierra Nevada nearby. And visitors from different countries will see the world differently again. Someone planning a new building should know that. It is no use asking the people involved how they see the world. They don't know, because the process of neural formation is unconscious. What the planner should do is be aware of the different neural formations of those who will experience the buildings with which he is concerned. It is this acknowledgement of the importance of variations in neural formation that makes a good planner a neuroplanner.

The location in the brain of the process of neural formation relevant to the perception of illusions has not yet been identified, but the fact that the illusions don't depend on object recognition suggests that it takes place in the so-called early areas of the visual system **slide**, V1 and V2 at the back of the brain, areas where the environment is primarily processed by the firing of banks of neurons that each respond to lines of a different orientation **slide**, before the involvement of the areas farther forward, V3 V4, V5, involved in more complex functions, where the brain identifies what an object is, noting whether it is moving and in what direction and drawing on memories of earlier experiences of such objects to determine its emotional associations.

It is easy to underestimate the importance of these early areas of the brain, but their relevance to the context of planning is also suggested by their association with the so-called Gestalt perception phenomenon noted by psychologists in Berlin a hundred years ago. **slide** What Gestalt psychologists discovered is that before we identify the objects in our visual field we subject them to categorization in terms of 'similarity', 'proximity' and so on. Take 'similarity' for example, what they discovered, as you see top right, **slide** is that people tend to organize forms they see by whether they look alike. The psychologists knew nothing of the basis for this tendency, but it now seems likely that it also takes place in areas V1and V2, before objects and have been identified and categorized. Almost certainly it depends on the unconscious detection of similarity eliciting a neurochemical reward, perhaps in the form of dopamine.

The way neurochemistry rewards us for such a basic classification activity suggests that it has been selected for by evolution and that indicates that it is adaptive. Thus we can see how the chances of survival of our fruit-eating monkey ancestors greatly increased if they possessed a brain which automatically sorted the similar forms of ripe fruit from the equally similar forms of leaves. Since those individuals that possessed a brain with that attribute were more likely to survive, the coding for it became part of their DNA. Once that happened, all humans found themselves, without them realizing it, always getting pleasure from similarity, and when they started to build that included similarity in architectural form. This is why 'similarity' is something that planners need to know about. There are two ways in which our pleasure in the detection of similarity is relevant for planning decisions. One, which applies in all contexts, is that we should be aware that when looking at a building we get pleasure when we can observe in it any repetition, whether of a form, such as a window, a material, such as a brick, or a colour, such as blue. Another, which is more important when we are considering planning decisions in the context of historic sites, is that we should be aware of the pleasure we derive when we notice such repetitions between a new building and those in the existing context which it is to join. Any repetition in a new structure of an element found in the existing architectural environment, be it a form, a material, a colour, or any other attribute, will always give those who look at it an unconscious pleasure. An example here in Seville is the way the oval shape of Pelli's Cajasol Tower **slide** relates to the rounded form of the Torre Triana of twenty years earlier **slide** . Such similarity guarantees a neurochemical reward.

Such echoes both within buildings and from one building to another have always existed because people generally, not just designers but patrons and users too, have unconsciously been affected by this powerful neural reward system. They did, however, became much more common once the Gestalt phenomenon had been recognized and written about by scholars like Rudolf Arnheim. He recommended its exploitation by architects, and this led figures such as Mies van der Rohe, as here in the model of the Seagram Building **slide**, to use repetition more systematically than any of their predecessors. In their case, as with Cesar Pelli's echoing of the Torre Triana, an unconscious neurological mechanism was reinforced by conscious intention.

So far I have been emphasizing the importance of the properties of the early parts of the visual system. Now I want to discuss responses rooted in the plasticity of later areas of the visual system, responses illustrating how the habits of looking in different populations can lead to particular visual phenomena acquiring unconscious emotional associations. One way I have studied these responses is by comparing the way different communities at different periods have given a basically similar landscape very different names. Take for example the American Rockies. The French who came to the northern Rockies in the seventeenth century named some the Grand Tetons, big tits or udders **slide**, reflecting their interests in sex, fertility and breasts. Nineteenth century Anglo-Saxons, on the other hand, whose interests were more consumerist and materialistic, gave mountains further west names like cigar rock **slide**. While much earlier the Spanish, with their more spiritual concerns, had named a range to the south the Sangre de Christo **slide**, because they saw them as stained with the Redeemer's blood familiar in communion wine. None of these groups knew that the reason they gave the same mountains these different names was because of the differences in their unconscious neural formation. Planners, though, do need to know this, as I was reminded when I talked about the naming of landscape in Atlanta Georgia. After the lecture a young African-American asked me if I had worked on the way his community saw things. I said that I hadn't, but I would like to. At which point he gave his own chilling example of why this was desirable. In the talk I had showed a slide of a Constable painting **slide** of a grand tree in an English park, pointing out that to the English it was an emblem of virtue and stability. That was not how he had seen it. As he told me, all he had done was 'look for the rope' **slide**. Clearly those planning parks in England and the American South should be aware of these different ways of seeing trees.

These examples of the way phenomena can, without us realizing it, acquire specific emotional associations illustrate one of the most important consequences of the neural plasticity of the visual cortex. The reasons people look at an object, such as a breast, a cigar or communion wine, with attention are usually emotional and, because such looking tends to strengthen the neural resources involved, when they see something else, in the above case a mountain, that shares some of its visual properties it is liable to acquire similar emotional meaning. This plasticity of our visual cortex was originally selected for by evolution because it ensured that the more often we looked for a desirable food or a tool-material the better we would become at finding it, but once established as an attribute of our visual system it affects our perception of everything. This means that we can use a knowledge of the principles that govern it to guide our planning decisions. Thus if people in a particular place and time look at a particular phenomenon frequently and intently we can safely predict that they will acquire a tendency not only to get pleasure from looking at anything else that shares its properties but also to increase those properties in any object they are making, commissioning or using.

One way to judge the relevance of this attribute of our neural system in a planning context is to looking back at earlier episodes in the history of architecture when startlingly new buildings were introduced into historic settings. We may not consider that the construction of the Parthenon **slide** and the Pantheon **slide** raise planning issues similar to those surrounding Seville's Cajasol tower **slide** or London's Gherkin **slide**, but I would argue that they do. After all, since their erection implies planning approval for an intervention in which no committee or guidelines were involved, and one whose merits are unquestioned today, they can provide useful test cases as we try to develop a creative new framework in a period when committees and guidelines are inescapable. There are no documents and discussions that we can turn back to, but we can reconstruct the processes of neural formation out of which the positive planning decisions emerged.

We can begin with the Parthenon **slide**, the building we take today as the natural expression of Classical Athens at its peak, but whose striking new attributes, its unprecedented scale, the rigour of its geometry, the hardness and whiteness of its marble, and the sharpness and angularity of its detailing, would not easily have got past a UNESCO committee today. Why then were they approved by the building's patron, Pericles, its architect, Ictinus, and its users, the citizens of Athens? What we need to know is what they had all been looking at with such interest and intensity that they welcomed these startling attributes in their new temple? The building itself suggests the answer. Its plan **slide** corresponds to the configuration of the phalanx, the formation of heavily armed and strictly disciplined soldiers which was the chief instrument of Greek military success **slide.** Greek temples had long taken over prime attributes of the phalanx, but never had the discipline of its geometry, the metallic angularity of its mouldings **slide**, and the sharpness that the fluting of its columns shared with sword blades and spear points **slide** been so emphasised. The Athenian planners approved the new structure not because it fitted with the fabric of city's historic buildings, but because it shared properties with something to which they paid much greater visual attention, the piece of military equipment of which they were most proud, the formation of disciplined heavily armed men with which, at Marathon, they had recently defeated the might Persians **slide**. Some of you may doubt this reconstruction of the neural formation of fifth century BC Athenians, but it is supported by two contemporary sources. One is a play by Euripides performed just below the Parthenon soon after its completion. There Iphigeneia describes a nightmare in which she saw her parental home collapsing until only one column was left. In her dream this then came alive, sprouting her brother's hair from its capital and emitting his voice, a transformation she explains as meaning that sons are a house's pillars. Euripides could not have made the claim if his audience did not share a similar feeling. And just such a feeling led Athenians in the same years to replace the columns of the slightly later Erechtheum **slide** with column-like women who might have been the sisters and daughters of the warriors represented by the columns of the Parthenon **slide.**

A structure that raises the same sort of issue in Rome as the Parthenon did in Athens is the Pantheon **slide**. Again we have to ask what it was that persuaded the Roman planners to accept this vast domed cylinder in their midst? What was it in the visual neural formation of patron, architect and users that made them welcome this intrusion into their city? The surprising answer is suggested by its resemblance to the most distinctive attribute of the surrounding landscape, the many extinct volcanoes **slide slide**, whose rounded forms, their craters filled with window-like lakes, anticipated the Pantheon's most remarkable properties **slide**. Nowhere else in the world was a great city surrounded by such mountains and nowhere else did a comparable building-type emerge. It was a visual exposure to this landscape feature that caused the neural formation that authorized a highly creative planning decision. And this explanation we can support by returning to Athens. The geology of Greece has endowed a mountain such as Hymettus **slide** which stood a few miles from the city, and which provided the marbles of which the temples were built, with highly distinctive summits whose parallel angular ridges have much in common with the roofs of the temples on the Akropolis**slide**. Modern planners, too, I would argue, should consider how a new building relates not just to the principal features of the immediate urban setting, but to those of the surrounding countryside.

Indeed, they should consider its relation to everything that might affect the neural formation of the places inhabitants, paying particular attention to cases where a neural exposure to one phenomenon might be strengthened by exposure to another sharing similar attributes. Thus the Romans' interest in the curved forms of the volcanoes around their capital is likely to have been sustained by their pride in the toga, the emblem of Roman citizenship, whose semicircular form, contrasted with the rectangular Greek tunic worn by slaves **slide**. A pride in the rounded toga had encouraged the Roman introduction of the arch **slide** and the rounded niche long before volcanoes encouraged planning approval for the Pantheon. Architectural innovation can be as easily stimulated by exposure to a dress type as to a new landscape. When both share common visual features, it is even more likely that the preferences with which they are associated will become embedded in people's neural formation.

A place where we can observe the consequences of an even more intricate layering of neural resources in a particular population is Venice. Certainly, if St Marks square had already acquired World Heritage status, the original eleventh century church **slide**, which was a much grander structure than anything else in the city, being copied from a great church in Constantinople, would never have been allowed by a UNESCO planning committee. And the committee would have had a similar difficulty with the later additions to the façade, which we see in Gentile Bellini's painting of 1496, slabs of coloured marble and the glass mosaics **slide**. They were, though, authorized unconsciously by the cumulative visual exposure of the city's inhabitants. The core feature in that visual exposure was the element that was unique to Venice, the water that filled its canals and the surrounding lagoon **slide**. The Venetians' neural resources for the processing of reflections would have been exceptional, and so too, especially considering their dependence on sailing and trade, would their resources for processing the shifting patterns and colours of clouds, both above them in the sky and below them mirrored in canals. It was these resources that nourished all their particular tastes, for the damasks and silks they encountered in their trade with the East **slide**, for the veined and coloured marble that they found in the ruined towns left by the Romans in the same area **slide** and for the glass mosaics they found in Constantinople **slide**. Each new exposure reinforced the neurally based preferences shaped by the original exposure to water. The same watery taste also led the Venetians to create the great glass industry of Murano **slide** and this allowed the introduction of glazed windows which multiplied the mirroring of sky and water **slide**. By the fourteenth and fifteenth centuries glazing and marble slabs were applied to more and more churches and palaces, until they were everywhere reflected in water and glazed windows, especially in the great buildings lining the Grand Canal. The process is most obvious in the series of ever more shining and colourful palace facades, from the thirteenth century Ca da Mosto **slide** to the early fifteenth century Ca d'Oro **slide** and the Ca Dario **slide** at the century's end.

A final echo of the distinctively marine neural formation of Venetians is found in the obelisks which were added to some palace facades in the seventeenth and eighteenth centuries **slide**. Permission to erect them was only given to admirals because they recalled success at sea. The obelisks do not look like the masts of a ship, but they activated the same neural networks as that most prominent element in a ship's equipment.

A more general exposure to the masts of shipping when it was a prime source of a city's strength also probably lies behind the approval of the many new tall towers that Sir Christopher Wren designed designs for London churches following the destruction of their predecessors in the Great Fire of 1666 **slide**. Certainly, nowhere else were so many slender towers erected. To the merchants of London they would have activated the same neural resources as the shipping that was to be the principal instrument of their economic expansion **slide**.

Some of you will be skeptical about the relationship I propose between the multiplication of tall towers and the expansion of shipping in Wren's London, but if you are you should reflect on the name given to the tall buildings that multiplied first in the great port cities of Buffalo, Chicago and New York in the late nineteenth and early twentieth centuries. From an early date these were called skyscrapers. The name is odd considering that scraping implies a movement against the sky impossible for a building, but it is not so strange when we remember that the tallest structures seen in those great port cities would have been the great sailing ships, whose topsails, which could rise to sixty metres, were called skyscrapers because they did indeed scrape the sky **slide slide**. Presumably what unconsciously attracted people to the skyscraper designation was that it drew attention not only to the height of the new buildings but to the energy and economic growth to which the businesses they housed aspired. The neural resources that authorized the intrusion of skyscrapers into the historic fabric of Chicago, Buffalo and New York were, at least in part, those shaped by looking at shipping, just as those that authorized the Parthenon were those shaped by looking at formations of armed men.

Skyscrapers have only recently arrived in London, but they have done so in style, in spite of the protests of conservationists. One of the most striking is Norman Foster's Swiss Re Insurance building **slide**. There were many factors, both conscious and unconscious, which influenced its design, but one to which I would draw our attention, because it could be easily overlooked, is the role of its designers' exposure to the movement of people. I myself was only alerted to this connection by a comment of the eighteenth century artist William Hogarth in his remarkable book designed to demonstrate that the double curve is the line of beauty **slide**. The basis for his claim is not just that this line is often found in beautiful objects in nature, from women to swans, but because it is the pattern marked on the floor by an English man and women when dancing **slide**. It is the pleasure that the eye takes in following such movements that makes the double curve so essential for the experience of beauty. This argument he then uses for a remarkable piece of architectural criticism. Wren, he says, was wrong to put a cross and sphere on top of St Paul's dome **slide**. It would have been much better if he had used a pineapple, a fruit covered with double curves, such as he had placed on the church's towers **slide**. If Hogarth thought Wren should have put a pineapple **slide** on top of St Pauls' because its form recalled the paths of contemporary dancers **slide**, **slide** might not Foster too **slide** have been influenced by an awareness of such linear movements. Other factors point in the same direction. One of the specific requirements that the planners made was that the building should take account of the many narrow lanes that surrounded the site, and although they certainly never thought of their layout inspiring the building's elevation, their observation could have contributed to the unconscious neural formation that ultimately led to the exterior recalling a pattern of winding streets **slide**. Certainly, given that Foster and his contemporaries were used to using flights of escalators to generate architectural forms, as in Rogers' Pompidou Centre **slide** and his Lloyds building a few yards away **slide**, it is not difficult to see the building's exterior in the same terms. Those who approached the building through narrow lanes and who might have descended the flights of escalators of the Lloyds building before visiting the other major insurance building in the area would have possessed neural networks ready to respond with purposeful pleasure to the gherkin's spiraling lines **slide**.

In the continuity between Hogarth's eighteenth century vision of a pineapple on top of London's cathedral and Foster's twenty first century gherkin constructed nearby, there is an intriguing resonance. Both seem inspired by vegetable forms. Such a resonance might have been found anywhere in the world, but I suspect that it is no accident that they emerge in the capital of a country whose citizens possessed neural networks particularly exposed to nature and gardening. As such they provide an example of the continuity in the local tradition of neural formation that my wife, Elisabeth de Bievre, has drawn attention to using the notion of the Urban Subconscious.

Picking up on this concept of the urban subconscious, I am tempted to ask what sort of new building might a neuroplanner approve as particularly suited to the distinctive neural formation of the inhabitants of Seville. The beginning of an answer is suggested by the emblem with which we began and which achieved its most monumental expression on Seville's townhall **slide**. We can now recognize that the two columns not only recalled the ancient idea of the pillars of Hercules, but resonated with the local topography. Not everyone who lived in sixteenth century Seville will have seen the two mountains either side of the straits, but all would have known that they were not only the most prominent local landmark but that they had come to stand for the gateway to the oceans of the world. Modern Sevillians may be less aware of this, but their visual memory of the emblem on the townhall might help to authorize a design which took it as a starting point. This is why I would suggest that if the Cajasol tower were doubled **slide**, joining it with a twin structure, it would productively activate several different networks. Most directly it would remind people of the Sevillian origin of the dollar sign, and would constitute a courageous recreation of that other evocation of that sign, the twin skyscrapers of the World Trade Centre. It would also testify to the city's awareness of the significance of its siting close to the meeting point of two frontiers, that between Europe and Africa, and that between the Mediterranean and the world. It would thus resonate with neural resources already possessed by Seville's population and would reinforce them.

And finally I would suggest that this project might inspire the formation of new neural networks in both Sevillians and visitors in the spirit of Francis Bacon's *Great Instauration* of1620 **slid**e. This prophetic book had a frontispiece showing two ships under full sail approaching the two pillars at the gateway to the Atlantic, an this image that was explained in the accompanying text. The stone columns represent traditional knowledge as handed down in books. The ships represent a new age of enquiry and experiment. Knowing the origin of the name skyscraper we can see how my twin glass towers **slide** might evoke not stone columns but the energies of ships under full sail, and the whole project announce another new age of intellectual exploration .

Nothing would be more emblematic of the spirit of this new age than this conference, which I see as a ship, sailing courageously past the old UNESCO guidelines on the insertion of new buildings in ancient centres, and shaping a new, more flexible and creative neural approach to the solution of such problems. Until now, when a new building was inserted into a historic architectural setting, its success tended to be judged principally by the way the new structure related to those around it. To me this gives too much importance to the way one material thing relates to another. In the light of what neuroscience teaches us about the way the human mind works, it would seem much better to judge any intervention in a historic setting by considering it in terms of relations not between material objects but between sets of neural resources. The challenge for planners has always been to ensure equal respect both for the people who first gave us our historic centres and for those who are adapting them for the future. Now we are better placed than ever to meet that challenge by acknowledging both the original neural formations of those who erected the existing buildings and the varied neural formations of the many people who might use a new structure. At least we are if we are neuroplanners.