## Michael Meredith

is Associate Professor of Architecture at the Harvard Graduate School of Design and the co-director with Hilary Sample of MOS, an interdisciplinary practice focusing on architecture and design through research and the production of multivalent architectural objects. The work engages issues ranging from typology, digital methodologies, the physical context of structure, fabrication, materiality, tactility, and use; to the larger social, cultural, and environmental networks. **www.mos-office.net**

Yes, we use parametric modeling, but so what. Like others, we're drawn towards totalizing systems of organization versatile enough to engage variable relationships, diverse parameters and complex proportions. (That said, there is no purely scalar relational organization, absolute measure can never be avoided when dealing with architecture due to material constraints, building codes, and the anthropomorphic imperatives of architecture.)
Recently, in the disciplinary attempts to utilize the power of the parametric process it seems as if everyone awoke from the embarrassing drunken party of post-modernism, trying to forget everything that happened.

## Never enough
**(transform, repeat ad nausea)**

The architectural field's current use of the parametric has been superficial and skin-deep, maybe importantly so, lacking of a larger framework of referents, narratives, history, and forces. Despite the contemporary collective desire to forget postmodern semiotic signification, everything visual eventually devolves into symbolic imagery. The recent architectural production has been dedicated towards a post-post-modern architecture of radical distortion as a way to escape signification and subvert semiotic legibility (twisted hyperbolic forms, stretched out shapes, extreme continuity of planes and surfaces, etc.). I would argue that the "parametric work" being produced today fits within an evolution of so-called postmodernism, concerning the image and referent although the parametric is the tautological modulated image of quantity; the indexical referent is itself and analogous systems. To the extent the profession has utilized parametrics today, there is very little instigating complexity other than a mind-numbing image of complexity, falling far short of its rich potential to correlate multivalent processes or typological transformations, parallel meanings, complex functional requirements, site-specific problems or collaborative networks. When something supposedly looks "parametric" today, it's aesthetic (re)production—the repetition of quality and taste. The mastering of hi-tech engineering software is ultimately used to produce ornate architectural decoration. The escape of referents through radical distortion becomes just another referent, albeit a solipsistic one.

Due to the inherent specificity of computational complexity or the desire for visual unifying consistency, parametric design typically reduces the number of formal variables, but maximizes their variability through transformational affects which are engendered via quantity. Although, this is extremely pragmatic in the production of panelized doubly curved surfaces (which is how we've used it in the temporary Huyghe puppet theater project and the Drive-in screen, ground, projection booth) it can quickly devolve into an aesthetic solely based upon the transformation of parts within a field, a totalizing smooth and singular formal aesthetic. The parametric is a totalizing aesthetic built upon the legacy of American formalism, an ideology which has since transformed from an important critique of functionalist dogma as a positivist and naively utopian discourse into its own positivist position ("it has to be that way because of the geometry or form" or "the software did it").

Parametric design fits within an architectural discipline that is simultaneously searching for a unified organizational clarity (the diagram, parti, etc.) and visual complexity (Venturi), but no matter how patterned, totalizing and parametric it is, architecture is inevitably a fragment, a disfigured orphaned object, even if it is a field or in a field. It requires differentiation for it to become Architectural, and it is the socio-political that allows it to escape the emptiness of objects. Architecture requires social engagement; it requires cultural/social relevance. It is not the parametric, the relentlessness malleability of form, nor is it complexity for its own sake, but rather a complex of complex relationships that produce architecture. The operational paradigm we're interested in is akin to Pierre Bourdieau's "field of cultural production," where form is the playing field within competing vectors within a larger cultural field of forces (instead of internalized language games). The specificity and agency of architecture can only happen within the particulars of its situation and in relation to the larger field. Architectural production is no longer the Marxist "us vs. them" dialectical model of resistance. In architecture there is only criticism within the market culture and something can only become critical in relation to things outside itself. Similarly, I've always considered the dialectical opposition of form vs. material, at the least, exaggerated. It's an opposition born of post-modernist signification, where form is more critical/meaningful to signification than material in which the form is based. This distinction is too simplistic and dogmatic. The potential of complex parametric relationships are to become radically inclusive and reconcile this artificial, form-vs.-material binary. Parametric models offer another type of play and design process based around multiplicity of scalar parameters, but it never resolves what parameters are necessary for architecture.

Like the other architects in this book, we're guilty as charged—formalists, specifically interested in fields of formal relationships. For us, the persistent architectural narrative of formalism has evolved so that the specificity of use is more important than the instantiation of form for its own sake. However, the instantiation of "use" should not be misconstrued as a simply pragmatic or functionalist narrative, but rather as against the simplistic and totalizing solipsistic internalization of architectural production. Use is about the performance of architecture: the double *entendre* of performance, both of utility and theatrical value/relevance.

Today, disciplinary formal games (unlike in the 80s and early 90s) need a purpose other than aesthetic experimentation in itself. The architecture discipline—the academy's legacy of beaux-arts formalism—has become so watered down and vague that it no longer provides a strong armature to work against or within. Without a broader system, the drive for form has been listless, lost in self-referential exercises, meaningless outside the field of architecture itself. Instead, architecture should *perform* rather than simply *form;* structurally, environmentally, economically, programmatically, contextually, or in multiple formal arenas. Formal distortions need to have purpose or cultural relevance and cannot stand alone as games or algorithms. Within this new discourse, meaning can be constructed locally and relationally.

The discourse of architecture has been too bound up in the techniques of its own construction, not its cultural social situation. Of course technique is part of the cultural situation, but we've forgotten about everything else. The object of architecture has become so depoliticized and neutered that we think it's just a progression of different tribal ideologies. Ideology is personalized to the point where there is almost no discourse. Performance optimization is not a fundamental architectural problem. Architecture is primarily a cultural socio-political form, not technological determinism; it's super vague, it's inclusive, relational, it's parametric, but it's far more complex than any of us could singularly map out within the computer and totally understand because it's out of our grasp. Not everything is easily quantifiable not all relationships are geometric and not all are to be coordinated into a smooth relationship.

Traditionally the enemy of avant-garde art and architecture is the production of taste and quality, false expression of the culture. We are not against these *per se*, but operating without an apriori "style" means we are looking to define an alternate

quality, one that is specific to its situation, one that establishes an alternate space for itself within its site. It doesn't have to express a generalized sense of culture, but the cultural variables that are at play within the specific situation. What is interesting to us is within the armature of each project, looking for new methods for the production of work, utilizing parametrics, but also establishing another mode of working in our office that isn't based upon traditional "top-down" hierarchical structures. The quality of the work depends on the depth of meaning generated by the specific circumstances/parameters of the cultural landscape it occupies; in this, the parametric can engage its full capacities.

Ultimately, what interests us about the parametric project is exactly what it excludes, the socio-political dimension of architecture. Parametrics' potential is to produce a hyperinclusive network of parameters and relationships—the more multivalent the object the more meaningful and complex it is. The more multivalent the object the more engaged it is in culture/market and the more elusive it is to being absorbed by it. At the very least, the narrative of "use" provides some sort of agency to form making, deriving meaning through the influence and production of formal contingencies—variable relationships from inside and outside the architectural object. Constructing use as the performance of architecture, however, is not about reconstituting a neo-neo-functionalism or a post-post-functionalism, it is against the dialectical opposition (functionalism/formalism) of form follows function. Use is a narrative structure. Constructing narratives of utility provides an escape from a tautological parametric solipsism without forsaking formalism by providing an instrumentality of form, which could include pragmatic performance, the visceral, as well as the intellectual, discursive, or meaningful. The potential for use is synthesizing multiple narratives of architecture, typology (especially typology), performance, material, relational participation/production within a given site rather than autonomous legibility of internal relationships. These cultural, social, formal narratives provide architectural value. Use renders form as something more than an isolated physical or aesthetic object; it provides the architectural object with both denotations and connotations which can resound outside an internalized field of signification. Through narratives of use, meaning is intimate, at a small scale and in relation to the specificity of its situation.

How has all of this affected our design process? I'm not exactly sure. (Within parametric terms, typically, our projects are manifested through point fields that are easily manipulated through lines and their position on lines. Those lines are manipulated through surfaces, typically surface normals. Parameters are constructed; some relationships are formalized while others remain immutable, due to constraints arising from site, material or structure. There is a clear hierarchy of elements and technique. Recently, we have been able to change this operative system where lines are produced through points that are produced through lines, and surfaces are produced through points or lines; essentially the hierarchy can break down and through scripting and programming within a parametric environment, through self-reflexive systems, the process can produce a sort of feedback loop of parameters.) We script, utilize and play with software in our work, and we appreciate the level of control and precision it offers, along with the intensive potential to experiment within a highly controlled environment. It is not all we do, but it is important to establish inclusive organizational systems. If anything an inclusive parametric process changes *how* we work, as well as our relationship to the 'office' itself. Parametric modeling is a discourse built upon techniques of either subdivision and/or aggregation (the perimeter is always arbitrary), but just as important are the office-laboratory, or workplace itself, as are the clients and users. The "apparatus" we use shifts and changes for each project. As Paolo Virno describes in his essay *Grammar of the Multitude*, the office is not a single person, nor is it a "we." Our office is a multitude of individuals and ideologies; there is no inside and outside; no "us" or "them;" inclusive of everything, excluding nothing. Everything can be internalized as a parameter. Our office itself is "parametric," a network of parameters connected to other offices and other fields, constructed of individuated opinions and persons that try to remain as open as possible. The system's openness is perhaps a direct result of the lack of a dominant ideology or position, certain aspects of an "open work," to use Umberto Eco's term. It describes one facet of current production, encouraging multiple readings, and the lack of any singular narrative, without a narrative hierarchy, where we look for "fields of meaning," instead of linear threads of meaning. As a result of this fluid system, the relationships that engage successive projects can shift or expand, constantly adapting to changes in the field, as well as socio-culture at large.

If our office is both an enactor of and an allegory for parametric systems, then the projects created within them are perhaps not as significant for their own sake as designs, but rather what they indicate about the evolving, if somewhat disoriented, nature of the field today. As specific (parametric) techniques of production and formal experimentation reveal the fluid normative workings within and between architectural offices, they also suggest how, in their (currently) problematic, proliferative and imagistic nature, context and use can be embedded in ever-multiplying, self-referential, parametric projects. However rudimentary the ways in which our offices are simultaneously and (albeit often unconsciously) cooperatively working to broaden and complexify formal experimentation, in order to imbue our technological development and their resultants with a socially grounded context, their very multiplicity and corresponding ambiguity can be extruded in such a way that the discipline of architecture itself, through the interaction between aforesaid "parametric" offices, possesses the potential to become a kind of ground-zero for the socio-political dimension currently missing from the current formalist trope of parametric modeling.

At the moment, we don't have any dominant prescriptive system, we consciously work within a very makeshift interdisciplinary practice engaging new media and methods of production, so parametric modeling truly helps us play by incorporating as many parameters as we can. Again, yes, the future is parametric, I have no doubt it will be, but technology won't fix all our problems; unfortunately, they're much deeper and much more human. Architecture can only be critical or difficult or meaningful or complex if it directly engages culture, if it becomes meaningful to a social cultural network. It can only persist if it is elusive. Parametric relational constructions have the capacity to become more inclusive, more adaptable, less absolutist... allowing for a new model that is not built upon the persistent dialectical constructions of form/function, but more inclusive more adaptable more socially relevant providing a provisional utopia, one that is here and now.

# Mutsuro Sasaki

is a professor at Hosei University, founded his structural engineering office in Tokyo in 1980. He is a major figure in Japanese architecture, collaborating with many architects in the realization of innovative buildings such as the Sendai Mediatheque with Toyo Ito or the Sapporo Dome with Hiroshi Hara. Sasaki develops new methodological approaches based on evolution and self-organization principles in response to new design developments in architecture.

**Morphogenesis of Flux Structure:** From the realization of free 3D forms by architects to evolving the most logical structure by computer calculation

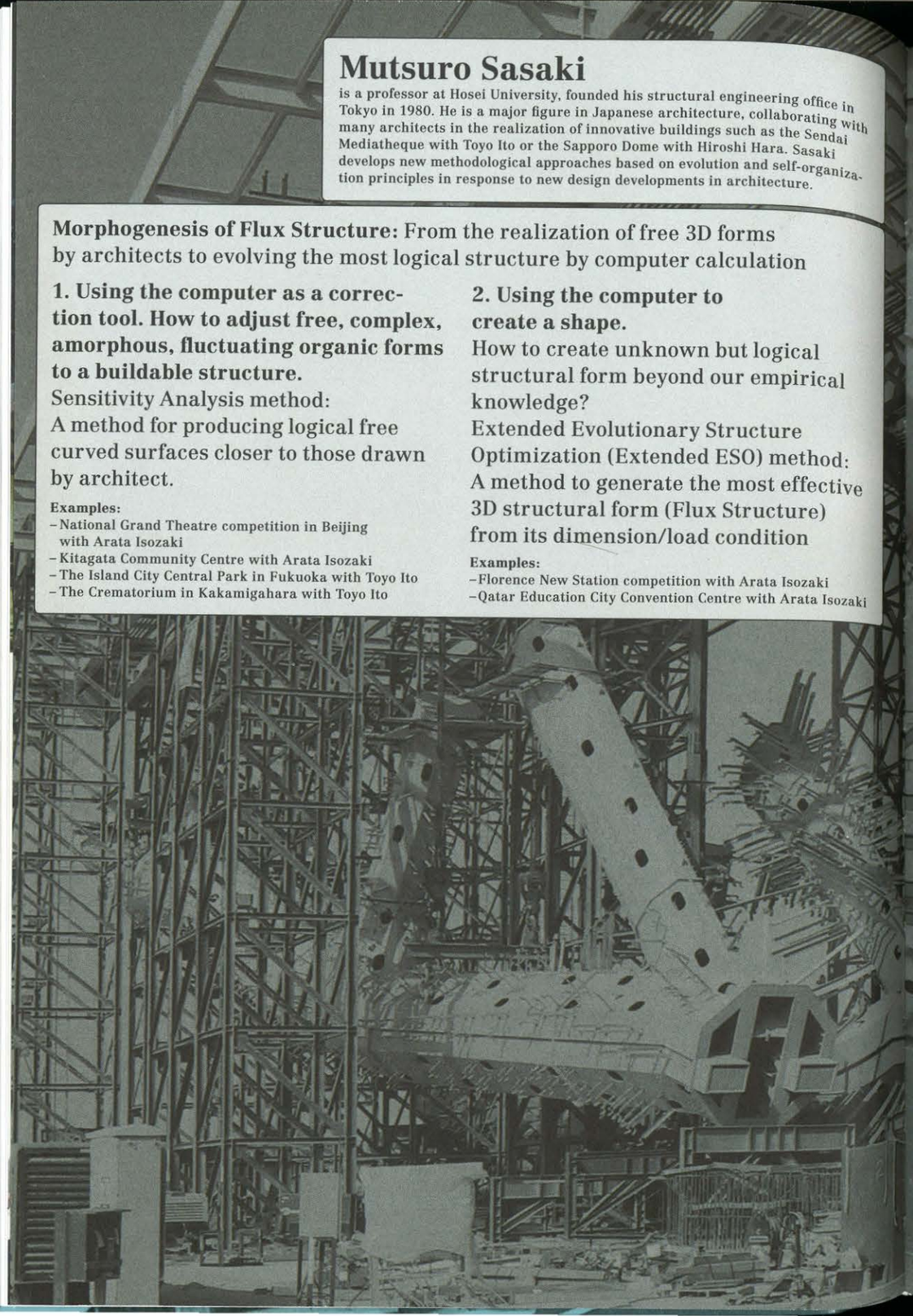
**1. Using the computer as a correction tool. How to adjust free, complex, amorphous, fluctuating organic forms to a buildable structure.**
Sensitivity Analysis method:
A method for producing logical free curved surfaces closer to those drawn by architect.

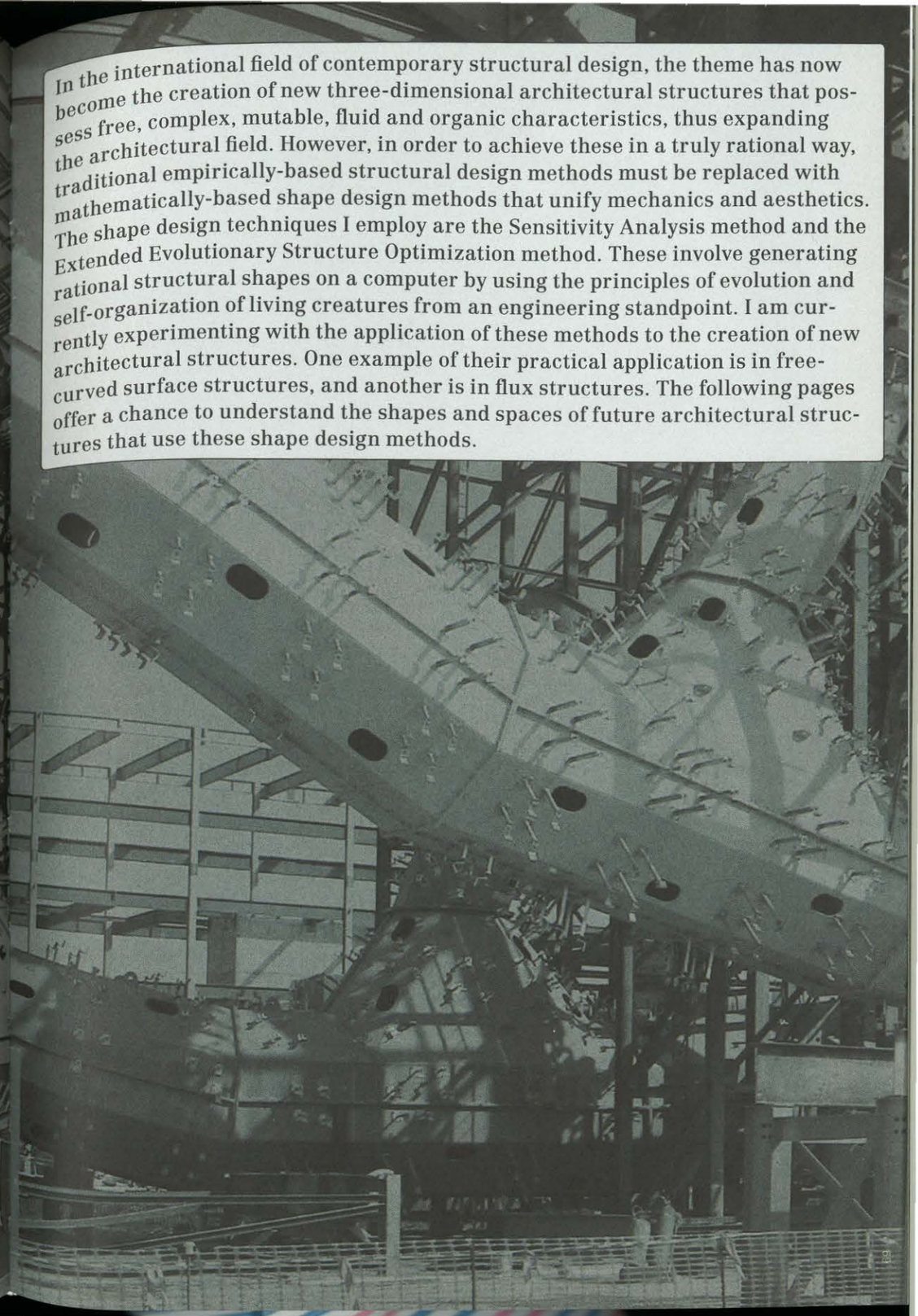
**Examples:**
- National Grand Theatre competition in Beijing with Arata Isozaki
- Kitagata Community Centre with Arata Isozaki
- The Island City Central Park in Fukuoka with Toyo Ito
- The Crematorium in Kakamigahara with Toyo Ito

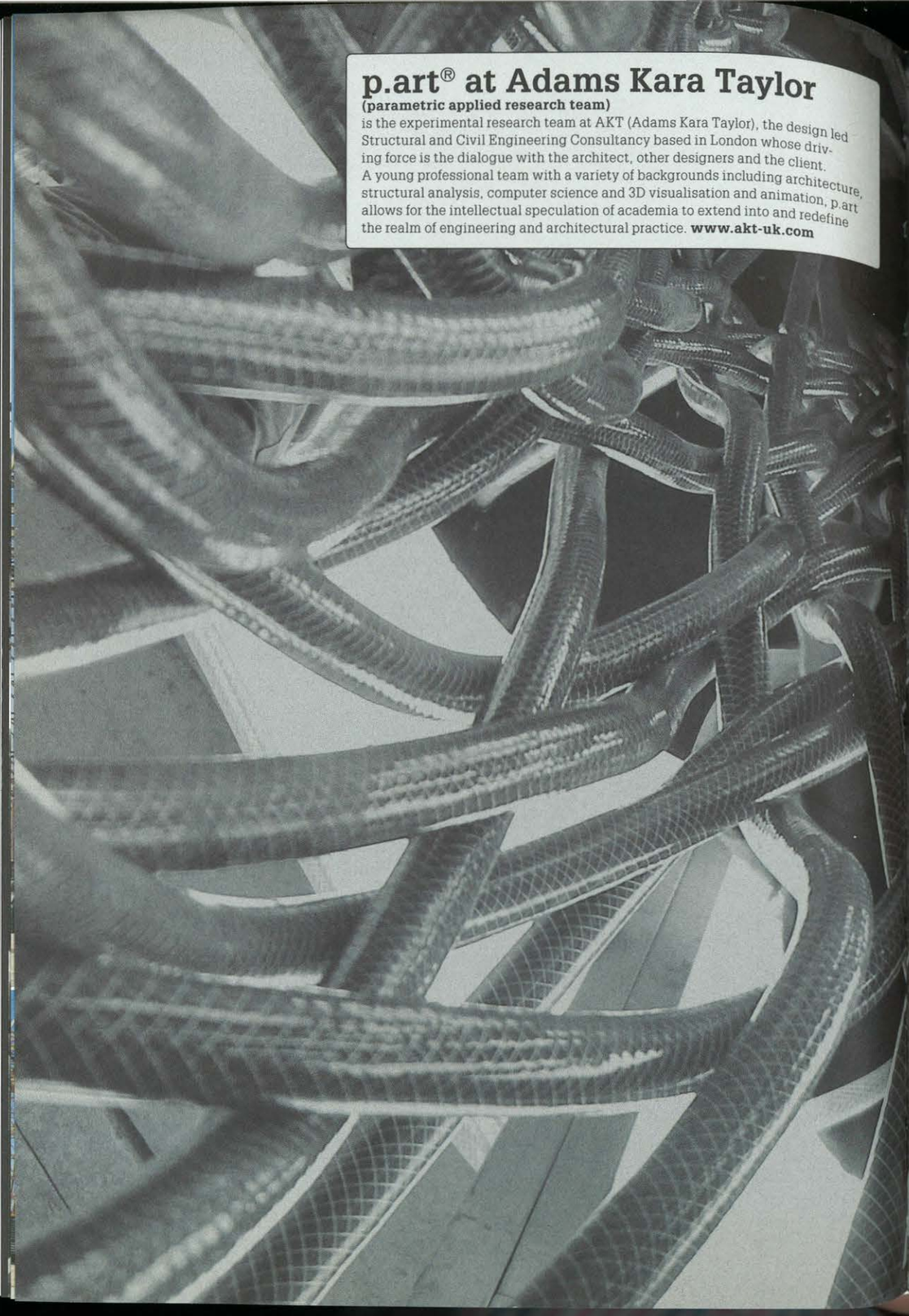
**2. Using the computer to create a shape.**
How to create unknown but logical structural form beyond our empirical knowledge?
Extended Evolutionary Structure Optimization (Extended ESO) method:
A method to generate the most effective 3D structural form (Flux Structure) from its dimension/load condition

**Examples:**
- Florence New Station competition with Arata Isozaki
- Qatar Education City Convention Centre with Arata Isozaki

In the international field of contemporary structural design, the theme has now become the creation of new three-dimensional architectural structures that possess free, complex, mutable, fluid and organic characteristics, thus expanding the architectural field. However, in order to achieve these in a truly rational way, traditional empirically-based structural design methods must be replaced with mathematically-based shape design methods that unify mechanics and aesthetics. The shape design techniques I employ are the Sensitivity Analysis method and the Extended Evolutionary Structure Optimization method. These involve generating rational structural shapes on a computer by using the principles of evolution and self-organization of living creatures from an engineering standpoint. I am currently experimenting with the application of these methods to the creation of new architectural structures. One example of their practical application is in free-curved surface structures, and another is in flux structures. The following pages offer a chance to understand the shapes and spaces of future architectural structures that use these shape design methods.







## p.art® at Adams Kara Taylor

**(parametric applied research team)**

is the experimental research team at AKT (Adams Kara Taylor), the design led Structural and Civil Engineering Consultancy based in London whose driving force is the dialogue with the architect, other designers and the client. A young professional team with a variety of backgrounds including architecture, structural analysis, computer science and 3D visualisation and animation, p.art allows for the intellectual speculation of academia to extend into and redefine the realm of engineering and architectural practice. **www.akt-uk.com**

p.art work with a diverse range of architects and designers each one employing a different approach to the creative process. At times they are part of a complex web of interacting development stimuli and aesthetic aspirations. At other times interacting sensitively with the spatial experience that an architect or designer is seeking, the complexity possibly not coming from the diverse range of design constraints that must be considered but from the rigorous application a geometrical rule set, material choice or specific design style which must be adhered to.

How can a structural engineering practice adapt its business systems and organisational procedures in such a way that the response to these diverse design requirements is a proactive and collaborative engagement with other designers rather than a passive mechanistic adherence to the traditional design process? The approach at AKT has many strands and, as with all complex systems within business and nature, the optimum performance is only achieved when each strand works in harmony and with fluidity. One of the organisational strands within AKT is p.art, the parametric applied research team.

The aim within p.art is to bring together designers from a variety of backgrounds such as architecture, structural analysis, computer science, forensic analysis, and 3D visualisation and animation. This array of cross disciplinary skills and training is then utilised to find and develop a toolkit of design approaches and methodologies which can be brought to bear on specific project design challenges. Of course each project brings a unique set of design hurdles to overcome, the ongoing question with each project is how best to utilise and develop the toolkit of methodologies in order to customise the process to suit the particular project.

The work within p.art is aimed at developing the discipline of structural engineering, as it is currently perceived by many, towards a more pluralistic approach taking advantage of skills from a range of design disciplines. In the following articles we present some of the work currently being undertaken covering diverse aspects of the design process including:

- Current and proposed use of parametric design software.
- Simplexity: Embedding structural analysis information in the design process.
- Parametric studies of the interaction between global geometry and local structural element.
- Student workshops on materiality versus parametric design.