Gabriela Izar

On design: interview with John Gero

Fig. 1: Lecture by John Gero in the 16º CAAD Futures conference. São Paulo, July 10, 2015. Source: Daniel Martinez. http://caadfutures2015.fec.unicamp.br/index.php/photos/communications2/ Acessado em 6 de agosto de 2015.

John Gero

Graduated in architecture, is a PhD (University of Sydney) and a research professor in the Department of Computer Science and in the School of Architecture (The University of North Carolina at Charlotte), as well as research professor at the Krasnow Institute for Advanced Study (George Mason University). Currently, he works as a consultant in the fields of theory of design, computer-aided design, technology policies.

São Paulo recently hosted the 2015 edition of CAAD Futures, an international event dedicated to exhibiting present-day experimentation in computer-aided architectural design. It featured renowned speakers and young researchers who shared their interest in emerging technologies within the context of thinking guided by the latest findings in the field of object-oriented programming. One of the speakers, Professor John Gero, a researcher in computer science and architecture at the universities of North Carolina (Charlotte) and George Mason (Virginia), gave an interview to the architect Gabriela Izar. Gero is currently dedicated to broad research in design science, computer design, artificial intelligence, computer-aided design, and design cognition related to architecture. His published work includes dozens of books, hundreds of papers and the recent creation of Design Science, a journal that furthers the scientific discussion of design. Gero´s analytic/scientific approach to architecture's representation is easily grasped within his and his colleague's recent production. In the article 'Measuring the information

Fig.2 – Lecture by John Gero in the 16º CAAD Futures conference. São Paulo, July 10, 2015. Source: Daniel Martinez. http://caadfutures2015.fec.unicamp.br/files/5814/3820/6943/IMG_5904.jpg Acessado em 6 de agosto de 2015

content of architectural plans' (2006), the authors apply mapping to codify notations in architectural plans of medieval churches. His morphological analysis, dissociated from iconographic data, seeks to demonstrate, through graphs and a coding system based on symbols (Q-code schema) that, at the turn of the thirteenth century, Gothic cathedrals were more spatially complex than Romanesque cathedrals. Connected to diagrammatic and parametric trend in contemporary design culture, his analytical method approaches to some extent the formal precedent studies in CAD developed in England, in the 1970s, by Lionel March and Robin Forrest, mathematicians once dedicated to revealing content about architectural space and form through mapping information derived from graphic notations and codified in binary values. Gero's work can in a way be considered a contemporary step in the perspective of architecture´s mathematization which was established after the development of computing after the Second World War.

This interview is addressed to architecture students and those interested in learning about some of Gero's ideas intertwined in his approach to design as a science, and in his investigation about cognitive processes driven by computational design. In this four-topic interview, Gero condenses and updates with remarkable didactic clarity some fundamental aspects of spatial reasoning operated with symbols, in particular reasoning involved in spatial cognition that is established within the creation of architectural design mediated by notations and the logic of diagrams. His belief is that the architect's role is to give shape to the client's symbolic and/or utilitarian requirements, in terms of a system organized through the logic of design. The cognitive aspect of this type of symbolic logic would be to allow the architect/designer to "augment" the capacity to think through diagrams and spatial notations. For readers who are familiar with cognitive research in architecture, it will be possible to review some of the author´s ideas about the application of computers in design, the possibilities that emerged through automated design, the role of diagrams in the creation and representation of form, and themes from his extensive research into what he calls Design Science.

acontece, porque quando nós manipulamos os símbolos e os traduzimos de **GI:**

Creation x creativity

Gabriela Izar: Professor Gero, if you could separate the design field in three sub-areas or stages - the creation, the production and the representation – would you consider your work much more concerned with the first phase, that of the creation, when there is not even the computer turned on but a designer is already designing?

John Gero: There's a couple of assumptions behind what you are saying which one needs to exam. Firstly, I think dividing designing that way misses some very important ideas, including that creativity, which is different from creation, occurs anywhere, so you don't say we are being creative at the beginning and we stop being creative. That's the first thing. There's an interaction between thinking and doing, so when you talk about producing things, that's a part of designing and sketching, which is production, and involves interaction with ideas. The separation of creation, the creation of ideas, the production of ideas and the documentation of them, the externalization of them, is all part of an overarching process, so I don't see them being divided that way.

The second thing is the notion that computers are totally separate from all of this. I'm not so sure about that either, in fact I disagree with that. I don't think computers come up with ideas. You can write programs that make them come up with ideas, but these programs, for example, analogy programs generate potential ideas that you didn't have, so why would you not use a computer when you're trying to come up with ideas? I disagree with the notion that creation is something that precedes the use of tools, and I think the notion of tools is also an interesting one. I think there are two fundamental axes which you can use to describe the effects of tools: one is the think of tools as an amplification of what you do, it just makes it faster, better and easier; or an extension, an augmentation, it allows you with the tool to do things you wouldn't think of doing without it. Doesn't mean you couldn't do it without it, but sometimes it means that too.

Thinking through computation design

So to me, the interesting part of computation in design is not how to produce the representation of form or the representation of all structural things, but to augment me as a human being, to allow me to do things that I wouldn't think of doing or maybe couldn't do without it, so that puts this in a different place. When we talk about CAD, I'm not talking about computer-aided drafting, where drafting is the representation of a well formed idea. Of course we need that too, but to me that's not the interesting part, the interesting part is: is this machine that is profoundly different of any machine ever invented, that has the capacity to allow us to think more than we could without it. We do that all the time or at least we do that very often, because the machine has some unique characteristic, which is: it works with symbols and we translate ideas into symbols and translate them back, and this

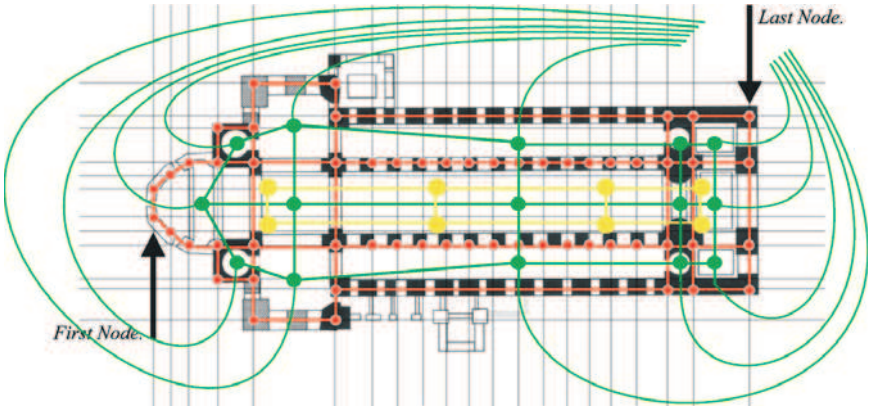

Figura 3: John Gero. "Two-class representation of a Romanesque cathedral plan dated from 1030AD, showing a grid that functions as a matrix overimposed to the cathedral's plan. Source: GERO, J. Measuring the information content of architectural plans, 2006. pág. 4. Disponível em http://mason.gmu.edu/~jgero/publications/2002/02oGeroJuppoSIGraDi.pdf. Acessed in 2, november, 2015. Courtesy of the author.

amazing thing happens, that when we manipulate symbols and translate them back into human ideas, it looks like the world looks like that (sic), although the world is not made of symbols, the world is made of either bits or atoms, and we ascribe symbols to them, ascribe meaning to it.

So there is this really interesting dialogue between humans, and no one really knows how they think. Do they think in symbols? Do they think using notions we haven't yet come to understand? And the machine can be made to look as if it's manipulating symbols, which is what computers do, they don't draw, they are actually doing something else and you can make them look as if, you can make them draw. There's something very different about using this tool compared to using a drafting machine, because a drafting machine doesn't manipulate symbols, it doesn't do anything. A drafting machine is just a more efficient way of you doing what you did before, and you can use a computer that way too, just a more efficient way of doing what you did before. But the interesting part is for to use it, to allow you to do something you didn't do before. That to me is the underpinnings of all the stuff that's interesting.

Diagramming

When we talk about diagrams, it's not how you put diagrams down, but can you find representations that are different, that allow you to think thoughts that you didn't have before. That's the power of the combination of humans and computers. Not that they produce beautiful drawings, which they do, and magnificent looking images, but it's what's behind it, it's something more profound than simple representations.

GI: Not only about computers, but about diagrams, about diagramming…

JG: In diagramming...a diagram has many meanings, but in designing we normally think of diagramming as having only a very limited set of meanings. You are either diagramming ideas or you are diagramming spaces. And when you start to diagram, most people use it for spatial descriptions, it´s another

way of describing space, which is different to some kind of boundary representation. Normally, we think of space as being described by the boundaries. Actually, we don´t draw spaces, we don´t draw spaces at all when we draw an architectural plan; what we draw are the boundaries which we understand as creating space, but if you think of it as a diagram, you can now put a point between the spaces and connect them. Every time there's a wall, for saying, you can put a point in the two spaces and link them, and now you end up with a different representation. It happens to be a dual graph. That's is not what is interesting about it; what's interesting about it is the different kind of representation than spatial boundary representations, and that representation the diagram allows you to do something which you can't easily do with other representations.

GI: And drive emergences of meaning that wouldn't be acessible without them.

JG: There's also qualitative representations of space, which look very different to both the boundary representation and the graph theoretic representation, which allow you to do other things, for example, instead of thinking of space describing via a graph or via the boundary, you can describe it just symbolically, just by symbols, where the symbols have meaning. For example, if you have a symbol for a corner and you put four of those together, and you give it a structure so the last one can be next to the first, you describe a bounded space, but in a different way. With that you can construct another kind of representation from which you can get different meanings without any drawings at all, without any diagramming, and you get meanings that you can't get from diagrams. So the power is in the representation and in the processes that you operate on different representations, so you can find emerging characteristics at the symbol level without ever looking at drawings, not just emergent shapes, but emergent understanding. For example, if I get a computer to do this because they operate on symbols, the interesting part is to have it find things that are hard for me to find. So I can produce a symbolic representation that will tell me whether this is a secure space without ever drawing it, just conceptualizing it. So the meanings of things can be found by processing symbols, and it allows you to do this without drawing. We think of drawing as being the only way we can put spatial ideas down, but it's not the only way.

GI: The term "drawing" refers to its classical notion?

JG: There are drawings and diagrams: diagrams are representations; one representation is a drawing. But you can also have diagrams which have semantic meaning, that is, the meaning is in the representation, not in the interpretation of the representation. If I look at an architectural plan I construct the meaning that says that "these two spaces are next to each other". If I produce a diagram of that I can put a link in the diagram which has the meaning already that "these two spaces are next to each other". So now I represent its semantics in the diagram, now I have semantic graphs and so on.

Design as an autonomous field

GI: Your discourse reinforces the idea that design is an autonomous field of research and activity. Would there be any difference between the design in art and in architecture?

JG: You have to be careful because artists do something which designers don't necessarily do; designers do things which artists don't necessarily do, but they also do things that look the same.

GI: Once all these process involve designing, would not be design present in both disciplines?

JG: Let me tell you the difference. Artists often do exploration for exploration's sake. And designers work for clients who have requirements. They may do exploration, but they never do exploration as designing for exploration's sake. They may do it because they want to understand more, the work where is part of artist's activities involves exploring and giving exploration weight and significance. And designers explore, but they always have as their goal that they have to do something with a client.

GI: May be that the client does not exist. For example, in his lecture entitled "Embodied computation' (CAAD Futures, 2015), Axel Kilian (Princeton University) presented several examples of experiments on materials and materialities which have no a priori practical purpose.

JG: They were exploring, they were building up their knowledge

GI: Do you consider that design?

JG: It's a part of designing, but it's not designing itself. It's like research, finding out about things. That´s a part of the totality of designing but designing is not research or knowledge extension, designing is that activity that commences with client's intentions and requirements, and finishes with giving something to the client, and the client pays for it and says goodbye to you.

GI: Then, for you, designer´s work is functional oriented?

JG: Well, that narrows it down, but yes. I think the goal of designing is to take the client's requirements and produce representations of what you've generated which you give to the client.

GI: If the client, for example, is the renaissance Pope, his requirements are basically symbolic.

JG: Yes, so you have to produce something that's very symbolic. You don't have to be the renaissance Pope. If you're IBM or Google, you'd tell the architect "I want a building that symbolizes the drive and openness of Google...", the same as a Pope saying "I want you to honor God" (or) "In my portrait I want you to honor me but I want you to honor God". How do you do that? Google has the same requirement, but they're not asking for God, they're asking to honor Google, and that the building reflect the ethos and intentions of Google. So, there's no difference in that sense.

GI: Then, would not have any difference in their transcendental purpose?

JG: Often people don't ask that. You go to an architect to design a house and you don't say "I want this house to be a symbol of how I live". Often, you just say "I want to build a house to make my life be the way I want it to be and with the spaces that I occupy", but then some people, often people who suddenly got into money say: "I want the building to show how successful I am".

GI: Or perhaps the client might ask "I want you to design a new way of life for me", so he has no demands.

GI: At last, a note to architecture students that are just beginning design practice.

JG: For a student there is something different than for a designer. Learning to be a designer is different than being a designer, because the really significant thing for anyone who wants to learn to be a designer is to be curious, if you're not curious you never become very interesting. And what does curious mean? Curious means finding things that you weren't looking for interesting. If you are looking for something then maybe you will find what you found interesting, but curiosity is finding things that you weren´t looking for interesting and then you expand, and then it goes on forever.

GI: Professor Gero, thank you very much.

References

GERO, J. Measuring the information content of architectural plans, 2006 http://mason.gmu.edu/~jgero/publications/2002/02oGeroJuppoSIGraDi.pdf

Datasheet

This presencial interview with Joh Gero was taken in July 10 (2015), during the 16th CAAD futures conference, held in Museu de arte de São Paulo. The text edition counted with the colaboration of Luis Felie Mansur, fifth grade architecture student in Centro de ensino unificado de Brasilia (UniCeub), in charge of the first audio extraction. We are also grateful for professor John Gero, who kindly reviewed the four development topics of the english version. The translated text was drawn up by the author.

Gabriela Izar
Is graduated in architecture and urbanism Universidade de Brasília(UnB), has a master degree in the same institution and Phd in architecture Universidade de São Paulo (FAUUSP), Since 2000, she teaches architectural history and architecture design in the Departament of architecture and urbanism at Centro de Ensino Unificado de Brasília (UniCeub), where she is researcher of the Núcleo de documentação da arquitetura de Brasília, held in the same institution.
g.izar@uol.com.br