Helping people to make smarter decisions faster: an interview with Aaron Marcus

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Aaron Marcus

Aaron Marcus has worked in graphic design and computers since 1967, and he is known for being the first graphic designer to work with computer graphics. He is a designer, researcher, writer, editor, speaker, and lecturer. He has received many honors and prizes from international professional communities: among these awards are his being named AIGA fellow (2007) and Member of the CHI Academy (2008). From 1982 he has been the president of Aaron Marcus and Associates, Inc., in California. He has written/co-written over 250 articles and six books, the latest being Mobile TV: Customizing Content and Experience (2010). He is recognized for his contribution to the fields of user-interface design, information-visualization design, and cross-cultural user-experience design.

1. ***You have been named a Fellow of the AIGA (2007) for your efforts in cross-cultural communication design from the AIGA (the USA professional association for design), recognizing your expertise and experience in cross-cultural user-experiences. What does this prize mean to you? What is the importance of cultural analysis for the information design area?***

   It was a great honor for me to be named an AIGA Fellow. The professional acknowledgement was somewhat new territory for the AIGA and a tribute to the influence of its Center for Cross-Cultural Design headed by Zelda Harrison. I was extremely pleased that almost 15 years of effort on my part publicizing, lecturing, designing, and analyzing cultural-related differences in communication, particularly for user-interfaces and information visualization of Web, mobile, and desktop software applications, was finally being recognized and acknowledged. I believe that analysis of the influence of culture on design of artifacts and communication will have an ever greater impact on professional design practice, especially influencing computer-based communication of all kinds, which is often instant, ubiquitous, and world-wide in its scope. In the area of information design and information visualization, one cannot ignore the research that shows cultural differences in mental models, in styles of navigation, in how people visually explore Web pages (proven by eye-tracking equipment), in how usability is considered, and even in how people think. There are many published resources that show these differences. The challenge for researchers and designers is to understand what patterns there are, what forces are at play, and to use that knowledge to design superior solutions that are more effective, appealing, successful, and humane. This effort even applies to the humble task of how to design fundamental tables, forms, charts, maps, and diagrams. By the way, I was also delighted to be honored by the ACM SIGCHI organization the following year, being elected into the CHI Academy, the first graphic designer ever so honored in that computer-human-interaction organization.

2. ***In an interview with Saul Carliner (Information Design Journal + Document Design 14(3), 190-197, 2006), you said that Paul Rand taught you "to think systematically, to question assumptions, and to be interested in a wide range of subject matter". Are there any other designers/teachers who inspired your professional life?***

   I have been fortunate to spend time with several influential teachers while I was a graduate student at Yale University's School of Art and Architecture studying for my master's degree in graphic design during 1965-68. Besides Paul Rand, I would list Alvin Eisenman, Norman Ives, Bradbury Thomson, Herbert Matter, and Sy Sillman (a student of Joseph Albers). Later professionals from whom I learned much through their books were Armin Hofmann and Josef Müller-Brockman, who introduced me to the Swiss-German graphic design approach that emphasized grids, sans-serif type, careful use of negative space, and the value of simple, geometric forms. Other graphic designers who inspired and challenged me were Dan Friedman, whom I met in 1972 at Yale when I was on a sabbatical from Princeton, and Wolfgang Weingart at the Kunstgewerbeschule in Basel, whom I probably first met in 1969 when I lectured there. In the area of computer graphics, I learned a lot from early pioneers like A. Michael Noll (graphics), Max Mathews (music), and Ken Knowlton (animation), who all were researchers at AT+T Bell Telephone Labs, where I was a consultant for several years, especially, 1969-71. When I began teaching at Princeton University in 1968, I came to meet and know some great teachers of design theory and design history. Among them were Ken Frampton, Lance Brown, Thomas Maldonado, and Umberto Eco. My interest in semiotics derived specifically from my contact with Umberto Eco whom I met in about 1976 and whose book A Theory of Semiotics I read from cover to cover. Much later, I was strongly influenced by reading Cultures and Organizations by Geert Hofstede in about 1999, which helped focus my attention on cross-cultural communication.

3. ***Your work must have inspired many designers. Is there a major lesson, or a few lessons that you would want to pass on to them?***

   If there are some teachings to pass on to future visual communication designers, I suppose these might be some maxims or advice:

   - Try to analyze the visual communication challenges facing you and see if you can trace things back to some fundamental issues, structures, and processes, then, use your knowledge of systems to move forward from those premises to lead you to some innovative and, I hope, successful resolution to what seemed before to be a confusing, complicated, and perhaps unsolvable puzzle.
   - In order to guess at the future, consider what other civilizations have experienced, struggled with, or accomplished in very different cultures, in very different locales, and at very long ago periods of time in human civilization.
   - Be curious about everything. You never know where you will learn something valuable that you can use at a later time. In any case, it will increase your enjoyment of life.
   - Find a suitable middle way between the imperious designer who thinks he/she knows everything, and the slave to mass trends, appetites, and fashions.
   - Take the time to learn technology tools and terminology so that you can perform capably, but do not become a slave to technology. Be suspicious.
   - Learn about other disciplines, cultures, systems, which helps you to communicate with a wide variety of people and to understand points of view that are very different from your own.

4. ***In your recent paper "Integrated information systems: a professional field for information designers" (Information Design Journal 17(1), 4–21, 2009) you present a prototype educational curriculum for information designers working with integrated information systems. Can you please explain what is required for information designers to work with integrated information systems? Does this field require a new way of designing?***

   For information designers to work with integrated information systems, e.g., with such systems as mobile mapping applications, social-networking services, large database management systems, and other forms of information management, distribution, and consumption, it is important to have a good grasp of development steps such as planning, research, analysis, evaluation, implementation,

and documentation, as well as design. These skills are not always taught in some schools or departments of graphic design, but they are increasingly taught in departments of computer science, schools of information management, and even some business schools. Designers must be aware of key stakeholders in product/service development (e.g., engineering, marketing, business management, and customers) and how to elicit key information that is crucial to successful design solutions. For some designers, this kind of experience, often gained in graduate study and professional practice, requires some new ways of thinking, of gathering information, of iteratively prototyping and testing. When I was a graduate student in graphic design, I think it was rarer for our teachers and my fellow students to think about explicitly testing a design and on that basis redesigning. Even if we did, we would not have been very skillful in the techniques of evaluation and analysis. Today, with the complexity of systems, and the large-scale impact on communities of users or customers, one cannot avoid being involved with such activities. Although we did some research, and perhaps I did more than most of my fellow graduates (having had an undergraduate emphasis on physics, mathematics, and philosophy), it was still not mainstream to do primary or even secondary research into issues that might affect design decisions. Today, it is inescapable; one needs to research issues carefully before proceeding further. All of these tasks take time, money, and effort, and must be budgeted into the designer's professional practice.

5. ***Do you think that design schools help students to become qualified and innovative information design professionals? Is there something missing in design school education nowadays?***

Many decades ago, just out of graduate school, I wrote a somewhat petulant article for Print magazine called "Why Design Education is Inadequate and What Can Be Done About It." I was embarrassed by our profession and frustrated by how much time, money, and effort went into persuasive communication, into advertising, and how little was devoted to informational communication. I cited the interior of the New York City Grand Central Station, which featured gigantic Kodak-sponsored displays of advertisements, and diminutive signs guiding people to their destinations, quite a change from other mass transportation environments in Europe or Asia where the informational signage was and is given more prominence, and the information design and visualization is more effective. The USA orientation seemed overly consumed with consumption. Much time has passed; we accept ads (sometimes discretely placed) in our everyday telecommunication as a basis for supporting the underlying economy. In many areas of life, people are becoming more aware of how crucial information-oriented communication is to successful hospital/healthcare systems, to the election process, to financial systems, to sustainability efforts, and to many other aspects of our modern life. Despite this, I cannot say for sure whether design schools, in general, devote more time and emphasis to information design and information visualization. There are certainly centers of excellence, but I think the community of information designers and information visualizers is still a small one. We gather at certain conferences and feel a sense of relief that we are again within our community of interest, of similar believers in the value of good informational communication.

Although decades ago I did undertake a study of graphic design schools in Europe in the late 60s, I am not an expert in what undergraduate and graduate schools are emphasizing today. I do have a sense for the immense subject matter that needs to be studied. That is what I tried to highlight in my article, but I cannot say for sure what the general patterns of educational focus are. That would require some specific new research itself. I do think that there has been a shift in that more technology and business schools support design education, that focus has shifted in technology-oriented schools from not just usability, but usefulness, and appeal in the solution of the user experience, and there is increasing awareness of the role to be played by experts in cross-cultural communication, trans-cultural communication (between dominant and subservient groups), ethnography, and anthropology.

6. ***You work with many areas of design, such as user interfaces, cross-cultural experiences, information visualization, Websites, mobile devices and vehicle systems. Although these can be considered connected areas they have specificities that require a lot of different knowledge from designers to work with all of them. What knowledge do designers need in order to do competent work in such diverse areas?***

The areas of focus that you mention are, indeed, diverse. You are mentioning areas of focus, such as user-interface design, or cross-cultural communication, and information visualization. You are also mentioning specific platforms: desktop, Web, mobile devices, vehicle systems. Each topic has

wide bodies of knowledge. There are arising so-called “Books of Knowledge”, e.g., in the Usability Professionals Association (http://usabilityprofessionals.org), or the Society for Technical Communication (http://stc.org) that seek to summarize all of the discipline knowledge, the principles, and the techniques of these many subjects. There are also handbooks of human-computer (user-) interface design, human factors, and universal access, for example, that summarize much of the discipline knowledge. The “rules” of the various platforms are covered in other books, many of them 600-800 pages in length. It is not possible to be an expert in all of these topics and platforms.

However, we have survived for almost 30 years by having people who are not afraid of complex problems (they look at them as interesting and pleasurable puzzles), who can inform themselves rapidly about client subject matter, discipline topics, and platform constraints, are inherently systematic in their approach, and are skilled in the basics of such matters as working with user profiles and use scenarios; iterative prototyping and testing; powerful effective visual design, and can write and speak as well as they can draw and test. It is these basic skills that inform their work with the specifics of any situation.

7. ***Your curriculum shows that you have worked with a variety of different projects and design fields and platforms. How your design trajectory has influenced your project development?***

Our firm began in 1982, and we worked during the 1980s primarily with advanced R+D firms and with CAD/CAM (computer-aided design and manufacturing) companies, like the US Defense Department’s Advanced Research Project Agency (DARPA), Computervision, and the Microcomputer Technology Consortium (MCC). In the 1990s, support for advanced R+D declined, and we shifted to commercial product development in vertical markets such as education, finance/banking, healthcare, and travel. We worked with many large organizations, such as Sabre, the US Federal Reserve Bank, and HP, but also with startups. When the Web arrived, we shifted to Web-based development as well. With the year 2000, and the collapse of the dot-coms, some of our Web-oriented work has shifted to healthcare, telecommunications, and again travel, e.g., for Kaiser Permanente, Samsung, and Virgin America. One effect of the greater interest in return on investment (ROI) on the part of our clients has been an ever greater support for usability studies: positioning reports (the entire approach to the market), focus groups, user tests, heuristic evaluations (according to a check-list or guide), and expert evaluations.

We remain oriented to complex projects, some of which our competitors would not even like to try, to information-dense subject matter, and to complex functions and tools such that we really need to test our own intuitive ideas against what real users, real people, actually do under realistic circumstances. In this regard, we have not really changed too much from our core approach over the past 28 years.

8. ***Bill Buxton, in his article Multi-Touch Systems that I Have Known and Loved (http://www.billbuxton.com/multitouchOverview.html, 2009), said that “everything is best for something and worst for something else”. According to him the potential problem with the diversity of population is the collection of devices required with different purposes and style of interactions. Do you agree with his opinion? In the context of a globalized world, how can designers develop successful user interfaces, which attend to the needs of diverse cultures, without creating a “collection of devices”?***

Currently our user-interface design tools do not enable us easily to make variations for diverse cultures, with different preferences and performances. If we did have them, it would be easier to provide customized solutions (which might then be further customized by the customers). Right now we cannot; perhaps in the future we shall be able to. I think it is a little naïve to think that one could make one thing or only a few things that would serve most cultures, purposes, and styles of interaction. People making real products and services for global customers know they must “tune” them correctly. Hence, I think we shall continue to have a variety of solutions, but it will be easier, less costly, and less wasteful to provide these solutions. As to whether we have a collection of devices, my own feeling is that a super-smart-phone of some kind will be able to handle the myriad applications, data, functions, needs, and use scenarios. No doubt there will be several and perhaps many manufacturers of such devices with a wide range of “flavors” or styles.

9. ***In your paper “Fun! Fun! Fun! In the User Experience We Just Wanna Have Fun...Don’t We?”***

(Interactions, July-August 2007) you said that "making the experience more fun is one key objective". Considering that user preferences differ around the world, is it very complicated to create a user interface that pleases users from different cultures? How can appealing, fun-oriented user interfaces be designed taking into account cross-cultural aspects?

In the past, product developers thought primarily about human factors and ergonomics. The primary objective was usability. Now we think additionally about usefulness and appeal, to make the experience of the product more enjoyable, memorable, desirable. Of course, around the world, research has shown that even the concept of "usability" differs significantly. For some cultures, experiencing a product has some aspect of appeal, pleasure, or "fun" is actually somewhat fundamental to its being "usable." Designing user interfaces for some cultures might involve much more use of cartoon-like creatures or different sets of colors, or different set of sounds. Our current globalization/localization development tools are more sophisticated than in the past, but further sophistication is required, as I've mentioned, to enable different solutions to be designed for particular markets easily, efficiently, and cost-effectively. Development teams, indeed, will require significant skill and experience to be able to design the right kind of fun, for the right kind of people, at the right time and place. That's what makes design challenges fun…☺…

10. There are a number of empirical studies that have found contrasting results between performance and preference measurements, which means that users perform faster and/or more accurately with one type of user interface, but they prefer to use the other type. Considering the relevance of both performance and fun aspects in user-interface design, which result do you believe designers should take into consideration while designing: users' performance or users' preference?

It seems to me that you are requiring an unnecessary decision to be made, as though it should be black or white, without the possibility of grays. Personally, I would say from experience that other factors also enter the situation, e.g., what marketers say will sell in the short-term vs. what users would actually find usable in the long-term, or what engineers push for because the results are easier for them to build. These factors, too, influence what the user finally experiences. Sometimes it is wise to give some "fun" experiences to the new user to encourage her/him and to provide some benefit or pay-off along the learning path to what later actually provides superior performance. This approach is a variation of the strategy that game developers learned long ago, simply transferred to office productivity tool environments or consumer shopping. Designers need to take both performance and preference into consideration, which may require careful study of users as well as content, careful creation of user profiles, and careful attention to use scenarios that build upon the complexity of real people working with products/services. From our own work experience, we are usually trying to make complex information and complex tools usable, useful, and as much as possible, appealing, rather than starting with a pleasurable experience and finding some way to make it useful or even usable.

11. David Sless showed in DD4D congress (Paris, 2009) a study called "Data for decisions: communication benchmarks project, a reality check" in which he found that users from different parts of the world committed many faults while using/interacting with credit card bills, and he showed that the design of these bills is not satisfactory. Do you believe that companies are concerned with information design aspects? What can designers do to help companies to offer better products to their users?

We worked for years with one major credit-card company. We have worked with many banks. We have worked with healthcare systems. All of these kinds of companies depend essentially upon good communication of information. While I have seen occasions in which companies announce improvements, like a brokerage firm proudly announcing its new, improved monthly report design, sadly, many of these improvements are modest. It was clear in many cases that the software engineers, the business people, and the marketers simply had little understanding of good information design and information visualization. This situation is not surprising. Hardly anyone teaches engineers or business students about good information design and information visualization. There are exceptions, but if designers want to help companies improve, some of them are going to have to find ways to insert their subject matter, skills, and principles into the busy curricula of schools of engineering, finance, and business. The case for good information design/visualization can be made, but it requires putting case studies in front of people in these companies and showing some return-on-investment. What are the benefits of doing it right? What are the risks of doing it wrong? In part, professional organizations need to reach out beyond their

own membership circles to get the attention of science, medicine, engineering, finance, banking, healthcare. Some of this effort is being made. Unfortunately, the situation is still poorly developed in many companies. We still encounter clients who have never tried outside people to do good user-interface design or to improve the report generation capabilities of their software… and this is 20-40 years after major changes have taken place elsewhere in the world for the better. I can only encourage information designers/visualizers not to give up. Progress is slowly being made (with occasional celebrity successes); one must be patient and persevere.

12. You have also researched new user interfaces and how people interact with them. What is the most important difference regarding how people interact with portable and small devices (e.g., mobile phones) than with static and bigger user interfaces (e.g., desktop computers)? What can we expect from such small platforms in the future?

Mobile user interfaces are used on the move. People are using them while immersed in some environment other than the relatively more quiet, stable, static office or fixed-location of the desktop computer. People may also have only one hand available for interaction. In addition, current mobile devices face the challenge of showing things on a smaller screen. All of these circumstances are challenges to designing usable, useful, appealing experiences. As consumers have seen, the range of applications is expanding rapidly, and many of them are quite successful in their designs. Customers and reviewers are quick to point out problems and reject poor design (unless they are stuck with few alternatives). Areas of development include increasing use of multi-modal voice-command and touch gestures. One further development is solutions that can move across applications to enable people to get things done without having to think about which application they are in, but rather focus on the objects of interest (photos, phone calls, social networks, etc.) and what they would naturally want to do with these objects. In terms of size of screens, my favorite solution is high-resolution, inexpensive, full-color eye-ware (some kind of stylish glasses) together with some hand-located sensors. Such a combination would provide an augmented reality experience that would enable us to stay closely attuned to our real-world experience, with smart annotation or supplementary displays, and effective ways to interact with the data/objects being displayed. Slightly futuristic, but not far off.

13. At the DD4D congress (Paris, 2009), you said that information design and information visualization are not good enough, that we need persuasive information design and information visualization to promote eco-behavior. Can you explain what you mean by persuasive information design?

Much of our informational communication relies on straight-forward information design and information visualization: our objective is to present facts and concepts, structures and processes as simply, clearly, consistently, and effectively as we can. One of the implicit or unstated assumptions is that all “reasonable” people will be able to comprehend the information and make good decisions in their and others’ best interests. However, reality is more complex. People may be distracted, ruled more by emotions, and not always in the best of moods. The situation is like earlier economics that assumed consumers were “rational.” In some cases other factors need to be taken in to consideration, especially if one wishes to motivate people to act on the facts.

Theories of persuasion have been proposed, e.g., by B.J. Fogg and Robert Cialdini, that describe the factors that influence persuasion. In the past this topic is been most closely allied with marketing. In some cases one can reasonably, ethically, design persuasive communication of information that is designed to lead to action or changes in behavior. Research and development groups worldwide have been working hard to fashion campaigns, devices, techniques that can lead to changes in behavior such as these: eating more nutritious foods that lead to lower likelihood of obesity, diabetes, and heart disease; quitting smoking; driving safely; quitting excessive risk taking or gambling; avoiding drug addiction; or saving energy. In all of these cases, many people would assume that there are good, healthy, beneficial bases for presenting information to people. The challenge is not only to present the information, but to provide support that leads to good actions on the part of viewers or users of that information, namely commitments to change in short-term and long-term behavior.

In our Green Machine project, a prototype mobile phone application that is intended to persuade people to save home-energy use, we tried to take typical techniques and use these to motivate and encourage people to change. These techniques include personal goal setting, games and competition with social networks, compelling views into future consequences of current actions,

and access to supporting informational resources. Eco-action was our specific choice of context in which to combine information design with persuasion design, but it might have been other contexts as well. We felt a mobile-device platform, was the most propitious choice for how to embody such an application.

14. You also mentioned two different scenarios for the future on earth in 2200, with high and low energy consumption. You highlight that the Green-machine can help reduce energy consumption. What will be the impact of this application? How exactly does this machine work?

The Green Machine exists currently only as a prototype application. Our team designed an initial version based on initial user profiles and use scenarios, then redesigned the contents, appearance, and interaction based on feedback from an initial user test. We wanted to find out if our general approach was correct, whether it would motivate people to change their behavior. Of course, we have no long-term use statistics of an actual application of this type as yet, but the initial response from people was positive. People on a mobile phone could frequently monitor their home energy use, in theory using Smart Grid technology, which is being developed in several countries. As easily as checking the time or the battery strength, one could note how one is doing with energy savings via a simple visual meter at the edge of the screen, then go into the application to explore further options, like viewing ones statistics about home energy use in detail, comparing usage with other people in friendship or competition groups, or checking the future impact of current behavior. Our hope is that if such an application, designed and implemented well, were available widely, it would lead to significant changes in people's behavior on a personal, daily basis, leading to significant energy-use reduction.

It is one thing to show the facts. It is another thing to get people to act on the basis of those facts and to make changes in their regular behavior over a long period of time. The same challenges await anyone who has tried to change her/his eating, smoking habits, work, or inter-personal communication habits. Change is hard, but many professionals have developed concepts, tools, and techniques that can make self-motivated change easier. Our Green Machine was trying to accomplish this in a limited way for a particular subject: behaving more ecologically at home.

15. Apart from the Green machine do you foresee other information design artifacts that can help world sustainability?

Design publications are filled these days with green (sustainable or ecological) designs, technology, processes, case studies, and research. In the area of information design, the challenge is to develop software and hardware that can measure the right components of our society accurately and precisely, then display them effectively (and persuasively) in the right circumstances to the right people, in the right way, at the right time and place. Does this sound familiar? Some companies like Natural Logic in California envision being able to display to all the citizens of one city how their city is doing in using energy. These displays could be on public kiosks, giant electronic billboards, or broadcast to everyone's video screen or mobile phone. What we have today on many television stations is somewhat boring, useless, overly precise information about today's weather, about which one might not be able to sense the differences and, in any case, about which one might not be able to do anything at all, except to choose to wear a rain coat.

What if vital, real-time statistics were shown about the city's, the region's or the nation's energy usage. Experiments by the French electrical system, EDF, have shown initial images of what it would be like for everyone to view the peaks and valleys of the nation's electrical usage in real-time. These scenarios provide a way in which citizens might act together to effect change, even if it is merely to compete with another city to be more ecological.

It seems to me that we have many new possibilities for designing persuasive information visually that can help to effect many desirable changes in behavior. Much needs to be done. We are just beginning to discover how best to accomplish our objectives. Keep having fun - what more is there to say? I'm just glad that people enjoy the games and want to keep playing them.

16. As a visionary thinker, what will be the importance of information design for our future?

In some ways, there is nothing new under the sun. Civilizations have always had high priests, the governors/politicians, the military, and the general public, or demos, as in democracy. What is new

is the ability to communicate information quickly among all involved, in particular, the large amount of complex information. Whether the information flows freely and leads to effective decision-making for the benefit of the society as a whole, or is kept bottled up and horded by some, determines the type of society. We have unprecedented ways of conveying information. We have available massive amounts of data undreamed about in previous centuries. Whether information design, visualization, and sonification (the use of sound, to account for full multimedia displays) is effectively encouraged and nourished among the leaders, and whether they choose to carry out effective information design and information visualization with the rest of society will determine whether we live in a humane civilization, or not. One recent tragic-comical depiction of the consequent dumbing down of everyone, without good education, communication, and decision-making was depicted in a film called Idiocracy. As you might be able to guess from the title, one would wish to avoid that future. Putting effort now into effective information design and visualization in our daily lives, in our schools, in our businesses, will help to keep our brains, as well as our bodies, happy. We have much exciting, challenging work ahead in helping people to make smarter visual decisions faster.

About Virginia Tiradentes Souto

Dr. Virginia Tiradentes Souto is a lecturer of the Design Department at the University of Brasilia, Brazil. She graduated in Design from the University of Brasilia (1995) and has both a master's (1998) and a PhD (2006) in Typography and Graphic Communication from the University of Reading, UK. She has been working as a designer since 1995, including at the National Council for Scientific and Technological Development (CNPq), and the National Education and Research Network (RNP). She has written a number of papers about design, especially the design of websites. Her main areas of interest are information design and the design of electronic media.