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a manifesto for the creation of experiences

While everything, technically, is an experience of some sort, there is something important and special to many experiences that make them worth discussing. In particular,

the elements that contribute to superior experiences are knowable and reproducible, which make them designable.

These elements aren't always obvious and, surely, they aren't always foolproof. So it's important to realize that great experiences can be deliberate, and they are based upon principles that have been proven. This book explores the most important of these principles.

The design of experiences isn't any newer than the recognition of experiences. As a discipline, though, Experience Design is still somewhat in its infancy. Simultaneously having no history (since it is a discipline only recently defined), and the longest history (since it is the culmination of many, ancient disciplines), Experience Design has become newly recognized and named. However, it is really the combination of many previous disciplines; but never before have these disciplines been so interrelated, nor have the possibilities for integrating them into whole solutions been so great.

Experience Design as a discipline is also so new that its very definition is in flux. Many see it only as a field for digital media, while others view it in broad-brush terms that encompass traditional, established, and other such diverse disciplines as theater, graphic design, storytelling, exhibit design, theme-park design, online design, game design, interior design, architecture, and so forth. The list is long enough that the space it describes has not been formally defined.

The most important concept to grasp is that *all* experiences are importa

"Experience is what separates the girls from the women…"
—*Where the Boys Are* 1960, Glendon Swathout

experience desi

d that we can learn from them whether they
e traditional, physical, or offline experiences;
whether they are digital, online, or other
chnological experiences. In fact, we know a great deal about
riences and their creation through these other established disciplines that can—
must—be used to develop new solutions. Most technological experiences—
ding digital and, especially, online experiences—have paled in comparison to real-world experiences and have been relatively unsuccessful as a result. What these solutions require first and foremost is an understanding by their developers of what makes a good experience; then to translate these principles, as well as possible, into the desired media without the technology dictating the form of the experience.

This book contains real-world, "offline" examples to counterbalance the online examples so that we can learn from them how to create more successful experiences in new media.

Experiences are the foundation for all life events and form the core of what interactive media have to offer.

One of the most important ways to define an experience is to search its boundaries. While many experiences are ongoing, sometimes even indefinitely, most have edges that define their start, middle, and end. Much like a story (a special and important type of experience), these boundaries help us differentiate meaning, pacing, and completion. Whether it is due to attention span, energy, or emotion, most people cannot continue an experience indefinitely, or they will grow tired, confused, or distracted if an experience—however consistent—doesn't conclude.

At the very least, think of an experience as requiring an **attraction**, an engagement, and a conclusion.

The attraction is necessary to initiate the experience. It can be cognitive, visual, auditory, or a signal to any of our senses. The attraction can be intentional on the part of the experience, not just the experience creator. For example, the attraction for filling-out your taxes is based on a need, and not a flashy introduction. However, there still needs to be cues as to where and how to begin the experience.

The engagement is the experience itself. It needs to be sufficiently different than the surrounding environment of the experience to hold the attention of the experience, as well as cognitively important (or relevant) enough for someone to continue the experience.

The **conclusion** can come in many ways, but it must provide some sort of resolution, whether through meaning—story or context—or activity to make an otherwise enjoyable experience satisfactory. Often, an experience that is engaging has no real end. This leaves participants dissatisfied or even confused about the experience, the ideas, or the emotions they just felt. An experience creator that does not spend enough (or any) attention on the conclusion—whether through inattention to detail, boredom, or speed—has just wasted his or her effort and the audience's time.

It is possible, and appropriate, for an experience to have an **extension**, which can merely prolong the experience, revive it, or form a bridge to another experience. In this sense, a larger conclusion with greater meaning can be alluded to so that experiences can be elicited. Each experience still needs a satisfactory conclusion on its own level in order to justify more time for further experiences. Hanging your audience completely out to dry will more likely disappoint them than keep their attention for more experiences. Just like serial narratives (such as episodes of television or comic books), all experiences must reward attention at their end.

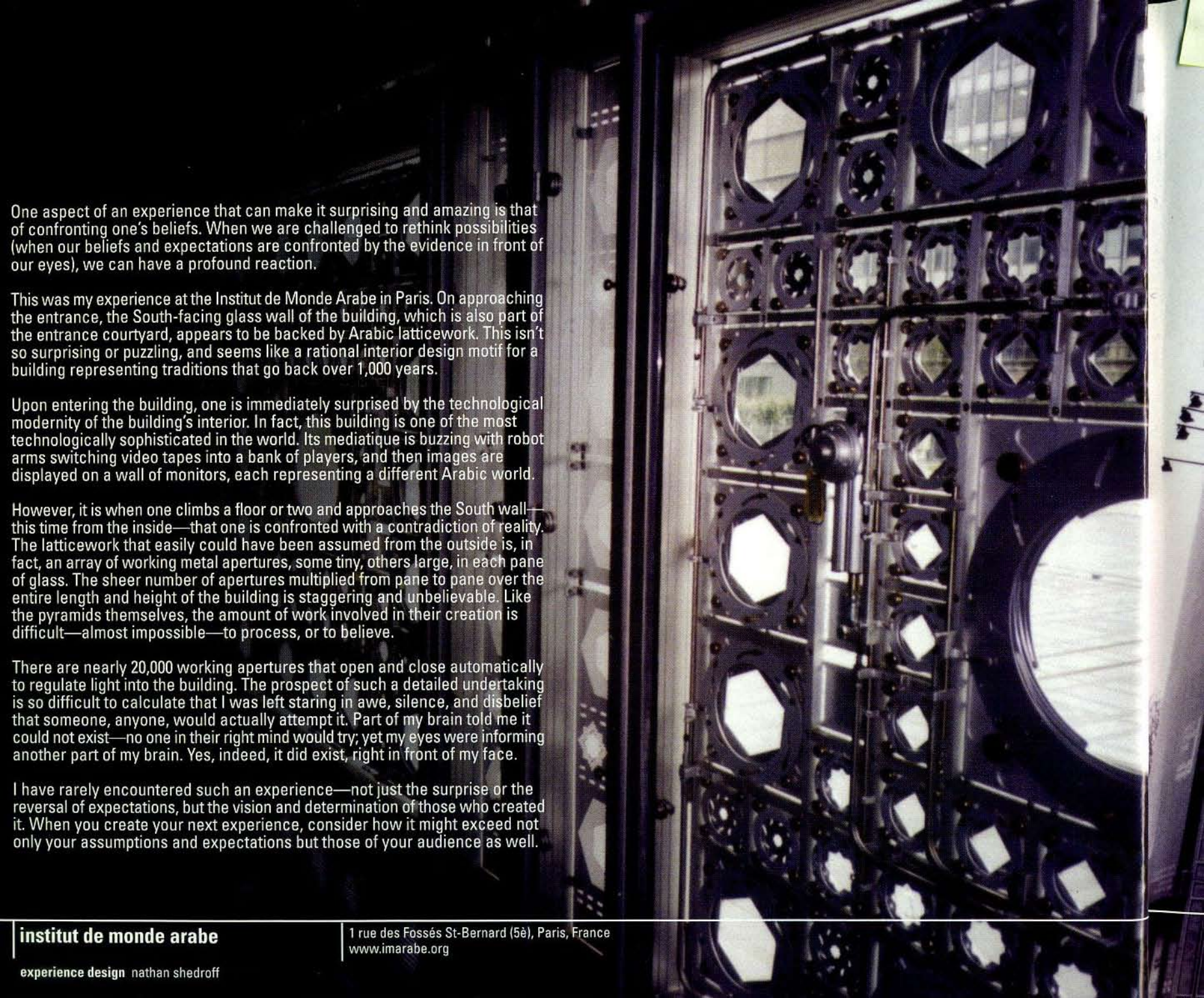
Experiences are crucial to our lives and our understanding of the world, as well as to our ability to function within it. Indeed, to be creative at all requires a wealth of experience from which to draw. As turn-of-the Century educator John Dewey described in his book *Experience and Education*, there are three natural mental resources: "a store of experiences and facts from which suggestions proceed; promptness, flexibility, and fertility of suggestions; and orderliness, consecutiveness, and appropriateness of what is suggested."

Finally, it is critical to remember that **while all experiences aren't created equally, all must compete for the attention of the audience and participants.**

This means that websites don't just compete with websites, or parties with parties or environments with environments. People searching for experiences—especially if those experiences inform—will choose from various media to meet their needs. One misconception in the digital world has been that CD-ROMs and websites in particular somehow don't need to be as interesting, compelling, or useful as traditional experiences in the same genre—that novelty alone was enough to be successful. What most developers have found is that successful digital media are those that offer experiences unique to their medium and compete with traditional media in usefulness and satisfaction.

"It is not enough to insist upon the necessity of experience, nor even of activity in experience. Everything depends on the *quality* of the experience which is had....

Just as no man lives or dies to himself, so no experience lives or dies to itself. Wholly independent of desire or intent, every experience lives on in further experiences. Hence the central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences."
—John Dewey, *Experience and Education*



One aspect of an experience that can make it surprising and amazing is that of confronting one's beliefs. When we are challenged to rethink possibilities (when our beliefs and expectations are confronted by the evidence in front of our eyes), we can have a profound reaction.

This was my experience at the Institut de Monde Arabe in Paris. On approaching the entrance, the South-facing glass wall of the building, which is also part of the entrance courtyard, appears to be backed by Arabic latticework. This isn't so surprising or puzzling, and seems like a rational interior design motif for a building representing traditions that go back over 1,000 years.

Upon entering the building, one is immediately surprised by the technological modernity of the building's interior. In fact, this building is one of the most technologically sophisticated in the world. Its mediatique is buzzing with robot arms switching video tapes into a bank of players, and then images are displayed on a wall of monitors, each representing a different Arabic world.

However, it is when one climbs a floor or two and approaches the South wall—this time from the inside—that one is confronted with a contradiction of reality. The latticework that easily could have been assumed from the outside is, in fact, an array of working metal apertures, some tiny, others large, in each pane of glass. The sheer number of apertures multiplied from pane to pane over the entire length and height of the building is staggering and unbelievable. Like the pyramids themselves, the amount of work involved in their creation is difficult—almost impossible—to process, or to believe.

There are nearly 20,000 working apertures that open and close automatically to regulate light into the building. The prospect of such a detailed undertaking is so difficult to calculate that I was left staring in awe, silence, and disbelief that someone, anyone, would actually attempt it. Part of my brain told me it could not exist—no one in their right mind would try; yet my eyes were informing another part of my brain. Yes, indeed, it did exist, right in front of my face.

I have rarely encountered such an experience—not just the surprise or the reversal of expectations, but the vision and determination of those who created it. When you create your next experience, consider how it might exceed not only your assumptions and expectations but those of your audience as well.

institut de monde arabe

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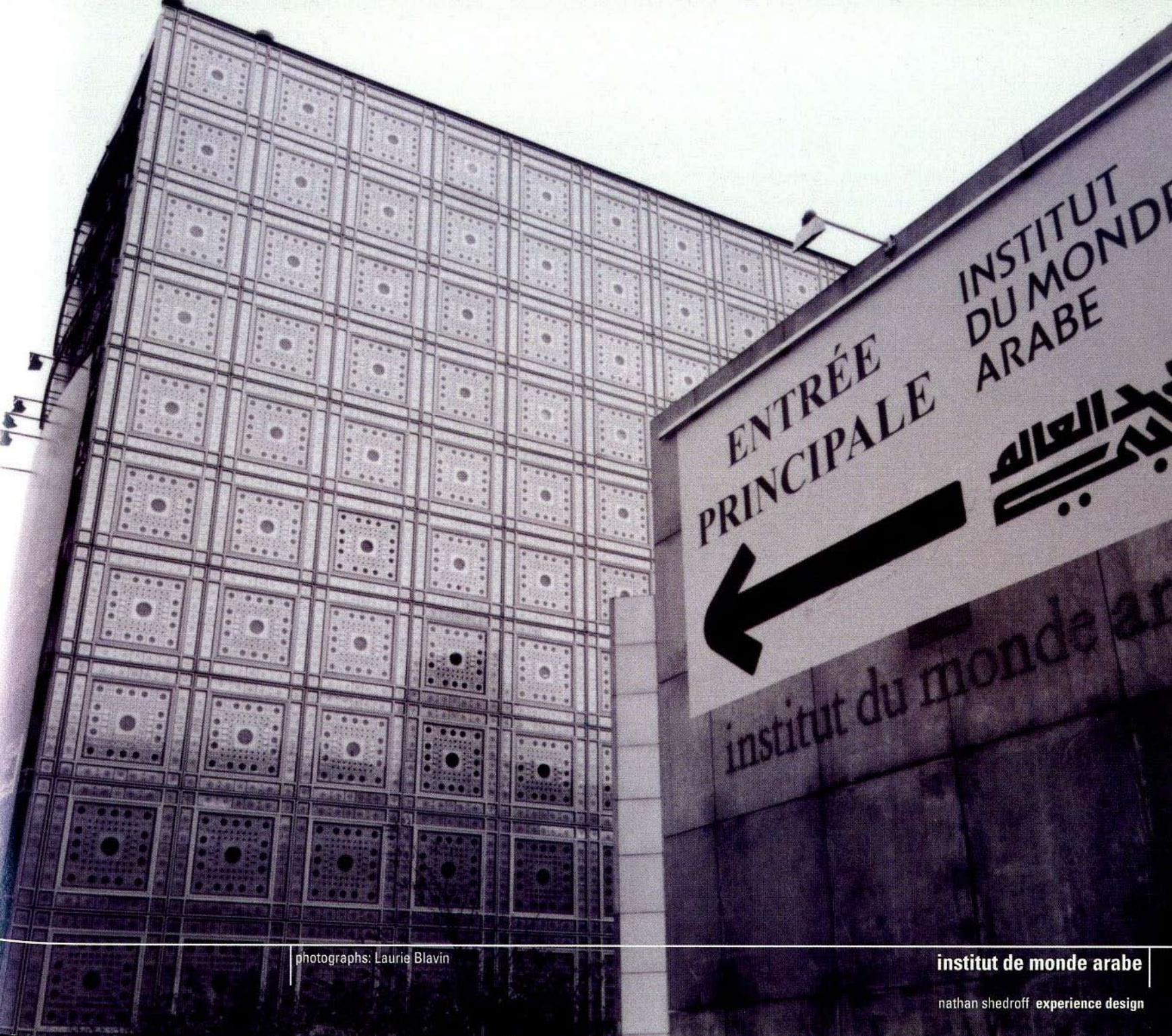
www.imarabe.org

experience design nathan shedroff



photographs: Laurie Blavin

institut de monde arabe

nathan shedroff **experience design**

How many different types of experiences are there? Most likely, the diversity isn't infinite. Functionally, however, the diversity is large enough to define an incredible amount of variety. This variety forms a palette for us to both define and discover what experiences have to offer—that is, what we can learn from them as well as how we can build new variations.

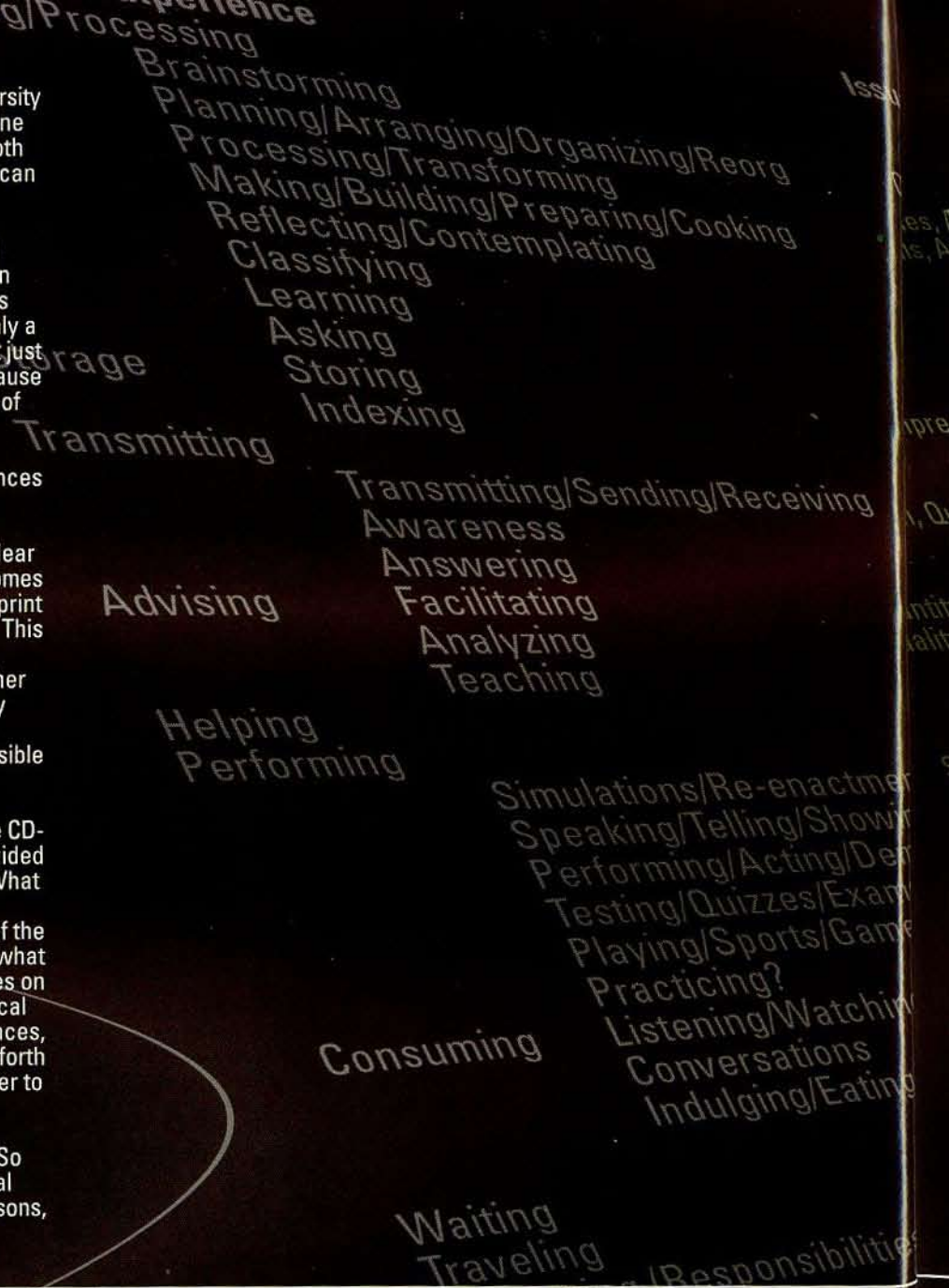
One way to understand what makes experiences successful is to build taxonomies of some the experiences that we can identify (ultimately, an endless list). This allows us to explore what makes various experiences distinct and what makes them special. The chart on this page offers only a few of the possible attributes of experiences and matches them against just a sliver of all the possible experiences. However, they were chosen because they have presented some of the best results and have revealed some of the most important insights.

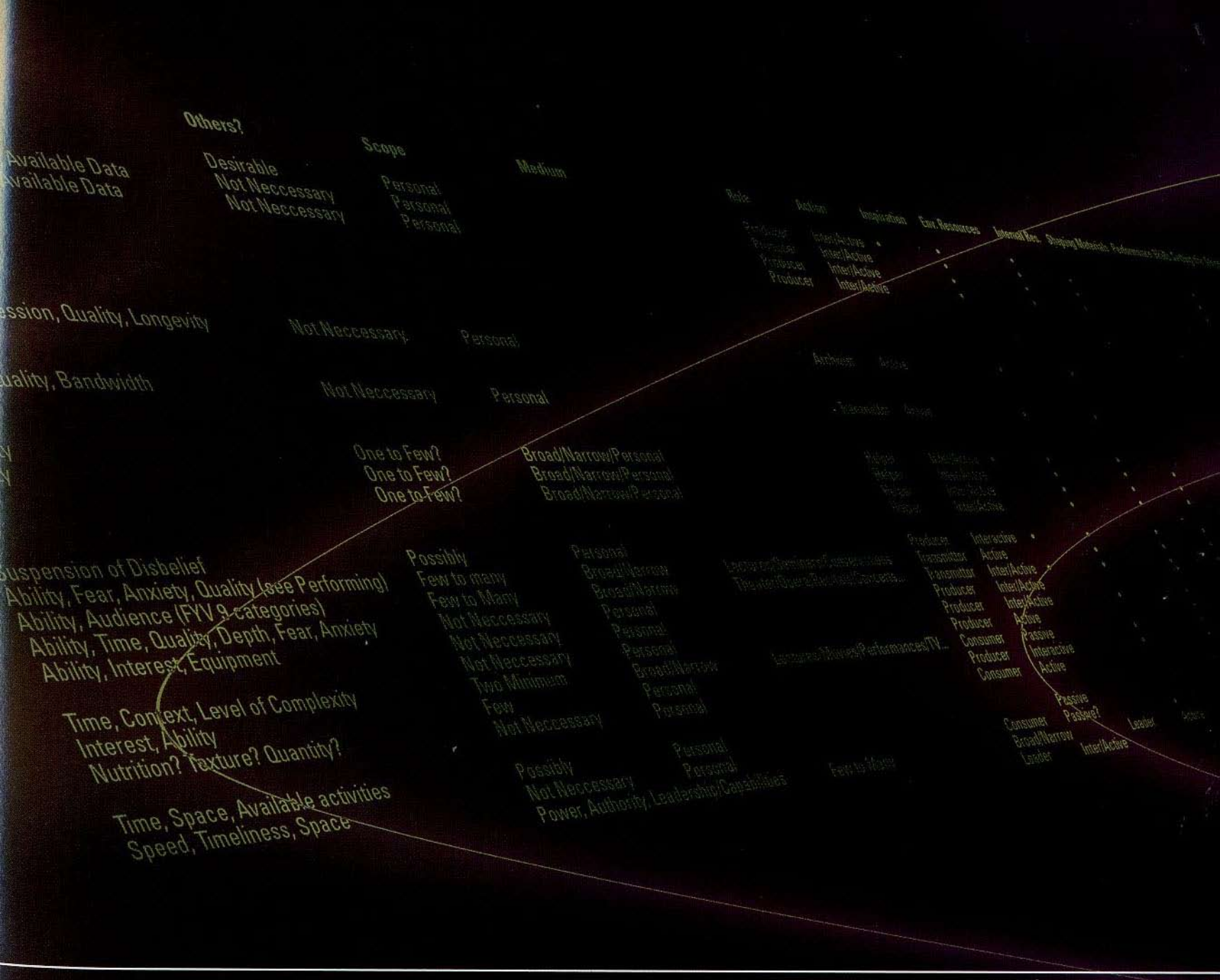
The best way to explore your own opinions and insights about experiences is to expand this chart yourself.

One of the most apparent values of a chart like this is that it makes it clear how related experiences compare in different ways. In particular, it becomes apparent that many experiences, though different in medium (such as print versus live versus digital) are similar in activity, meaning, and success. This leads to one of the most important understandings about experiences, especially digital ones—that is, all experiences compete with each other on many levels and in different media. Historically, this has been poorly understood by developers of "new media," because these developers assumed that their competition was other similar media and not all possible experiences around that topic or purpose.

For example, developers during the CD-ROM explosion rushed to create CD-ROMs on every conceivable topic—most often with dubious and misguided understandings of interactivity and of its strengths and weaknesses. What they created were mostly exotic experiences that, in the end, weren't successful for their audiences once their curiosity was satisfied. Any of the criteria on an experience taxonomy could have helped them discover what was potentially important about their products next to other experiences on similar topics in other media. For example, a CD-ROM about, say, tropical fish would clearly need to compete against other tropical fish experiences, such as television specials, scuba diving, visiting an aquarium, and so forth on *some* important level to capture an audience's attention, and in order to be successful.

The same phenomenon has occurred in the online world of websites. So many websites that have been created cannot compete with traditional experiences in the same milieu and are failing (often for a variety of reasons, though this is an important contributing one).




Others?
Scope
Medium
Available Data
Available Data
Desirable
Not Neccessary
Not Neccessary
Personal
Personal
Personal
ession, Quality, Longevity
Not Neccessary
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uality, Bandwidth
Not Neccessary
Personal
One to Few?
One to Few?
One to Few?
Broad/Narrow/Personal
Broad/Narrow/Personal
Broad/Narrow/Personal
uspension of Disbelief
Ability, Fear, Anxiety, Quality (see Performing)
Ability, Audience (FYV 9 categories)
Ability, Time, Quality, Depth, Fear, Anxiety
Ability, Interest, Equipment
Possibly
Few to many
Few to Many
Not Neccessary
Not Neccessary
Not Neccessary
Two Minimum
Few
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Personal
Broad/Narrow
Broad/Narrow
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Personal
Broad/Narrow
Personal
Personal
Time, Context, Level of Complexity
Interest, Ability
Nutrition? Texture? Quantity?
Time, Space, Available activities
Speed, Timeliness, Space
Possibly
Not Neccessary
Personal
Personal
Role
Action
Inspiration
Producer
Transmitter
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Active
Passive
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Active
Consumer
Broad/Narrow
Loader
Passive
Passive?
Inter/Active
Archivist
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Interactive
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Inter/Active
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Inter/Active
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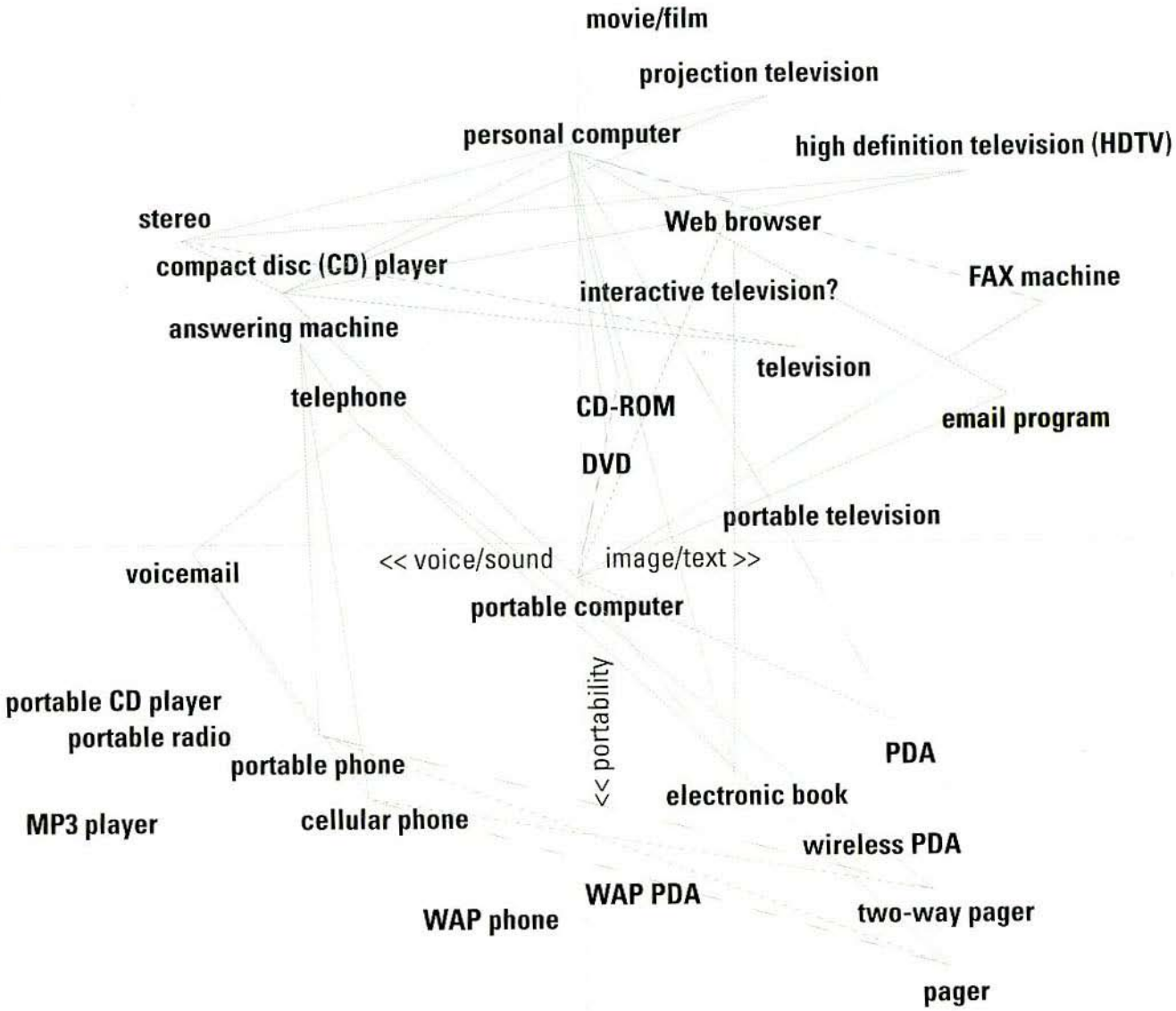
Passive
Interactive
Active

Some of the happiest memories from our youth include the fun and excitement of amusement parks. Whether it was the rides themselves or just the environment, the excitement was always a result of exploring an unusual environment with often fantastical features. Most amusement rides offer us the ability to experience things we could not otherwise, or play on our senses in ways that would be difficult outside the parks. Rides that twirl us at high speed or lift us off the ground are usually novel and stimulate our adrenaline and emotions. Even walking around the park is often a visual, sonic, and olfactory treat, as we smell, see, and hear novel things created especially to grab our attention and enhance the experience.

Another way to understand experiences is to identify the different media within which they occur. It's easiest, then, to identify the prominent attributes that differentiate products and media. There are no "right" answers here, and the differences in opinion and perception among people vary wildly. You might try discussing these in a group of people to gain an understanding about how media are viewed by others. This is an exercise I often use in classes and presentations, and the conclusions people make are some of the most valuable insights they will ever have.


movie/film
projection television
personal computer
high definition television (HDTV)
stereo
Web browser
compact disc (CD) player
FAX machine
interactive television?
answering machine
television
telephone
CD-ROM
email program
DVD
portable television
<< voice/sound
image/text >>
voicemail
portable computer
<< portability
portable CD player
portable radio
PDA
portable phone
electronic book
MP3 player
cellular phone
wireless PDA
WAP PDA
two-way pager
WAP phone
pager

Information design only recently has been identified as a discipline; it is one in which we all participate and, in some way, we always have. Information is really data transformed into something more valuable by building context around it so that it becomes understandable.

One of the first things we can learn about understanding is that it is a continuum from Data, a somewhat raw ingredient, to Wisdom, an ultimate achievement. Along this spectrum is an ever-increasing value chain of understanding, which is derived from an increasing level of context and meaning that becomes more personal and more sophisticated—not to mention more valuable—as it approaches Wisdom.

There are many ways to describe this spectrum. In *The Experience Economy,* H. Joseph Pine II and James H. Gilmore equate this spectrum with the following parts:

Noise	=	Commodities:	Value is for raw materials.
Data	=	Products:	Value is for tangible things.
Information	=	Services:	Value is for activities.
Knowledge	=	Experiences:	Value is the time customers spend with you.
Wisdom	=	Transformations:	Value is the demonstrated outcome the customer achieves.

We have learned from information design that structure, itself, has mean

and it can affect not only the effectiveness but the meaning of a message. This axiom has been proven time and time again in the presentation of "statistics" and in their "interpretation." People readily agree and believe that statistics can "lie." For years, Richard Saul Wurman has shown us that simply reorganizing the same pieces in different ways changes our understanding of them, as well as the whole. A quick survey in any medium shows a notable lack of innovation in most products of communication in terms of their structure and form. This is mostly due to a lack of initiative and imagination rather than a lack of ability or opportunity. To build more effective communications, we must experiment much more with the form these might take.

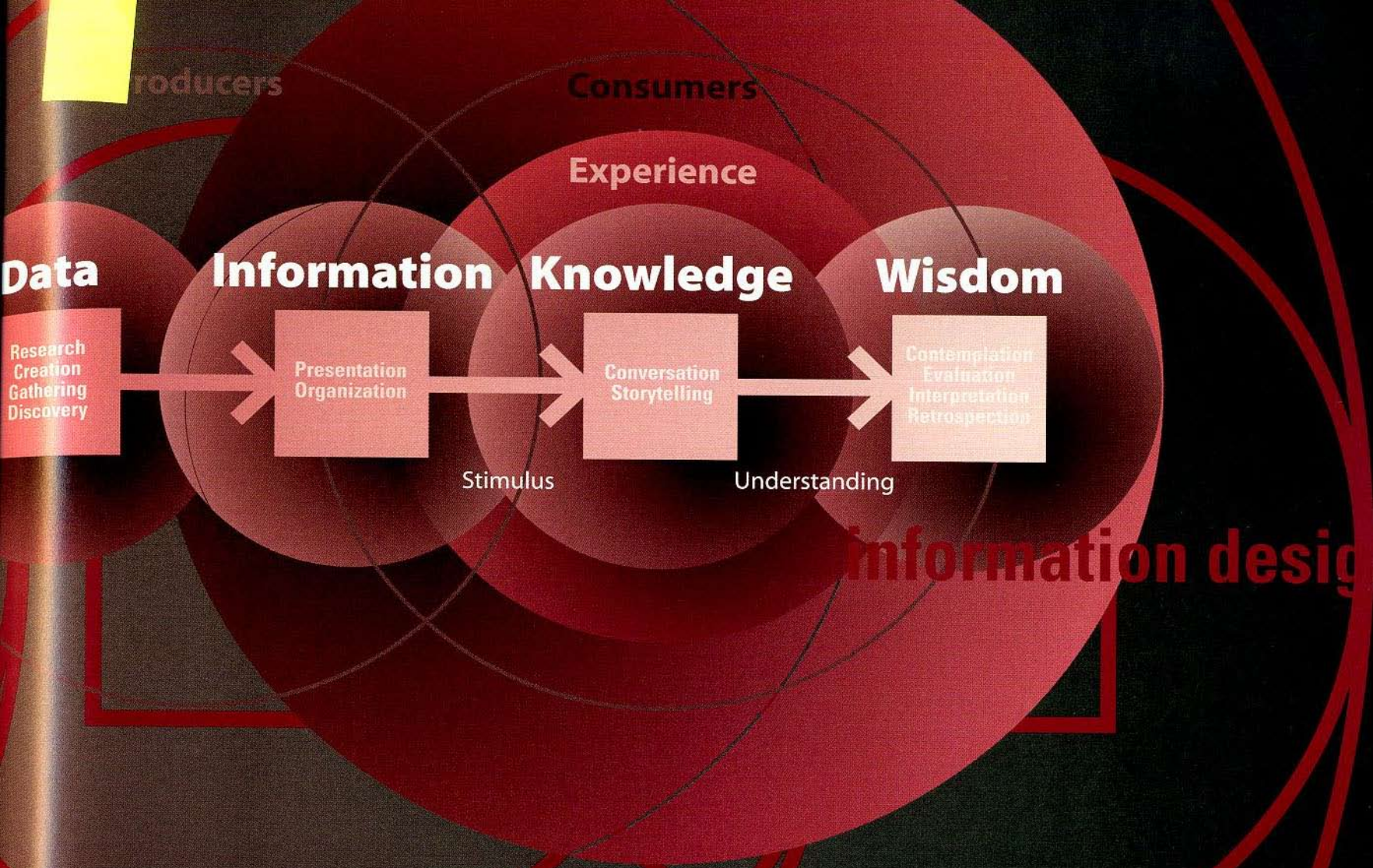
The term **information overload** has been used for several decades now but I don't think that this is really the problem. Instead, consider Richard Saul Wurman's definition of **information anxiety**. In his latest book, *Information Anxiety 2,* he and I define this malady in terms of its social effect: a lack of context and meaning in our world. It isn't so much that there's more to read (although this is certainly the case), but that there is such a paucity of valuable insights and meaning; no one has shown that there is, in fact, any greater number of meanings to understand than ever before.

The way to lessen this condition is to create more insight, perhaps the most valuable product of all

Insight is what is created as we add context and give care to both the presentation and organization of data as well as the particular needs of our audience. And as insight is increased by building with more care and context, communication is pushed higher up or deeper into the understanding chain.

In the following pages, you'll see examples of all of these concepts, including multiple ways of organizing data and the emotional impact it can have on the message. Information presentations often can be seductive, sometimes in the content, often in visual presentation, but most important is their form and ability to communicate clearly.

The Experience Economy, Joseph Pine II and James H. Gilmore, isbn: 0875848192
Information Anxiety 2, Richard Saul Wurman, isbn: 0789724103


roducers
Consumers
Experience
Data
Information
Knowledge
Wisdom
Research
Creation
Gathering
Discovery
Presentation
Organization
Conversation
Storytelling
Contemplation
Evaluation
Interpretation
Retrospection
Stimulus
Understanding
information desig

Data is not information.

This is paramount to realize. Though we use the two terms interchangeably in our culture—mostly to glorify data that has no right to be ennobled—they mean distinctly different things.

Data is raw and often overabundant. While it may have meaning to experts, it is, for the most part, only the building blocks on which relevance is built. It also should never be produced for delivery in raw form to an audience—especially a consumer audience. This isn't so that it can be kept secret but because it has no inherent value. Until it is transformed into information (with context), its meaning is of little value and only contributes to the anxiety we feel dealing with so much information in our lives.

An unfortunate fallacy we live under is that this is an "Age of Information."

Never before has so much data been produced. Yet our lives are not enhanced by any of it. Worse, this situation will only become more pervasive.

Data is often passed off as information, while the bulk of it doesn't even qualify. For example, CNN often fills the space between advertising and news on its television channels with "factoids"—probably the best word yet to ensure that there isn't any meaning, information, or value attached to it. These serve not to inform, but to create the perception of information. Each is a wasted opportunity for actually enlightening us with insightful observations about the news around us. Instead, they serve only as worthless trivia that mostly divert our attention from more important things, while giving the illusion that accuracy and obscurity are replacements for understanding.

Likewise, titles like Chief Information Officer (CIO) and even Information Technology (IT) further mask the problem. In most cases, neither has anything to do with information, communication, or any systems for generating these. Rather they are merely steeped in data, data systems, data technologies, and data processes. The famed "productivity paradox" (the lack of proof that any gains in increased productivity stem from computers and related technologies) is mostly a crisis arising from this misunderstanding of data and information. What we tend to measure is only data and while this has increased in our society, it has not—and cannot—improve productivity or anything else because it lacks the value to do so, or the value to make meaningful change. Once we re-educate ourselves as to what information really is, then we may be able to find the opportunities for increased understanding and productivity.

Data is so uninforming that we can liken it to heavy-winter clothing, enshrouding us as we interact with each other. It doesn't completely stop us from communicating, but it makes it much more difficult, and it surely makes any complex interactions more laborious.

"Information is data endowed with relevance and purp
Peter Drucker

Information is the beginning of meaning.

Information is data put into context with thought given to its organization and presentation. And even at that, it is only the lowest form of meaning as the context involved in creating and presenting data is usually basically generalized. However, at least there *is* context, unlike data.

Because information is so basic, it tends to be formal and rather impersonal. Also, most of us have such poor information skills—that is, the skills necessary for reorganizing, analyzing, synthesizing, and presenting data—information tends to be even less sophisticated when it finally comes into being.

We all create information on some level, though most of us aren't consciously aware of doing so. However, we do make note of those people or sources that we tend to trust and understand better than others. We do feel a difference when we feel we're being understood, and a frustration when we aren't. Because information is part of our lives, we all are both producers and consumers. This is why it is so critical for us to have basic information skills. Without these skills we relinquish the responsibility and the ability to create information for ourselves and those around us—to add value, if for no other purpose than to relate our own personal stories and experiences.

Like data, information can be captured and frozen in time. It can be printed in books or inherent in natural phenomena (like tides). However, it is only of value if we know how to decode it, if we can speak the language with which it has been encoded, and if the information hasn't been obscured by other phenomena.

Unfortunately, there are very few products that help us create information. Software manufacturers, in particular, have been adept at creating tools that allow us to manipulate data, color and animate it, but not help us create meaning from it. Usually, these tools only make things worse as their effects only mask meaning further.

Organizing Things

The organization and presentation of data can profoundly change its understanding. Presentation can affect the knowledge people build and the experience people have. This is where information design can have its greatest impact. It is the discipline concerned with transforming data into information by creating context and structure. Information design is the method through which graphic design and other visual disciplines are expressed.

Though data organization is a profoundly important process, it isn't necessarily a foreboding one. As Richard Saul Wurman has so often shown, there are only a few ways to organize data in order to create information. In fact, it is often a fun exercise that yields surprising and satisfying results. Meaning is formed by the arrangement of data and transformed as we restructure it.

Consider the basic ways we can organize data, being mindful that organization and presentation are different concepts. Data can only be organized within a few principles: **Magnitude, Time, Numbers, Alphabet, Category, Location,** and **Randomness.**

Magnitude, Time, Number, and Alphabet are all sequences of some type, which we can use to organize things based on a similar characteristic shared by all the data. The last three of these attributes (**Time, Number,** and **Alphabet**) are special, simple sequences that we've come to understand through training but which often have no inherent meaning for the data. These organizational structures are merely easy for us to use, even though their use can seem somewhat artificial.

Category and **Location** are organizations that also use some inherently meaningful aspect of the data around which the data can be oriented. Because these organizations are more qualitative than quantitative, they often seem more "natural" and less artificial. These two organizations can be thought of as two-dimensional (and sometimes even three-dimensional) in that they each orient data, necessarily in at least two directions (whereas sequences like those above are fundamentally one-dimensional). There is no greater value necessarily in data arranged two- or three-dimensionally other than one-dimensionally, as long as it is meaningful. However, 2D data arrangements can tend to offer more accessibility since there is more than one way to access the inforrmation (either dimension).

Randomness is the lack of organization. It is often important when we're trying to build an experience that isn't necessarily easy (a perfectly legitimate endeavor as long as it's appropriate), for example as in a game.

> The same organization (for instance a geographical or locational one) can be presented or *expressed* in several different forms, e.g., maps, written descriptions and directions, illustrated in graphs, charts, and timelines, or read to us audibly. The organization need not change through all of these forms and, thus, the meaning won't either. However, the presentation will still affect a person's ability to understand.

Data often has its own natural organization. It almost has a *will* to be organized in a particular way (still within one of the forms we've discussed). Experimenting with different organizations is often a process of uncovering the organization that exudes from the data, thereby informing its structure.

> Each organization creates a new mental model of the data and can lead to new understandings of the data. These can sometimes revolutionize our understanding of even familiar subjects since they illuminate an aspect that might have been confusing or obscured before.

The difference between information and knowledge is a difficult one to explain. Knowledge isn't just a more complex version of information—its use is different as well. Knowledge is a kind of meta-information that must be understood in a more general way. In fact, **a definition of knowledge could be "sufficiently generalized solutions gained through expe**

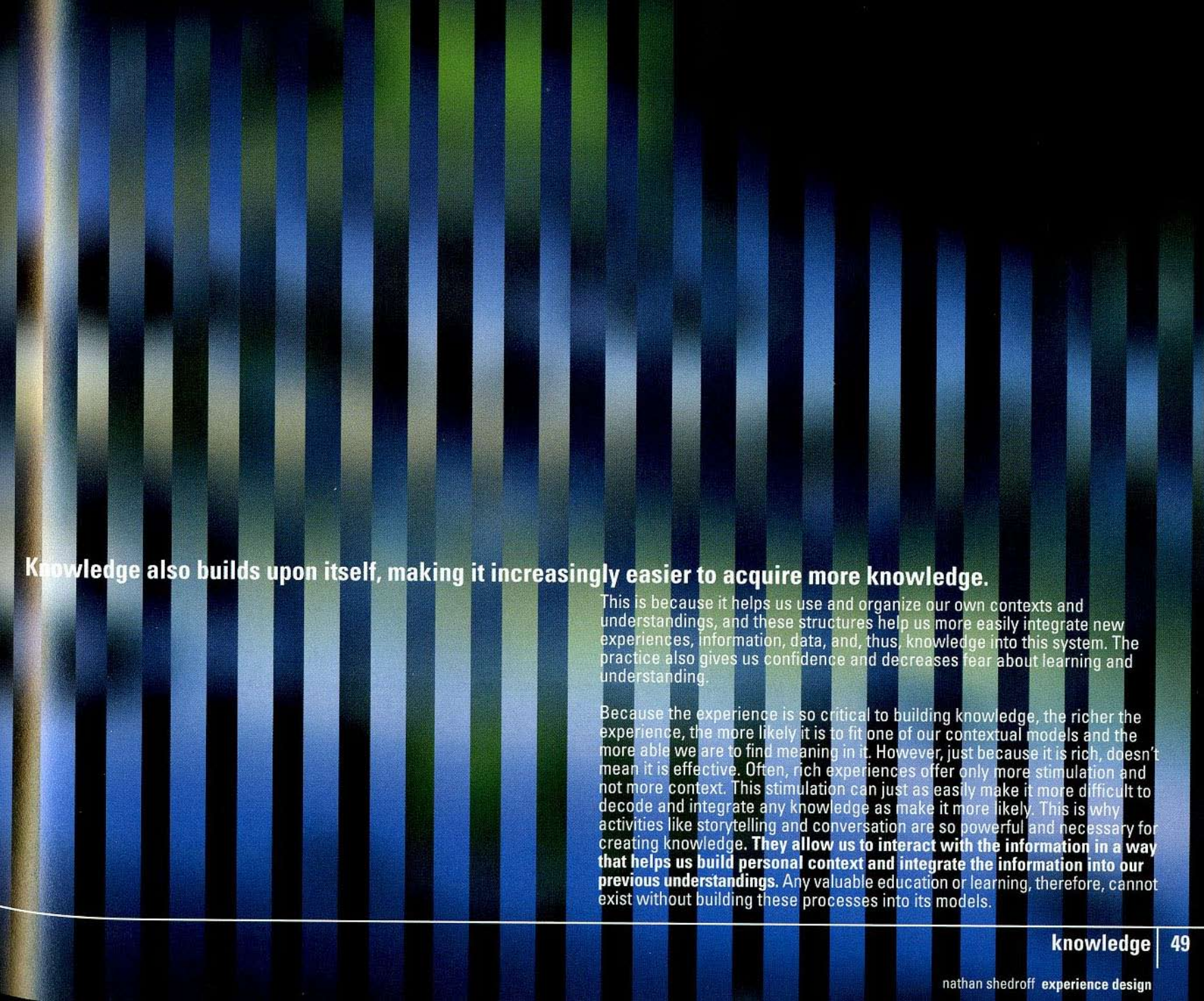
This means that knowledge is something that is, necessarily, accessible in many and varied contexts and situations, and not merely descriptive of details in particular ones.

This generalization is important because it makes knowledge more useful, and it helps distinguish knowledge from information since its meaning must be distilled from information in order to be understood as knowledge and not information. In other words, **generalization is a criteria that helps us understand a meaning that is deeper or of a higher-order than information.** This is also possible only through experience since we cannot distinguish knowledge from information unless we can compare its use in several, different situations, each of which is an experience.

While we can help build knowledge for others (in pointing it out as well as designing the experiences to make it easier to understand), this is the beginning of the crossing of a threshold in which **people must build these kinds of understandings for themselves.** Wisdom, for example, is something people can only build for themselves and knowledge shares part of this characteristic.

Knowledge is increasingly personal in that the processes in our minds that help define and understand knowledge rely increasingly on personal contexts, content, and previous understandings, and less on shared ones. Again, by the time we can build wisdom, the context is so personal that we are unable to share it.This process of internalization helps create knowledge and wisdom but at the same time makes it more difficult to share.

Context moves from the global (societal or cultural) to the local (shared among increasingly smaller groups and more idiosyncratic) to the personal (easily understood only to ourselves without explanation). **Knowledge, then, becomes more casual in its use. As it becomes more personal,** it cannot be used as formally with others; and formal situations often can make it more difficult to communicate knowledge.



Knowledge also builds upon itself, making it increasingly easier to acquire more knowledge.

This is because it helps us use and organize our own contexts and understandings, and these structures help us more easily integrate new experiences, information, data, and, thus, knowledge into this system. The practice also gives us confidence and decreases fear about learning and understanding.

Because the experience is so critical to building knowledge, the richer the experience, the more likely it is to fit one of our contextual models and the more able we are to find meaning in it. However, just because it is rich, doesn't mean it is effective. Often, rich experiences offer only more stimulation and not more context. This stimulation can just as easily make it more difficult to decode and integrate any knowledge as make it more likely. This is why activities like storytelling and conversation are so powerful and necessary for creating knowledge. **They allow us to interact with the information in a way that helps us build personal context and integrate the information into our previous understandings.** Any valuable education or learning, therefore, cannot exist without building these processes into its models.

Widsom is even more difficult to explain than knowledge since the levels of context become even more personal, and thus the higher-level nature of wisdom renders it much more obscure. Where knowledge is mainly sufficiently generalized solutions, **think of wisdom as "sufficiently generalized approaches and values that can be applied in many, varied situations**

Wisdom cannot be created like data and information, and it cannot be shared with others like knowledge. Because the context is so personal it becomes almost exclusive to our own minds, and incompatible with the minds of others without extensive translation. This translation requires not only a base of knowledge and the opportunities for experiences that help create wisdom, but also the processes of introspection, retrospection, interpretation, and contemplation.

We can value wisdom in others but only we can create it for ourselves.
Because of this, it doesn't come naturally or accidentally; it is for the most part created deliberately. Exposing people, especially children, to wisdom and the concept of wisdom is critical in opening the door to becoming wise (or having common sense); however, the work cannot be done for us by others. It can only be done by ourselves and this requires an intimate understanding and relationship with ourselves.

It is quite possible that the path to wisdom is not even open until we approach understanding with an openness and tolerance for ambiguity. Fear and rigid tenets often create barriers to truly understanding experiences and situations and creating wisdom from them. This doesn't mean that we must be without principles, but that we must be constantly willing and open to challenging our principles and modifying them—even abandoning them—in the face of new experiences that prove more reliable or illuminating. Since wisdom is so personal, a fear or lack of understanding about yourself becomes one of the most extreme roadblocks to becoming wise. Since we are always striving to better understand ourselves, this becomes a continuous process that requires that we constantly evaluate ourselves as well as our previous understandings and functions.

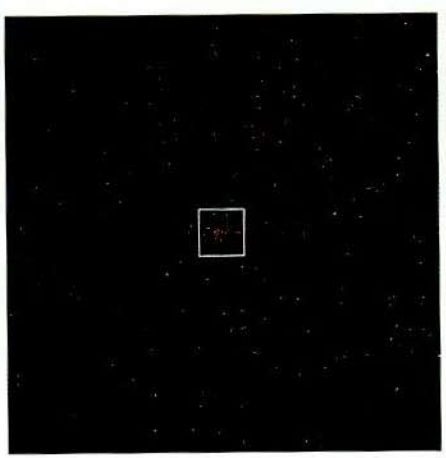
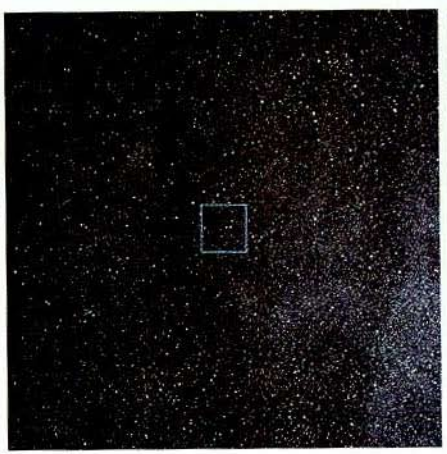
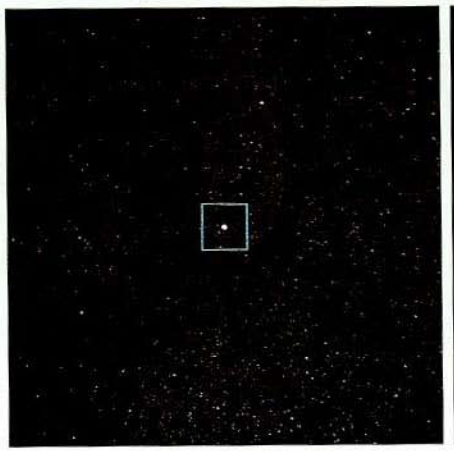
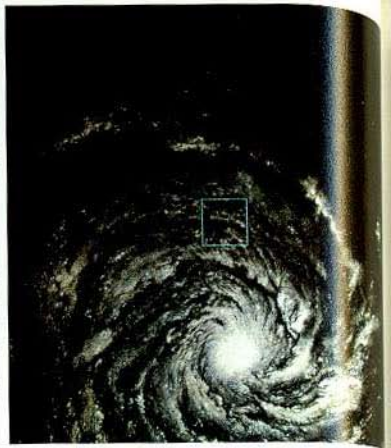
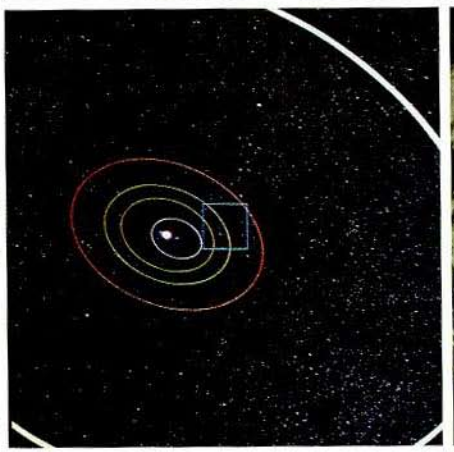
The most important aspect of any design is how it is understood in the minds of the audience.

This concept, whether fully or partially formed, is a **cognitive model**. Everyone forms cognitive models for nearly everything they encounter—particularly those things they interact with repeatedly, or those things that we focus on because they are important to us. Some people are more adept at forming cognitive models than others, and these facilities also differ between people in their type of understanding—that is, some people form understandings textually, visually, aurally, temporally, geographically, and so forth. In any case, the form of the experience is what gives it meaning since this is what people experience directly.

Whether or not you focus on creating a cognitive model for your experience, your participants will nonetheless. They might form a mental map of the sequence or process or location. It might be of their feelings, or merely a randomly strung together list of memories of their experiences. What's important, however, is whether you want or need them to remember the experience well enough to follow directions, repeat it, recount it, or duplicate it. Much of education is about creating mental models for students to use and follow.

New cognitive models can often revolutionize an audience's understanding of data, information, or an experience by helping them understand and reorganize things they previously understood (or, perhaps, couldn't understand), in a way that illuminates the topic or experience.

To create meaningful cognitive models, consider the ways in which you want your audience to find meaning and what you want them to remember. In most cases, you will need to choose one form for the overall experience (like the sequence of a book, play, or music, or the layout of a party, theme park, or building). There are no *right* answers to this one form, but you would be wise to explore different forms before settling on one (see *Information* on page 42 and *Multiplicity* on page 72). Of course, this form won't work best for everybody, so when it's important—and possible—create other ways of moving through the experience that allows others to form a mental map in a way that better suits them. Also, be wary of mental models that constrain your experience or cause cognitive disonance (when the mental map formed doesn't conform well to the reality of the experience) for your participants (see *Metaphors* on page 102).


There have been few descriptions of our universe as powerful and astounding as the film *Powers of 10* made by Charles and Ray Eames and Phyllis and Phillip Morrison (now also a book). The size of the Universe and that of the atom are difficult for most people to grasp since these numbers are so vastly large and small (respectively); and, we have little way to relate them to what we can experience directly (the major way we create understandings).

This film takes us on a journey from 1 meter off the Earth's surface to the edges of the Universe—not in a direct or algebraic line (a journey that would be impossibly long) but an exponential one. In other words, instead of presenting pictures back toward the Earth at every meter thereafter, we see views that increase exponentially from one meter to 10 to 100 to 1000 etc., finally stopping at nearly one billion light years from the Earth.

Likewise, the second half of this journey takes us into increasingly smaller views (starting at the same point one meter above the surface of the Earth) until we move inside the body, its organs, its cells, its organelles, its molecules, its atoms, and finally to the smallest edge of our understandings of the physical Universe: inside sub-atomic particles.

The film (and book) use this linear organization with constant intervals of distan to help us form a cognitive model of the relative sizes of the things we understa (and don't yet) in terms that we can begin to understand.

One of the most important, and unexpected, observations isn't how big or smal things are, but that certain repeating patterns of vast emptiness and packed ac are almost constant from the sub-sub-sub atomic to the largest conceivable astronomical bodies. These kind of relationships draw conclusions about the na of the Universe and even how we perceive, and these revelations also lead to t formation of a cognitive model for the Universe that anyone can understand.

isbn: 0716760088
www.eamesoffice.com/powers_of_ten/powers_of_ten.html

creators: Phillip and Phyllis Morrison and Charles and Ray Eames
first published in 1968

INTRODUCTION

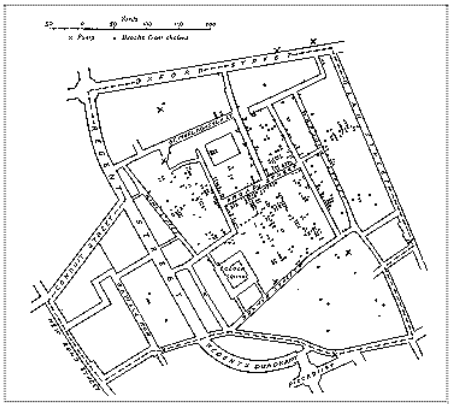


fig.1. Location of deaths from cholera in Central London by Dr. John Snow, 1854.

Information graphics reveal the hidden, explain the complex and illuminate the obscure. Constructing visual representation of information is not mere translation of what can be read to what can be seen. It entails filtering the information, establishing relationships, discerning patterns and representing them in a manner that enables a consumer of that information construct meaningful knowledge.

In the attention scarce world of today, information graphics (or infographics) have taken the media and communications industries by storm. From simple instructions on how to assemble your table, to explaining how a conjoined set of twins were surgically separated, to understanding what went wrong in the Challenger Shuttle disaster - designers, educators, journalists, and communicators in general have embraced infographics to help audience understand their intent in a swifter and smarter way.

In this seminar we will see what an infographic is, how it evolved, and what it takes to create one.

WHAT IS AN INFOGRAPHIC?

fig.2. mesü measuring bowls by Studio Panepinto, 2005.

Infographics are traditionally viewed as visual elements such as charts, maps, or diagrams that aid comprehension of a given text-based content. Thus, a newspaper infographic on a breaking news accident is expected to faithfully record, using visuals, what has been explained in the accompanying text.

However, as we shall see in this seminar, visual representation of information can be more than just the manner in which we are able to record what has been discovered by other means. I hope to establish that they have the potential to become the process by which we can discern new meaning and discover new knowledge.

A classic example of an infographic that not merely illustrates the content but interprets it in a manner that was not possible otherwise, was produced by Dr. John Snow to identify the cause of cholera epidemic in Central London. By plotting (fig.1) the two available sets of data about number of deaths and their corresponding locations, Snow was able to pinpoint the notorious contaminated pump well.

In designing infographics, applying a graphic style to the information is not nearly as important as giving a graphic form to the actual content, with a clear understanding of how that content is perceived and processed by an audience. For example, the Periodic Table chart designed by Henry Hubbard is a visual representation of known chemical elements. Since the last edition of the Hubbard chart, 16 new elements have been discovered. These discoveries have confirmed the genius of the Periodic Table as a template that not only summarizes information succinctly, but also provides a system for predicting future outcomes[1].

1. For a scathing criticism of the indiscriminate appropriation of scientific imagery, read *Wonders Revealed: Design and Faux Science* by Helfand and Drenttel.

fig.3. Light Switches.

fig.4. Electric Plugs.

fig.5. Traffic Light.

fig.6. One Rupee Currency.

fig.7. Lift Floor Indicator.

Also in this seminar, we will see how infographics have wide ranging applications beyond news dissemination, in several other domains such as, scientific visualization, product design, education, information technology, business communication and entertainment. The ceramic measuring bowls (fig.2) from the design studio Panepinto is a fine example of product that displays unambiguous information in a vivid manner.

EXERCISE 1

Let's look at some common everyday artifacts around us. Think about the nature of the information they contain and how they get communicated to the user.

The clock for example is probably the most well-known information graphic in the world. Three hands revolving on the clock face at differing speeds reveal information about seconds, minutes, hours and days. It is a clever depiction of four measures using one scale.

Take a look at the 5 artifacts on the left. What information do they possess? Where is the information embedded? Why is the information important? How do they communicate them to us?

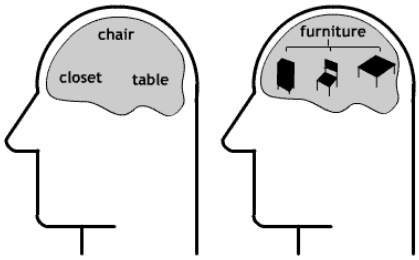


fig.8. We think in terms of categories. A diagrammatic representation by Alberto Cairo.

fig.9. The Treachery of Images by Rene Magritte.

fig.10. Bizarro by Don Piraro *The Globe and Mail* 24.03.97.

VISUAL THINKING AND REPRESENTATION

Representation (literally, to *present again*) provides the basis for all communication. We can convey ideas about things that are not materially in our presence only by calling forth an appropriate mental representation. These mental representations are stored in categories and are characterized by a degree of abstraction. Recent studies have revealed that we categorize even before we identify things.

For example when we look at a chair, a closet, and a table, we process them as a broader class of objects ("furniture") rather than as individual instances of the class (fig.8). Furthermore, the mental imagery associated with each of the furniture is likely to have the essential characters of the class ("chairness") rather than literal characters of a specific instance ("recliner").

Thus, we think in terms of categories, and relationships among categories. This capacity to generalize, to form associations, to detect relationships, and to seek comfort in organization is the cornerstone of our communication system. While words and sentences are part of the verbal communication system, images and graphical representations form the visual communication system.

The visual-verbal dichotomy[2] is well illustrated in the example of Rene Magritte's *The Treachery of Images* (fig.9). When serving as representation of concrete, real-world objects, images make identification easy. When word and image collide, as in this case, the image dominates perception and it is impossible to read the caption ("this is not a pipe") without first recognizing the pipe.

The representational style - a highly realistic rendering of the pipe - is a conscious choice of expression by the painter to underscore the contradiction between word and image. Pictorial representations cross social and linguistic boundaries with ease. However they are also dependant upon the culture in which their meaning is established. Magritte's painting can be recognized as a pipe by anyone, but only a Francophone will appreciate the full meaning of the work. Communication therefore is always affected by the context in which it occurs.

Infographics, because they use a combination of images, words, and numbers, operate in a hybrid system of both the verbal and the visual. Consequently they offer us the greatest opportunity to increase the effectiveness of our communication.

2. For a more detailed discussion of the topic, read chapter 'Image and Representation' from the book *Designing Visual Interfaces* by Mullet and Sano.

fig.11. Abstraction from Typical to General.

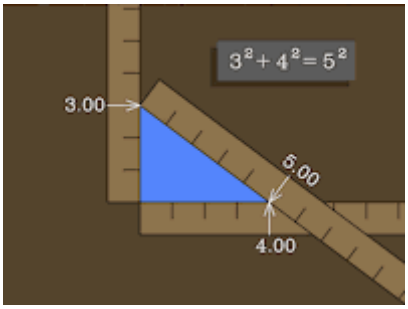


fig.12. Animated Proof of Pythagoras Theorem, *Project Mathematics*, California Institute of Technology.

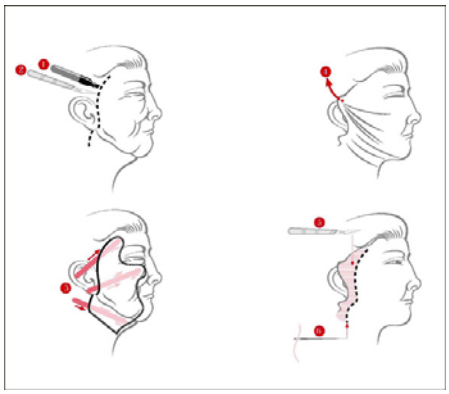


fig.13. How to do a facelift. *Wordless Diagrams,* Nigel Holmes.

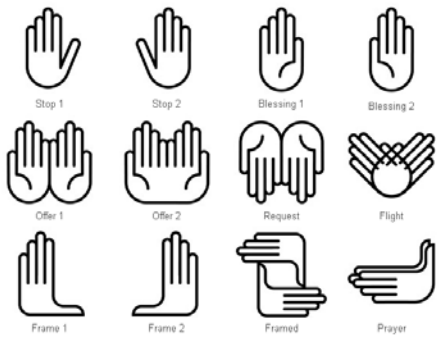


fig.14. Hand Symbols by Ravi Poovaiah Industrial Design Centre, Indian Institute of Technology, Bombay.

EXERCISE 2

A given representation can be characterized by its degree of abstraction. The ease of interpretation varies with the level of abstraction of the representation.

As highly concrete, realistic representations are simplified, they become easier to interpret – up to a point, beyond which further abstraction begins to obscure its meaning. We get best results by eliminating non-characteristic details and exaggerating defining features.

Representations that successfully manage to communicate are easily visible, simple, immediate, cohesive and general in nature.

Create visual representations for the following things, processes, or phenomena.

1. Slow moving traffic
2. Flood Alert
3. Building unsafe to live
4. Women's Self Help Group
5. Delayed indefinitely

6. How to tie a tie?
7. Lunar eclipse
8. How to greet someone in India?
9. Using an ATM
10. Tsunami

11. Middle class
12. Purchasing Power
13. Voter apathy
14. Democracy
15. War against terrorism

fig.15. Vishnu's Footprints as Constellation of His Earthly Symbols, Rajasthan, 18th century.

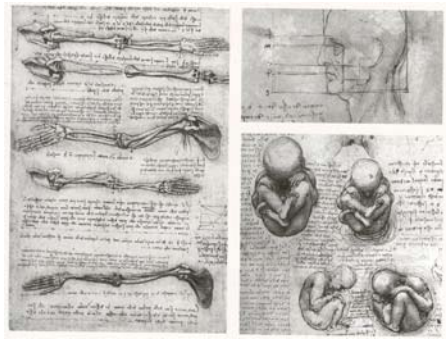


fig.16. Anatomical Studies by Leonardo Da Vinci, 15th century and 16th century.

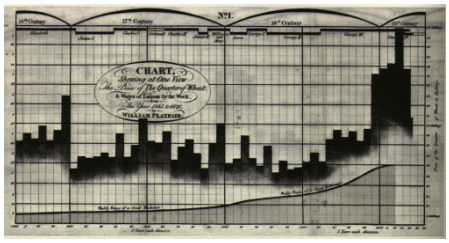


fig.17. Chart by Playfair, showing the price of the quarter of wheat and the wages of labor by the week, 1786.

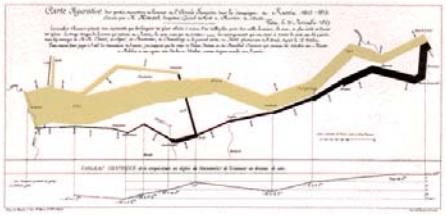


fig.18. Napoleon's Army's Russian Campaign by Charles Minard, 1861.

3. Petroglyphs: The word comes from the Greek words petros meaning "stone" and glyphein meaning "to carve".
4. See Edward Tufte's *The Visual Display of Quantitative Information* (p.40).

A BRIEF HISTORY OF INFOGRAPHICS

Images predate not only today's graphics-laden media but also written language itself. Petroglyphs[3], which were the earliest forms of non-verbal communication created by prehistoric societies, are found in all continents except Antarctica. They evolved into more advanced pictograms such as the Sumerian cuneiform script and the Egyptian hieroglyphs, which in turn led to linguistic writing that we use today.

Throughout most of this history, image and text have remained inextricably mixed. From ancient holy books (fig.15) to Renaissance writing (fig.16), authors strived to integrate visuals and script into a coherent whole. However when technology intervened in the form of moveable type, visual expression become separated from written text because of the different production processes and the skills required to produce them.

With the advent of desktop publishing in the late eighties, and the emergence of the field of information design in the nineties, the infographic movement has regained its lost momentum. But before we get to its present state, let's look at 5 key examples from the past that have left a lasting influence on the way we think about and create infographics today.

1. William Playfair's The Commercial & Political Atlas: Scottish engineer and political economist William Playfair is credited with inventing the bar chart and the pie chart. With the help of charts, he was able to better communicate the data that was conventionally presented in tables.

In 1786, he published *The Commercial and Political Atlas,* which contained a series of 43 charts (fig.17) representing changes in data over time graphics and one bar chart. It has been described as the first major work to contain statistical graphs.

By abandoning a literal, metaphorical approach that likened data to piles of items, Playfair "broke free of analogies to the physical world and drew graphics as designs-in-themselves," Edward Tufte[4] notes. In doing so, he furthered the quest for symbolically representing ideas than simply depicting them.

2. Charles Minard's Map of Napoleon's Army's Russian Campaign: French engineer Charles Joseph Minard in 1861 charted the ill-fated campaign by Napoleon's army during the Russian Campaign of 1812. This map (fig.18), along with several dozen others that he published during his lifetime, set the standard for excellence in graphically depicting statistical data such as flows of people and goods in space and time.

Edward Tufte[4], who considers Minard's map as the best statistical graphic ever drawn, identifies six separate variables that are captured in the map. First, the line width continuously indicates the size of the army. Second and third, the line shows the latitude and longitude of the army as it moved. Fourth, the direction that the army was traveling, are distinguished by colors, tan for advance and black for retreat. Fifth, the location of the army with respect to certain dates.

Finally, the temperature along the path of retreat. Few, if any, maps before or since have been able to coherently and so compellingly weave so many variables into a captivating whole.

fig.19. Isotype system by Otto Neurath, 1920.

3. Otto Neurath's Isotype: Otto Neurath an Austrian sociologist and political economist conceived a visual communication system called ISOTYPE (International System Of Typographic Picture Education) in Vienna in the late 1920's. Using a standardized system of symbols, he believed he would be able to convert profound research statistics into ideas, ideas into a picture narrative, and a drama of social interpretation (fig.19).

Meant to represent quantitative information as easily interpretable icons, Isotype served to visualize social and economic relations especially to ease reception of complex matters for the uneducated receiver. Isotype was developed from a specific socialist concept of adult education beyond reading, one that was generally accessible independent of individual educational backgrounds.

In this picture language, elements or pictograms were reduced to the smallest possible detail of what they represented (e.g. starting with the outline of a "man" and if necessary, with additional attributes to identify the man as "worker", "coal worker", "unemployed" etc). In the pictures, perspective was abandoned, details banned and any use of colors standardized. They were then arranged into fact pictures according to a set of rules concerning serialization and consistency in use.

Although Isotype failed due to the difficulties related to the sheer enormity and complexity of iconic representation, it had profound impact on graphic design and iconography. The influence continues to be felt today in such things as road signs, universal symbols and software user interfaces.

fig.20. London Underground Map, 1932.

4. Henry Beck's Map of London Underground: The London underground rail system was getting complex in the 1930's and the map designers were having a hard time fitting all the stations into the standard issue card folder (fig.20). Un-intimidated by cartographic convention, an out-of-work engineering draughtsman called Henry Beck plotted the underground as if he was sketching an electrical circuit board.

He used only vertical, horizontal, or 45 degrees angled colored lines; located the stations according to available space; and evened out the distances between stations. The resulting "map" although geographically inaccurate, provided a coherent overview of a complex system (fig.21). The map was an instant success and for Londoners it became the organizing image of their city. "The map organized London, rather than London organizing the map", remarks Tufte.

fig.21. Redesigned Map by Henry Beck, 1933.

(There was an interesting and unwitting fallout from Beck's map. The map telescoped scale, and brought the suburbs closer to central London. Suddenly, Watford was no further from Paddington than Liverpool Street. The map lubricated the exodus of London's inner-city dwellers as nearly half a million people were enticed out to the suburbs, where they

fig.22. London Underground Today.

found themselves captive customers of their local tube station).

Beck's map is by far the most successful infographic as it continues to accommodate the ever expanding rail network (fig.22) and inspires design of countless other route maps world-wide. This success is due to 2 design strategies that the map employs.

First, the map places importance on function over precise geography. A commuter is interested in how to go from one station to another. All he needs to know are: which line to take, where to change lines, and what are the preceding stations. The map fulfills this need by simple lines (which ensure an uncluttered layout), color (which differentiates the lines), clear typography (which makes text easy to read), and symbols (which differentiate stations from interchanges).

Second, the map capitalizes on the fact that the system operates underground and therefore the commuters need not be burdened with the confusing topography above ground. The only surface feature to survive was the River Thames. The map makes complex information simple by eliminating all extraneous details.

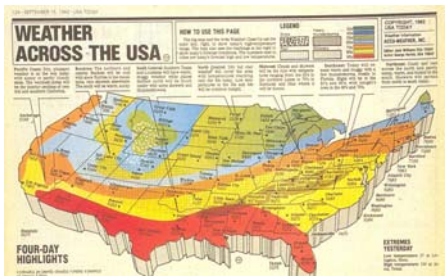


fig.23. Weather Map by George Rorick, *USA Today*, 1982.

5. George Rorick's Weather Maps: At a time when graphics in Newspapers were considered time consuming and distracting, George Rorick[5], pioneered the use of graphics as an important component of news communication. He envisioned *USA Today* as a visual Newspaper – "Visuals that help people understand the news. And color, of all things!"

However, he is best known for the weather graphics, which revolutionized the way we read weather information and is probably the most imitated news infographic (fig.23). Using a combination of color, maps, tables, symbols, and annotation, Rorick transformed a hitherto dull and often hard to understand information into something very interesting and accessible.

Rorick's greater legacy though was his efforts in gaining a widespread acceptance for visual journalism in a profession dominated by text, establishing a business case for infographics, and formalizing a production process within the newsroom setup that churn out consistent quality infographics on a continuous basis under tight deadlines.

5. The vision of George Rorick (http://www.poynterextra.org/George/index.htm).

INFOGRAPHIC DESIGN: A FRAMEWORK

There are 3 major challenges in designing a successful infographic.

1. To clearly understand what type of information it is trying to communicate – whether spatial, chronological, quantitative or, as is usually the case, a combination of all three.

2. To conceive a suitable representation for that information as a cohesive whole – a whole that is more than the sum of its constituent parts such as, charts, diagrams, maps, timelines etc.

3. To choose an appropriate medium for presentation – static (paper or computer screen), motion (animation or video), or interactive (increasingly web or other electronic device-based, but could be something as simple as a paper-based pregnancy wheel).

Despite the difficulty in creating a design framework, it would be useful to have one, in order to understand the overall picture of the infographic design process. The following diagram depicts one such a framework:

6. Read *Interactive Visual Explainers - A Simple Classification* for an elaboration of the types of Interactives (http://www.elearningpost.com/features/archives/002102.asp).

Infographic Design Framework