

Chapter 11: Icons

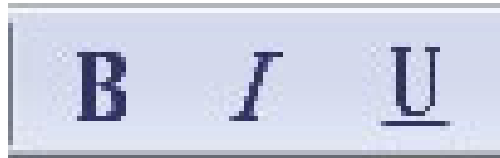
The Resonant Interface HCI Foundations for Interaction Design First Edition

by Steven Heim



Chapter 11 Icons

- Human Issues Concerning Icons
- Using Icons in Interaction Design
- Technical Issues Concerning Icons



Human Issues Concerning Icons

- Novice User
 - Icon-based systems do not necessarily afford novice users a self-explanatory interface
 - An icon's functionality must be learned and understood



versus



Human Issues Concerning Icons

- The Dual Nature of Icons
 - People relate to icons as the representations of objects
 - They also perceive icons as the objects themselves
 - The symbols and metaphors we create should not prevent people from moving between these two perspectives



Human Issues Concerning Icons

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Icons should not be created in isolation

- Consider the entire interface as a global entity, a visual ecosystem

Human Issues Concerning Icons

- Real-World Expectations
 - The associations that people have create expectations that affect their perception of an icon's physical properties



Human Issues Concerning Icons

- Recall/Recognition

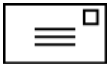
MAXIM

Icons have an advantage over text in terms of recognition and recall

- Recall of images is superior to that of text
- Images are more easily distinguished than text
- People have almost perfect image recall

Human Issues Concerning Icons

- Icon Analysis Chart

Icon	Name	Distance	Separation Trail	Degrees
	Mail	Perceptual	Shape/	1/2
		Cognitive	Letter/e-mail	
B	Bold	Perceptual	Letter/bold/	2/2
		Cognitive	Letter 'B'/bold command	

Using Icons in Interaction Design - Search

- Search – do icons aid search activities?

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Humans respond first to the physical qualities of icons and then to their semantic associations

- The intensity of an icon's physical characteristics is an important factor in search activities
- People perform better with icon targets than with text targets
 - The icons must be sufficiently differentiated

Using Icons in Interaction Design - Search

- Physical attributes that can affect the way we perceive icons

- Detail
- Color
- Size
- Shape
- Location
- Logo



Using Icons in Interaction Design - *Search*

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There is a range of acceptable **detail** that will benefit icon search

Varying the **color**, **size**, or **shape** of an icon will make it easier to locate

When applying color, start with fewer colors; additional ones can be added later

Using Icons in Interaction Design - *Search*

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Icon images should have distinctive **shapes**

Icons may facilitate search if their **location** is properly designed

Using Icons in Interaction Design - *Screen Real Estate*

- Screen Real Estate

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Icons can save screen real estate

Using Icons in Interaction Design - Screen Real Estate cont.

- Screen Real Estate



Using Icons in Interaction Design - *Conventions*

- Conventions

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Icon conventions should be used whenever they are appropriate



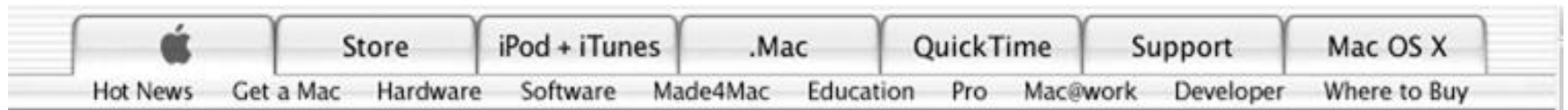
Amazon.com shopping cart

Using Icons in Interaction Design - Conventions

- Conventions - tabs



Amazon.com tabs



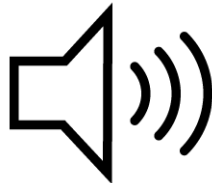
Apple.com tabs

Using Icons in Interaction Design - *Conventions*

- Conventions



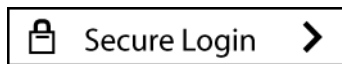
Audio icon—notes



Audio icon—speaker



Home icon



Secure Connection icon



Web Search icon



Amazon.com Search

Using Icons in Interaction Design - *Context*

- Context supplies a frame of reference
 - We perceive icons in relation to all the other screen elements

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Icons have no meaning without context

- $\text{Icon}_i + \text{context}_j + \text{viewer}_k = \text{meaning}_{ijk}$

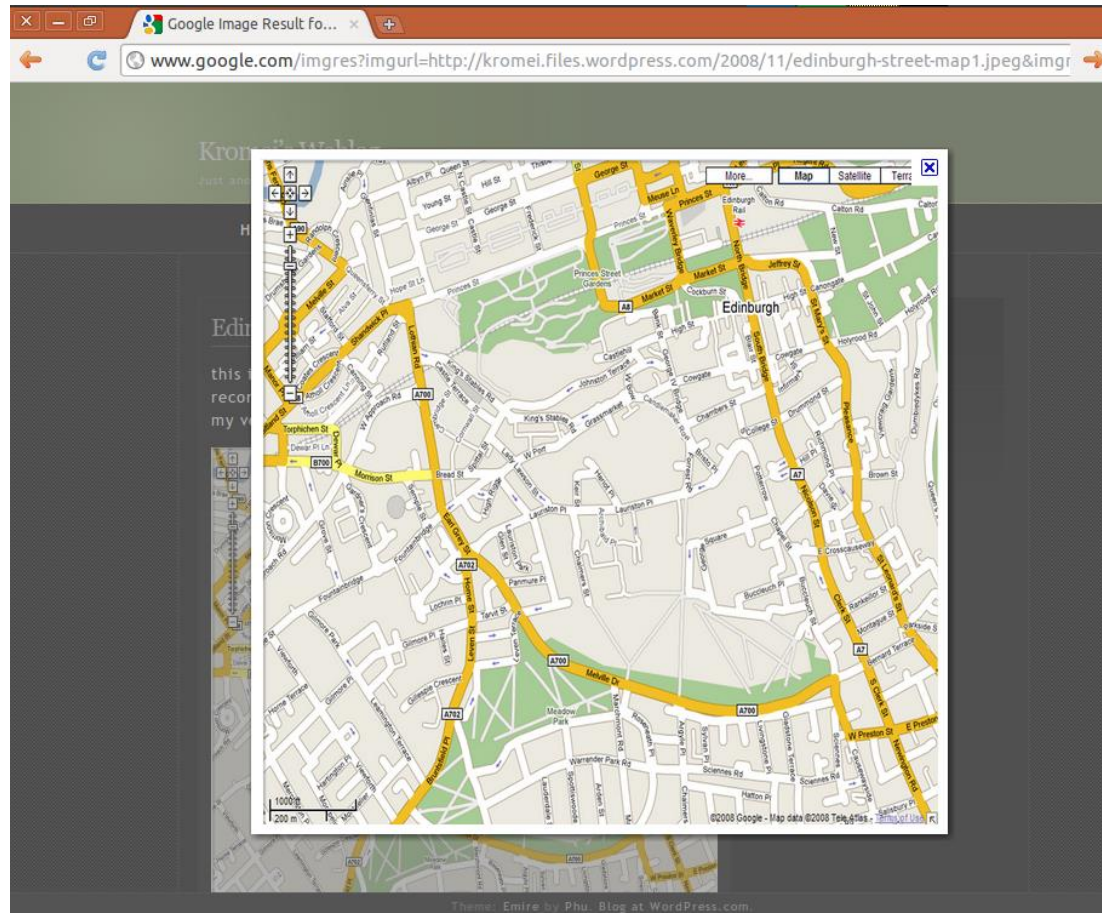
Horton (1994)

Using Icons in Interaction Design - *Context*

- Icons can be seen in many different contexts:
 - Physical
 - Location
 - Contrast
 - Juxtaposition
 - Density
 - Cognitive
 - Metaphorical
 - Temporal

Using Icons in Interaction Design – *Context cont.*

- Juxtaposition

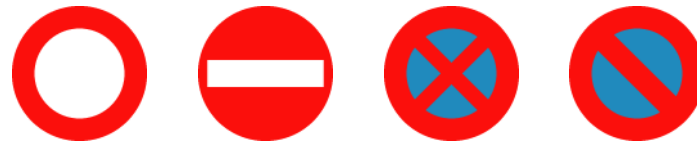


Using Icons in Interaction Design - *Context*

- Globalization–Localization
 - Images are often considered to be “language agnostic”



Italian street signs



European Union traffic signs

Using Icons in Interaction Design - *Context*

- Globalization–Localization
 - Signs can also be localized and reflect very specific conditions that do not exist in other locations



Cow warning sign



Deer warning sign

Technical Issues Concerning Icons - *Terminology*

- Icon Terminology
 - **Phonogram**: a sign or symbol representing a word, syllable, or speech sound
 - **Pictogram**: a picture that resembles what it signifies
 - **Abstract Shapes**
 - **Ideogram**: a symbol that stands for an idea or concept
 - **Logogram** (Logograph): a symbol that represents a word

Technical Issues Concerning Icons – Terminology cont.

- Icon Terminology

Logogram



Phonogram

Examples of Hieroglyphics			grain
	king		boat, ship navigation
	eat, drink, speak, think, feel		air, wind, sail
	mummy, likeness, shape		in, from, as with (of instrument)
	move backwards		goddess, queen
	snake, worm		calf
			envelop, embrace

Pictogram



Ideogram



Technical Issues Concerning Icons - *Terminology*

- Icon Terminology
 - Icons are often difficult to characterize as purely logographic, ideographic, phonographic, or pictographic

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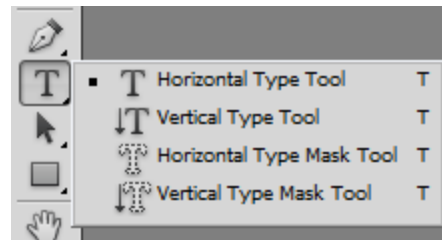
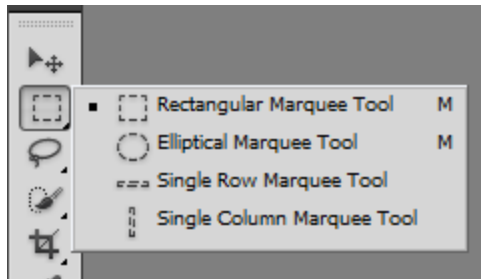
Icons function on many levels of meaning simultaneously

Technical Issues Concerning Icons - *Terminology*

- Semiotic Terms
 - **Iconic:** represent objects through resemblance
 - **Indexical:** have a direct causal relationship with the object to which they refer
 - **Symbolic:** the meaning of a symbolic sign is derived through convention

Technical Issues Concerning Icons – *Principles for Icon Creation*

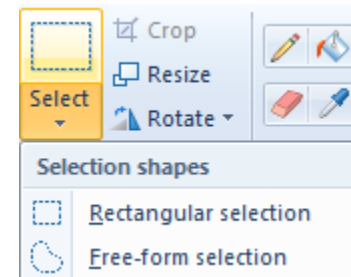
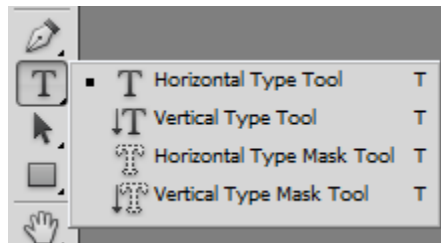
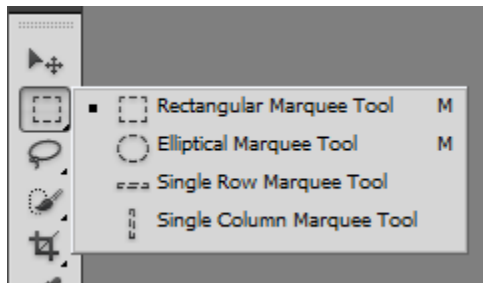
- Principles for Icon Creation (internal syntax)
 - Simplicity/complexity
 - Signal to Noise Ratio
 - Leveling
 - Cohesiveness
 - Icons that perform related functions should be created as a family and should share some visual characteristics



Technical Issues Concerning Icons – *Principles for Icon Creation*

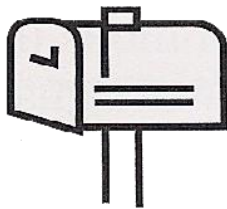
– Distinctiveness

- The icons within each family must communicate their unique identity

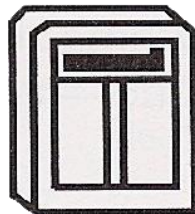


– Familiarity

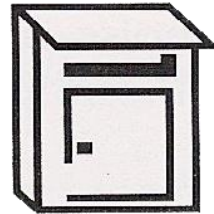
- Icons should be familiar to the user



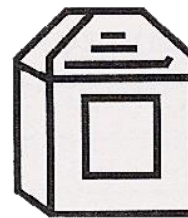
USA



France



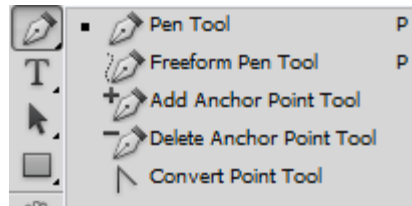
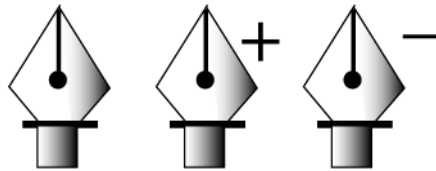
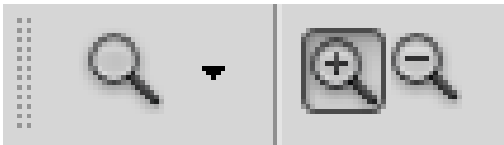
Italia



Denmark

Technical Issues Concerning Icons – *Icon Grammar*

- Icon Grammar
 - The principles that govern the internal structure of icons form a grammar
 - This grammar is constructed on rules and procedures

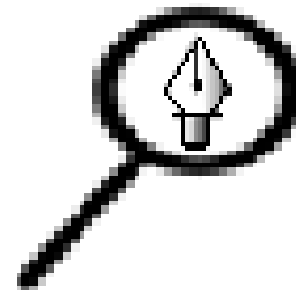


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The grammatical rules must be observable, logical, predictable, and consistent

Technical Issues Concerning Icons – *Icon Grammar*

- Horton (1994) suggests that a graphical grammar should specify the following:
 - **Which elements are required and which are optional**
 - **How elements can be graphically combined**
 - How elements are arranged left to right, top to bottom, and front to back
 - How each element is represented
 - Which elements are the same for all icons in the series and which vary from icon to icon within the series
 - **How many elements can be combined before the resulting symbol is too complex**



Technical Issues Concerning Icons – *Universal Systems*

- Universal Systems

“If a system of symbols could be compiled that would be equally recognizable in Lago and Lapland, perhaps the dream of a universal basic means of communication could be realized.” (*Dreyfuss 1972, 18*)



Technical Issues Concerning Icons – *Universal Systems*

- Semantography
 - Charles K. Bliss created what he considered a “simple system of pictorial symbols” called Semantography (Bliss, 1965)
 - Semantography is based on symbols called Blissymbols that incorporated a symbolic logic and semantics

Technical Issues Concerning Icons – *Universal Systems*

- Blissymbols

Blissymbols with grammar

Hand Finger Wrist Thumb



Open

Close

Open Hand

Fist



Blissymbols combined



Technical Issues Concerning Icons – *Universal Systems*

- ISOTYPE
 - Otto Neurath created the **I**nternational **S**ystem **O**f **T**ypographic **P**icture **E**ducation (ISOTYPE) in an attempt to make information accessible to a universal audience (Neurath, 1972)
 - It has also laid the foundation for modern traffic signs and public utility symbols

Technical Issues Concerning Icons – *Universal Systems*

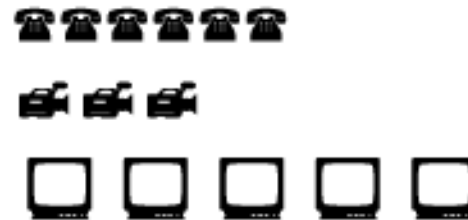
- ISOTYPE



(a) Male and female population 65 years and older.



(b) Modes of transportation in millions.



(c) Retail appliances in percentage per capita.

Technical Issues Concerning Icons -

Deconstructing Icons

- Deconstructing Icons
 - Basic shapes
 - Indicators
 - Styles
 - Canonical view
 - Aggregate symbols

Technical Issues Concerning Icons -

Deconstructing Icons

- Basic shapes

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Complex shapes can be created from a few basic elements

- Horton (1994), all graphics can be decomposed into points, lines, and areas

Technical Issues Concerning Icons -

Deconstructing Icons

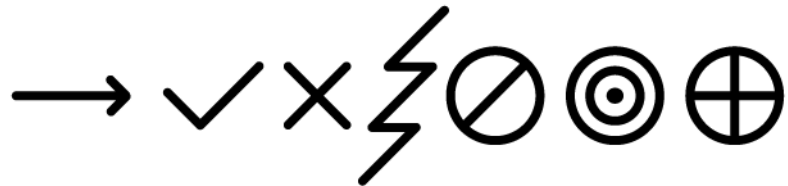
Basic lines and points



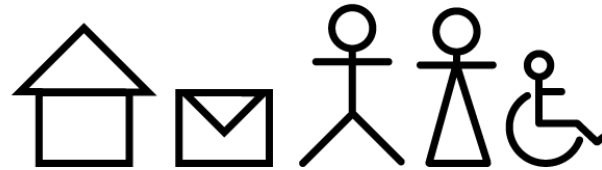
Basic shapes



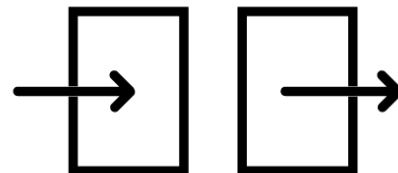
Basic combinations



Real-life symbols



Enter/Exit Blissymbols



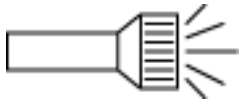
Technical Issues Concerning Icons -

Deconstructing Icons

- Basic shapes

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Indicators can be used to convey action, state, and direction



Light rays



Sound waves



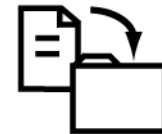
Speed lines



Shake lines



Ghost images

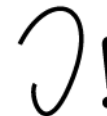


Save to folder



Blissymbols:

Look



Listen

Technical Issues Concerning Icons -

Deconstructing Icons

- Styles

Photograph



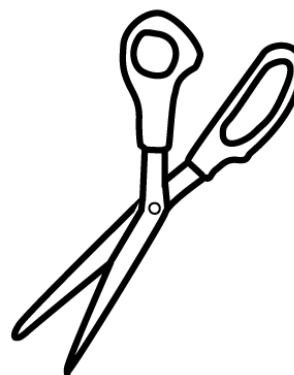
Drawing



Caricature



Outline



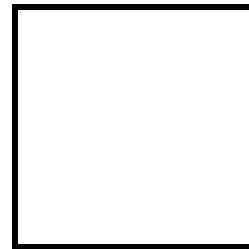
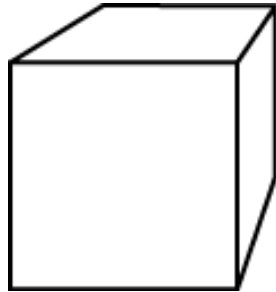
Silhouette



Technical Issues Concerning Icons -

Deconstructing Icons

- Canonical view
 - The most common view of an object
 - The view that typifies the object
 - That is most easily recognized



- A box is more recognizable in a 3D rendering than in a 2D one

Technical Issues Concerning Icons -

Deconstructing Icons

- Aggregate symbols

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Symbols can be combined to communicate complex information



Search symbol



“No Smoking” sign



Information symbol

Technical Issues Concerning Icons -

Deconstructing Icons

- Aggregate symbols

- Overlap



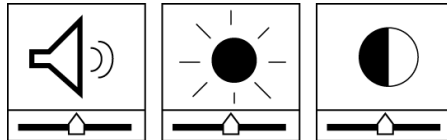
- Addition



- Antithesis



- Specification



Technical Issues Concerning Icons -

Deconstructing Icons

- Icon Size

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Icons are always square and standardized at fixed dimensions

- Supply icons for your application in 16-color and 256-color versions and in three sizes: 16 16 pixels, 32 32 pixels, and 48 48 pixels (*Microsoft Co., 2006*)
- You need to provide at least the following files: * A 128 x 128 image (for Finder icons) ... For the best-looking icons at all sizes, you should also provide custom image files (“hints”) at two other sizes: 32 x 32, and 16 x 16 (*Apple, 2007*)

Technical Issues Concerning Icons -

Deconstructing Icons

- Transparency and Background

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To make areas of an icon transparent, include a mask

- A mask may be applied to application icons that appear on the desktop
 - There is no way to predetermine what the background color will be

Technical Issues Concerning Icons – *Current Practices*

- Current Practices – Photorealist icons

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Higher graphic quality does not always imply greater intelligibility

- It is possible for a user to confuse these rich graphics with other images that do not represent functionality