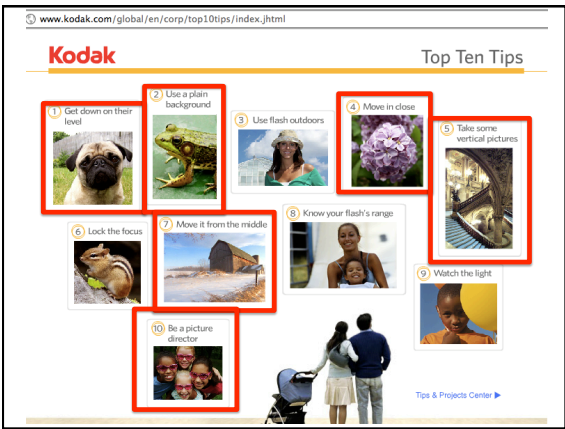


# Presentation: Design, Organization, Simplification, Photography, Website Design, User Interface Design, ...

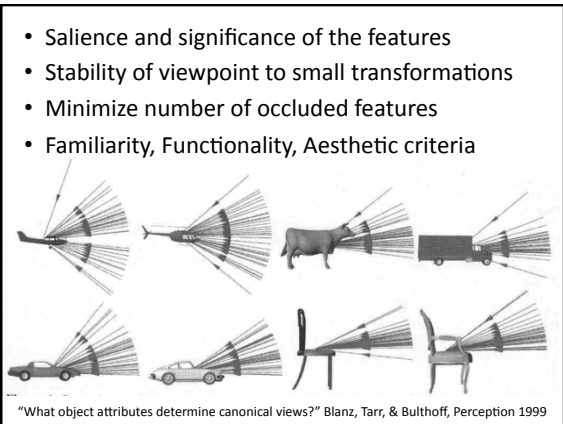
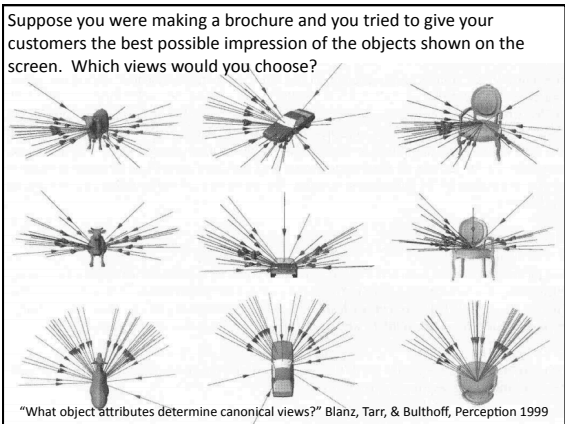
- ## Today
- Photography tips
    - Canonical Viewpoints
  - Principles of Effective Website Design
  - Principles of Good User Interface Design
  - Principles of Good Visualization Design
  - Examples from Assignment #3
  - Readings for Today
  - Assignment #3
  - Readings for Next Week



## “Canonical” Viewpoints

- From Dictionary.com:
  - authorized; recognized; accepted
  - the body of rules, principles, or standards accepted as axiomatic and universally binding in a field of study or art: the neoclassical canon
  - a fundamental principle or general rule: the canons of good behavior
  - a standard; criterion: the canons of taste

“What object attributes determine canonical views?” Blanz, Tarr, & Bulthoff, Perception 1999



## Rule of Thirds

[http://en.wikipedia.org/wiki/Rule\\_of\\_thirds](http://en.wikipedia.org/wiki/Rule_of_thirds)

- align subject with guide lines and intersection points, discourage placement of the subject at the center
- placing the horizon on the top or bottom line, avoid dividing picture in half



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## Principles of Effective Website Design

- Guiding the eye (position, color, contrast, size, design elements)
- Spacing, padding, white/empty space, reduce cognitive load
- Navigation/orientation
- Typography (font, size, color, paragraphs)
- Usability/standards/conventions be obvious, "Don't make users think"
- Consistency
- Alignment, polished, simplicity
- Effective writing
- Clarity, sharpness, contrast, exaggeration

<http://psd.tutsplus.com/tutorials/designing-tutorials/9-essential-principles-for-good-web-design/>  
<http://uxdesign.smashingmagazine.com/2008/01/31/10-principles-of-effective-web-design/>

## Principles of Good User Interface Design

- Consistency and standards
  - Match real world words, phrases and concepts familiar to the user, real-world conventions, natural and logical order, coherency
- Flexibility and efficiency of use: cater/tailor to both inexperienced and experienced users
  - Know your user, user testing, listen to the user
- User control and freedom: clearly marked "emergency exit" to leave the unwanted, support undo and redo
- Aesthetic and minimalist design: every extra unit of information competes with and diminishes visibility of relevant information
  - System status: keep users informed
- Recognize, diagnose, and recover from errors
  - Error prevention: good error messages, eliminate error-prone conditions, confirmation option
- Help and documentation
  - Recognition rather than recall: information/instructions should be visible or easily retrievable

[http://www.sylvantech.com/~talin/projects/ui\\_design.html](http://www.sylvantech.com/~talin/projects/ui_design.html)  
[http://www.useit.com/papers/heuristic/heuristic\\_list.html](http://www.useit.com/papers/heuristic/heuristic_list.html)

## Principles of Good Visualization Design

- Scientific Visualization vs. Information Visualization
- Simple clean design vs. "Chart Junk"
- Managing & leveraging huge amounts of data
- Understanding your Audience
  - E.g., Visualization for Science, Communication, Education, Debugging, etc.
- Importance of companion text (title, axis labels, legend, caption)
- Targeting visualization design to human perception & low-level vision processing

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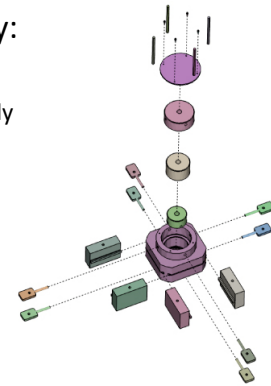


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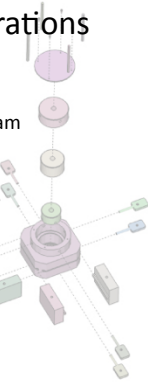
## Reading for Today:

- "Designing Effective Step-By-Step Assembly Instructions"  
Agrawala et al., 2003



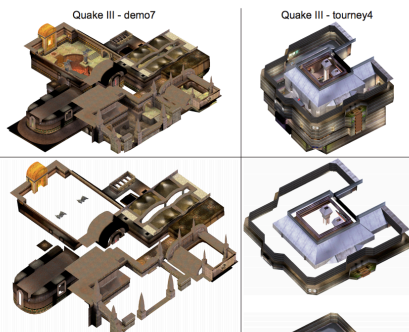
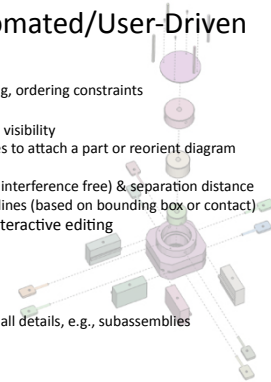
## Design Principles for Illustrations

- hierarchy/grouping of parts
- hierarchy of operations
- step by step instructions vs. single diagram
- only 1 significant piece at a time
- structural vs. action diagrams
- present as much information as possible
  - don't repeat, don't be tedious
- orientation, natural & preferred views
  - maximize # of important features visible
  - minimize accidental alignments
- visibility
  - occlusion ok when symmetry is clear
  - earlier parts visible for context

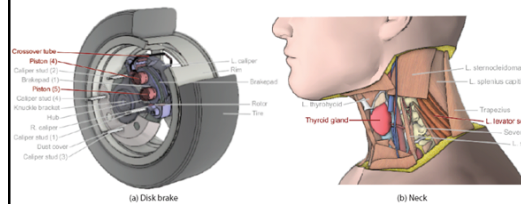


## Input/Output/Automated/User-Driven

- Input:
  - geometry, orientation, grouping, ordering constraints
- Automatic:
  - location translational blocking, visibility
  - at each step, "planner" chooses to attach a part or reorient diagram
  - optimization for visibility
  - direction (maximally separate, interference free) & separation distance
  - diagrammatic elements, guidelines (based on bounding box or contact)
- Semi-automated user-driven/interactive editing
  - add grouping
  - add constraints
- Not automatic (yet):
  - structure
  - zoom in/use insets to show small details, e.g., subassemblies



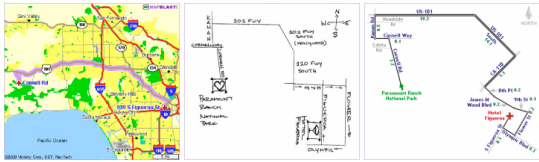
"Non-Invasive Interactive Visualization of Dynamic Architectural Environments", Christopher Niederauer, Mike Houston, Maneesh Agrawala, Greg Humphreys, I3D 2003



"Interactive Cutaway Illustrations of Complex 3D Models", Wilmot Li, Lincoln Ritter, Maneesh Agrawala, Brian Curless, David Salesin, SIGGRAPH 2007

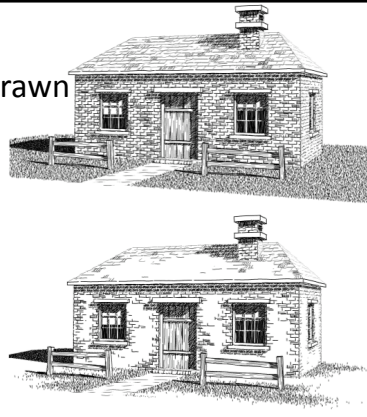
## Reading for Today:

- Maneesh Agrawala & Chris Stolte, "Rendering Effective Route Maps: Improving Usability Through Generalization", SIGGRAPH 2001



- Necessary vs. Unnecessary, Useful vs. Clutter
  - computers make it easy to create lots of detail
  - simplification
- Lessons from Cognitive Psychology/User studies important things for route maps
  - most important: turning points
  - exact length, angle, shape are less important
- Extra information can be included to help confirm you are on the right track, but only when it does not interfere
- Usefulness & conventions guide labeling style

## Example: Computer-drawn Illustration



Computer-generated  
pen-and-ink illustration  
Winkenbach & Salesin 1996

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## Homework Assignment 4: **due Tuesday @ 11:59pm** Big Data & Summarization

- Identify a "really big" dataset (that you have access to!)
- Collect this dataset in a variety of sizes (start small)
- Parse/Process/Organize for a preliminary visualization
- Identify challenges/flaws: "Data is so big it..."
  - "... crashes my favorite visualization toolkit"
  - "... runs really, really slow"
  - "... font/data overlaps/is so small I can't read it"
- As time permits, propose/implement automatic simplification/summarization of data
- Focus: Data Collection (primary) & Visualization Execution (secondary)

*Teamwork: optional*

*Revisit previous assignment ideas: optional*

## Readings for Next Week (*pick one*)

- "Graphical Histories for Visualization: Supporting Analysis, Communication, and Evaluation", Jeffrey Heer, Jock D. Mackinlay, Chris Stolte, and Maneesh Agrawala, InfoVis 2008.
- "Software Design Patterns for Information Visualization", Jeffrey Heer, Maneesh Agrawala, TVCG 2006.