

Paper Engineering, a.k.a. Pop-ups!

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Pop-up and movable books have educated and delighted us for nearly 800 years. Movable paper construction began in the 13th century in medieval monasteries. These creations weren't for entertainment; they communicated information and calculated data. Illustrated **volvelles** (wheels) turned to calculate the position of the stars.

The 19th Century

Commercially made pop-up books and cards originated in the early 1800's in London. Designers used the **peep-show method** of cut-out scenes aligned one behind the other to give a three-dimensional effect. Each layer was fixed to the next by a piece of ribbon that was pulled to make the scene spring up into perspective.

The 20th Century

After the first World War, British publisher S. Louis Giraud create books with movable illustrations that they called "living models." In the 1930's, Blue Ribbon Publishing of New York animated Walt Disney's characters with pop-ups. Blue Ribbon was the first publisher to use the term "pop-up" to describe their movable illustrations.



Today there are between 200 and 300 new pop-up books produced in English each year. All contemporary pop-up books are assembled by hand – most in Colombia, Mexico, or Singapore. More complex books can require as many as 60 people doing over 100 individual handwork procedures.

In addition to hiring illustrators for a pop-up book, publishers employ Paper Engineers. These designers decide how movable pieces attach to the page so they won't break, which points need glue or other attachments, what size the pull tabs should be, etc.

What Makes Them Pop?

Construction methods for movable paper can be divided into three general categories:

Movables: Elements lie flat on the page, but they don't lie still. These creations include volvelles (wheels), flaps, and pull tabs.

Pop-ups: Three-dimensional designs rise from the surface of the page. This is what we often think of when we say "pop-up book." Every designer uses different terms, but paper construction uses four basic techniques:

- Stage set
- V-fold
- Box and cylinder
- Floating layers

Multiple constructions: Contemporary paper engineers don't confine themselves to a single method. Plastic, string, mirrors, wire, and sticks are now part of the pop-up toolbox.

Glossary

Backing sheet: A contrasting color of paper behind a cut-out element.

Box and cylinder: A box-like rounded cylinder rises as the book is opened.

Carousel: A book opened into a complete circle and secured with string, or other tie.

Crease: The precise fold that is the basis of all paper engineering.

Flap: A piece of illustrated paper attached to a base page at a single point; when lifted, a hidden illustration is revealed. *Harlequinades* or *pantomimes* are books in which sequential flaps change the picture or reveal a twist in the plot.

Floating layers or platforms: Paper supports that lift an illustration off the page, creating the illusion that it is floating over the surface.

Leporello: An accordion book made of one long sheet of folded paper that stretches out into a zigzag shape. Named after Leporello, servant in the opera Don Giovanni, who carries such a book to record the list of Giovanni's romantic conquests.

Mountain and Valley folds: Folds with the crease on the bottom (valley) or top (mountain).

Pull-tab: A sliding paper tab, ribbon, or string that is pulled to reveal a new image.

Self-healing mat: A cutting surface that can withstand multiple cuts. Some are made for use with rotary cutters, and thicker ones can be used with standard fixed blades.

V-fold: The most basic "pop-up." An illustration is attached to facing pages and unfolds from the center of the page when the book is opened 180°.

Volvelle or wheel: A revolving illustrated disc attached to a page using string or grommets. As the reader turns the wheel, the discs align images.

Resources

Books

Look for the following call numbers: 736.98, 745.54, 745.59

Birmingham, Duncan. *Pop-up design and paper mechanics: how to make folding paper sculpture*. Guild of Master Craftsman, 2011.

Czernicki, Stefan. *The most incredible cardboard toys in the whole wide world*. Lark Books, 1999.

Diehn, Gwen. *Making books that fly, fold, wrap, hide, pop up, twist & turn: books for kids to make*. Lark Books, 2006.

Hiner, Mark. *Paper engineering for pop-up books and cards*. Tarquin Publications, 2006.

Online

A concise history of pop-up books by Ann Montanaro: libraries.rutgers.edu/rul/libs/scua/montanar/p-intro.htm *More interesting than one might expect, with a great bibliography.*

The Movable Book Society: movablebooksociety.org *Association for anyone interested in pop-up and movable books; events and publication.*

The pop-up lady by Ellen Rubin: popuplady.com *Blog, current events, publications, ideas.*

Pop-up Lady Joan Irvine: joanirvine.com *Blog, current events, publications, ideas.*

Pop goes the page by University of Virginia Brenda Forman Collection: www2.lib.virginia.edu/exhibits/popup *Reviews and descriptions of fabulous pop-up books.*

Smithsonian Institution Exhibition, Fold, Pull, Pop & Turn: smithsonianlibraries.si.edu/foldpullpopturn/ *Unbelievable pop-up books and cards!*

