CRANKY CONTRAPTIONS

Cranky Contraptions are wood and wire kinetic sculptures that animate a character or scene when the handle is turned. The base of the motion comes from a crank slider mechanism, and you can complexify the motion by adding linkages. With a few simple materials you can make your own whimsical and wonderful creation!

TRY IT!

Gather these materials for building your cranky contraption

Essential materials

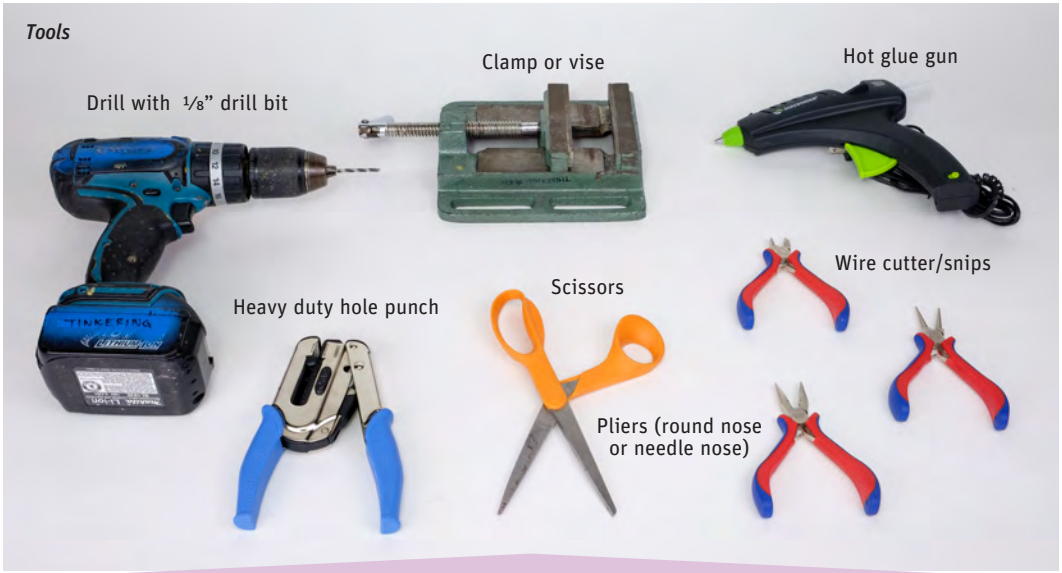
Wooden block (about 4" h x 1½" w x ¾" d) - drill a hole with an ⅛" drill bit 1½" from the bottom edge)

TIP: if woodworking supplies aren't available, corrugated plastic sheets or cardboard rectangles can work.

Stainless steel wire (18ga, several pieces that are about 6" long)

Thick craft foam (6mm) - cut to ½" x ½" pieces

Tools



For popsicle stick linkages:

Heavy duty hole punch, such as Crop-A-Dile ⅛' & ¼" punch

Tiny brads (10mm)

Popsicle sticks or tongue depressors

Other useful materials for decorating and building:

Colorful cardstock or paper

Thick and thin foamie sheets (6mm and 3mm)

Pipe cleaners

Straws

Cardboard

Feathers

Feathers

Thumbtacks

Washers (or other small weights)

Markers or sharpies

Googly eyes

the tinkering studio

exploratorium

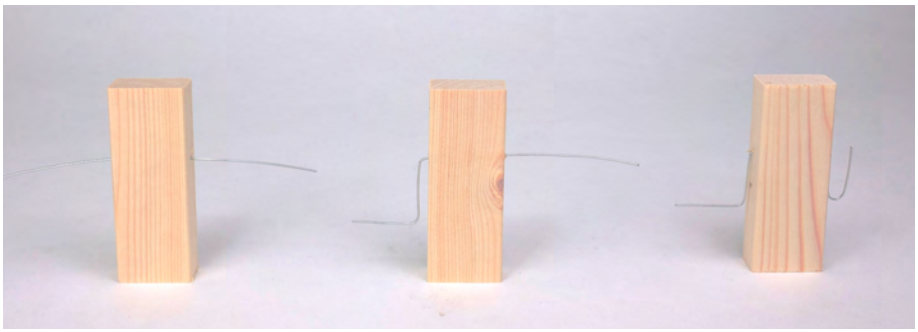
GETTING STARTED

Link to video: https://vimeo.com/246865775

Drill a hole

1. Use a vise or clamp to securely hold your wood block in place. Holding the drill perpendicular to the wood, make a ⅛" hole about 1 ½" from the edge all the way through. This piece will be the base of your cranky contraption.

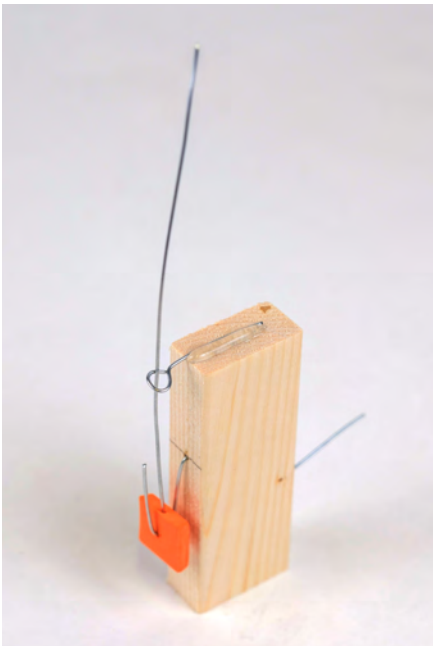
Construct your crank slider mechanism



2. **Make a crankshaft:** Insert the wire through the block, then make two 90-degree bends. Depending on the length of your wire, you can make one or more U shapes for each moving part of your sculpture. One side will also have an L shaped bend to be your handle to turn the crank.

3. **Add a cam:** Poke a hole in the center of a piece of thick craft foam about ½" x ½" in size, then slide onto your crankshaft at each U bend.

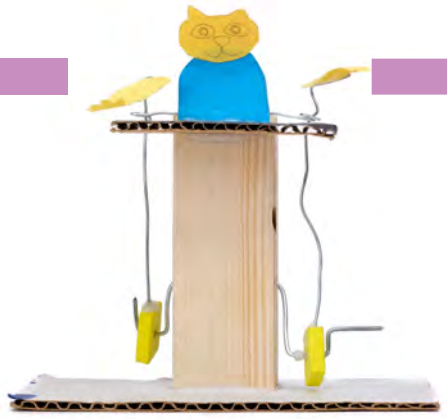
4. **Add a slider:** Poke another piece of wire into the edge of your craft foam for the crank slider (this one will be on the edge of the foam, not the face). *TIP: if you don't want your wire to spin, try bending the end into an L shape before poking it into the foam, then use hot glue to secure it.*

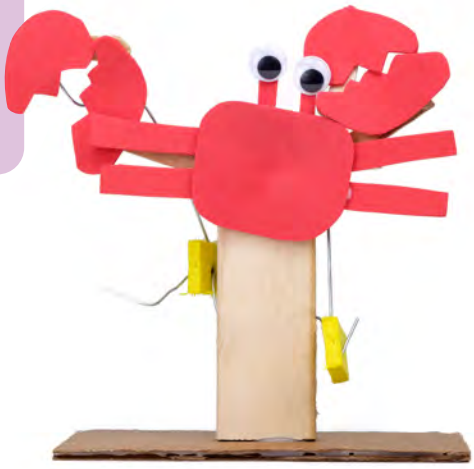


5 **Make the wire loop limiter:** Use your pliers to make a small circle limiter on one end of a piece of wire and hot glue it to the top of your block. This piece will hold the crank slider in place for your sculpture. You may need to experiment with the size of the circle. Cardboard or a tongue depressor can also work for this.

Keep experimenting!

Try adding linkages or multiple motions to your sculpture. Experiment with the size of the U bend and notice how that impacts the range of motion of your crank slider. You can use the moving pieces to tell a story or animate a character.





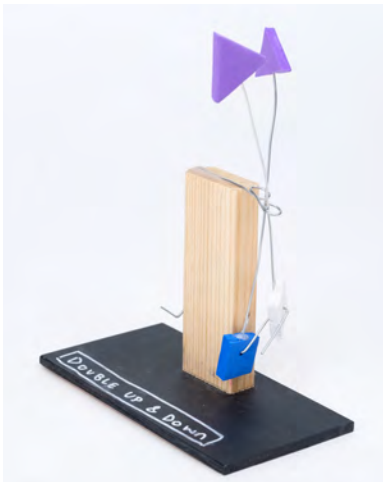
EDUCATOR ADDENDUM

A note on our philosophy: The Tinkering Studio is based on a constructivist theory of learning, which asserts that knowledge is not simply transmitted from teacher to learner, but actively constructed in the mind of the learner. Constructionism suggests that learners are more likely to make new ideas while actively engaged in making an external artifact. The Tinkering Studio supports the construction of knowledge within the context of building personally meaningful artifacts. We design opportunities for people to "think with their hands" in order to construct meaning and understanding.

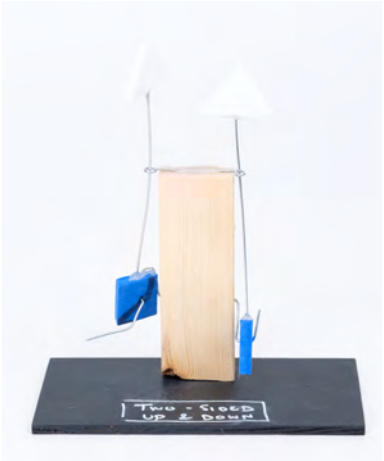
Environment: When setting up an environment for Cranky Contraptions, we like to have a few designated areas for tools and materials. We place the core building supplies (like wire, pliers, snips, mechanism examples, and foam squares) on the main work surface. We use a small cart or table to hold the additional building and decorative supplies. We've found this system allows learners to focus on designing and testing their mechanisms at the start of their exploration without overcrowding the table with too many supplies. The aesthetic components are still nearby and readily accessible when they're needed. We also keep our glue guns on separate carts away from the main work table for safety.

One element we've found to be helpful is to have a set of mechanism examples available. They clearly show all the core components of a cranky contraption without suggesting what the final sculpture should be. The mechanisms are:

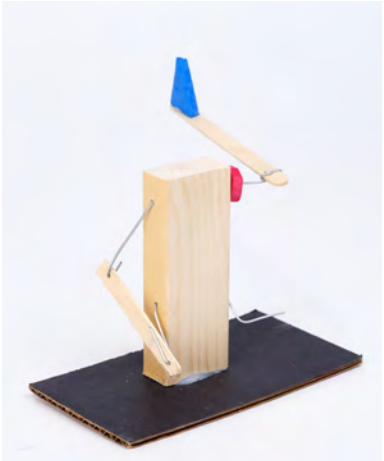
Single up and down



Double up and down



Two-sided up and down



Wag

Flap

Facilitation: As always, before facilitating this activity with others we recommend that educators try it once (or more) on their own as a learner. This helps to build understanding of the process and helps you to anticipate what moments may be challenging for learners. You may find yourself feeling frustrated - and that's OK! It's part of tinkering, and working through those stuck moments will help you develop new understandings of the tools, materials, and phenomena you're working with.

To start out, we often ask learners to point out what parts they notice and ask questions like "how many wires do you see?" or "what parts are fixed and what parts are moving?" This allows learners to take in the system as a whole. From there, we'll ask, "what piece do you want to start building?" Based on that we can offer suggestions on what tools or materials to use and what might be an intro to building that piece. One of the biggest challenges of facilitating making a Cranky Contraption is that it can easily slip into a more step by step process rather than being driven by the learner, so using these types of questions early on to spark engagement and observation can help prevent that..

As learners work through making their mechanism move the way they want it to, you can also ask questions about their goals for the final design. Are they making a moving animal? A scene in a story? Do they want to have one part that moves or multiple parts? Asking open-ended questions about their ideas draws out their thinking and gives opportunities to offer facilitation that is personalized. Ultimately, as facilitators our goal is to sustain participation through the tinkering process and help to deeper learners' understandings of what they choose to explore.

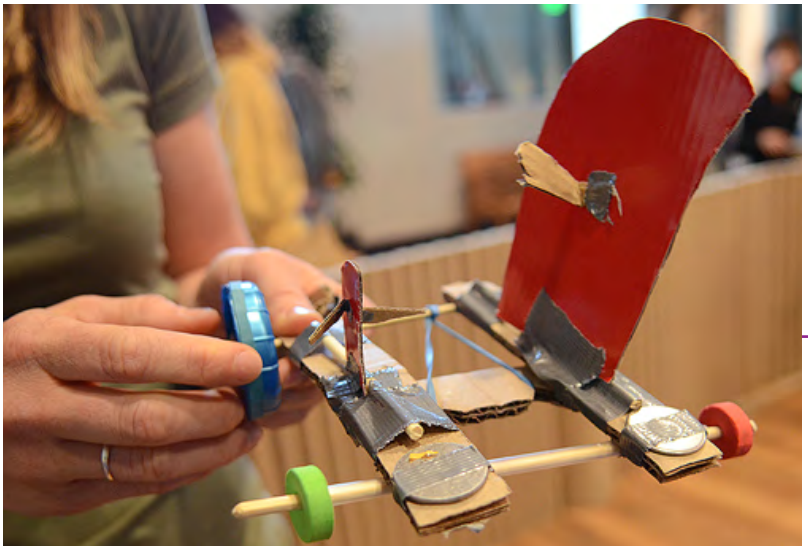
RELATED TINKERING ACTIVITIES

Cardboard Automata: Cardboard automata is a type of mechanical sculpture made of simple materials that lets you bring stories to life. As you build you can explore simple machine elements such as cams, levers, and linkages in a playful way. Making this version of automata lets you quickly get started in building functional mechanisms as your mechanical sculpture ideas develop.

ARTIST CONNECTIONS

Hernán Lira
Hernán Lira began making toys and puppets at the age of 16. He is inspired by his own experiences and the culture, poetry, and music of his homeland, as well as by the artists and craftspeople he's met in his travels around the world. To spread toy making and puppet making in his native country of Argentina, he has developed workshops for children and designed and built thematic series of automata. The series "Juguetes con Oficio" (Toys with a Trade) is an homage to the culture of work and represents the variety of trades that have been around him since childhood.

Keith Newstead
Keith is an automata artist who studied at Barking College of Art and Technology. After short-lived careers on a paper round in Finland and as a graphic designer, he became a motorcycle dispatch rider in London for 10 years. Keith counts his childhood memories of the machines in the Penny Arcade at Southend as being one of the most important influences on his work. Keith collaborated with Learning Studio staff to construct all sorts of automata and models out of cardstock and paper.



Noga Elhassid
Noga describes her work in the following words: "The Moving Toys Workshop demonstrates scientific principles through simple means using playful teaching strategies." She has many years of experience with children in the U.S. and Israel, winning awards for her work. The toys are made out of simple and recyclable materials.