

Almost anyone can master the three-ball “cascade,” but wait till you try the “shower” and the “fountain”

## Give Juggling a Hand!

Condensed from THE SCIENCES  
JOE BUHLER AND RON GRAHAM

NOTHING COULD BE SIMPLER than a game of catch. But just add another ball or two and the game turns magical—the juggled balls take on a life of their own. Suddenly, simple motions and common objects blur into one stunning display after another.

In recent years, juggling has experienced a renaissance. Street performers and skilled amateurs are practicing the ancient art in parks, back yards and on campuses around the globe. Membership in the largely amateur International Jugglers' Association (IJA) has more than doubled since 1979.

Juggling is actually 4000 years young. In Egypt, Asia and the Americas, it was once associated with religious ritual. In medieval Europe, wandering minstrels often juggled; the very term derives from these *jongleurs*.

Amazing jugglers imported from the Orient—in particular the “East Indian” Ramo Samee, who was said to string beads in his mouth while turning rings with his fingers and toes, and the Japanese artist



Takashima, who manipulated a cotton ball with a stick held in his teeth—convinced 19th-century Europeans that juggling could be extraordinary show business.

Perhaps the greatest juggler of all time was variety-show virtuoso Enrico Rastelli. By his death in 1931, he had taught himself to juggle eight clubs, eight plates or ten balls; he could even bounce three balls continuously on his head.

Most people assume that a skilled juggler can manage up to 20 objects. In fact, even five-ball juggling is very difficult and requires about a year to master. Only a few jugglers worldwide have perfected seven-ball routines. At the 1986 IJA competition, one entrant separately

juggled nine rings, eight balls and seven clubs.

Jugglers use a bewildering variety of objects, including bowling balls, whips, plastic swimming pools, cube puzzles, fruit, flaming torches, and playing cards. Performers trying for the largest number of objects usually choose rings, which allow a tighter traffic pattern and are stable when thrown to great heights. Several jugglers can manage ten or 11 rings, and some are trying for 12 or 13.

Clubs are the most visually pleasing objects to juggle. They're especially suited for passing back and forth between performers. Because they take up a lot of space when they rotate and must be caught at one end, juggling even five is

---

tricky. Almost nobody can manage seven, even for a few seconds.

Throughout history, all jugglers—from South Sea Islanders to Aztec Indians—have used the same fundamental patterns:

**The Cascade.** Here, each ball travels from one hand to the other and back again, following a looping path that looks like a figure eight lying on its side. The juggler starts with two balls in his right hand, using a scooping motion and releasing a ball when his throwing hand is level with his navel. As the first ball reaches its highest point, the other hand scoops and releases a second ball, and as that one reaches *its* apogee, he throws the third. Skilled jugglers can keep three, five

or even seven balls going in a cascade, but never four or six. With an even number, balls collide at the intersection of the figure eight.

**The Shower.** In this more difficult pattern, the balls follow a circular path as they are thrown upward by the right hand, caught by the left and quickly passed back to the right. Since the right does all the long-distance throwing, the shower is inherently asymmetrical and, therefore, inefficient; it is difficult with more than three objects.

**The Fountain.** This figure allows for a large number of balls. In a four-ball fountain, each hand juggles two balls independently in a circular motion. For symmetry, the number of balls is usually even. If the hands throw alternately and the

---

## GIVE JUGGLING A HAND!

two patterns interlock, it is surprisingly hard to discern that the fountain is made of two separate components and not one.

Because gravity causes objects to accelerate as they fall, a juggler has only a short time to catch and throw one ball before another drops into his hand—even if he throws high. A juggler who throws a ball eight feet in the air, for example, must catch it 1.4 seconds later, but throwing it four times that high only doubles the flight time.

THE BEST WAY to understand juggling is to learn to do it yourself. Some people get the hang of the three-ball cascade in minutes, although most need at least a few days. Limit your sessions to ten minutes rather than frustrate yourself with a two-hour binge.

*Step 1: One ball.* Practice throwing a ball from your right hand to your left and back, letting the ball rise to just above your head. Make the ball follow the path of a figure eight lying on its side, by “scooping” the ball and releasing it near the navel. Catch the ball at the side of your body, then repeat the sequence.

*Step 2: Two balls.* Put one in each hand. Throw the ball in the left hand as in Step 1, and then, just as

the ball passes its high point, throw the right-hand ball. Avoid releasing the second throw too early or tossing the balls to unequal heights.

At first it may be difficult to catch the balls. Don't worry. Focus instead on the accuracy and height of the throws. Catching will come naturally as soon as the throws are on target. If things seem hectic, try higher throws.

*Step 3: Two balls reversed.* Reverse the order of throws so that the sequence is right, then left.

*Step 4: Three balls.* Now put two balls in your right hand and one in your left. Try to complete Step 2 while simply holding the extra ball. Pause, then do Step 3.

The third ball can make it difficult to catch the second throw. To solve this, throw the third ball just after the second reaches its high point. The sequence is thus right, left, right. At first it may be tough to persuade your right hand to make its second throw. Remember: catches are irrelevant in the beginning. Throw high, accurately and *slowly*. Don't rush the tempo, and don't forget the figure-eight pattern.

ONCE YOU'VE MASTERED the three-ball cascade you'll want to try other patterns. A juggler is never finished: there is always one more ball.

