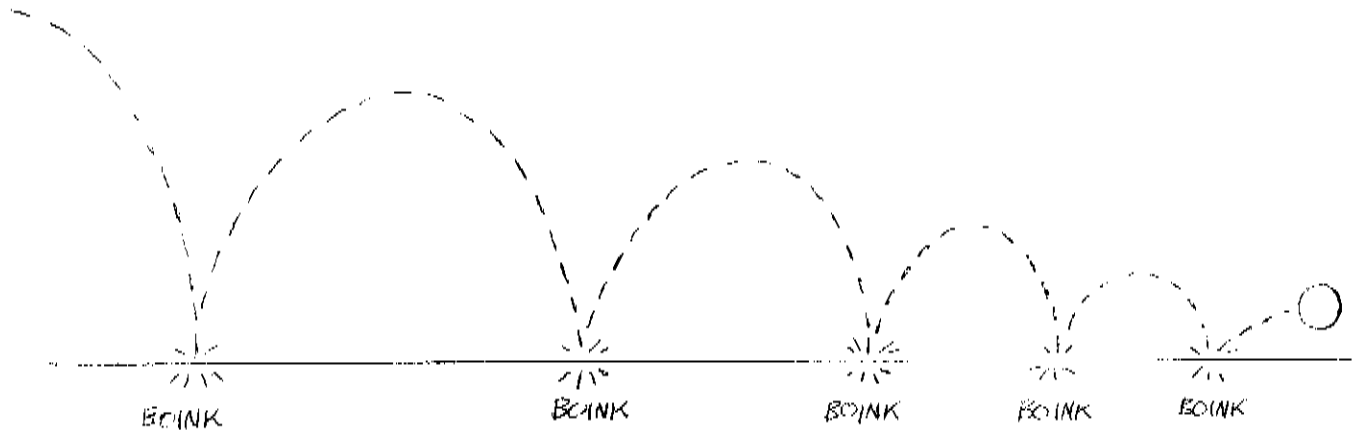


The bouncing ball says it all.

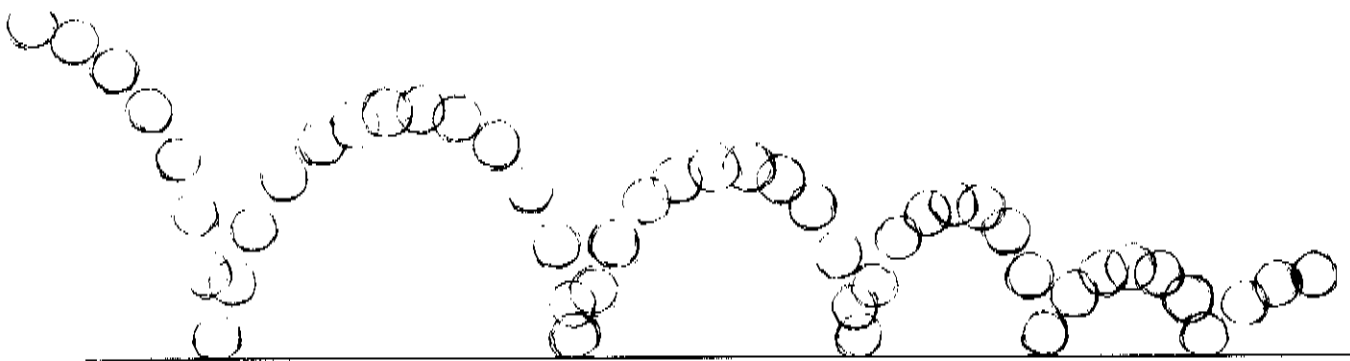
The old bouncing-ball example is often used because it shows so many different aspects of animation.

A ball bounces along,



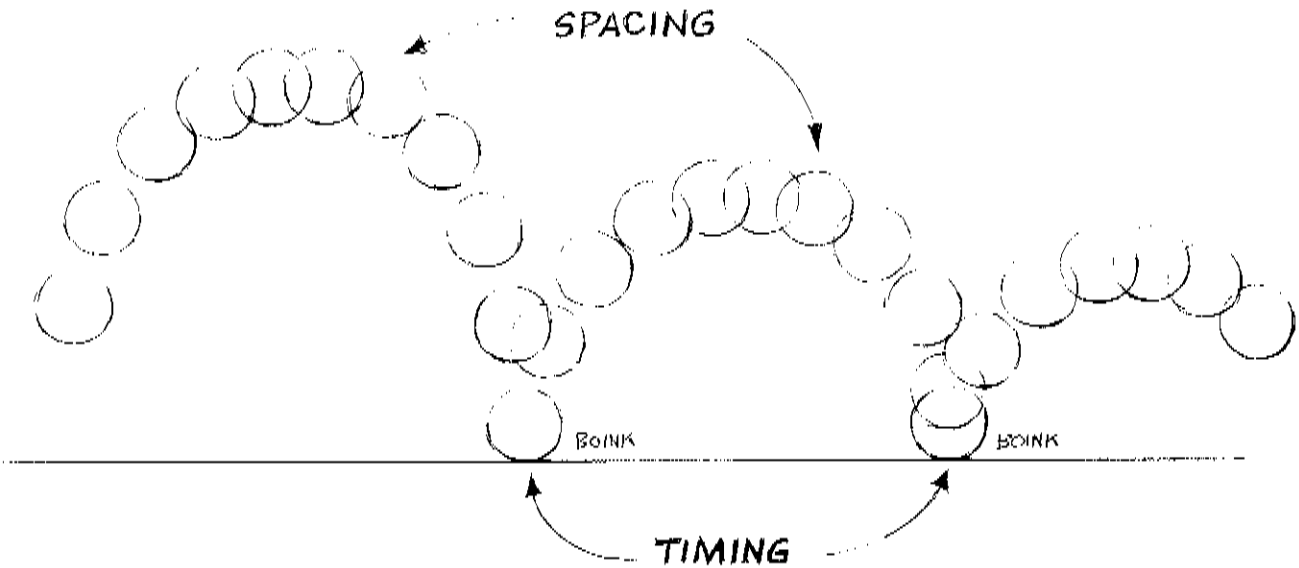
and where it hits – the 'boinks' – that's the *timing*. The impacts – where the ball is hitting the ground – that's the *timing* of the action, the rhythm of where things happen, where the 'accents' or 'beats' or 'hits' happen.

And here's the *spacing*.



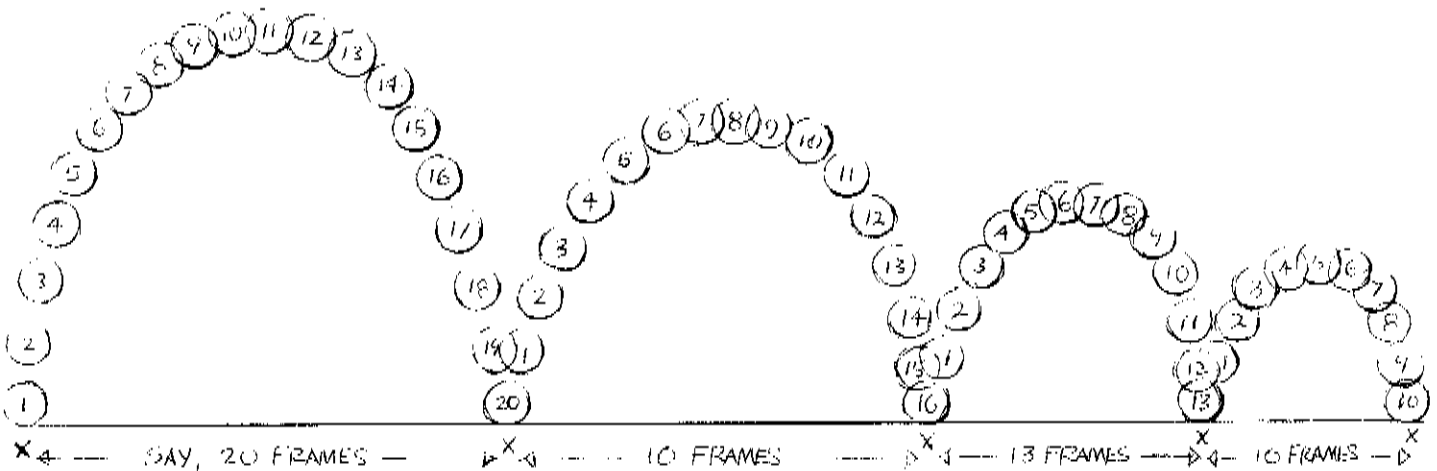
The ball overlaps itself when it's at the slow part of its arc, but when it drops fast, it's spaced further apart. That's the *spacing*. The spacing is how close or far apart those clusters are. That's it. It's simple, but it's important. The spacing is the tricky part. Good animation spacing is a rare commodity.

So we have:



The two basic elements of animation.

To experience this, take a coin and film it in stages under a video camera.



First plot out the *timing* – where you want the ball to hit the ground. Then push the coin around – taking a picture at each frame – and see what looks right or wrong. Try it with different timings and spacing. You're already animating. You're already dealing with the important fundamentals and you haven't even made a single drawing. You're doing pure animation without any drawings.

Hidden in this simple test is the weight of the ball – how it feels, light or heavy; what it's made of. Is it large or small, moving fast or slow? This will all emerge if you do several tests – which only take a few minutes to do. The importance of the timing and the spacing will become obvious.

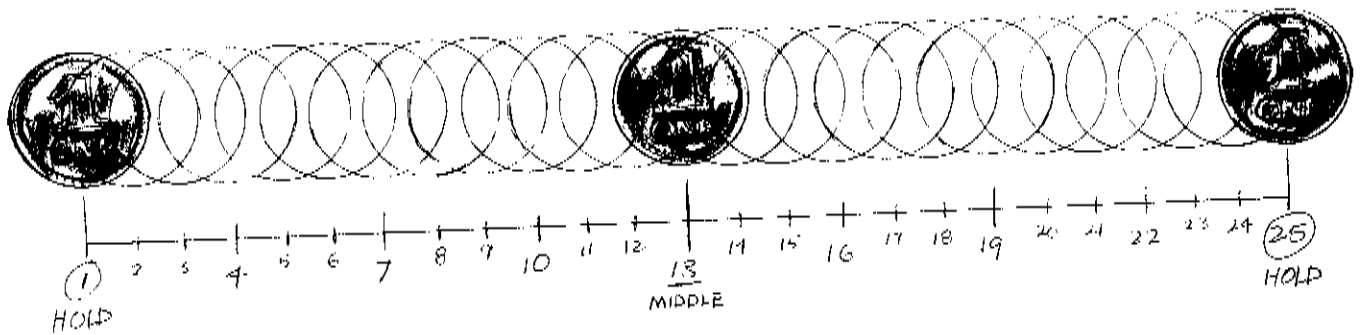
Because *you* did it, a certain amount of personality will creep into the action – whether the ball is deliberate, slow, jaunty, erratic, cautious, even optimistic or pessimistic.

And all this, before you've made a single drawing. This reveals how important and dominant the timing and the spacing is. Even if the ball positions were drawn in detail by Michelangelo or Leonardo da Vinci, the timing and the spacing of the drawings will still dominate.

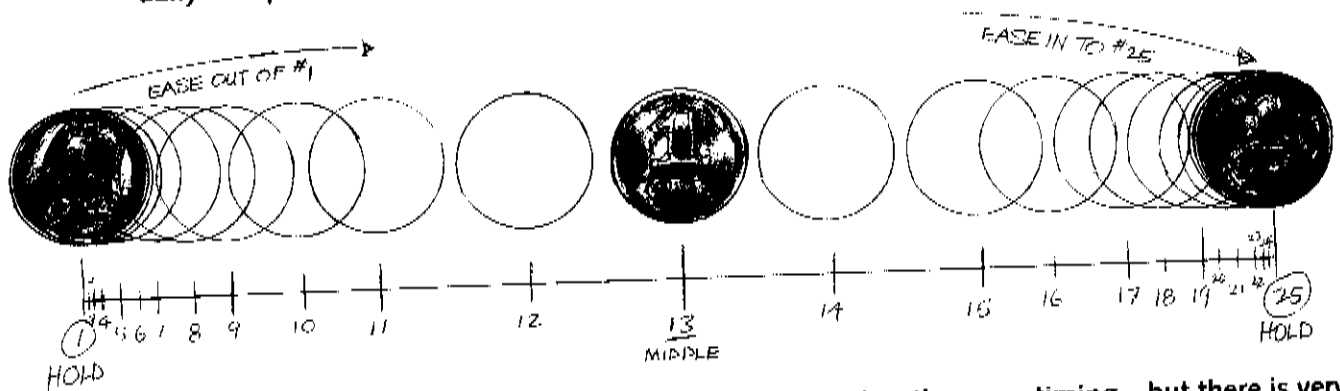
Another interesting way to experience the difference between timing and spacing right away is this:

Let's put a coin under the video camera and move it across the page (or screen) in one second – 24 frames of screen time. That's our *timing*.

We'll space it out evenly – and that's our *spacing*.



Now we'll keep the same *timing* – again taking one second for the coin to move across the page. But we'll change the *spacing* by slowly easing out of position number 1 and easing gradually into position number 25.



It still takes one second for the coin to get over there. It has the same timing – but there is very different movement because of the different spacing. Both start together – and both hit the middle together – but the spacing is quite different. And so the action is very different.

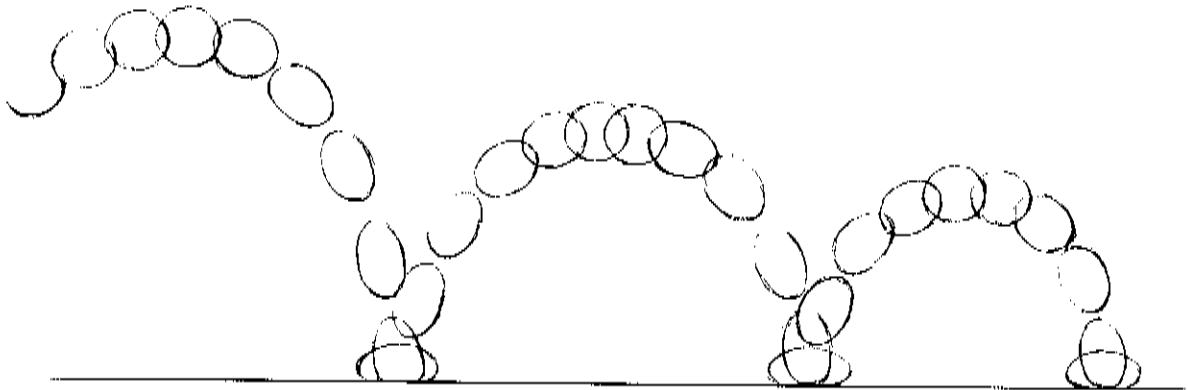
You could say that animation is the art of timing. But you could say that about all motion pictures.

The most brilliant masters of timing were the silent comedians: Charlie Chaplin, Buster Keaton, Laurel and Hardy.

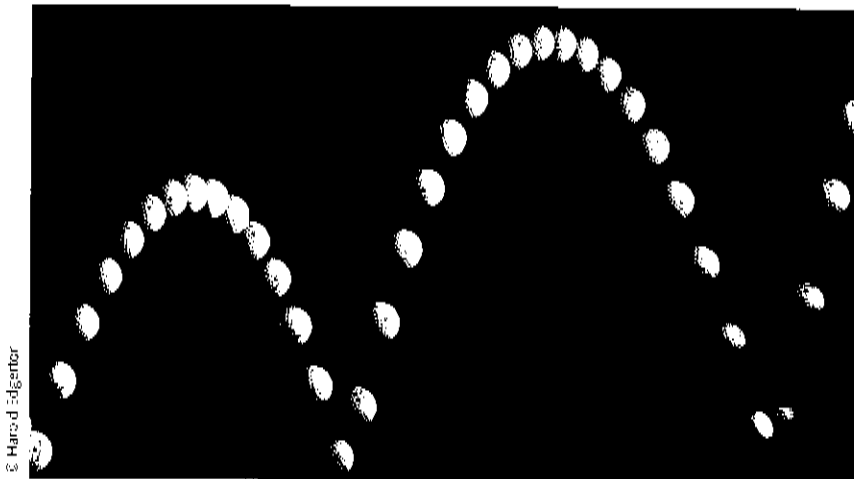
Certainly for a film director, timing is the most important thing. For an animator, it's only half the battle. We need the spacing as well. We can have a natural feel for timing, but we have to learn the spacing of things.

One other thing: The bouncing ball example is often used to show animation 'squash and stretch' – that is, the ball elongates as it falls, flattens on impact with the ground and then returns to its normal shape in the slower part of its arc.

It *might* squash and stretch this way if it was a very soft ball with not much air in it, but what



I've found is that you can get a good enough effect with a rigid coin – *provided* the spacing of it was right – so this added technique is not always necessary. Certainly a hard golf ball isn't going to bend all over the place. In other words, if you do this squishy squashy thing too much, everything comes out a bit 'sloopy', like it's made of rubber. Life ain't like that. At least most of it ain't. More about this later.



Golf ball bounce, 1951

Having established all this, let's go to lesson one: