

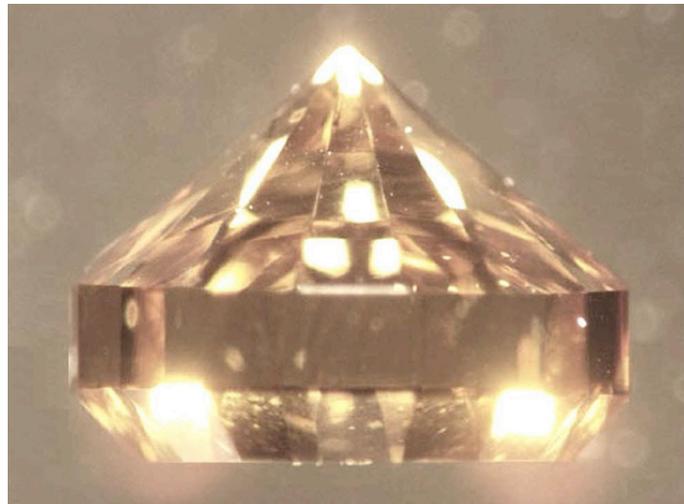
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When Diamonds Are Dirt Cheap, Will they Still Dazzle?

Robert H. Frank

As a seventh grader, I was lucky to land the job of ball boy for the Brooklyn Dodgers during their annual late-March exhibition games in Miami. The experience left me with fond memories — of Roy Campanella smoking a cigar as he stroked line drives in the batting cage, of a young Sandy Koufax throwing harder than seemed humanly possible and of an aging Jackie Robinson struggling to remain in the lineup.



A technique called chemical vapor deposition can produce diamonds, created from gases, that are virtually indistinguishable from mined diamonds.

Oddly, however, my most vivid memory is of the Dodgers' longtime batboy as he sat in the locker room producing autographed

baseballs. He'd twist his hand at odd angles as he scrawled replicas of the signatures of Duke Snider, Pee Wee Reese and other Dodger legends. To my untrained eye, the balls he inscribed were indistinguishable from those signed by the players themselves.

Handwriting experts probably could have identified his forgeries without difficulty, but technology has progressed considerably since then. In many domains, perhaps even including signed baseballs, it's becoming possible to produce essentially perfect replicas of once rare and expensive things.

That's true, for example, of diamonds and paintings. Renowned art originals will always be scarce, and so will high-quality mined diamonds, at least while De Beers holds sway. But what will happen to the lofty prices of such goods if there is an inexhaustible supply of inexpensive perfect copies? Economic reasoning can help answer this question. It can also shed light on how new technologies might alter traditional ways in which people demonstrate their wealth to others, or might change what society embraces as tokens of commitment and other gifts.

First, some background about the new technologies. For many decades, the best diamond facsimile was cubic zirconia. It is similar to a diamond in brilliance and clarity but it isn't as hard as a diamond and could never fool an experienced jeweler. Recently, though, new processes have made it possible to culture diamonds that are visually identical to mined ones.

One such process, [chemical vapor deposition](#), produces diamonds

with a heated mixture of hydrogen and methane in a chamber at very low pressures. Writing for [Smithsonian Magazine](#) shortly after the technique was developed, Ulrich Boser described having taken a sample stone to a respected diamond merchant in downtown Boston, who inspected it carefully under a jeweler's loupe. After pronouncing it a "nice stone" with "excellent color" and no visible imperfections, the jeweler asked where it came from. When Mr. Boser said it had been cultured in a lab 20 miles away, the astonished merchant inspected it again. "There's no way to tell that it's lab created," he said.

In significant ways, the new cultured stones are actually better than many mined diamonds. The Gemological Institute of America classifies them as colorless or near colorless Type IIa stones, [a premium category](#) that includes only 2 percent of natural diamonds. The new stones also sidestep environmental and human-rights concerns that have plagued mined diamonds in recent years.

Progress has been almost as striking in the duplication of oil paintings. Chemical and spectral analysis of original works can now identify paint compounds and hues precisely. A Cornell University electrical and computer engineering professor, C. Richard Johnson Jr., and his collaborators have been developing ways to identify an artist's [signature brush stroke style](#) by applying statistical modeling to 23 original works by Vincent van Gogh. To date, their efforts have been used mostly to help detect forgeries, but they will inevitably serve future copiers as well. [Robots can already produce](#) near-perfect copies of simple paintings. Skilled forgers have been fooling experts for centuries, but going forward, those artisans won't keep pace with

smart machines and 3-D printing.

Not even perfect replicas, however, will extinguish strong preferences for original paintings and mined diamonds. In the short run, price premiums for such goods are likely to persist, as collectors scramble for certificates of authenticity.

Longer term, those premiums may prove fragile. Wearing large diamonds, for example, will no longer be likely to signal significant wealth or attract admiring glances. Some people will ask, why not buy cultured stones and spend the difference on things that actually matter — or that are, at least, truly scarce? No matter how many new skyscrapers are jammed into the city, there will only be so many penthouse apartments with sweeping views of Central Park. When some of the superrich start using money formerly spent on diamonds to bid for those apartments, other bidders will feel pressure to follow suit.

Prices of famous paintings will be more stubborn. But replication technologies will be applied not just to artworks but also to certificates of authenticity. Even billionaires would be reluctant to pay \$100 million for a Picasso of uncertain provenance.

Tumbling prices will transform many longstanding social customs. An engagement diamond, for instance, will lose its power as a token of commitment once flawless two-carat stones can be had for only \$25.

Replication technologies also raise philosophical questions about where value resides. How heavily, for example, should museums

invest in ownership of famous works? (As noted in [my last column](#), this question looms large in Detroit's current bankruptcy proceedings.) Perfect replicas would enable local museumgoers to see the Mona Lisa without having to cross the Atlantic. But would the experience of seeing the painting — a perfect copy or even the original somewhere other than the Louvre — be rendered less special?

Perfect replicas would enable even the poorest fans to own autographed baseballs. Original or a copy? No one would know the difference, not even an expert. But would a 10-year-old be just as delighted to receive one for his birthday as I once would have been?

Technology won't eliminate our need for suitable gifts and tokens of commitment, of course. And such things will still need to be both intrinsically pleasing and genuinely scarce. But technology will change where those qualities reside.

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