3-D printers make replicas of cuneiform tablets

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On the left is an original cuneiform tablet, compared with a scanned and printed replica. Below is an enlarged replica of the same tablet. Photo: Jason Koski

Today's Assyriology scholars study Sumerian and Babylonian cuneiform tablets with the help of digital photographs or handwritten copies of the texts, but ideally, they visit collections to see the tablets firsthand.

Technology could introduce a new way to connect researchers to these precious, unique artifacts by creating exact replicas.

Such an effort is under way at Cornell in the lab of Hod Lipson,

associate professor of mechanical and aerospace engineering, who specializes in the burgeoning field of 3-D scanning and printing of everyday objects.

Natasha Gangjee '12, a student in Lipson's lab, worked with six cuneiform tablets to try and replicate them exactly using optical scanning and layer-by-layer printing technology. A former student of Lipson's, Evan Malone, made an initial prototype.

"If we can create very accurate reproductions, this would be a great help to us," said David I. Owen, the Bernard and Jane Schapiro Professor of Ancient Near Eastern and Judaic Studies.

Tablets can be copied using latex molds, but this runs the risk of damaging the original, Owen said. The most important recent technological development in the field was digital photography; this allowed millions of ancient artifacts to become instantly available to scholars everywhere. But it is nothing like the real thing.

"With a photograph you can see a lot and that's great, but oftentimes you can read even more if you can actually hold the tablet because of the angle of the light -- how it hits the signs can help you see it better," added Alexandra Kleinerman '03, a postdoctoral associate working with Owen.

The collaboration started because Owen and Lipson are neighbors and friends. Hearing Owen talk about his research got Lipson thinking about how 3-D printing could contribute to Owen's field. The challenge would be to find the right materials to color-match the tablets and give them an authentic feel, weight and texture.

Gangjee used a 3-D scanner in the lab to make files of each tablet. She then sent the files for fabrication at a ZCorp color 3-D printing service,

averaging about $25 per tablet.

The first 3-D reproductions looked like the originals, but the smallest signs will require additional refinements before a completely accurate result is possible. Nevertheless, Lipson says they will continue with various techniques and may try using a CT scanner to improve performance.

Lipson thinks this is just one of a myriad of applications that these printers will bring to people's lives when they become more available to the general public.

"We are basically taking two existing technologies, scanning and 3-D printing, and trying to use them in a new way," Lipson said. "This will make tablet collections accessible to more scholars and students the world over."

More information: Download and print your own cuneiform tablet at creativemachines.cornell.edu/cuneiform

Provided by Cornell University