TRY IT YOURSELF

CAN YOU JOIN THESE VIRTUAL 3D FRAGMENTS?

This is a virtual reconstruction you can try yourself. The 3D models were acquired from real cuneiform tablet fragments held at The British Museum. The pieces are quite complicated 3D shapes.

Joining virtual pieces manually using a computer isn't easy. Can you join these pieces? (The AUTO SOLVE button can show you the computed solution.)

YOU CAN USE YOUR OWN COMPUTER OR PHONE ...

http://virtualcuneiform.org/interaction3.html

OTHER RECONSTRUCTIONS

We can reconstruct other broken objects using the virtual reconstruction method we used for the cuneiform tablets. For example, we can join broken pieces of fossils, Stone Age flints, pottery, sculptures and other objects.

LEARN MORE

We hope you enjoyed learning about cuneiform and using our interaction.

You can learn lots more about the Virtual Cuneiform Tablet Reconstruction Project and the research we do here: http://virtualcuneiform.org/

VIRTUAL CUNEIFORM TABLET RECONSTRUCTION TEAM:
The project is an international collaboration across science, engineering and Assyriology disciplines. **Dr Sandra Woolley** co-leads Software and Systems Engineering Research at Keele University. **Dr Tim Collins** is Electronic Engineering Programme Leader at Manchester Metropolitan University. Together with Assyriologist **Dr Erlend Gehlken** and Computer Scientist **Professor Eugene Ch'ng** they are founding members of The Virtual Cuneiform Tablet Reconstruction Project.

ACKNOWLEDGEMENTS

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VIRTUAL CUNEIFORM
Keele University
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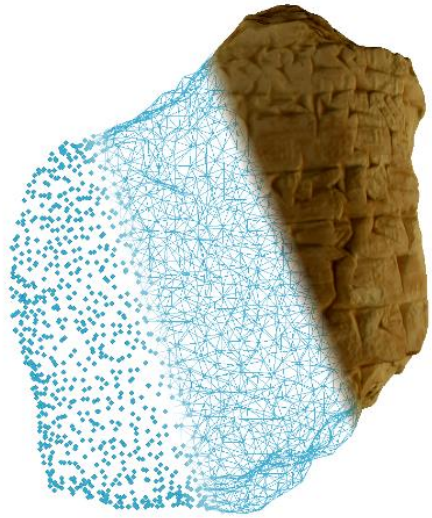


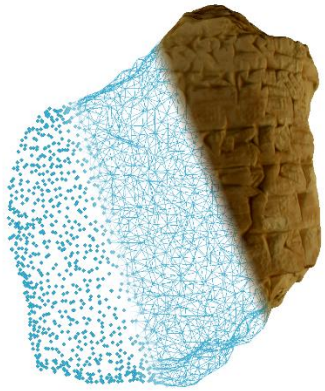
VIRTUAL CUNEIFORM

ACTIVITY FOR SCHOOLS

Keele University
Manchester Metropolitan University
Johann Wolfgang Goethe Universität Frankfurt am Main
The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

INSIDE A 3D MODEL

3D scanners build 3D models by creating sets of points called **vertices** that define the shape of virtual objects. These vertices are connected to form surfaces from a **mesh of triangles.**



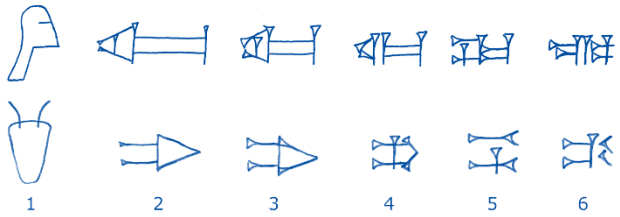
The triangles can be shaded according to the colour of the object and the virtual lighting. This is called **rendering**. The 3D model can be made to look real by wrapping it in pixels from photographs of the original object.

If we have 3D models of real objects, we can share new virtual collections of objects even when the physical objects are in different locations.

WHAT IS CUNEIFORM?

Cuneiform was humankind's earliest writing. Dating back five thousand years, cuneiform was written by making impressions in clay "tablets". It was the *original* information technology.

Cuneiform script was in use for some three thousand years in ancient **Mesopotamia**, the region in and around modern-day Iraq and Syria. The writing evolved from simple picture-signs we call **pictograms** into a sophisticated writing system for communication in several languages.



This is how the cuneiform signs for "head" and "cattle" evolved. Can you see that the early pictograms were rotated 90° anti-clockwise?

BROKEN AND SEPARATED

Many thousands of inscribed cuneiform tablets have been excavated in the last 200 years. Most of them were already broken when they were excavated and, now, the broken pieces are mixed up and separated, sometimes by 1,000km or more. These separations occurred because past archaeological digs divided up finds between the dig partners, and because many finds have been privately sold or illegally traded.

WORLDWIDE 3D JIGSAW PUZZLE

Even though broken cuneiform tablet pieces are thousands of years old, they can often fit together perfectly. But because the pieces are so mixed up and far apart, and because physical access to them is very limited, it simply isn't possible to physically reassemble them.

Together the broken pieces form an enormously complicated worldwide set of 3D jigsaw puzzles.

VIRTUAL RECONSTRUCTION

With virtual 3D models of real objects we can attempt virtual reconstruction, even when the physical objects are a 1,000km apart!

There are hundreds of thousands of broken and separated cuneiform tablets and millions of other broken objects that could be reassembled with the help of virtual reconstructions.

"THE FIRST LONG-DISTANCE VIRTUAL JOIN WAS MADE FROM FRAGMENTS IN THE BRITISH MUSEUM AND MUSÉE D'ART ET D'HISTOIRE GENEVA."

HOW VIRTUAL RECONSTRUCTION WORKS

We have achieved *automated* virtual reconstructions by writing a computer program to measure the distances between virtual surfaces of 3D fragment models. The computer moves the pieces and repeats the measurements until it finds the best possible fit. The computer makes calculations in 3D space using **geometry**. Because the models have tens of thousands of **vertices**, the computer needs to do many millions of calculations. We speed up these calculations by using fast **graphical processors**.