High tech printing makes checking banknotes possible in the blink of an eye

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Credit: University of Birmingham

New '3-D micro-optic' security features in banknotes enable the general public to detect counterfeits reliably within a fraction of a second, according to new research at the University of Birmingham.

During a typical cash transaction, people glance at banknotes for about a second, not giving them much time to check banknotes for authenticity.

The team, in the University of Birmingham's School of Psychology,

tested the new security feature on bank notes designed by the US-based company, Crane Currency. Incorporating a specially-designed micro-optic lens that focuses on an icon or image underneath, the technology makes an image appear in 3-D and animates it as the note is moved around.

Crane Currency has designed a number of banknotes incorporating 3-D micro-optic security features, including currency in Uzbekestan and an award-winning note in circulation on the island of Aruba, in the Caribbean Sea. These have been in circulation for about a year and this study is the first to confirm the reliability of the new security feature from a user point of view.

In the study, 46 participants reviewed a series of 108 banknotes, each incorporating a single security feature and each with a specific denomination. They were asked to report each note's denomination and make a judgment about whether the banknote appeared authentic after seeing the note for just a split second. In a second phase of the study, participants were asked to review the notes under low light levels to see if the security feature was still easily distinguishable.

The results, presented at Optical Document Security 2020, a foremost industry conference, showed that participants were able to reliably pick out authentic notes from counterfeits when they had less than half a second to view the notes. Remarkably, this was also the case when lighting conditions were poor.

Professor Jane Raymond, Professor of Visual Cognition at the University of Birmingham, says: "Most people trust their banknotes, are usually in a hurry, and often handle cash in places where the lighting is bad. The big problem is that the security features on most banknotes from around the world only work well when people slow down and look carefully at them under good light. So, in lots of situations, it not so hard

to miss a fake banknote. Security features need to give people fast, easy-to-see signals that work under all sorts of lighting conditions.

"Human perception can be extraordinarily sensitive—with the 3-D features, our participants were able to pick out the fake bank notes from the real ones in a fraction of a second. This research shows the real potential of modern 3-D technologies to reduce the circulation of counterfeit bank notes."

The results are published in *Proceedings of Optical Document Security 2020*.

More information: Raymond et al (2020). 3D Micro-Optics Enable Fast Banknote Authentication by Non-Expert Users. *Proceedings of Optical Document Security 2020*.

Provided by University of Birmingham