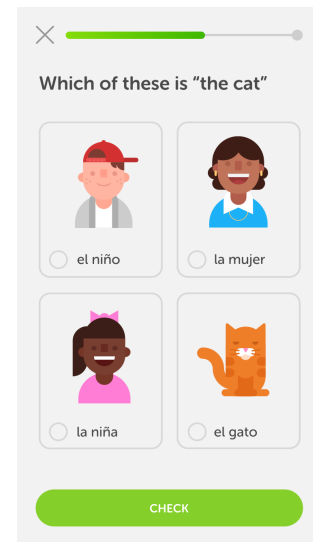# LEMELS⦿N·MIT

Winner of the 2018 $500,000 Lemelson-MIT Prize – Luis von Ahn, PhD

A pioneer in the field of human computation, Luis von Ahn is improving the world through technology and transforming language education around the globe. Von Ahn is inventor of reCAPTCHA, co-inventor of CAPTCHA and creator of a free language-learning platform, Duolingo.

Duolingo

Luis von Ahn is the CEO and co-founder of Duolingo, which was established in 2011. Over the years the company has grown to be the largest language-learning platform in the world, currently offering 82 total language courses for more than 30 distinct languages to 300 million users worldwide. Von Ahn created Duolingo with the mission of bringing free and accessible language education to anyone in the world. In fact, there are more people learning languages on Duolingo today than there are people learning languages in the entire U.S. public school system. An independent study conducted by the City University of New York has shown that 34 hours on Duolingo are equivalent to a university semester of language classes.

CAPTCHA/reCAPTCHA

Completely Automated Public Turing to tell Computers and Humans Apart (CAPTCHA) was part of von Ahn's early PhD work with his doctoral advisor, Manual Blum, at Carnegie Mellon University in 2000 to protect online forms from receiving automated submissions. They co-invented CAPTCHAs, which are computer-generated tests that humans are routinely able to pass, but that computers have not yet mastered. The test displays a distorted image of letters and/or numbers, which the user must type into a text box. CAPTCHA is utilized by millions of websites in order to: prevent "bots" from registering for large numbers of free email accounts, prevent comment spam in blogs, and protect email addresses from scrapers.

Von Ahn also invented reCAPTCHA in 2007. ReCAPTCHA is another cybersecurity system, which differentiates from CAPTCHA because it assists with the digitization of books. ReCAPTCHA achieves this through its computer-generated test, which displays words from scanned texts for its users to decipher; as opposed to CAPTCHA, by which users decipher randomly ordered characters. The words humans decipher through reCAPTCHA are then used in

the digitization of books, maps and AI challenges. To date, over a billion people have helped digitize books through reCAPTCHA. ReCAPTCHA is helping to digitize approximately two million books per year from the Google Books project. It has also assisted with the digitization of more than 13 million articles in *The New York Times* archives from 1851 to the present.

ESP Game (Games With a Purpose)

Von Ahn's 2005 PhD thesis was the first publication to use the term "human computation" and the first work on Games With a Purpose. These "games" are played by humans to help solve problems that computers cannot solve alone. The most notable is the ESP Game, asks players to match words or phrases in order to describe an image. Each time an image is matched by a human, it becomes an accurately classified digital image.

Applications and Commercialization

Luis von Ahn's inventions have seen widespread adoption and commercialization. Google bought the ESP Game in 2006 in the form of Google Image Labeler, in order to improve its image search capability. ReCAPTCHA was also acquired by Google in 2009.

Additionally, as of 2014, Duolingo has offered the Duolingo English Test (DET), a more affordable and convenient alternative to traditional English certification tests. Whereas traditional tests generally take two or more hours, cost about $250, and require test-takers to be in a particular place at a scheduled time, the DET costs $49, takes 45 minutes to complete, and can be taken at home on a computer. The DET, which uses machine learning to adapt to the progress of each test taker, is accepted by over 400 institutions worldwide, including universities such as Yale, Columbia, New York University, Duke, Dartmouth, and UCLA. An independent study found that the DET's results are highly correlated with other major assessments such as the TOEFL and the IELTS. By making English language certification more affordable and easily accessible, von Ahn hopes to remove a significant barrier to social mobility for people across the globe.