THE EDITOR'S CORNER

I'm Not a Robot

The Turing test, proposed by British mathematician Alan Turing in 1950, is a criterion for determining whether a machine exhibits artificial intelligence (AI). In the test, initially called the "imitation game," a human evaluator asks a machine and a human a series of questions. If the evaluator cannot reliably distinguish between their answers, the machine has passed the test. Turing tests have evolved over the past 70 years but continue to be used today as benchmarks for progress in AI.

You might be surprised to learn that you have taken countless Turing tests online in the form of CAPTCHAs. The acronym stands for "completely automated public Turing test to tell computers and humans apart." Invented in 1997 at Carnegie Mellon University, the test is a security measure to prevent internet abuse by AI-driven bots. Versions are used whenever security is a concern, especially during login, checkout, or account-creation processes. Common variants include text-based CAPTCHAs, which display distorted characters that users must type into a field; image-based CAPTCHAS, in which users are asked to select pictures that match specific criteria (such as all the squares that contain traffic lights); and checkbox or "I'm not a robot" CAPTCHAs, which require website visitors to use a mouse to click a box.

These tests are designed to be easy for humans to complete but challenging for computers. One of the primary ways CAPTCHAs differentiate between humans and computers is through behavioral analysis. For example, "I'm not a robot" tests analyze how users interact with the checkbox. A human will move a mouse less linearly and take more time to click the box, often interacting with other content on the page beforehand. The unique and complex patterns of human behavior are difficult for AI bots to replicate.

Understanding CAPTCHAs is essential given AI's emerging role in orthodontics, a paradigm shift that has the potential to affect every aspect of the field, from education and research to clinical care. AI will likely have the most significant impact on diagnosis and treatment planning. Soon, AI-driven software will be able to analyze digital scans, radiographs, and photographs to diagnose malocclusions and identify patterns or anomalies. It will also simulate the outcomes of different treatment options, allowing orthodontists and patients to plan the most effective strategies. Are you uncertain whether to extract upper premolars or use a Herbst appliance? Let's ask the computer.

Still, there is increasing awareness of the need to safeguard against misuse. Concerns about the use of AI in orthodontics are numerous. Software must maintain data privacy, respect the right to informed consent, and conform to regulations. Algorithms may be biased or unreliable. Moreover, as AI replaces human jobs, it may lead to a loss of accountability, moral judgment, and the human touch. Addressing these issues will necessitate comprehensive strategies beyond traditional CAPTCHAs, especially when navigating the murky waters of virtual treatment. Therefore, in 2024, the AAO created a task force of experts to develop parameters for the appropriate use and application of AI in orthodontics. These parameters will be crucial to future regulatory advocacy efforts.

Despite the importance of Turing's theoretical work, he is best known for his pivotal role in deciphering the Enigma, a cipher machine used by Nazi Germany to encrypt military communications. Today, CAPTCHAs highlight the differences between human cognition and machine processing. As orthodontics increasingly intertwines with AI, it is essential to harness this technology responsibly. The only way to pass this test is to keep our humanity. NDK