**NATURAL INTERFACE APPLICATIONS**

A major area of artificial intelligence research has the goal of creating a more natural interface between human and machine. Currently, computer users are restricted in most instances to using a mouse and keyboard for input. For output, they must gaze at a fairly static, two-dimensional screen. Speakers are used for sound, and a printer for hard copy. The user interface consists of typing, pointing, and clicking. New speech recognition and natural-language technologies promise to change that soon.

**Speech Recognition**

One of the most immediately applicable improvements comes in the area of speech recognition. Rather than typing information into the computer, users can direct it with voice commands. A computer that can take dictation and perform requested actions is a real step forward in convenience and potential. Speech recognition software has developed rather slowly, mainly because the typical PC did not have the necessary speed and capacity until very recently.

**Natural-Language Interface**

Computers that are able to communicate using spoken English, Japanese, or any of the hundreds of other languages currently in use around the world would certainly be helpful. In the not-so-distant future, computers will most likely be able to read, write, speak, and understand many human languages. Language translators already exist, and they are getting better all the time.

Programmers can look forward to a human-language computer interface. With better interfaces, programmers may be able to describe what they want using natural (human) language, rather than writing programs in the highly restrictive and rather alien programming languages in use today. Natural-language interfaces are an area of artificial intelligence that is broader in scope than simple speech recognition. The goal is to have a machine that can read a set of news articles on any topic and understand what it has read. Ideally, it could then write its own report summarizing what it has learned.

**Virtual Reality**

Virtual reality (VR) describes the concept of creating a realistic world within the computer. Online games with thousands of interacting players already exist. In these games, people can take on a persona and move about a virtual landscape, adventuring and chatting with other players. The quality of a virtual reality system is characterized in terms of its *immersiveness*, which measures how real the simulated world feels and how well it can make users accept the simulated world as their own and forget about reality. With each passing year, systems are able to provide increasing levels of immersion. Called by some the “ultimate in escapism,” VR is becoming increasingly common—and increasingly real.

**Mental Interface**

Although still in the experimental phase, a number of interfaces take things a bit further than VR, and they don’t require users to click a mouse, speak a word, or even lift a finger. Mental interfaces use sensors mounted around the skull to read the alpha waves given off by our brains. Thinking of the color blue could be used to move the mouse cursor to the right, or thinking of the number seven could move it to the left. The computer measures brain activity and interprets it as a command, eliminating the need to physically manipulate a mouse to move the screen cursor. While this technology has obvious applications for assisting people with disabilities, military researchers are also using it to produce a superior form of interface for pilots.