Toward a society of interacting computers

The talking head on the computer screen can smile, frown, or look perplexed. When you ask it a question, it barely pauses before responding with an appropriate facial expression and a suitable comment. And it's all done with software and two synchronized workstations.

Developed at the Sony Computer Science Laboratory in Tokyo, this system combines speech recognition, language understanding, and voice synthesis with a graphics capability that models the way muscles contort a face to create certain expressions. It also represents a step toward what Mario Tokoro, director of the Sony laboratory, calls the "intimate" computer.

Tokoro envisions the development of computers that can chat with their owners, offer advice, joke around, provide moral support, and so on. Although such versatile, friendly digital assistants and companions are not yet available, he contends that some of the technologies required for such machines are already being investigated and developed.

"I would like to have a computer buddy," Tokoro says. "This would give us a new, different world."

Tokoro, who is also a professor at Keio University in Yokohama, offered these and other speculations about the future of computing in a presentation at the Association for Computing Machinery's conference on object-oriented programming systems, languages, and applications, held last week in Washington, D.C.

The last few years have seen tremendous growth in object-oriented computer programming. Roughly speaking, this technique involves writing computer programs in special kinds of chunks, known as "objects." Like physical objects in the real world, these software objects have certain attributes, and they interact with other objects according to well-defined rules, or laws. In other words, these capsules of digitally encoded information — including data, files, and directories — can "communicate" with each other in only certain ways.

Thus, with the object-oriented approach, programmers no longer have to worry about the details of what's inside a particular object once it's created. Instead, they can focus on how one object interacts with another to accomplish a specific goal. This contrasts with the more traditional type of programming, in which the software author produces a list of instructions — a recipe — specifying in precise detail exactly how to proceed from beginning to end to achieve the desired result.

Tokoro has investigated a class of objects that also includes processors capable of executing commands. He likens these "concurrent" objects to the cells that make up a biological organism. Although the cells work together, each one has its own biochemical machinery and individual life. Similarly, a collection of concurrent objects could work together as an "autonomous agent," Tokoro says.

Each agent would respond to stimuli, have the ability to learn about its situation, be able to make decisions in a timely manner, and develop its own goals. All such agents acting together would constitute a "society," in which collective behaviors that cannot be ascribed to individual objects could emerge.

Tokoro's "intimate" computer represents an example of an autonomous agent — one that has a human face, understands language, and inspires respect and camaraderie. The "talking head" system is a first step in this direction.

At present, the system handles questions and comments (in Japanese) concerning Sony's line of computer products. Researchers are now looking into enlarging this domain, incorporating models of how people interact socially and adding such capabilities as reading a system user's facial expression.

With further development, such a system may in the short term evolve into an extraordinarily friendly instruction manual. Anyone need advice on how to program a VCR?   — I. Peterson

Cancer treatment: Does age bias interfere?

A 95-year-old man with liver cancer gets bad news: His doctors tell him the malignancy will kill him within the year; treatment is not likely to provide a cure.

But the man refuses to give up. He finds his way to Paul P. Carbone's office and demands treatment. Carbone, a medical oncologist, agrees to initiate chemotherapy, and in fact the cancer recedes. Almost three years later, the cancer appears not to have returned.

Carbone's patient now tells him he feels healthier than he's felt in 20 years. "He told me he wanted to live to be 105," Carbone says, noting that the man's persistence insured he got the most aggressive medical therapy. But not every nonagenarian with cancer fares as well.

Indeed, a new research report by Carbone and his colleague Polly A. Newcomb uncovers some disturbing trends in cancer treatment for the elderly.

Newcomb and Carbone, both at the University of Wisconsin-Madison Comprehensive Cancer Center, conducted a telephone survey of 628 Wisconsin women who recently had been diagnosed with breast or colorectal cancer. The women, who were 20 to 74 years old at the time of their diagnosis, answered a set of questions about the type of treatment they received.

After adjusting for severity of disease, the team found that cancer treatment for both breast and colorectal cancer varied substantially depending on the age of the patient.

When the team looked at the 507 women with breast cancer, they discovered that nearly all had undergone surgery as the primary treatment. However, women age 65 or older were significantly less likely than younger women to receive radiation treatment or chemotherapy following surgery.

And compared to their younger counterparts, older women proved more likely to consent to a mastectomy, an operation that requires removal of the breast.

Newcomb and Carbone also found certain age-related differences among 121 women treated for colorectal cancer. For instance, older women received chemotherapy significantly less often than younger patients. The proportion of colorectal cancer patients receiving surgery or radiation treatment was similar in both age groups, the team points out.

Clinicians without specialized training in cancer care, such as family physicians, were more likely to provide ongoing care after an older woman underwent cancer surgery, the Wisconsin team found. Just 57 percent of older women were referred to an oncologist, compared with 73 percent of younger women.

In some cases, patients' own preferences may determine the treatment they receive, the authors conclude in the Oct. 6 JOURNAL OF THE NATIONAL CANCER INSTITUTE. For example, many older women say they want a mastectomy, perhaps because they fear repeated trips to the doctor for toxic chemotherapy, Newcomb says. However, the authors saw no sign that older women reject treatment simply out of a fatalistic belief that they are too old for such ministrations.

For many older women, physicians don't fully explain the treatment options, the researchers found. Since most patients follow their doctor's advice, that omission may account for most of the age-related differences in treatment.

Although this study didn't include men, other research suggests that older men with cancer may also face age-related bias when it comes to treatment, Newcomb points out.

Even when older patients are given a range of choices, the physician may spend more time discussing the negative aspects of cancer treatment, Carbone says. Many doctors incorrectly believe that chemotherapy or radiation is too toxic for elderly patients, he asserts.

Indeed, some previous studies (SN: 7/4/92, p.4) suggest that many elderly people with cancer can tolerate aggressive treatments.   — K.A. Fackelmann