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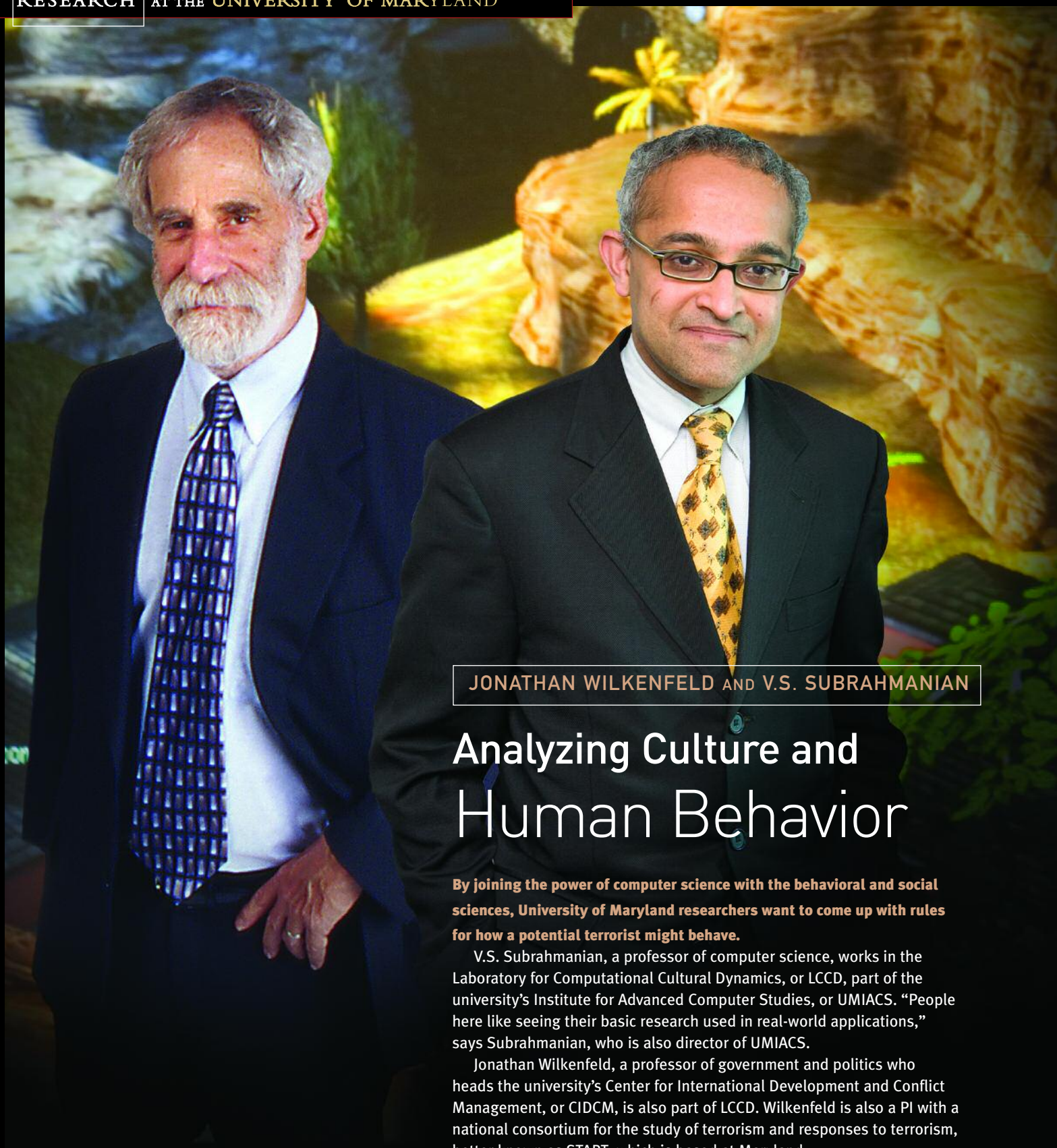

JONATHAN WILKENFELD AND V.S. SUBRAHMANIAN

Analyzing Culture and Human Behavior

By joining the power of computer science with the behavioral and social sciences, University of Maryland researchers want to come up with rules for how a potential terrorist might behave.

V.S. Subrahmanian, a professor of computer science, works in the Laboratory for Computational Cultural Dynamics, or LCCD, part of the university's Institute for Advanced Computer Studies, or UMIACS. "People here like seeing their basic research used in real-world applications," says Subrahmanian, who is also director of UMIACS.

Jonathan Wilkenfeld, a professor of government and politics who heads the university's Center for International Development and Conflict Management, or CIDCM, is also part of LCCD. Wilkenfeld is also a PI with a national consortium for the study of terrorism and responses to terrorism, better known as START, which is based at Maryland.

For 20 years, faculty and students at CIDCM have maintained a database about minority groups around the world that face discrimination. For

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Computational Cultural Dynamics

organizations representing those ethnic groups, Wilkenfeld and his colleagues track variables such as the type of discrimination a group faces, the leadership structure of each organization, and the ties it has with diaspora groups. Wilkenfeld's team has annually updated data on almost 300 organizations. "Some—thankfully a small number—have resorted to violence," he says. "And an even smaller number have engaged in terrorism," violence directed against civilians.

Wilkenfeld's research team has compiled the database by relying on human coders who spend much of their time finding source material. With the help of Subrahmanian and other computer scientists in LCCD who have developed sophisticated data-mining techniques to compile large amounts of information, the coders working with Wilkenfeld will be able to locate sources automatically.

"It's hard for any single human being to keep up with all the information being created daily, in multiple languages, in multiple formats," says Subrahmanian, who adds that models compiled by hand are necessarily limited. "Our advantage is global reach within minutes," he says. For example, the researchers of LCCD have been developing software tools that they call T-REX and STORY, which scour the Internet to extract data on subjects of interest and compile that information into succinct, personalized summaries. The computer scientists have also developed OASYS, a program that sifts through vast amounts of text, including information from newspapers, blogs, and newsgroups, to quickly gauge the collective opinion about a given subject. OASYS's output reveals the intensity of people's feelings as well as whether that feeling is positive or negative. In 2006, OASYS won a *Computerworld* magazine competition for innovative emerging software.

With funding from the Department of Defense, LCCD researchers are developing ways to feed the knowledge extracted by T-REX, STORY, and OASYS into a "reasoning architecture"—a formal language—that deduces rules about how people in different cultural contexts are likely to behave. The researchers have applied this cultural reasoning architecture to problems such as how outside incentives might reduce the cultivation of opium in Afghanistan and how health care organizations could help reduce the spread of diarrhea in Kenya, as well as how to tell when a minority organization might cross the line from political action into violence, and how to help prevent that transition. "We'd like to help branches of the U.S. government determine how to make choices that will lead to less violence," says Wilkenfeld.

LCCD researchers are feeding the behavioral rules they are deciphering into interactive tools to help soldiers, diplomats, and others. For example, the lab members are building a virtual experience game where a user can be surrounded by images of a real landscape and respond to virtual characters trained with vast amounts of data to mimic how an actual person in a particular culture might behave.

Simple forms of the game have already proven useful. A U.S. Army infantry captain whose division was deployed to Afghanistan in early 2006 commented: "These are great products and just the type of information I have been trying to compile. You have no idea how much this is going to benefit our guys on the ground."

Robert Tamburello, a civilian analyst with the U.S. Army, says the tools "could easily serve to produce more effective and culturally aware soldiers." One of the most highly developed simulations allows a player to learn how to behave when entering an Afghan village. A soldier can learn how to gauge the level of hostility in a village and how to show respect to the elders—and ultimately have a better chance of gaining cooperation.

"What we're trying to do is provide the best computational models possible," says Subrahmanian. "We're testing conventional wisdom and adding to it." The ultimate goal is to provide objective advice for anyone facing an unfamiliar culture. —*Karin Jegalian*

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