

Ideas on the Edge

The Gaits of Perception

NIKOLAUS TROJE AT QUEEN'S UNIVERSITY IS EXPLORING HOW WE READ PEOPLE BY THE WAY THEY MOVE.

"Well, you can tell by the way I use my walk, I'm a woman's man: no time to talk..."

The old Bee Gees tune may not exactly have the flavour of scientific discourse. But the band was onto something; just ask Dr. Nikolaus Troje.

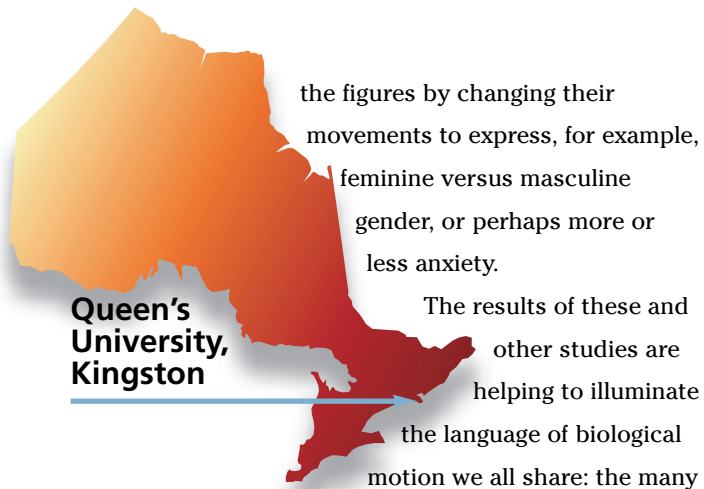
Dr. Troje is studying how and what we can learn about other human beings simply by watching how they move. "Even if we don't know the person, or if they're at some distance," he says, "we can still learn lots about them. We all experience this, but we know very little about how that information is encoded and how we retrieve it."

He's investigating the problem in his Queen's University BioMotionLab—equipped in part with the help of the Ontario Innovation Trust. In one set of experiments, Dr. Troje and his colleagues attach up to 60 reflective markers to their bodies, and then use high-speed cameras to photograph them walking. A computer tracks the changing positions of all the markers and creates a simplified, animated stick model, stripped of cues such as facial features and expressions, clothing and body shape. What remains is pure movement. The stick models can also be manipulated digitally to exaggerate certain motions and minimize others.

Dr. Troje then asks other subjects to watch the figures in motion and describe what those movements tell them, not only about gender and age, but mood, intention and character. He also lets the observing subjects play with



NIKOLAUS TROJE'S RESEARCH WAS RECENTLY RECOGNIZED WITH THE AWARDING OF A PRESTIGIOUS STEACIE FELLOWSHIP FROM THE NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL.



Queen's University, Kingston

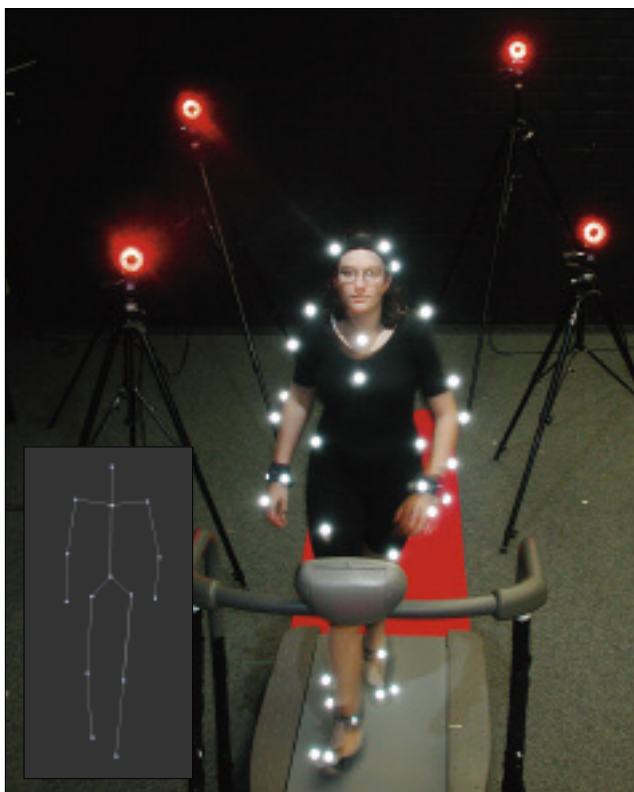
the figures by changing their movements to express, for example, feminine versus masculine gender, or perhaps more or less anxiety.

The results of these and other studies are helping to illuminate

the language of biological motion we all share: the many

subtle ways we unconsciously encode information about ourselves into our movements, and the ways in which others decode those movements to learn about us.

Dr. Troje's research is ground-breaking and has a wide range of applications—a fact acknowledged by the



RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- new tools for early diagnosis of neurological motion disorders and depression
- leadership in computer animation for business, education and entertainment

Natural Sciences and Engineering Research Council when they awarded him a prestigious Steacie Fellowship in 2007. There could be important commercial and artistic implications,

for example, in the growing field of computer animation. “Currently, computer animated characters look very realistic,” says Dr. Troje, “until they move. We have subtle expectations in that regard. By applying what we’re learning about what features are pertinent in our perception, we can make those characters move more realistically.”

Dr. Troje is also pursuing intriguing possibilities for diagnosing illness. He’s looking at how patterns of movement may provide early warning signs of Parkinson’s disease and other neurological motion disorders. And, collaborating with a clinical psychologist, he’s trying to determine if gait can be used to diagnose depression, and to track the progress of treatment.

If so, he’s also wondering if the connection also works in the other direction. “If peoples’ feelings are expressed in the way they walk, does the way someone moves also change a person’s emotional state?” He speculates: “We could then help depressed people by teaching them to walk as if they felt much better.”

The Bee Gees would definitely get it.

More info at <http://biomotionlab.ca>

Project: Real-Time Motion Capture System and Virtual Social Reality Laboratory

Institution: Queen’s University

Research Sector: Life Sciences

Principal Investigator: Nikolaus Troje

Trust Investment: \$200,000

CFI Investment: \$200,000

Total research investment from all sources: \$500,000



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Infrastructure for Innovation
About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.