

Mobile sensing system could give couples the power to anticipate each other's emotional states, adapt behavior

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Credit: George Hodan/public domain

Your partner comes in and slams a door. What was that about? Something you did? What if you knew to anticipate it because you were notified in advance from an automated text message that he/she didn't have a great day at work? Might that change the dynamic of your interactions?

You had a bad day. The last thing you need is to get into an argument when you get home because your partner also had a bad day. What if technology could automatically send you a notification advising you to do a short meditation module to restore your mental state? How might this affect the quality of your interactions with your partner?

In the near future, researchers from the USC Viterbi School of Engineering and the USC Dornsife College of Arts, Letters and Sciences believe technology might be employed to help de-escalate any potential conflicts among couples. In a collaboration between the Signal Analysis and Interpretation Laboratory (SAIL) in the Ming Hsieh Department of Electrical Engineering and the Family Studies Project in the Psychology Department at USC Dornsife, researchers employed multi-modal ambulatory measures to develop a system in order to detect if conflict had occurred between a couple—a sort of seismometer of the shakes, rattles and rolls in a relationship.

The research, documented in "Using Multimodal Wearable Technology to Detect Conflict among Couples," by Adela C. Timmons, Theodora Chaspari, Sohyun C. Han, Laura Perrone, Shrikanth S. Narayanan, and Gayla Margolin, is published by the *IEEE Computer Society* this month.

In order to detect intra-couple conflict, the researchers with support from the National Science Foundation, developed algorithms to assess whether conflict was present among couples. This algorithm pulled together physiological data from various sources including wearables, mobile phones, and physiological signals (or bio-signals) to assess couples' emotional states. Data collected included body temperature, heart activity, sweat, audio recordings, assessment of language content and vocal intensity. The algorithm analyzing this data has proved to be up to 86 percent accurate in its ability to detect conflict episodes (based on participants' hourly self-reports of when conflict occurred). The authors of the study believe it is the first instance in which passive modal

computing is being collected and employed to detect conflict behavior in daily life.

Theodora Chaspari, an Electrical Engineering Ph.D student in Shri Naryanan's SAIL lab at USC Viterbi, speaks of why this particular collaboration appealed to her and the SAIL group: "We could help beyond pure engineering domains, providing a more quantitative measures of human behavior."

Lead author Adela C. Timmons, a psychology Ph.D student in Gayla Margolin's Family Studies Project team at USC Dornsife, together with Chaspari runs the USC Couple Mobile Sensing Project (homedata.github.io) with "the eventual goal of developing interventions to improve couple functioning." In addition to the notion of helping couples who can't often replicate the interventions and behavioral strategies they learn and practice in therapist's office, Timmons spoke about the importance of this research in detecting and perhaps having couples minimize conflict in their relationships. She indicates that negative relationships (or the absence of positive relationships) have long been recognized as a health risk. The quality of relationships, Timmons said, can provide health benefits. Further, she indicates that research has shown that those with healthy relationships have less stress and that chronic stress is known to cause "wear and tear" on the body.

The authors say that the next step in the research is using such unobtrusive, passive technologies to anticipate conflict—perhaps five minutes before it might occur, by letting computer software determine the likelihood that conflict will occur. The other part of anticipating conflict is developing early interventions—possible real-time interventions or behavioral prompts such as text notifications of a partner's psychological state or to guide an individual to meditate before bringing that conflict home.

Chaspari acknowledges that this is not a one-fits-all approach. Machine learning software can learn what is most useful in an individual. For example, for any given person, certain factors might have more weight in predicting [conflict](#).

Once this system has been proven, the authors anticipate that it can be employed to other important relationships such as a parent-child dynamic.

Provided by University of Southern California

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