Using Haptic Metaphor to Communicate Emotion:
A structured approach

Jocelyn Smith and Karon MacLean
Department of Computer Science, University of British Columbia
SENSORY PERCEPTION AND INTERACTION RESEARCH GROUP

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Problem

In computer mediated person-person haptic interaction, does the haptic interaction model and the metaphor used to described it influence user experience? In this research, we are exploring two hypotheses:

1) *More intimate touch metaphors create a stronger sense of connection.*
2) *Emotional expressiveness is related to the metaphor's intimacy of touch.*

Motivation

During face-to-face interaction, touch can relay complex messages. A touch on the arm can show concern, provide comfort and suggest elements of a relationship's power dynamic.

We are prototyping and studying haptic representations that can add a more subtle and expressive emotional element to remote computer-mediated interaction. **Critical questions include:**

- Can I **understand**, use and build on the metaphor?
- How **expressive** is the interaction?
- How **connected** does it make us feel?

Previous research has studied *device design* [4] [1], the *natural uses* of an audio/haptic device [3], *haptic communication of preferences* [3], and the influence of *context (competitive vs. cooperative)* on preference for presence of haptic feedback along with visual feedback [2].
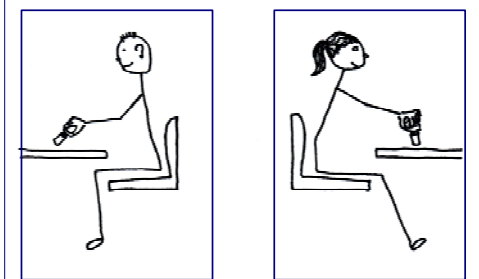
Study

We will conduct a study in which dyads interact using *only* a pair of coupled haptic devices which display the metaphors introduced here.

Our **goal** is to examine the impact each metaphor has on participants'
- ability to convey emotions
- confidence in ability to convey emotions
- sense of connection to each other

Setup

Experiment Task

During our experiment, participants will convey and identify emotions through a haptic device. The following sequence is repeated several times for each metaphor:

1. Participant is instructed to convey given emotion
2. Partner is asked to identify emotion
3. Each participant is asked for confidence in conveyance/identification

After using each haptic metaphor, users will fill out a questionnaire to gauge how it affected their sense of connection to the other person.

At the end of the study, we will discuss with subjects how the various metaphors allowed them to communicate emotion and influenced their sense of connection.

Analysis

- We will perform a **quantitative comparison** across metaphors, of participants' **success** and **confidence** in conveying emotion, and their **sense of connection**.
- A **qualitative study** of interview responses will provide a better understanding of participants' experiences.

Metaphors

In creating our haptic metaphors, we sought to model haptic interactions of varying degree of intimacy that are already engaged in by dyads in the real world.

Example Metaphors

Metaphor	Ping Pong	Tug-of-War or Crosscut Saw	Shaking Hands	Holding Hands
Intimacy	→			
Type of Touch	With a free shared object	Through a stiff shared object	Direct touch	Direct intimate touch

'Holding Hands' Metaphor

Metaphor	**Model**
Hand on knob	*Rendered as a nonlinear friction coupling between the two knobs*

Palm-to-palm

Feel other's movement

Marginally stable

Force in direction of other's velocity

No longer aligned

Fall towards interleaved position

Unstable

Force towards stable position

In interleaved position

Resist movement out of this position

Stable

Force in direction of other's velocity

Summary

This study undertakes a systematic look at how metaphor and the underlying interaction model influence:

- the degree of **personal connection** experienced by remote dyads engaged in computer mediated haptic interaction; and
- affordance of **communicating specific emotions** to a partner.

A better understanding of these effects will help us to create emotionally expressive haptic interactions for connecting remote dyads.

References

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