Emotions and Collaborative Processes in Dyadic Problem Solving

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Abstract
Numerous research found a significant role of emotion in problem solving. However, how emotions shape collaborative problem solving remains an open question. In this study, we sought to determine relationships between emotions shared by problem solvers and collaborative processes involved. Twenty-two participants were randomly assigned to same-sex pairs and asked to complete a problem solving task. At any time, participants could voluntarily share their emotions with their partner, using a reporting tool. Their speech was transcribed and categorised into a series of meaningful collaborative categories. Two chi-square tests of independence (due to test constraints, only positive emotions were considered) confirmed a relation of dependency between collaborative processes and positive shared emotions, both before sharing emotions ($\chi^2(96) = 218.41, p$)

Reference

Available at:
http://archive-ouverte.unige.ch/unige:123955

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Emotions and collaborative processes in dyadic problem solving

Using permutations tests to explore their interplay with non-parametric data

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Background

Problems solving implies sequence of cognitive and affective processes for the purpose of challenges adaptation [5].

In group problem solving, collaborative processes are in addition to individual processes [2].

The research shows that:

- Individual problem solving is influenced by emotions [8, 9, 10].
- Social interaction is impacted by emotions [9].

Emotions can generally affect duration during problem solving [1].

Research question

As emotions intervene in individual problem solving and social interactions, two key components of collaborative problem solving, may collaborative processes vary depending on the emotions shared as well?

Method

Real-time rates of collaborative processes during emotion sharing episode

Correlation of emotional use rates which depicts real-time use of collaborative exchanges in a window of 11 exchanges (5-15 s) around the sharing of a given affective feeling. Number of exchanges in each condition.

Correlation of non-emotional use rates in the same way when no subjective feeling were shared.

Permutation tests [10]

Permutation tests allow for testing relationships on data that do not meet parametric assumptions (non-normal distribution, non-independent samples). Emotional and non-emotional windows were considered here as independent observations.

Instead of computing the actual value of a test statistic to a standard critical distribution, the reference distribution is generated from the data between:

- Observed differences of means between emotional and non-emotional samples are computed:

  \[
  \text{Observed difference} = \mu_{\text{emotional}} - \mu_{\text{non-emotional}}
  \]

- The two samples are then shuffled together in a large number of times resulting in a sampling distribution of randomized sample mean differences:

  \[
  \text{Sampling distribution} = \{\mu_{\text{shuffled}}(1), \ldots, \mu_{\text{shuffled}}(N)\}
  \]

- \( p \)-values are computed as the proportion of permuted statistics which produces a mean difference at least as extreme as the one observed from the actual data:

  \[
  \text{p-value, left} = \frac{\sum_{i=1}^{N} \left| \mu_{\text{shuffled}}(i) \right|}{N}
  \]

  \[
  \text{p-value, right} = \frac{\sum_{i=1}^{N} \left| \mu_{\text{shuffled}}(i) \right|}{N}
  \]

Conclusion & Perspective

Emotional sharing can correlates with changes in the quality of collaborative exchanges:

- At cognitive level (level of task information)
- At emotional level (level of satisfaction)

Preliminary analysis needs further improvements:

- Improving collaborative exchanges (interesting/interesting reliability is very moderate)
- Exploring reciprocal impact of collaborative exchanges (impact of the emotional sharing of one person on the other)
- Testing optimal window duration that provides the largest emotional sharing collaborative process relationship

- Improving generalization of results with:
  - Higher and equivalent number of emotional reactions between subjects
  - Larger variety of problem-solving tasks

References


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