

NON-INTRUSIVE PSYCHO-SOCIAL STATE DETECTION FOR ATTITUDES WITH EXERCISE

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ABSTRACT

Our research is developing automated verbal-processing techniques to assess individual and team psycho-social states non-intrusively, from existing textual (or speech converted to text) data streams captured as a part of normal space operations. We are examining both individual journal data and interactive task dialogs to assess different states. A companion paper at this workshop discusses overall techniques and findings from application to daily journals (and associated survey data) provided by 12 participants over ~100 day stays in Bed Rest Study Campaign 11 conducted at the Flight Analog Research Unit at UTMB. Here we report a “deep” analysis on a single topic.

One claimed advantage for automated text processing of journal data is that the techniques are very rapid to use and reconfigure for alternate questions. Since free-form journal data is a very rich source of individual attitudes and concerns (far more than targeted survey questions, for example), it is possible to rapidly explore issues which may not have been anticipated during initial study design. This presentation explores one such incident not anticipated in our initial study design—exploring attitude differences between exercisers and non-exercisers.

The UTMB bed rest participants varied in their exercise regime; those assigned to an exercise condition undergo a rigorous schedule of daily exercises to combat the physical effects of prolonged bed rest, while others are assigned to a control condition and do not exercise. For our purposes (the validation of our automated analysis techniques), this exercise condition was essentially irrelevant and was, at first, ignored. Recently, however, we were recently asked whether we had detected psychological state variation between exercise groups via our techniques.

In ~2 hours, using our existing journal and survey data, we have been able to identify several significant correlates implying benefits for the exercise group. For example, the emotional valence (as calculated using techniques from [1 and 2]) of exercisers’ journal entries showed significantly more positive emotional valence than did non-exercisers. There are also many significant differences in frequency of word category use between the groups. Of particular interest is pronoun usage [3]. Non-exercisers use more first person singular pronouns (“I”, “me”, etc.), implying more self-focus [3], while exercisers use more other pronoun forms (“she, they her, we, my”, etc.) implying more focus on others. There is also some indication in prior research [3] that such self-focus in journal entries can be indicative of depressive tendencies. Note that these findings are in spite of the fact that participants are not instructed to write about their exercise experience or their emotions specifically. In fact, exercisers tend to rate their physical state higher in survey responses, but to mention their physical state *less* frequently in their journals. This is in keeping with an overall significant negative correlation for both groups where more frequent mentions of physical and body-related terms co-occur with lower rating of own physical state—implying that discussions of body and physical state in journal entries occurs primarily when it is negative. Other findings are available from the survey questions we have been asking participants concurrently to provide “ground truth” data for our analyses. For example, exercisers’ survey responses indicate that they are more sleepy, less stressed, less bored, more satisfied, and that they feel less numbness, but slightly more headaches than non-exercisers.

We are now beginning a more detailed analysis of specific topics used between the two groups, as well as individual differences in correlates with body and physical terms. We used this approach previously to analyze how and why individual subjects have the attitudes they do about food (e.g., some associate it with weight gain/loss, others with nostalgia and family, etc.) and anticipate that we will be able to provide similar results for exercise and its absence.

REFERENCES

- [1] Landauer, T., Foltz, P. & Laham, D. (1998). *Discourse Processes* 25, 259–284. [2] Pang, B., & Lee, L. (2008). Opinion mining and sentiment analysis. *Foundations & trends in info retrieval* 2.1-2, 1-135. [3] Pennebaker, J.W. (2011) *Secret Life of Pronouns*.