This article presents an experiment, designed to examine the emotional perception of non-anthropomorphic robotic features, such as (angular and linear) velocity, body orientation, and movement direction. Likert scales are used to create a top 10 table of emotions in different treatments of a non-anthropomorphic robot platform in order to develop guidelines for implementation of emotions in social robots.

The focus on emotional inductions in non-anthropomorphic features is interesting since not every robot application may justify anthropomorphic features, e.g. for non-interactive tasks. In contrast, anthropomorphic design would just evoke inappropriate expectations in such cases. Hence, there will be many non-anthropomorphic robot applications. Nevertheless, these applications can benefit from emotional features unrelated to anthropomorphic design in the future, e.g. in terms of user acceptance and avoiding bullying behavior or, as the authors state, in terms of long-term user relations and conveying the internal state of the robot. The idea of relating precise values of movement features, e.g. acceleration or curvature, with specific emotions is good and the presented work is a first step towards this goal.

The experiment is designed to identify specific values of some movement features that could be used to express four selected basic emotions as dependent variables, identified by Ekman: happiness, sadness, anger and fear. As independent variables, the selected movement features are: oscillation angle, linear and angular velocity, direction, and orientation.

The experiment is conducted in a repeated measures design. Each of 49 subjects is exposed to 20 treatments (trials) in randomized order to prevent any bias. Then, participants are asked first to label an emotion to each treatment, and second, to rate its intensity on a 10-item Likert-scale. As socio-demographic factors, profession, age, and country of origin are asked in the questionnaire.

Overall, the paper presents a nice, well-designed and well-conducted user study that could be used in marketing research in order to optimize the desired emotional expressiveness of a robotic device before introducing it to the market. However, since the results are not transferrable to any other robotic application, and, thus, not generalizable, the study in its present form is rather marketing research than scientific research. It would help to repeat the study using the same treatments on different robotic platforms with different geometry to see if the perception of the corresponding emotions depends on the (non-anthropomorphic) robot design.

General Strenghts:

- Good structure
- Clear presentation
- Nice user study, that can, for example, be conducted in marketing research before introducing a new robotic advice with regard to optimize its emotional expressiveness. But not yet generalizable research.
- Statistically sound data analysis

General Weaknesses:

- Generalizability is questionable, because emotions were deducted from the Likert-Scale indicated by the subjects for each treatment, however, this cannot be transferred to other robotic platforms with different specifications. So, this is a nice approach to optimize one product (robotic platform) with regard to its emotional expressiveness, so transferability to other robotic platforms is not clear.

- The paper should be proof read by a native speaker. Especially in Section 1, grammatical issues should be revised

Recommendations/ Issues:

To justify a journal publication (in contrast to a conference paper), the following issues should be taken into account:

- In the introduction, the authors refer to the term of "social presence". However, in the experiment, this topic is omitted as there is no corresponding item included in the questionnaire. The study would highly benefit from including constructs for user acceptance/ user experience, e.g. the construct of social presence. Evaluated measures can be found in the UTAUT-Model (Heerink et al.) and the Godspeed questionnaires (Bartneck: http://www.bartneck.de/2008/03/11/the-godspeed-questionnaire-series)
- As indicated above, it would help to repeat the study using the same treatments on different robotic platforms with different geometry to see if the perception of the corresponding emotions depends on the (non-anthropomorphic) robot design.
- It would be interesting to know, why the four tested emotions were selected among the basic emotions as identified by Ekman

Intro/ 2 Related Work/ **2.2 Robotic studies**:

- With regard to robotic studies on emotions in gait, the highly related research of Michelle Karg et al. should be reviewed and cited.

3.2 Software/ 4.1 Independent variables

- It is not clear how the movements of the robot are modeled (velocity and set point). Is there an underlying model or is it just heuristically assigned? Where do the selected values for the independent variables come from? How were they set? I understood that all possible treatments that could add a value to the experiment are generated heuristically, in total 195.