A physiological approach to assess and promote fan service in a professional baseball game of “The Hokkaido Nippon-Ham Fighters”

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METHODS

We measured the heart rate variability derived from ECG (electrocardiogram), body acceleration, video images by viewpoint camera, and behavior of ten of the audience (five females and five males, age:21-53) watching games of a Japanese professional baseball team, the Hokkaido Nippon-Ham-Fighters, at Sapporo Dome. The audience participated in the experiments in one to three games during the months from July to September 2006. We measured the data of 27 people in total.

EXPERIMENTAL EQUIPMENT

HEART RATE VARIABILITY AND BODY ACCELERATION SIGNALS

EXAMPLE OF HEART RATE AND BODY ACCELERATION SIGNALS

Heart rate (HR) signal derived from RR interval of electrocardiogram measured from a subject watching Fighters’ baseball game in July.

Body acceleration signal measured from a subject watching Fighters’ baseball game in July.

DEFINITION OF HR RESPONSE

The purpose of this study is to clarify how the heart rate physiological response to fan service in professional baseball game (e.g., scoring rallies, during the game) varies during the course of an event and by type of fan and interest level in game.
RESULTS

1. CORRELATION BETWEEN HR RESPONSE AND SUBJECTIVE MOOD

Correlation coefficient between subjective evaluation of happiness and heart rate response was 0.60. This implies that we can use heart rate response to assess fans’ happiness during baseball game.

2. DEPENDENCE OF INTEREST LEVEL IN GAME ON HR RESPONSE

The heart rate responses to Fighters’ scoring decreased in August and September compared to that in July. Fighters were in contention for the league championship in July but fell behind the competition in August and September. Moreover, the game schedule overlapped with the Olympics Games in Beijing in August. These factors might have affected the decrease in the excitement response.

3. SLOPE OF LINEAR TREND OF HR

The slope of linear regression line (trend) from the beginning of the game till the end was negative for 22 out of the 27 subjects. This suggests increasing weariness and sleepiness as the game progressed.

4. DEPENDENCE OF FAN CAREER ON HR RESPONSE

The heart rate increase response to Fighters’ scoring was likely to become lower as the total number of Fighters’ games watched increased. This indicates that responses to scoring became duller as the fan career matured.

5. PERCENTAGE OF TIME NOT WATCHING GAME

Analysis from view point camera and behavior measurement:

<table>
<thead>
<tr>
<th>Type of subjects</th>
<th>cheering dominant</th>
<th>game watching dominant</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Fighters’ offense</td>
<td>&lt; 1%</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>During Fighters’ defense</td>
<td>29%</td>
<td>7%</td>
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</tbody>
</table>

CONCLUSION

This study introduced a new approach that uses physiological signal (HR: heart rate) and video analysis to assess fan service in a professional baseball game.

Analysis of the measured data clarified the followings:

1. HR response had high correlation with subjective level of happiness.
2. HR response to scoring by supported team depended on interest level in game and fan career.
3. The slope of linear trend of HR was negative in 22 out of 27 subjects showing increasing weariness and sleepiness as the game progressed.
4. Cheering dominant subjects and game watching dominant subjects showed clearly different behavior during supported team’s defense.