Tie-breaker: using language models to quantify gender bias in sports journalism

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#CoverTheAthlete

http://covertheathlete.com/
Bias in sports journalism(?)

In the news

Female Tennis Players Crying 'Fault!' Over Nike's Skimpy Wimbledon Outfit

*Inside Edition* - 2 days ago

A new dress worn by some *female tennis stars* at *Wimbledon* is getting more attention than ...
Bias in sports journalism(?)

Air-time

Stereotypical descriptions & Framing

[Eastman and Billings, 2000]
[Higgs et al., 2003]

[Angelini and Billings, 2010]
[Kian et al., 2009]
Bias in sports journalism(?)

- *not* in consensus
- subjective manual coding
- targeting only a few specific players?

This work: objectively quantifying gender bias at scale
Data

Data

Jan, 2007 ~ Oct, 2015

6467 interviews
80000+ Questions
167 female & 191 male players
Q. Can you talk about your next opponent?

A: ...

Q. After practice, can you put tennis a little bit behind you and have dinner, shopping, have a little bit of fun?

A: .....
# First attempt: word level analysis

<table>
<thead>
<tr>
<th>Male players:</th>
<th>Female players:</th>
</tr>
</thead>
<tbody>
<tr>
<td>clay</td>
<td>yet</td>
</tr>
<tr>
<td>challenger(s)</td>
<td>every</td>
</tr>
<tr>
<td>tie</td>
<td>new</td>
</tr>
<tr>
<td>sets</td>
<td>become</td>
</tr>
<tr>
<td>practiced</td>
<td>meet</td>
</tr>
<tr>
<td>tiebreaker</td>
<td>winning</td>
</tr>
<tr>
<td>maybe</td>
<td>type</td>
</tr>
<tr>
<td>see</td>
<td>won</td>
</tr>
<tr>
<td></td>
<td>draw</td>
</tr>
<tr>
<td>impression</td>
<td></td>
</tr>
<tr>
<td>serve</td>
<td></td>
</tr>
<tr>
<td>height</td>
<td>friends</td>
</tr>
<tr>
<td>support</td>
<td>nerves</td>
</tr>
<tr>
<td>shots</td>
<td>mom</td>
</tr>
</tbody>
</table>

## still subjective!

Words are ranked in decreasing order of difference in percentage of male and female players who have ever been asked the term.
The serve-and-volley is being used frequently by Federer and it’s enabling him to take control behind his own serve.
Game language

GAME 7: **J. Del Potro 4 - 3**

- **J. Del Potro** wins the game with a forehand Smash Winner.

40 - 30  **J. Del Potro** loses the point with a double fault.

40 - 15  **S. Wawrinka** loses the point with a backhand Unforced Error.

A gender-balanced set of **3000+** commentaries from

http://www.sportsmole.co.uk
What about your serve, Rafa?

The tiebreak, was that the key to the match?

Who designed your clothes today?

game-related

perplexity = \exp(\text{cross-entropy})

non-game-relevant

bigram language model trained with KenLM, which uses modified Kneser-Ney smoothing.
Main result

Questions to male athletes are closer to game language explained by a few players?

*** p ≤ 0.001
* p ≤ 0.05

with Mann-Whitney U test
Main result

Questions to male athletes are closer to game language not explained by a few players!

*** p ≤ 0.001
* p ≤ 0.05

with Mann-Whitney U test
Other experiments

<table>
<thead>
<tr>
<th>CENTRE COURT - LADIES' SINGLES</th>
<th>Pts</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Williams (USA) […] ✓</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Vesnina (RUS)</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RANKING</th>
<th>COUNTRY</th>
<th>PLAYER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Novak Djokovic</td>
</tr>
<tr>
<td>2</td>
<td>🇬🇧</td>
<td>Andy Murray</td>
</tr>
<tr>
<td>3</td>
<td>🇨🇭</td>
<td>Roger Federer</td>
</tr>
</tbody>
</table>

**type of question**

**game outcome**

**player ranking**
Conclusions

- New language-model-based approach to quantify gender bias

- Questions to male athletes are generally more game-related

- Dataset & our measure can be useful to evaluate other types of bias
Conclusions

- Who asked which question?
- Player responses?
- Other domains?