Beyond Corsi: Examining Weighted Shots

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Looking Beyond Corsi

• Corsi is dead! (At least according to Ken Campbell)
• In many ways “pure” Corsi has been dead for a while now
  • Corsi Rel adjusts for strength of teammates
  • dCorsi (Burtch) accounts for situational factors, looks at offense/defense separately
  • Score Adjusted Corsi (Tulsky, McCurdy) is more predictive than raw Corsi
• Corsi has flaws that others have pointed out
  • Treats goals, shots, misses and blocks the same (no “quality” factor)
Weighted Shots and Score Adjustments

• Team level Weighted Shots (wSH or Tango) differentiates between goals and non-goals
  • Goals = 1
  • Non-Goal Shot Attempts: 0.2

• Score Adjustments are necessary to properly weight events depending on game state and location
  • Game State: Losing teams shoot more, but score on a lower % of those shots
  • Location: Home teams take more shots

• At the team level Score Adjusted Weighted Shots (SAwSH) is as repeatable as Score Adjusted Corsi (SAC)

• SAwSH is a better predictor of future Goals For Percentage than SAC
Individual Score Adjusted Weighted Shots: The Basics

• Only 5v5 Data
• Adjusted for score and location
• Consider forwards and defencemen separately
  • What’s indicative of success for a forward is different than for a defenceman
• Consider offence and defence separately
• Weights derived from split-half regression, i.e.:
  • Odd/Even GF60 ~ Even/Odd iGF60 + Even/Odd TMGF60 + ...
  • Even/Odd GA60 ~ Odd/Even GA60 + Odd/Odd SAAS60 + ...
<table>
<thead>
<tr>
<th>Stat</th>
<th>Individual</th>
<th>Teammate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals For</td>
<td>0.346</td>
<td>0.100*</td>
</tr>
<tr>
<td>Shot Attempts For Saved</td>
<td>0.022</td>
<td>0.036</td>
</tr>
<tr>
<td>Shot Attempts For Missed</td>
<td>0.052</td>
<td>0.037</td>
</tr>
<tr>
<td>Shot Attempts For Blocked</td>
<td>0.036</td>
<td>0.029</td>
</tr>
<tr>
<td>1st Assists</td>
<td>0.337</td>
<td>n/a</td>
</tr>
<tr>
<td>2nd Assists</td>
<td>0.260</td>
<td>n/a</td>
</tr>
</tbody>
</table>

All weights are before score/venue adjustment
*Teammate goals exclude 1st and 2nd assists

$$SAwSHF60 = 0.34 \times iGF60 + 0.10 \times TMGF60 + 0.02 \times iSAFS + \cdots$$

**Offensive Event Weights - Forwards**

- Individual shot attempts are more heavily weighted than teammates’ shot attempts
- 1st assists are just as valuable as goals
<table>
<thead>
<tr>
<th>Stat</th>
<th>Individual</th>
<th>Teammate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals For</td>
<td>0.054*</td>
<td>0.114***</td>
</tr>
<tr>
<td>Shot Attempts For Saved</td>
<td>0.054*</td>
<td>0.042</td>
</tr>
<tr>
<td>Shot Attempts For Missed</td>
<td>0.022**</td>
<td>0.029</td>
</tr>
<tr>
<td>Shot Attempts For Blocked</td>
<td>0.022**</td>
<td>0.041</td>
</tr>
<tr>
<td>1st Assists</td>
<td>0.320</td>
<td>n/a</td>
</tr>
<tr>
<td>2nd Assists</td>
<td>0.103</td>
<td>n/a</td>
</tr>
</tbody>
</table>

All weights are before score/venue adjustment

*Modelled as one variable
**Modelled as one variable
***Teammate goals exclude 1st and 2nd assists

\[ SAwSHF60 = 0.05 \times iGF60 + 0.11 \times TMGF60 + 0.05 \times iSAFS + \ldots \]

Offensive Event Weights - Defencemen

- For defencemen, goal scoring is less critical than shot generation
- After the puck leaves a defenceman’s stick they have little control over it
- Assists are once again a key predictor of future success
### Defensive Event Weights

- Preventing goals against appears to be more of a talent for forwards than defencemen.
- For forwards there’s little difference between non-goal events.
- For defencemen, blocked shots are less “risky” than saves and misses.

<table>
<thead>
<tr>
<th>Stat</th>
<th>Forwards</th>
<th>Defencemen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals Against</td>
<td>0.128</td>
<td>0.085</td>
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<tr>
<td>Shot Attempts Against Saved</td>
<td>0.043</td>
<td>0.045</td>
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<tr>
<td>Shot Attempts Against Missed</td>
<td>0.038</td>
<td>0.048</td>
</tr>
<tr>
<td>Shot Attempts Against Blocked</td>
<td>0.036</td>
<td>0.025</td>
</tr>
</tbody>
</table>

All weights are before score/venue adjustment.

\[
F: S_{AwSHA60} = 0.13 \times GA_{60} + 0.04 \times SAAS_{60} + 0.04 \times SAAM + \cdots
\]

\[
D: S_{AwSHA60} = 0.09 \times GA_{60} + 0.05 \times SAAS_{60} + 0.05 \times SAAM + \cdots
\]
Repeatability

- For forwards, SAwSh% shows better repeatability over longer periods of time than SACF%.
- For defencemen, SAwSh% shows roughly equal repeatability.

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Predictability

- For forwards, SAwSh% is a consistently better predictor of future GF%.
- For defencemen, SAwSh% is an equally good predictor of future GF%.
Next Steps

• Similar to Corsi we can look at Quality of Competition and Teammates, and Rel stats
  • In particular, relative stats may be more valuable in future predictions of defence

• We can also look at the breakdown between individual and teammate components
  • Individual components show higher repeatability
  • Does splitting by individual/teammate lead to better predictions in future years?

• We can look at adding more granularity to our shot data (rebounds, rush shots, etc.)