Video Analysis of Pair Programming

Andreas Höfer · APSO08
10 May 2008
We have a lot…

• descriptions of pair programming in books for XP practitioners
  • Beck 2000
  • Jeffries et al. 2001
  • Wake 2002
  • Williams & Kessler 2002, …

• studies about the efficiency of pair programming compared to other methods (though the results are mixed).
  • Dybå et al. ’07
But we only have a few...

- studies examining pair compatibility based on personality traits
  - Katira 2004
  - Domino et al. 2003
  - Chao & Atli 2006
  - Sfetsos 2006

- studies observing and analyzing pair interaction
  - Bryant 2004
  - Bryant et al. 2006
  - Chong & Hurlbutt 2007
Role Attributes

Driver
• programming
• using mouse and keyboard
• writing down design
• explaining actions to the navigator

Navigator
• thinking strategically
• thinking of alternative solution/design
• reviewing driver
• listening to the driver’s explanations
Participants

- 18 Computer Science Students
- enrolled in an XP-Course
- 3.4\textsuperscript{th} year of study
- 4.8 years programming experience, including 2.0 years experience with Java
Workplace and Task

- Implement “open” state of an elevator control
  - Java
  - JUnit 3.8.1
  - mock-object
Obtaining the results

Transcribe videos
Obtaining the results

Preprocess transcripts

Transcribe videos

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Analyze transcripts
Input Device Control

![Bar Chart]

- **Percent**
- **Pair**
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9

Legend:
- **Green**: Programmer 1
- **Blue**: Programmer 2
- **Orange**: Conflict

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Video Analysis of Pair Programming
### Time for task completion, pair balance and input device conflict

<table>
<thead>
<tr>
<th>Pair</th>
<th>Time (h:mm:ss)</th>
<th>Balance</th>
<th>Conflict (%)</th>
</tr>
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<tbody>
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<td>3:07:40</td>
<td>0.37</td>
<td>0.76</td>
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<tr>
<td>2</td>
<td>2:17:55</td>
<td>0.15</td>
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<tr>
<td>3</td>
<td>2:34:45</td>
<td>0.18</td>
<td>0.57</td>
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<td>4</td>
<td>6:52:07</td>
<td>0.22</td>
<td>0.33</td>
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<td>5</td>
<td>4:03:01</td>
<td>0.65</td>
<td>10.42</td>
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<td>6</td>
<td>4:28:57</td>
<td>0.26</td>
<td>0.94</td>
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<td>7</td>
<td>4:20:05</td>
<td>0.14</td>
<td>0.75</td>
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<tr>
<td>8</td>
<td>2:42:13</td>
<td>0.95</td>
<td>0.54</td>
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<tr>
<td>9</td>
<td>2:26:46</td>
<td>0.72</td>
<td>3.60</td>
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<td>Mean</td>
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</table>

The formula for calculating the balance ($b$) is:

$$b = \frac{\min(t_1, t_2) + \frac{1}{2} t_C}{\max(t_1, t_2) + \frac{1}{2} t_C}$$
Our activity on the keyboard was balanced.
I would work with my partner again.
## Driving Times

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<td>0:01:03</td>
<td>0:02:02</td>
<td>0:02:34</td>
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</tbody>
</table>
Limitations

- Few data points
- Participants rather inexperienced in XP
- Experimental setting and cameras
I felt disturbed and observed due to the cameras.
Next Steps

• Collect more data points (especially from experts)
• Analyze verbalizations
• Analyze conformance to TDD

• Further suggestions are welcome!
Thank you for your attention!