Matching Job Ads to Job Seekers’ Needs for Flexible Working:
A Machine Learning Algorithm to Predict Perceived Fit

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The industry problem

Flexible working

- **Time** (no fixed schedule, part-time...)
- **Place** (teleworking, co-working...)
- **Content** (communication media, freelancing...)

(ten Brummelhuis et al., 2011; ter Hoeven and van Zoonen, 2015)

The company
Internet job board providing job ads to job seekers wanting to find ‘flexible jobs’
The company need:

Develop an algorithm to
Match job ads to their job seekers’ needs for flexible working in real time
The research problem

• Developing such algorithm is challenging

1. Few research on the antecedents of P-E fit

2. P-E fit traditionally requires direct measurement...
   • ... Of fit as perceived by individuals (molar approach)
   • ... Of perceptions and needs (atomistic approach)

(Edwards, Cable, Williamson, Lambert, & Shipp, 2006)
To what extent and parsimony can job ads be matched to job seekers’ needs for flexible working without direct measures of perceived fit or advertised perceived flexibility?
The project
Figure 1. *Objective and Subjective Supplies-Needs Fit* (adapted from Edwards et al., 2006; Edwards, Caplan, & Van Harrison, 1998, p. 32).
The framework 2/2

Accuracy of job ad perception

Objective Flexibility Supplies
The flexibility (time, place, content) that is advertised in the job ad.

Subjective Flexibility Supplies
The flexibility (time, place, content) that is perceived by the job seeker in the job ad.

Perceived Flexibility S-V Fit
The job seeker’s perception that the advertised job may provide enough flexibility (time, place, content).

Objective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker can accept.

Subjective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker would like to accept.

Accuracy of flexibility needs assessment

Figure 2. Objective and Subjective Supplies-Needs Fit for Flexible Working Needs.
Hypothesis 1

Accuracy of job ad perception

Objective Flexibility Supplies
The flexibility (time, place, content) that is advertised in the job ad.

Subjective Flexibility Supplies
The flexibility (time, place, content) that is perceived by the job seeker in the job ad.

Objective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker can accept.

Subjective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker would like to accept.

Perceived Flexibility S-V Fit
The job seeker’s perception that the advertised job may provide enough flexibility (time, place, content).

Accuracy of flexibility needs assessment

H1. Subjective flexibility supplies and needs will predict perceived flexibility S-V fit
Hypothesis 2

Objective Flexibility Supplies
The flexibility (time, place, content) that is advertised in the job ad.

Subjective Flexibility Supplies
The flexibility (time, place, content) that is perceived by the job seeker in the job ad.

Perceived Flexibility S-V Fit
The job seeker’s perception that the advertised job may provide enough flexibility (time, place, content).

Objective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker can accept.

Subjective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker would like to accept.

Accuracy of job ad perception

Accuracy of flexibility needs assessment

H2. Objective flexibility supplies will predict subjective flexibility supplies
Hypothesis 3

Accuracy of job ad perception

Objective Flexibility Supplies
The flexibility (time, place, content) that is advertised in the job ad.

Subjective Flexibility Supplies
The flexibility (time, place, content) that is perceived by the job seeker in the job ad.

Subjective Flexibility Needs
The minimal flexibility (time, place, content) that the job seeker would like to accept.

Perceived Flexibility S-V Fit
The job seeker’s perception that the advertised job may provide enough flexibility (time, place, content).

Accuracy of flexibility needs assessment

H3. Objective flexibility supplies and subjective flexibility needs will predict perceived flexibility S-V fit.
Methodology
and
Preliminary results
Methodology

- **Machine learning** linear regressions
- **Algorithm 1**: predict supplies from job ads content
- **Algorithm 2**: predict fit from ads content + needs

Sample

- Volunteer users of this Internet job board
- 93 users analyzed 410 job ads (312 distinct)
- Each job ad analyzed by 1.3 participants on average
- Which interrater coefficient to use?
The algorithms

Algorithm 1
Predicting Job Ads
Flexibility Supplies

Algorithm 2
Predicting Perceived Flexibility S-V Fit

Figure 3. The two algorithms that will be designed to test the hypotheses.
The experiment

• Test the predictive power of the algorithms on the website using an experimental design

1. **Control group**: see random job ads (no algorithm)
2. **Low match**: see job ads with low computed match
3. **High match**: see job ads with high computed match

• Compare Perceived Fit scores with ANOVA...
## Preliminary results for Hypothesis 1

<table>
<thead>
<tr>
<th>Outcome: Perceived Flexibility S-V Fit</th>
<th>Variable</th>
<th>Unstandardized coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Constant)</td>
<td>3.540</td>
</tr>
<tr>
<td></td>
<td>Birth year</td>
<td>-.002</td>
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<tr>
<td></td>
<td>Gender</td>
<td>.130</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>.096*</td>
</tr>
<tr>
<td></td>
<td>Job experience</td>
<td>-.018</td>
</tr>
<tr>
<td></td>
<td>Salary expectations</td>
<td>.103*</td>
</tr>
</tbody>
</table>

**Step 1**  
$R^2 = .025^*$

| | Subjective Time Flexibility Supplies | .424*** |
| | Subjective Time Flexibility Needs | -.121** |
| | Subjective Place Flexibility Supplies | .290*** |
| | Subjective Place Flexibility Needs | -.019 |
| | Subjective Content Flexibility Supplies | .182*** |
| | Subjective Content Flexibility Needs | .025 |

**Step 2**  
$R^2 = .707^{***}$

| | Perceived Demands-Abilities Fit | .149*** |

**Step 3**  
$R^2 = .727^{***}$

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**Notes.** $R^2$ is adjusted and its significance refers to the significance in F change compared to the previous step. * $p < .05$. ** $p < .01$. *** $p < .001$. 
Potential implications

• **Practical**
  – Algorithm used by the company
  – Better and easier job seeking experience based on scientific research on fit
  – Can be replicated for other fit algorithms

• **Theoretical**
  – A replicable fit algorithm used in practice
  – Understanding of objective supplies
  – Relationships between atomistic and molar fit