Selected issues of feedback and motor learning

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II. Uluslararası Spor Psikolojisi Sempozyumu
İzmir, 2001
Overview

1. Feedback and motor learning
2. The reversal effect
3. Meta-analysis: Feedback frequency
   3.1 Method
   3.2 Results
4. Conclusion
1. Feedback and motor learning

2. The reversal effect

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4. Conclusion

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**Feedback**

Schmidt, 1988, 424

**Extrinsic feedback**

Knowledge of results (KR)

Knowledge of performance (KP)

**Intrinsic feedback**

Important research variables:
- Temporal aspects
- Frequency/Schedule
- Precision
- Sources of information

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**Feedback**

- Intrinsic (inherent) feedback
- Extrinsic (augmented) feedback

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Feedback and motor learning

Extrinsic (augmented) feedback

Knowledge of results (KR)

Knowledge of performance (KP)

Important research variables:
- Temporal aspects
- Frequency/Schedule
- Precision
- Sources of information

Intrinsic (inherent) feedback

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Schmidt, 1988, 424

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Reversal effect in motor learning

Performance

Practice 1  Practice 2

Treatment A
Treatment B

Intermission

Reversal-effect
<table>
<thead>
<tr>
<th>1. Feedback and motor learning</th>
<th>Explaining the reversal effect: The guidance hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The reversal effect</td>
<td>Schmidt, 1991</td>
</tr>
<tr>
<td>3. Meta-analysis: Feedback frequency</td>
<td></td>
</tr>
<tr>
<td>3.1 Method</td>
<td>• Guidance function of extrinsic feedback in the acquisition phase</td>
</tr>
<tr>
<td>3.2 Results</td>
<td>• Maladaptive short term corrections as an over-reaction</td>
</tr>
<tr>
<td>4. Conclusion</td>
<td>• Negative influence on processing of intrinsic feedback (missing consolidation of a reference of correctness)</td>
</tr>
<tr>
<td></td>
<td>• Fusion of extrinsic feedback and learning task</td>
</tr>
</tbody>
</table>
Reversal effect in terms of effect sizes

Effect size

-0.3 -0.2 -0.1 0 0.1 0.2 0.3

Acquisition Early retention Late retention

Reversal effect
No reversal effect

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Meta-analysis and effect size

Definition of meta-analysis

The statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings

(Glass, 1976, 3)

Definition of effect-size

The standardized mean difference between a treatment group and a control group in terms of an outcome variable

(Schwarzer, 1989, 3)
**Meta-analysis of feedback frequency**

**Purpose of the Meta-analysis:**
- Exploring the importance and robustness of the reversal effect
- Testing of potential moderator variables

**Method:**
- Sample: 40 studies with 72 effect sizes
- Procedure:
  ⇒ Identification of relevant studies
  ⇒ Coding of study characteristics
  ⇒ Computation of effect sizes
  ⇒ Data analyses (global and moderators)
Results of the global analysis

-0.25  -0.2  -0.15  -0.1  -0.05  0  0.05  0.1  0.15  0.2  0.25

Acquisition  Early retention  Late retention

Cohen (1992): 0.20 low effect
0.50 moderate effect
0.80 strong effect

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**Results of the moderator analyses**

<table>
<thead>
<tr>
<th>CONTEXT OF TASK</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
<td>-0.2</td>
</tr>
<tr>
<td>Early retention</td>
<td>0.4</td>
</tr>
<tr>
<td>Late retention</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Lab-related** and **Sports-related tasks**
Results of the moderator analyses

<table>
<thead>
<tr>
<th>DEGREE OF REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
</tr>
<tr>
<td>0% - 33%</td>
</tr>
</tbody>
</table>

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   Feedback frequency
   3.1 Method
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4. Conclusion
Results of the moderator analyses

CONTENT OF FEEDBACK

<table>
<thead>
<tr>
<th>Effect size</th>
<th>Acquisition</th>
<th>Early retention</th>
<th>Late retention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Actual performance
- Desired performance
- Discrepancy

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Results of the moderator analyses

ACQUISITION TRIALS

Effect size

-0.4 -0.2 0 0.2 0.4 0.6 0.8

1 - 30 Trials  31 - 60 Trials
31 - 90 Trials  above 90 Trials
61 - 90 Trials

Effect size

Acquisition Early retention Late retention
### Conclusion

- **Reversal effect:**
  Extremely inconsistent phenomenon; may be a methodological artefact

- **Moderators:**
  - Context of task
  - Degree of reduction
  - Content of feedback
  - Amount of practice (acquisition trials)
Thank you!