Specificity and Transfer in Learning
How to Follow Navigation Instructions

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Flight Crew
Left 2 squares
Down 2 levels
Forward 1 step
Training Conditions

Easy (Lengths 1-3)
Hard (Lengths 4-6)
Mixed (Lengths 1-6)

Testing

Mixed (Lengths 1-6)
Schneider, Healy, Barshi, & Bourne (2007)

The graph shows the proportion of correct responses across different message lengths. The x-axis represents the message length, and the y-axis represents the proportion correct. The bars are color-coded as follows:

- Red: Easy
- Blue: Hard
- Green: Mixed

The error bars indicate the variability of the data.
Encoding Specificity Principle (Tulving & Thomson, 1973)

Retrieval is successful to the extent that the encoding cues and operations correspond with those available at retrieval.


Performance depends more on the correspondence between the processing occurring during acquisition and that occurring during testing than on the level of processing during acquisition.
Procedural Reinstatement Principle

Specificity of training is found for procedural information (knowing how to do something), whereas transfer of training is found for declarative information (knowing that something is the case).
Dimensions of Navigation Task
Response type
Wordiness of the instructions
Presentation mode of the instructions
Display type
Size of the grids
Presence of landmarks

Measures of Performance
Specificity (same vs. different)
Transfer (train vs. test)
Dimensions of Navigation Task
Response type
Wordiness of the instructions
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Measures of Performance
Specificity (same vs. different)
Transfer (train vs. test)
Response Type
Schneider, Healy, Barshi, & Parker (2012)

Training Condition
Key
Mouse

Test Condition
Key
Mouse

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<tbody>
<tr>
<td>L</td>
<td>5</td>
<td>R</td>
<td></td>
<td>D</td>
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<td>1</td>
<td>B</td>
<td>3</td>
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<td>Enter</td>
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<td>0</td>
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Schneider, Healy, Barshi, & Parker (2012)

![Bar chart showing proportion correct](chart.png)

- **Condition**: Key, Mouse
- **Bars**: Red (Same), Blue (Different)
- **Proportion Correct** range from 0.0 to 1.0

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**Legend**
- Red: Same
- Blue: Different
Schneider, Healy, Barshi, & Parker (2012)

The diagram shows a bar graph comparing the proportion of correct responses for two conditions: Key and Mouse. The y-axis represents the proportion correct on a scale from 0.0 to 1.0. The x-axis represents the Condition, with two categories: Key and Mouse. The graph indicates that the proportion of correct responses is higher in the Key condition compared to the Mouse condition.
Wordiness of the Instructions
Schneider, Healy, & Barshi (2012a)

Training Condition
Minimal
Redundant

Test Condition
Minimal
Redundant

Command Wordiness
Minimal (two words):
Left two
Redundant (four words):
Turn left two squares
Schneider, Healy, & Barshi (2012a)
Schneider, Healy, & Barshi (2012a)
Presentation Mode of the Instructions
Schneider, Healy, & Barshi (2010)

Training Condition
Auditory (hear words)
Visual (read words)
Spatial (see movements)
Symbol (see arrows)

Test Condition
Auditory (hear words)
Visual (read words)
Spatial (see movements)
Symbol (see arrows)
Symbols Shown to Subjects

Moves of one

Moves of two

Moves of one or two grids

Moves of one or two grids
Schneider, Healy, & Barshi (2010)

![Bar chart showing proportion correct for different modalities: Auditory, Spatial, Symbol, Visual. The chart compares 'Same' and 'Different' conditions with error bars indicating variability.]
Schneider, Healy, & Barshi (2010)
Display Type
Schneider, Healy, Barshi, & Parker (2005)

Training Condition
Bird’s Eye
Blank
Desktop VR

Test Condition
Bird’s Eye
Blank
Desktop VR
Schneider, Healy, Barshi, & Parker (2005)

The diagram shows a comparison of proportion correct across different conditions: 'Bird's Eye,' 'Blank,' and 'Desktop VR.' The bars represent the proportion of correct responses, with error bars indicating variability. The red bars represent the 'Same' condition, while the blue bars represent the 'Different' condition. The x-axis is labeled 'Condition,' and the y-axis is labeled 'Proportion Correct.'
Schneider, Healy, Barshi, & Parker (2005)

The bar graph shows the proportion correct across different conditions: Bird's Eye, Blank, and Desktop VR. The x-axis represents the condition, and the y-axis represents the proportion correct. The graph includes error bars indicating the variability in the data. The colors green and blue represent the 'Train' and 'Test' conditions, respectively.
Size of the Grids
Schneider, Healy, & Barshi (2012b)

Training Condition
3 x 3
4 x 4
5 x 5

Test Condition
3 x 3
4 x 4
5 x 5
Schneider, Healy, & Barshi (2012b)
Schneider, Healy, & Barshi (2012b)

![Bar Chart]

- **Train**
- **Test**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Proportion Correct</th>
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<tbody>
<tr>
<td>3 x 3</td>
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<tr>
<td>4 x 4</td>
<td></td>
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<tr>
<td>5 x 5</td>
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</tbody>
</table>
Presence of Landmarks
Schneider, Healy, & Barshi (2011)

Training Condition
Direction Empty
Direction Landmark
Location Landmark

Test Condition
Direction Empty
Direction Landmark
Location Landmark

Direction left 2
Location green E
Schneider, Healy, & Barshi (2011)

![Graph showing proportion correct across different conditions.

- **Condition**:
  - Direction Empty
  - Direction Landmark
  - Location Landmark

- **Proportion Correct**:
  - **Same**
  - **Different**

The graph illustrates the proportion of correct responses under various conditions, comparing 'Same' and 'Different' responses.
Schneider, Healy, & Barshi (2011)
Schneider, Healy, & Barshi (2011)

Empty Display

Landmark Display
Dimensions of Navigation Task

Response type
  no specificity, **transfer**

Wordiness of the instructions
  **specificity** for redundant, no transfer

Presentation mode of the instructions
  **specificity** for symbol, **transfer** to visual

Display type
  **specificity** for blank & desktop VR, **transfer** to bird’s eye

Size of the grids
  **specificity** for 5 x 5, **transfer** to 4 x 4

Presence of landmarks
  **specificity** for direction landmark & location landmark, **transfer** to direction empty
Dimensions of Navigation Task

Response type
  no specificity, transfer

Wordiness of the instructions
  specificity for redundant, no transfer

Presentation mode of the instructions
  specificity for symbol, transfer to visual

Display type
  specificity for blank & desktop VR, transfer to bird’s eye

Size of the grids
  specificity for 5 x 5, transfer to 4 x 4

Presence of landmarks
  specificity for direction landmark & location landmark, transfer to direction empty
Practical Implications

Simulator training does not need to be faithful to the response requirements in the field.

Simulator training should duplicate the cognitive and perceptual procedures used in the field, especially when unique procedures are required.

Simulator training that introduces new task features might be useful for the development of new task representations.
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