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
Schneider, Healy, Barshi, & Bourne (2007)

Training Conditions

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

Testing

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

![Graph showing data on Proportion Correct vs Message Length with categories Easy, Hard, Mixed.](image-url)
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
Presentation mode 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

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>9</th>
<th>U</th>
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<tbody>
<tr>
<td>L</td>
<td>5</td>
<td>R</td>
<td>D</td>
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<tr>
<td>1</td>
<td>B</td>
<td>3</td>
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0 . Enter
Schneider, Healy, Barshi, & Parker (2012)

Proportion Correct

\[ \begin{array}{c}
\text{Key} \\
\text{Mouse}
\end{array} \]

- Red: Same
- Blue: Different

Condition
Schneider, Healy, Barshi, & Parker (2012)

![Bar chart showing proportion correct for Key and Mouse conditions, with 'Train' and 'Test' conditions indicated.](chart.png)
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)

![Graph showing proportion correct by condition (Minimal and Redundant) with bars for 'Same' and 'Different' conditions.](image)
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
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)

![Bar chart showing proportions correct across different conditions](chart.png)
Schneider, Healy, Barshi, & Parker (2005)
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
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)
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.
Acknowledgments

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