

Specificity and Transfer in Learning How to Follow Navigation Instructions

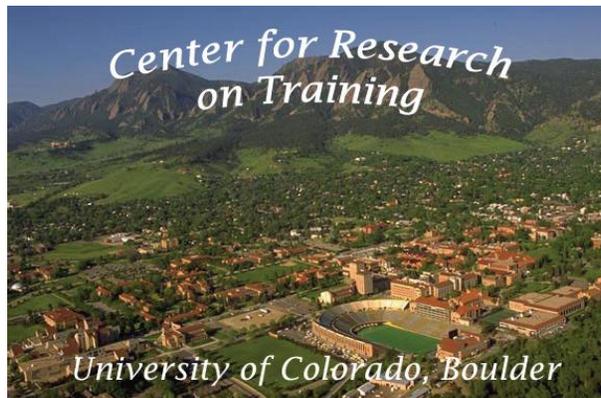
Alice F. Healy

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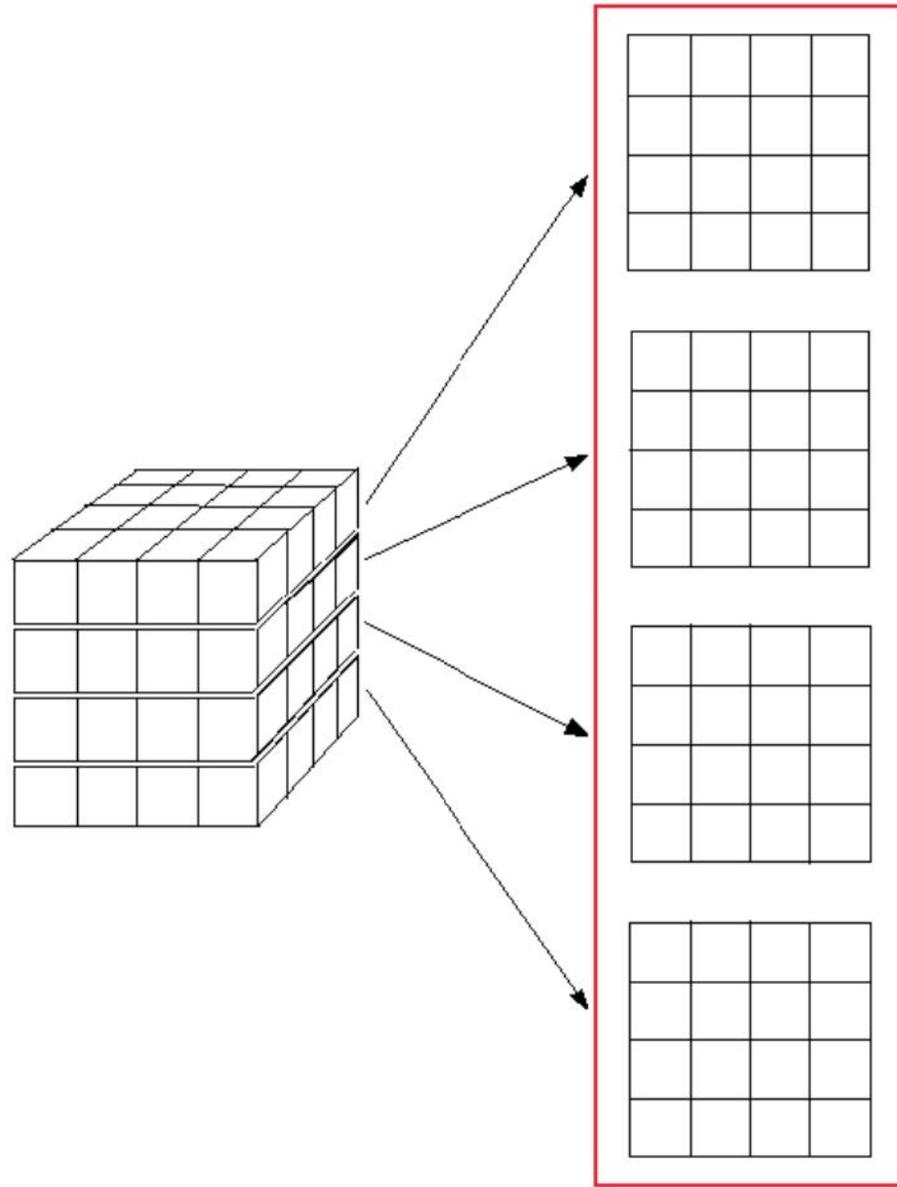


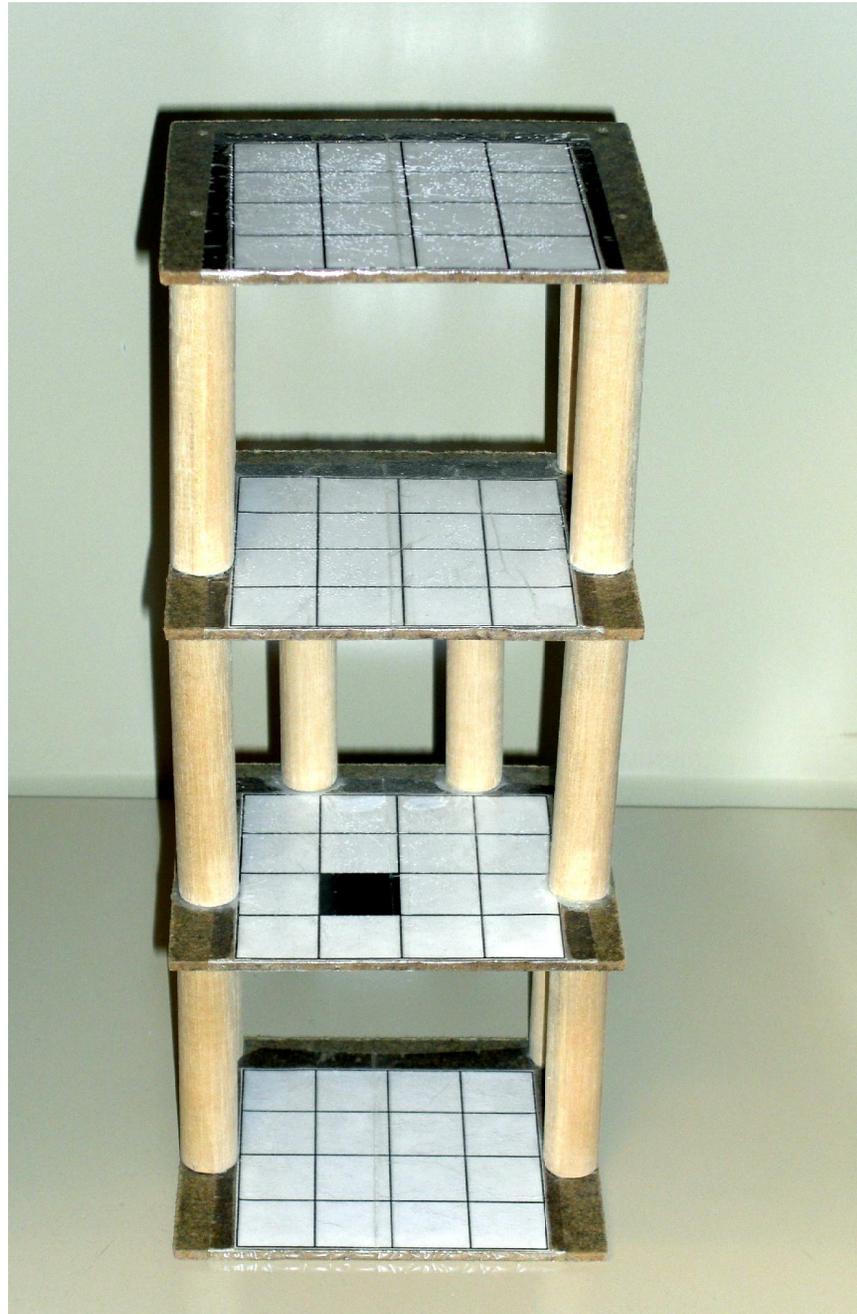


Air Traffic Control

Flight Crew







The image shows a vertical stack of four 4x4 grids, each with a different number of shaded squares. The first grid is empty. The second grid has the numbers '2' and '1' in the first row, and a 2x2 shaded square in the second row. The third grid has the number '3' in the first row. The fourth grid has the numbers '5' and '4' in the first two rows. At the bottom of the stack is a button labeled 'Done clicking'.

Left 2 squares

Down 2 levels

Forward 1 step

Schneider, Healy, Barshi, & Bourne (2007)

Training Conditions

Easy (Lengths 1-3)

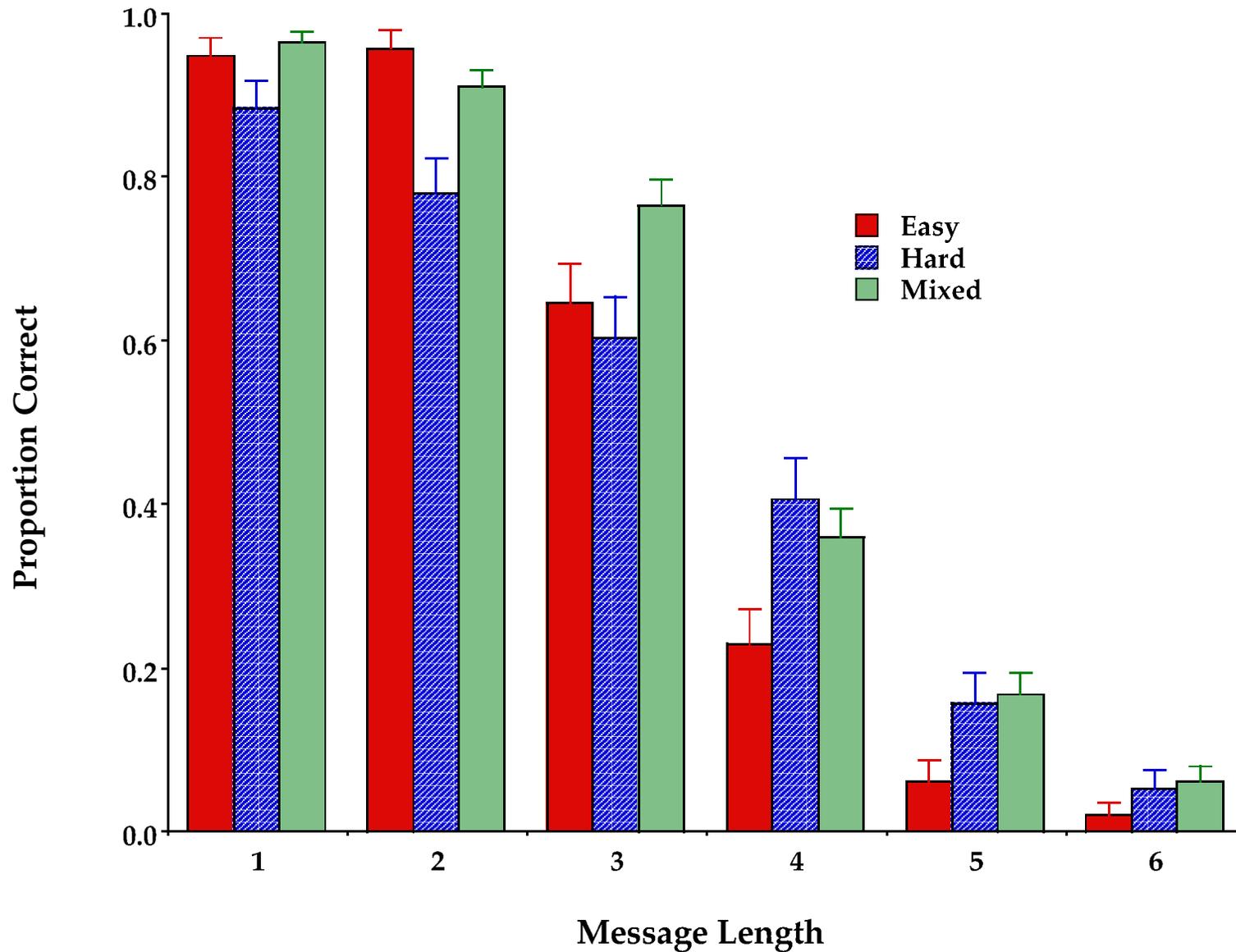
Hard (Lengths 4-6)

Mixed (Lengths 1-6)

Testing

Mixed (Lengths 1-6)

Schneider, Healy, Barshi, & Bourne (2007)



Encoding Specificity Principle (Tulving & Thomson, 1973)

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

Transfer Appropriate Processing Principle (McDaniel, Friedman, & Bourne, 1978; Morris, Bransford, & Franks, 1977; Roediger, Weldon, & Challis, 1989)

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

(Healy, 2007; Healy & Bourne, 1995; Healy, Fendrich, Crutcher, Wittman, Gesi, Ericsson, & Bourne, 1992; Healy, Wohldmann, & Bourne, 2005)

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

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Response Type

Schneider, Healy, Barshi, & Parker (2012)

Training Condition

Key

Mouse

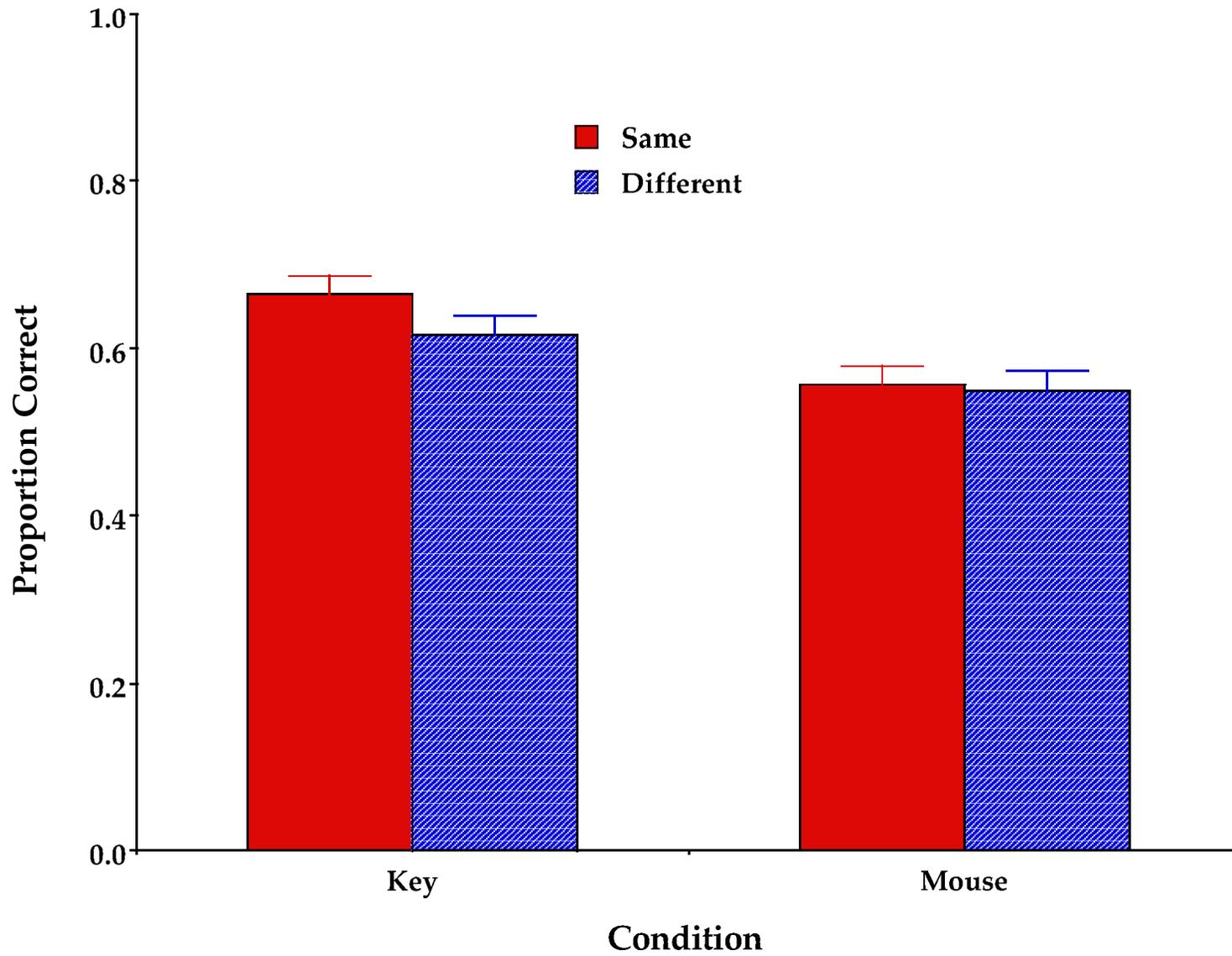
Test Condition

Key

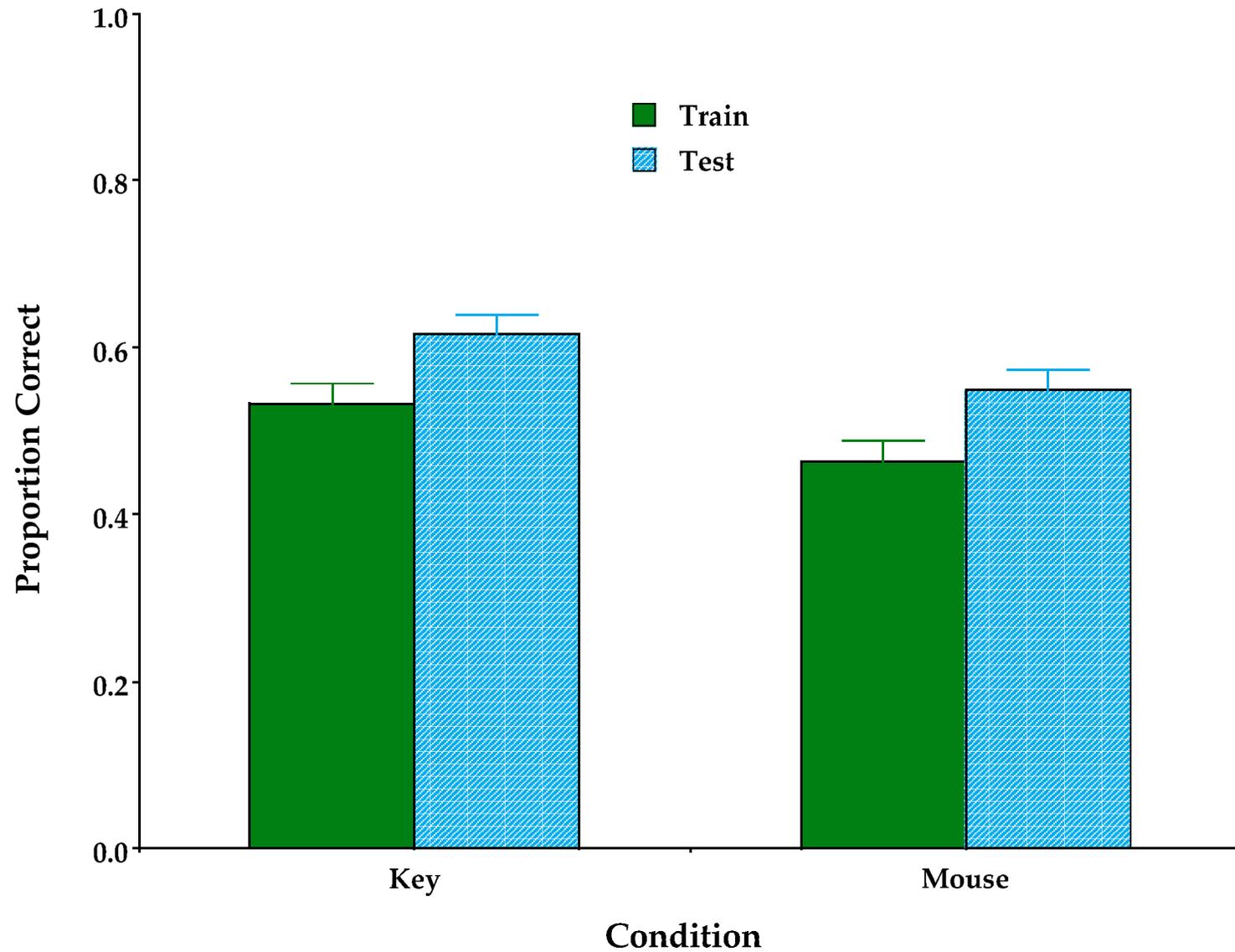
Mouse

7	F	9	U
L	5	R	D
1	B	3	Enter
0	.		

Schneider, Healy, Barshi, & Parker (2012)



Schneider, Healy, Barshi, & Parker (2012)



Wordiness of the Instructions

Schneider, Healy, & Barshi (2012a)

Training Condition

Minimal

Redundant

Test Condition

Minimal

Redundant

Command Wordiness

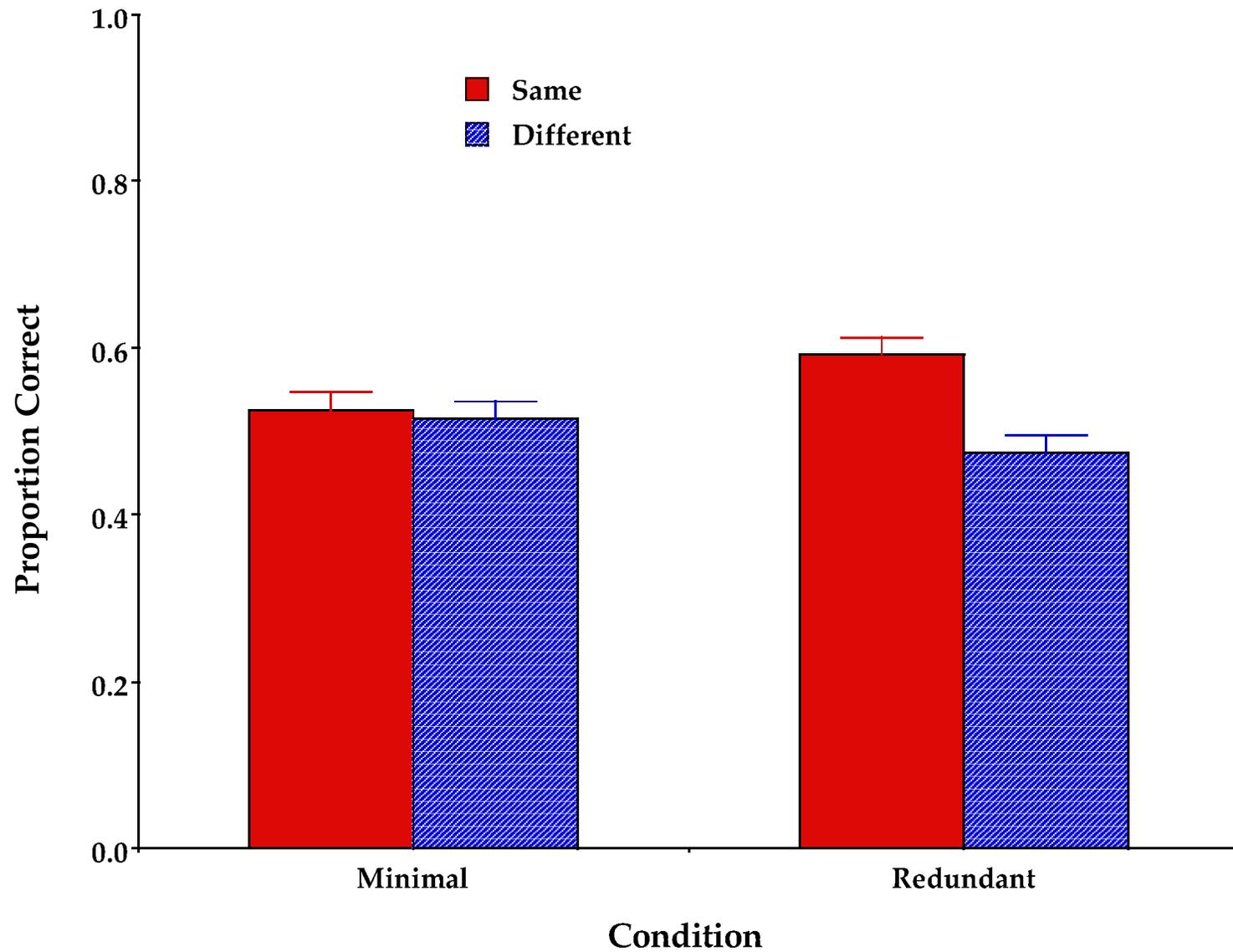
Minimal (two words):

Left two

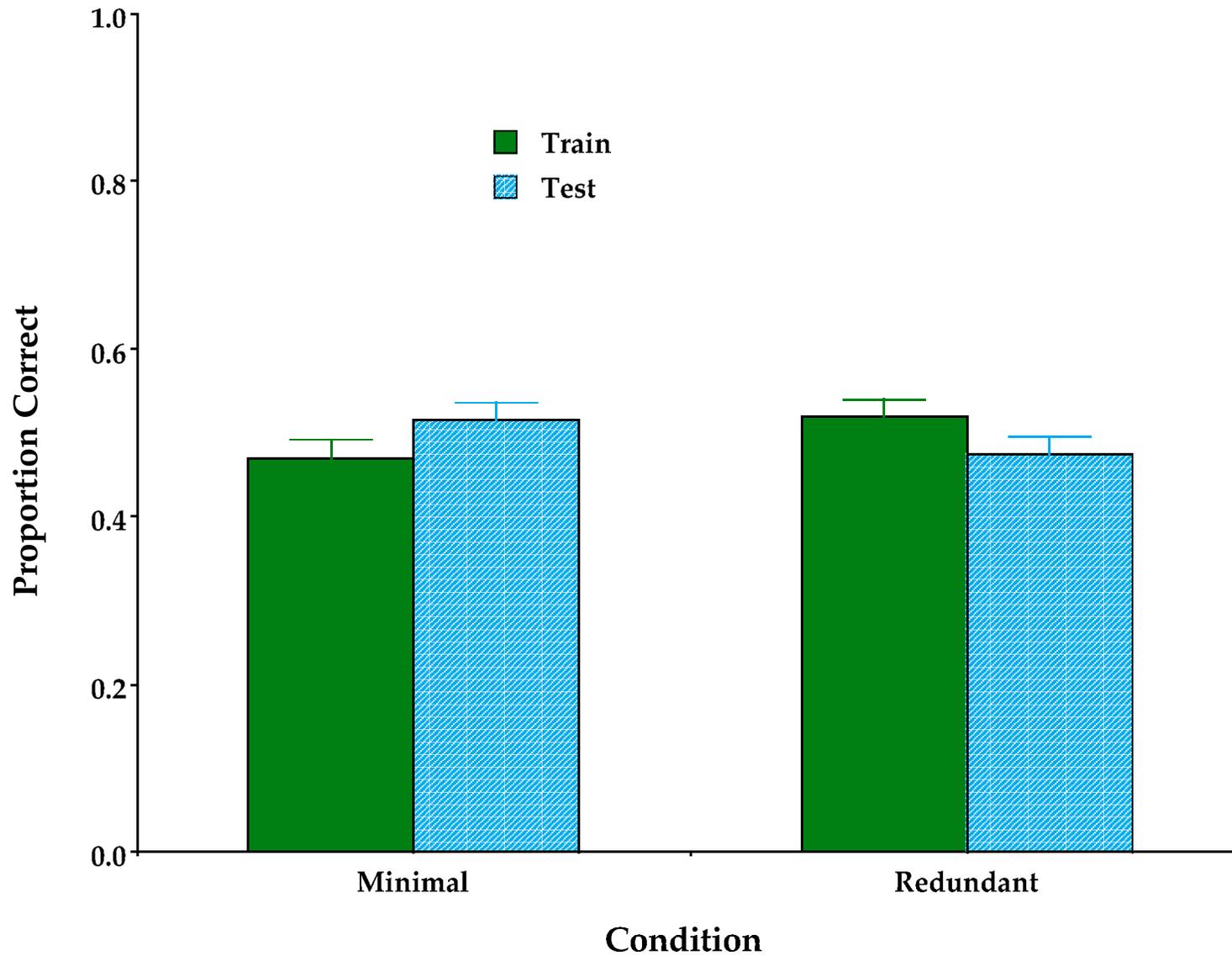
Redundant (four words):

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

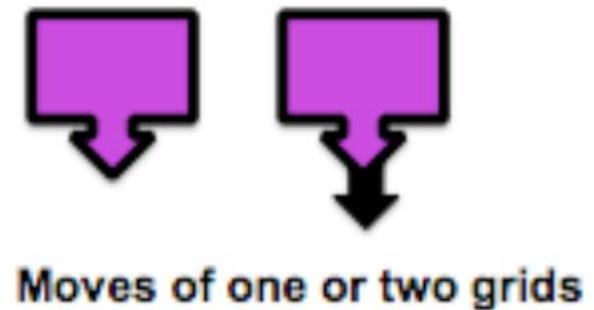
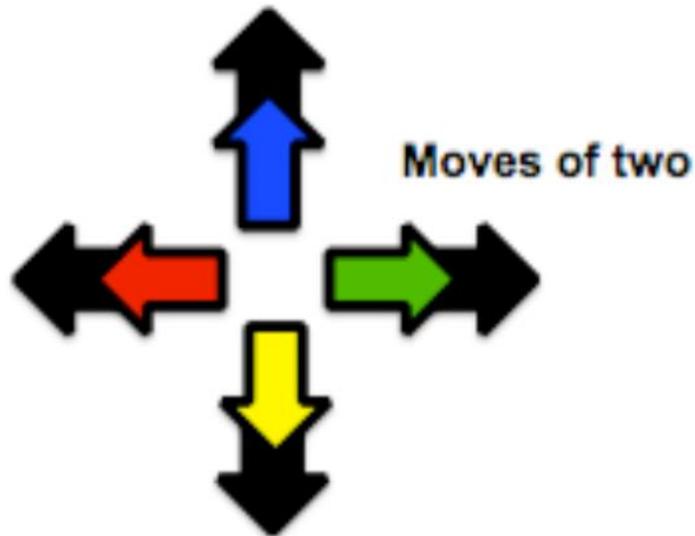
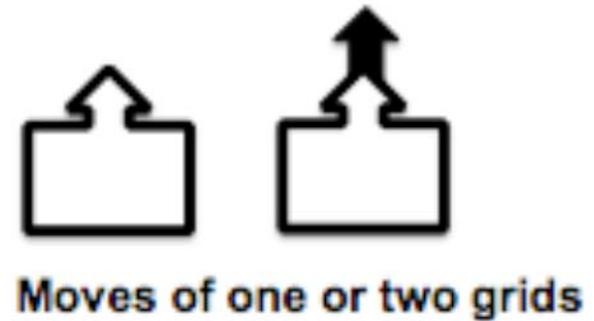
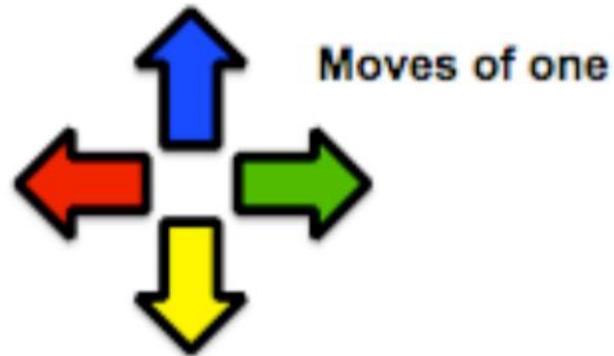
Auditory (hear words)

Visual (read words)

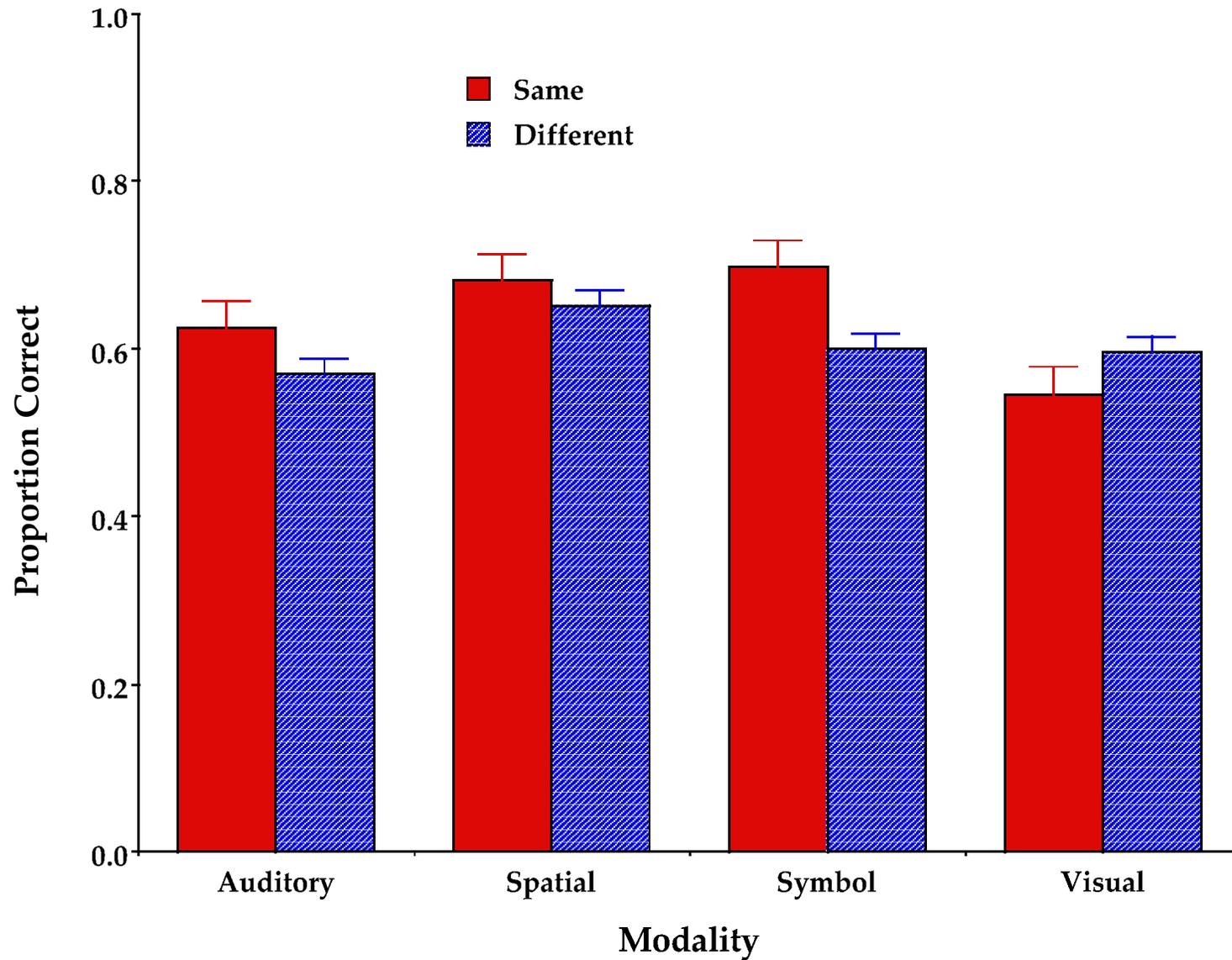
Spatial (see movements)

Symbol (see arrows)

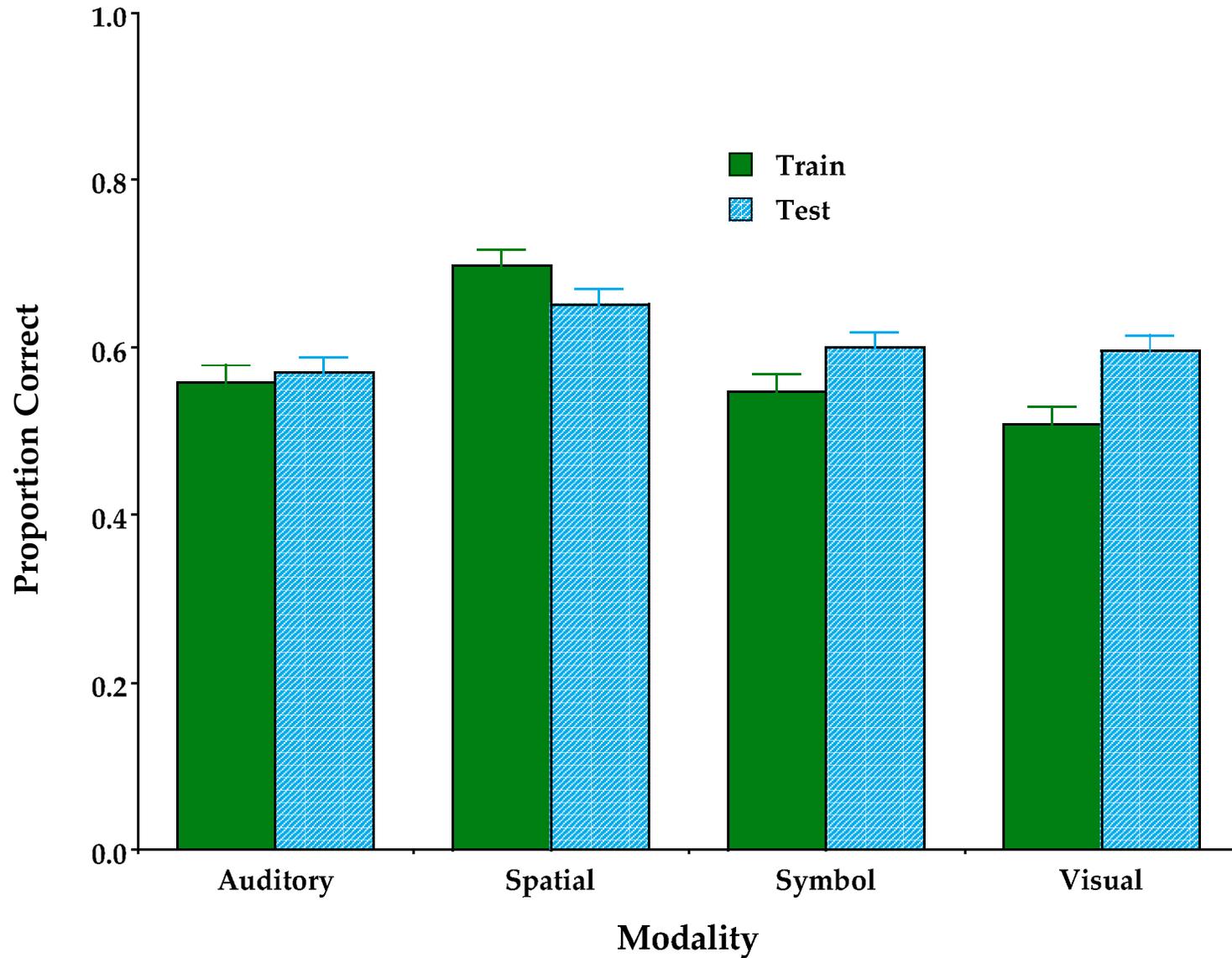
Symbols Shown to Subjects



Schneider, Healy, & Barshi (2010)



Schneider, Healy, & Barshi (2010)



Display Type

Schneider, Healy, Barshi, & Parker (2005)

Training Condition

Bird's Eye

Blank

Desktop VR

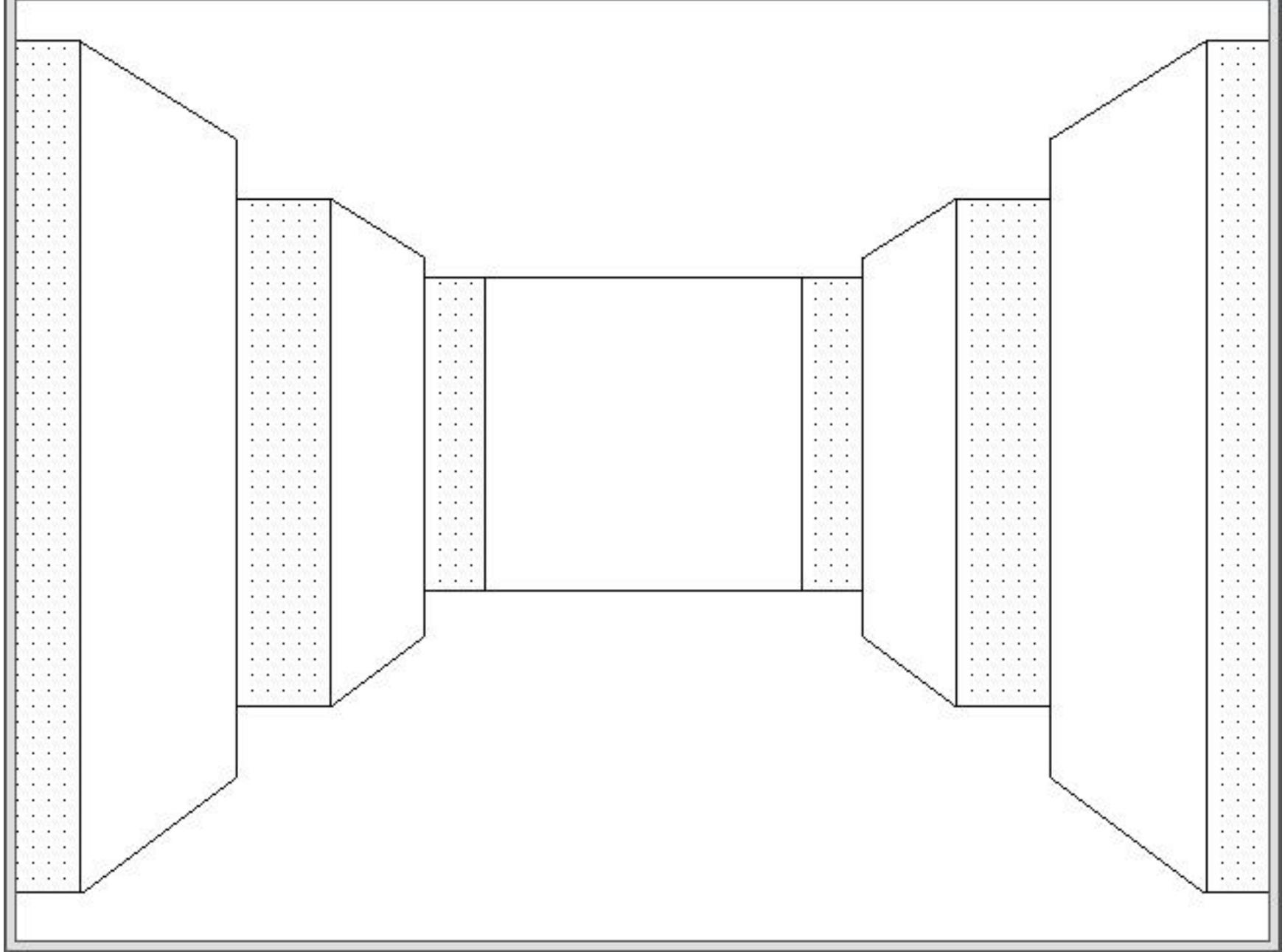
Test Condition

Bird's Eye

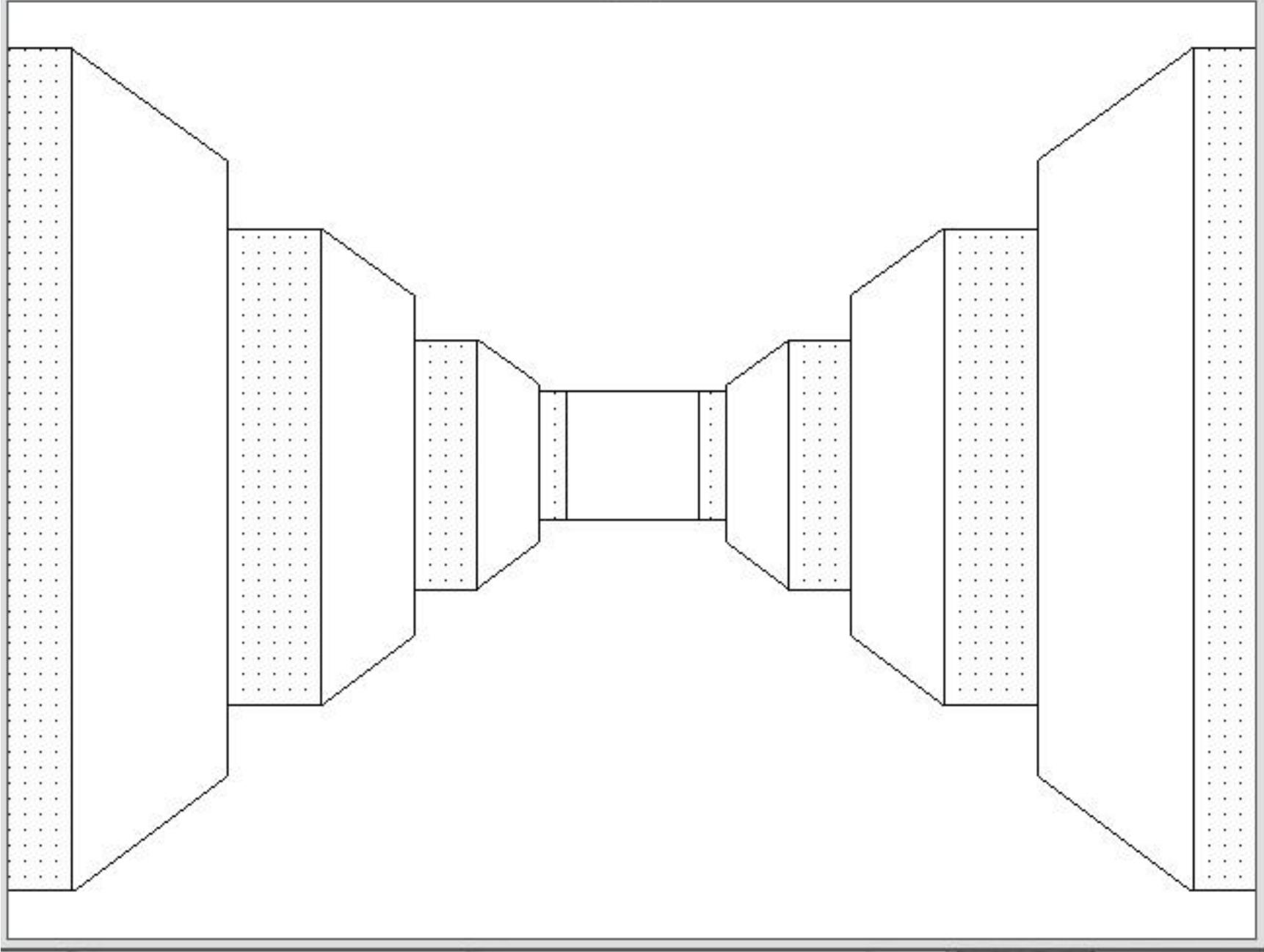
Blank

Desktop VR

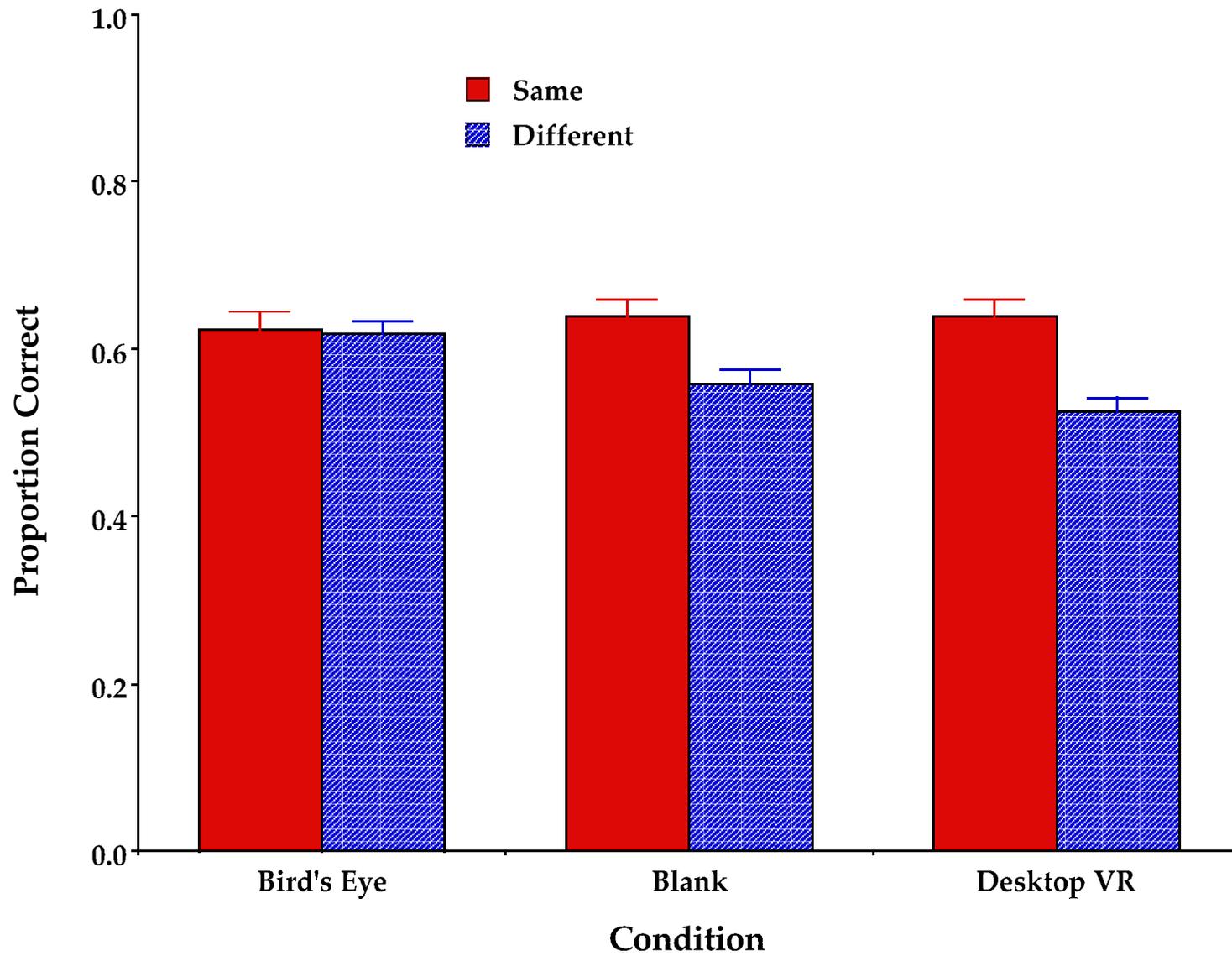
Exp 1



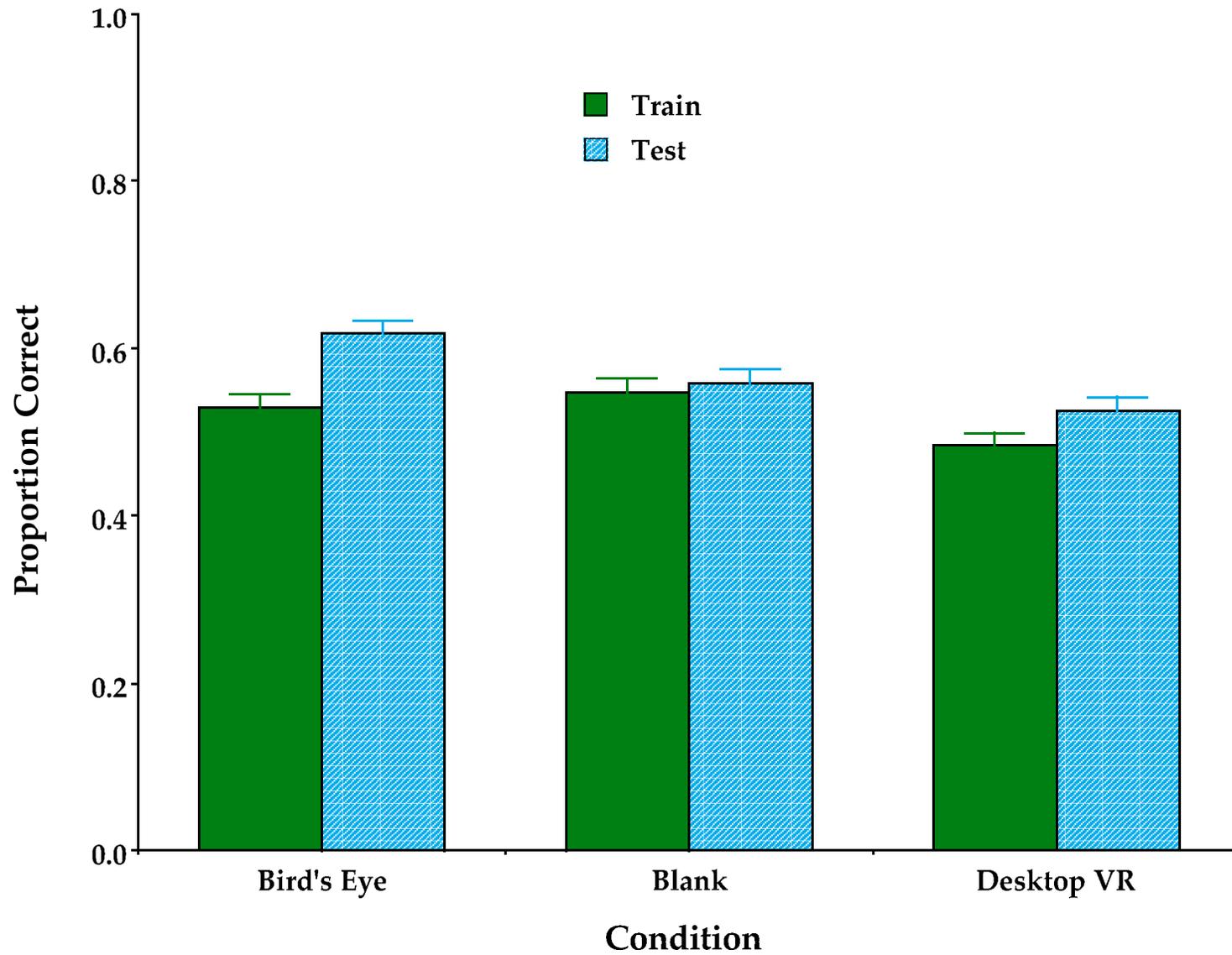
Exp1



Schneider, Healy, Barshi, & Parker (2005)



Schneider, Healy, Barshi, & Parker (2005)

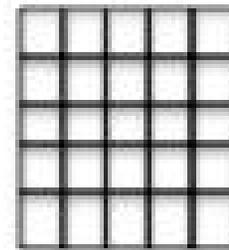
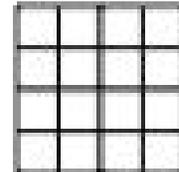
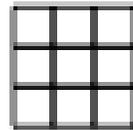


Size of the Grids

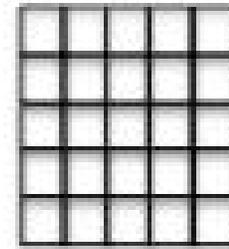
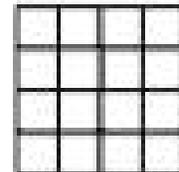
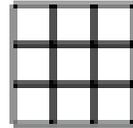
Schneider, Healy, & Barshi (2012b)

Training Condition

3 x 3



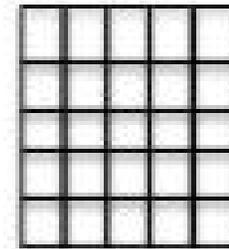
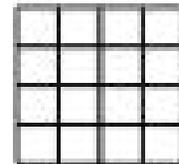
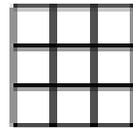
4 x 4



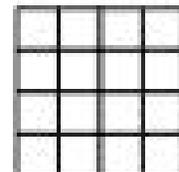
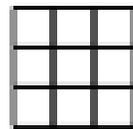
5 x 5

Test Condition

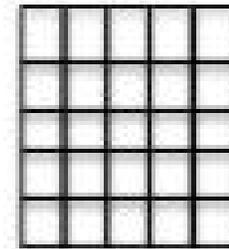
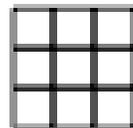
3 x 3



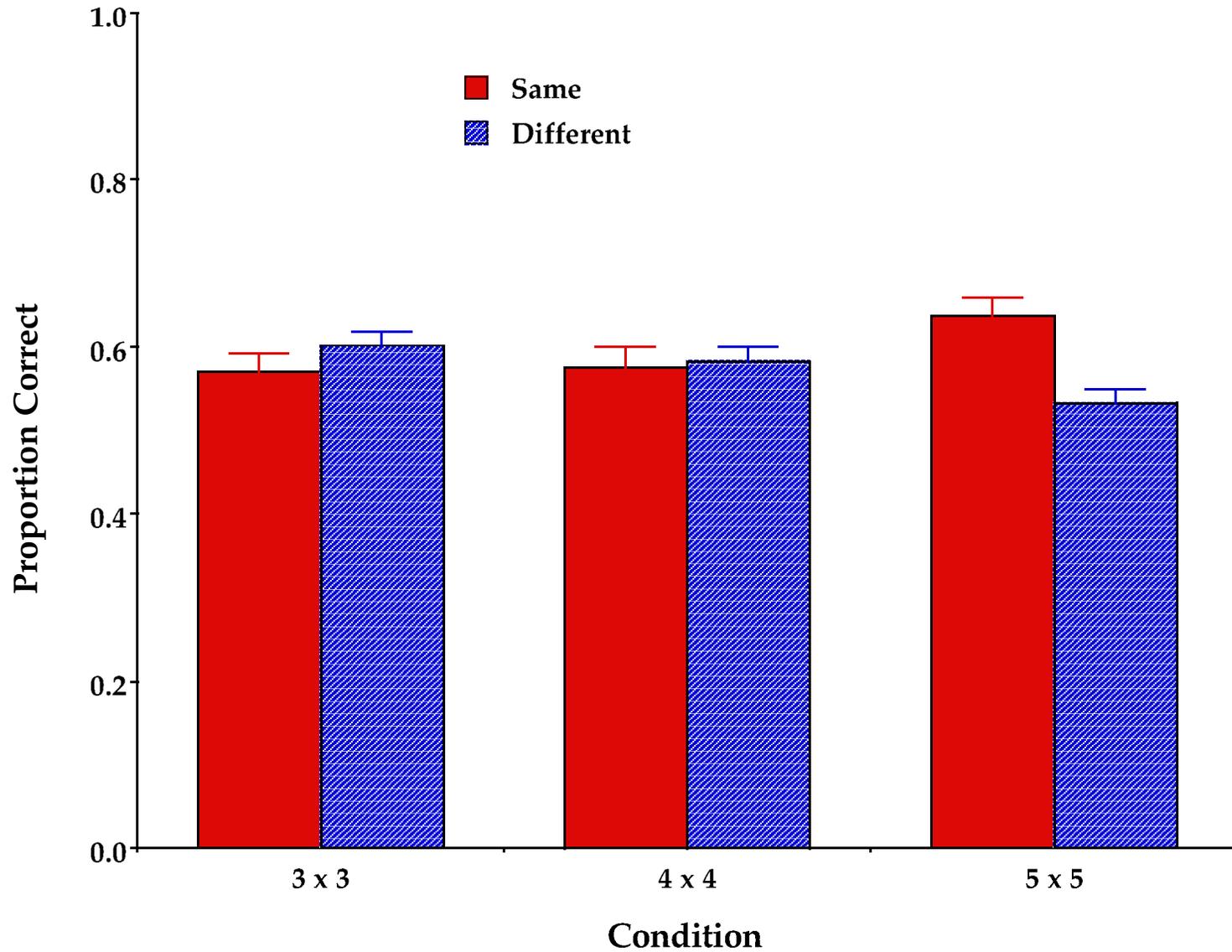
4 x 4



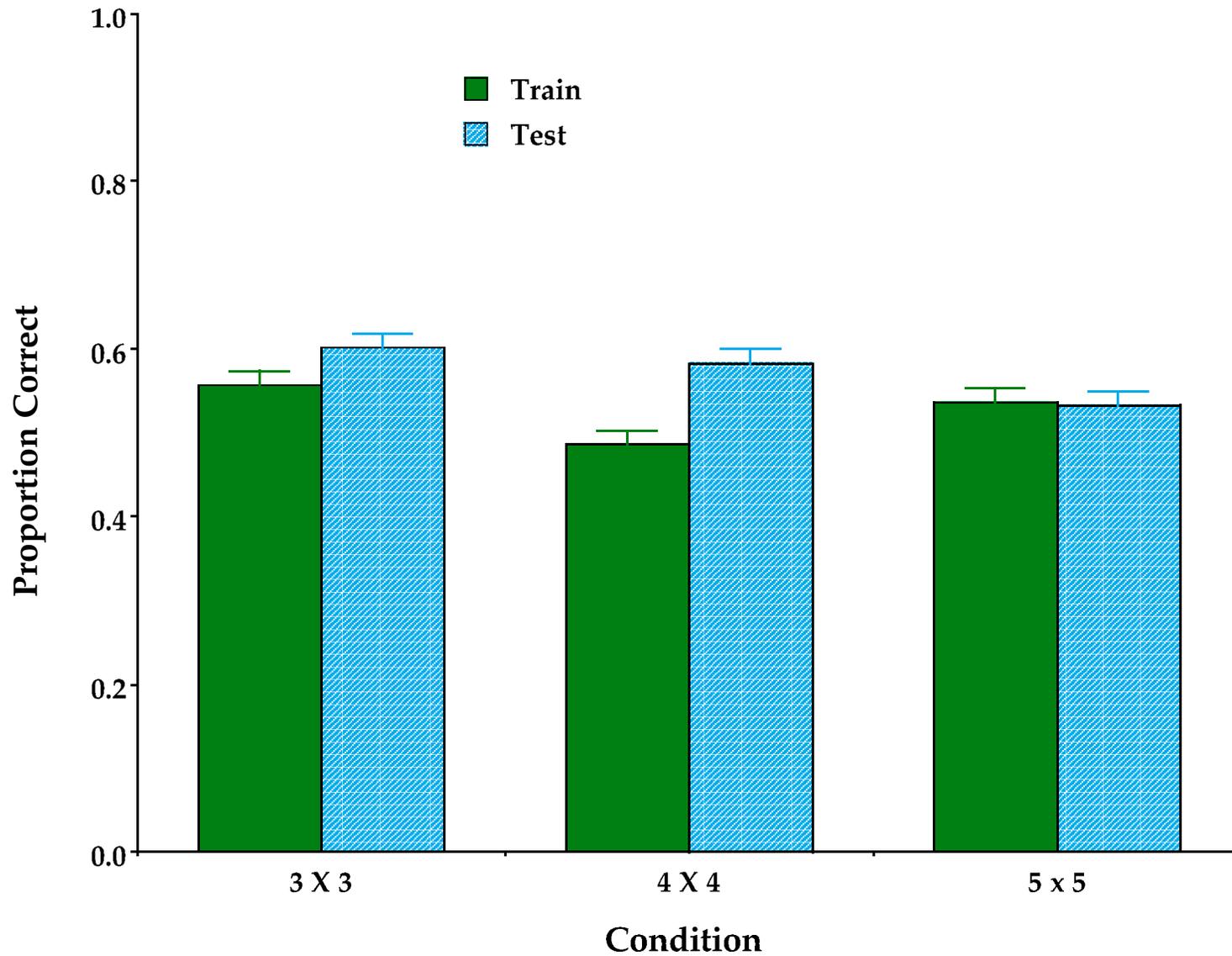
5 x 5



Schneider, Healy, & Barshi (2012b)



Schneider, Healy, & Barshi (2012b)



Presence of Landmarks

Schneider, Healy, & Barshi (2011)



Training Condition

- Direction Empty
- Direction Landmark
- Location Landmark

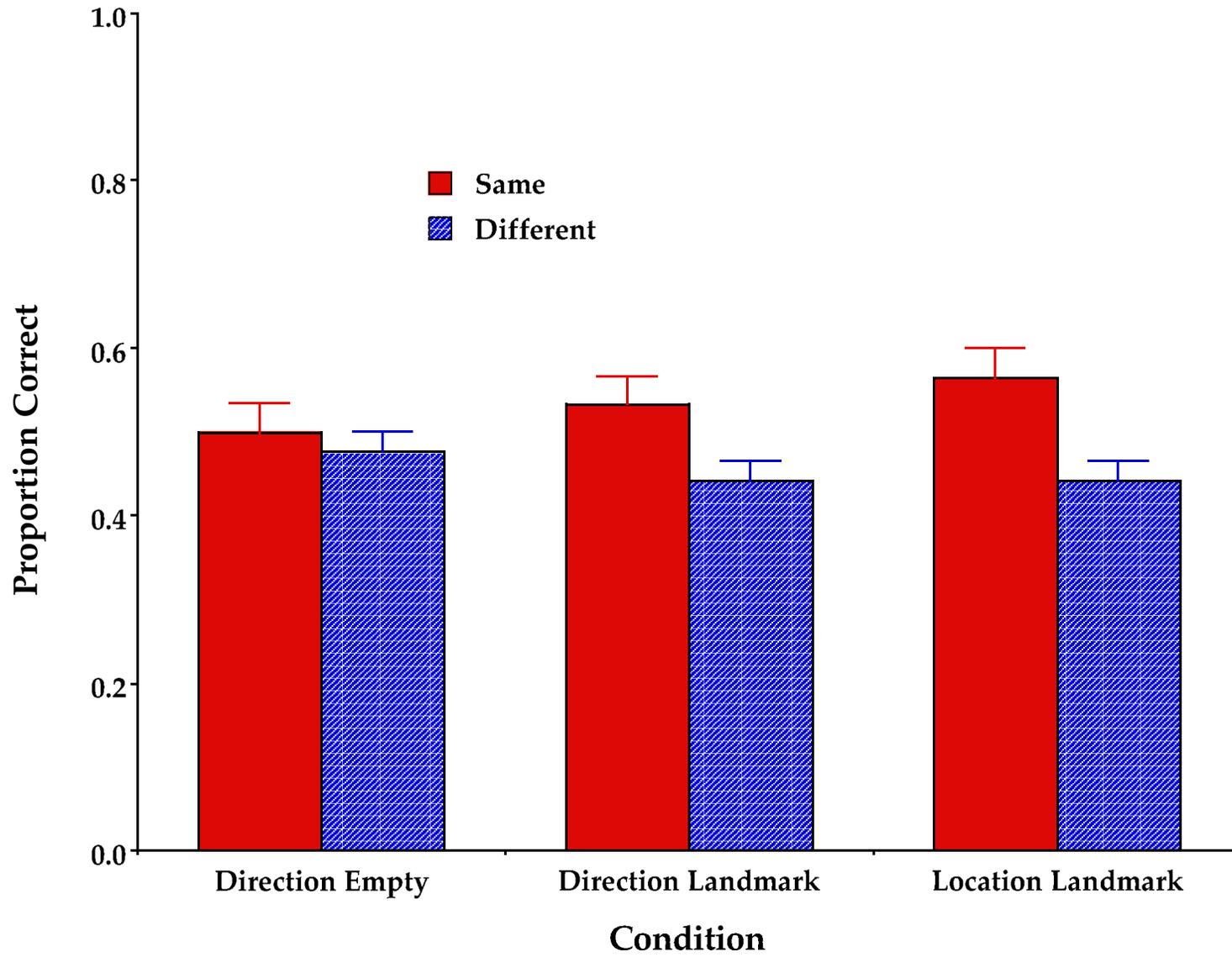
Direction
left 2

Test Condition

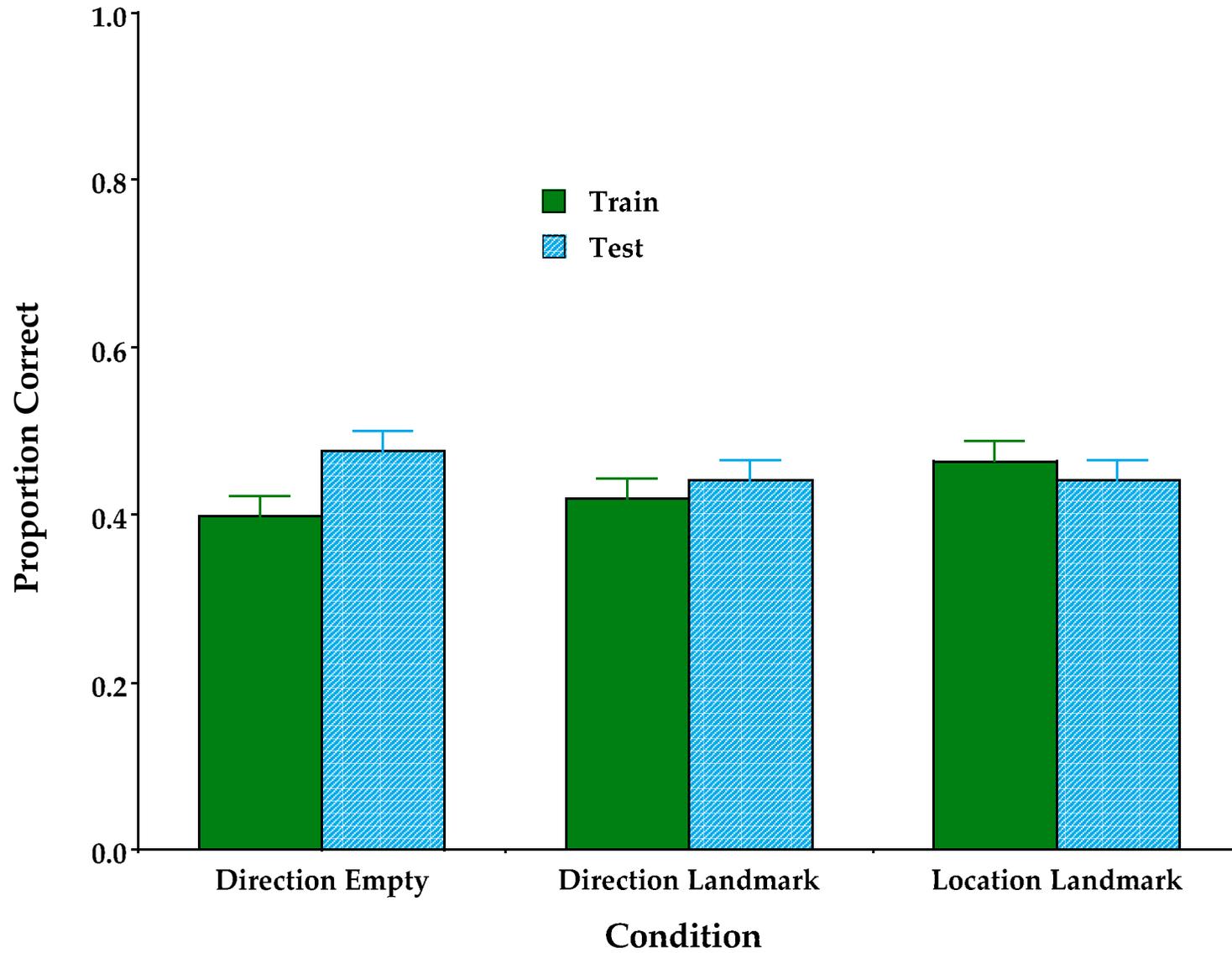
- Direction Empty
- Direction Landmark
- Location Landmark

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

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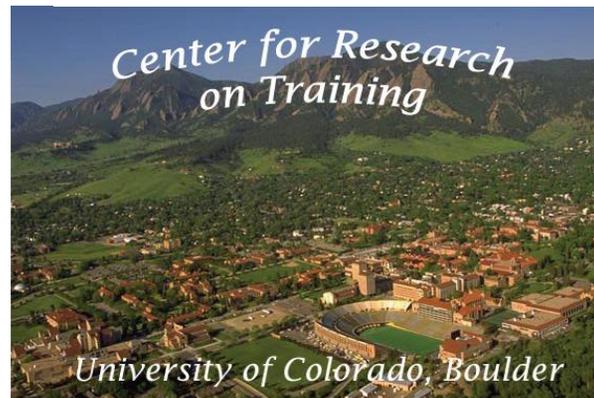
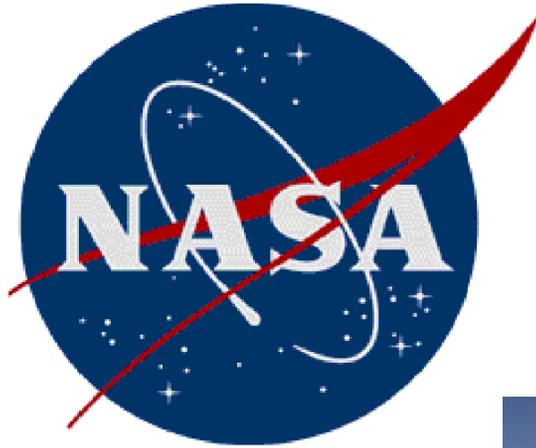
Practical Implications

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



**Mike Overstreet, Carolyn Buck-Gengler,
James Parker, Blu McCormick, David Weiner,
& Lyle Bourne**