

Visual Perception is Affected by Motor Experience: Evidence from Letter Recognition

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Motor sequences associated with objects through learning are activated upon perception of the object (Grezes & Decety, 2002; Harman, 1999; James, 2000; Tse, 2000; Tucker & Ellis, 2001;)

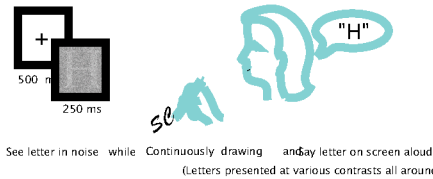
Mental rotation (Wohlschläger, 1998; Wexler, 1998) Letter Perception (Bartolomeo, 2002;) are affected by concurrent motor behaviour.

****Motor and perceptual systems can interact in various ways: Do they interact in letter perception?**

Research Question:
Does our motor experience with letters (writing) affect visual perception?

Can we study the effects of prior motor learning by looking at effects of concurrent motor behaviour (in a dual-task paradigm)?

Dual-task Paradigm:
Subjects drew letters or shapes while verbally identifying letters presented in noise



Measure amount of interference (decrement in perception performance) due to drawing letters vs shapes that can differ in terms of feature similarity with seen items

The nature of the interference in this task can tell us how the motor and perceptual systems interact

Experiment 1:

See: "curvy" - G D U and "straight" - H N K Letters
Draw: "curvy" letters: SC or "straight" letters: WY or

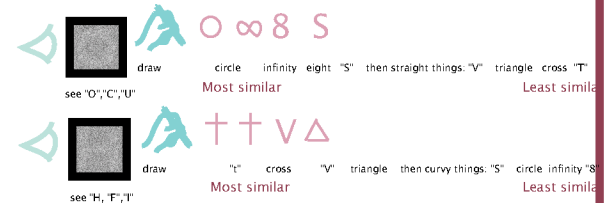
○ ○ "curvy" shapes: □ □ or "straight" shapes:

Predictions:

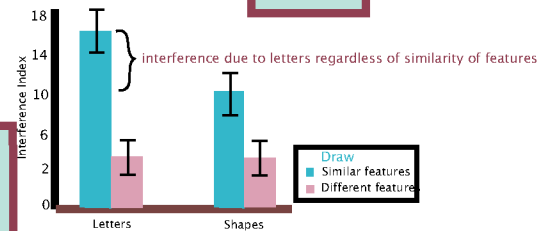
- If low-level interaction, drawing anything straight should interfere with perception of straight letters more than curvy letters
- If high-level interaction drawing letters should interfere with letter perception more than drawing shapes.
- If multi-level interaction, letters interfere more than shapes AND items with similar features should interfere.

Experiment 2:

See: "curvy" - C O U and "straight" - H F I Letters
Continuum of feature overlap among drawn and seen items:



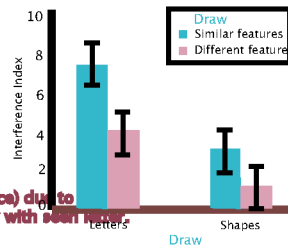
Results



Results:

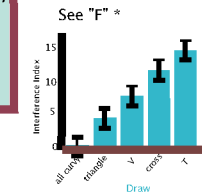
Summary:
-Drawing letters worse than shapes overall (high-level interference)
-Large effect of degree of similarity (low-level interference)

Similar category: interference
Similar features: interference



Interference index = Naming accuracy without dual task (0) - accuracy during dual-task

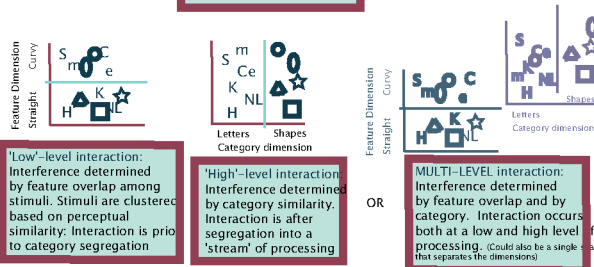
****Interference at multiple levels of processing****



-When same movement (cross & "t") more interference from letter
-not feature similarity alone
-more evidence for Multi-level interference

* results for other letters show a similar pattern of results

Possible results:



Questions:

-Do letters interfere more because they are letters or because they share more features?

-need shapes that share features with letters.

Results Summary:

-Drawing any stimulus that is similar in features (measured by amount of curvature) will interfere with perception.
-BUT drawing a similar letter will interfere the most!

****Concurrent motor movement interferes with letter perception due to feature similarity, writing experience influences the degree of the interference****

References:
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Harman et al., (1999) Current Biology, 9, 1315-1318
Tse & Cavanagh, (2000), Cognition, 74, 827-832
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Wohlschläger & Wohlschläger (1998), JEP:HPP, 24, 397-412