E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Deliberative Processing and Overall Similarity in Free Classification

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Brooks (1978)

- *Analytic categorization*
  - Participant separates aspects of the stimulus and evaluates their ability to predict category membership.
  - Typically results in a subset of those aspects being used.
- *Nonanalytic categorization*
  - Participant evaluates category membership on the basis of overall similarity to known examples.
  - So, all stimulus attributes have some control over responding.
  - More likely to occur where cognitive resources are limited.

- A striking prediction:
  - A categorization process that employs all the information in the stimulus (overall similarity) is less effortful than a categorization process that employs a subset of that information (analytic, or "rule-based", categorization).

Less is more

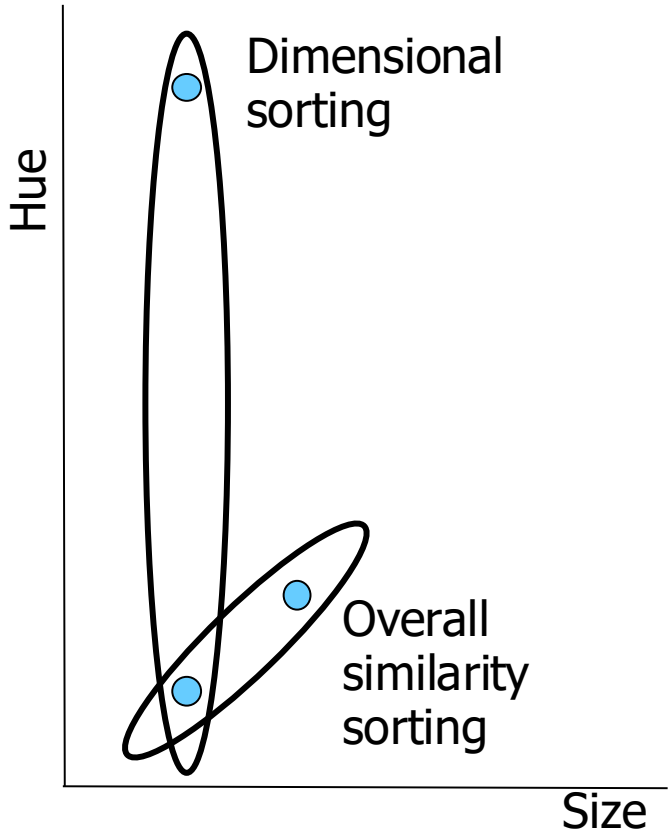
"…it is easier for people to base similarity and categorization judgments on more, rather than fewer, properties"

Goldstone & Barsalou (1998)

"…family resemblance categorization emerges as a primitive, fallback strategy when more sophisticated cognitive strategies are lacking for any reason"

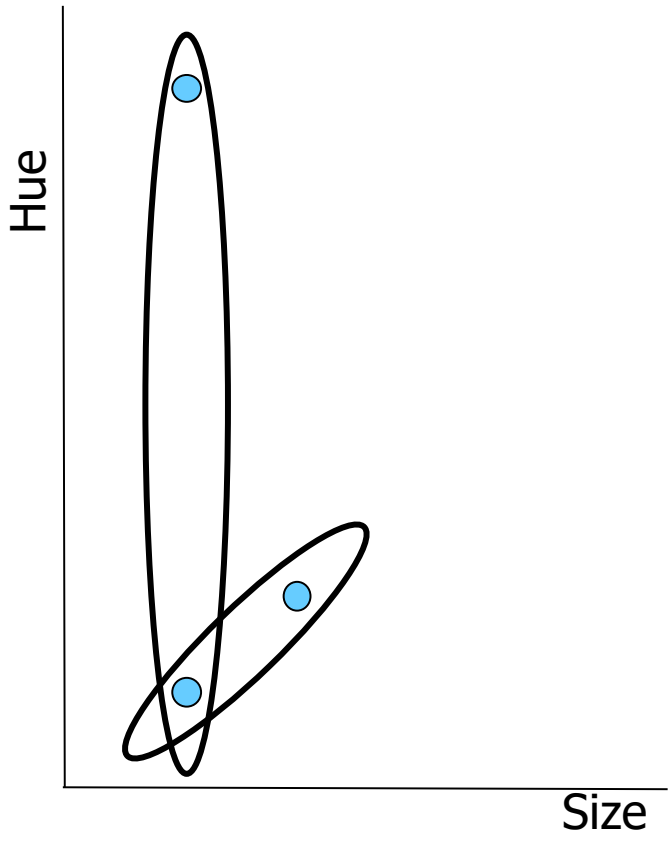
Couchman et al. (2010)

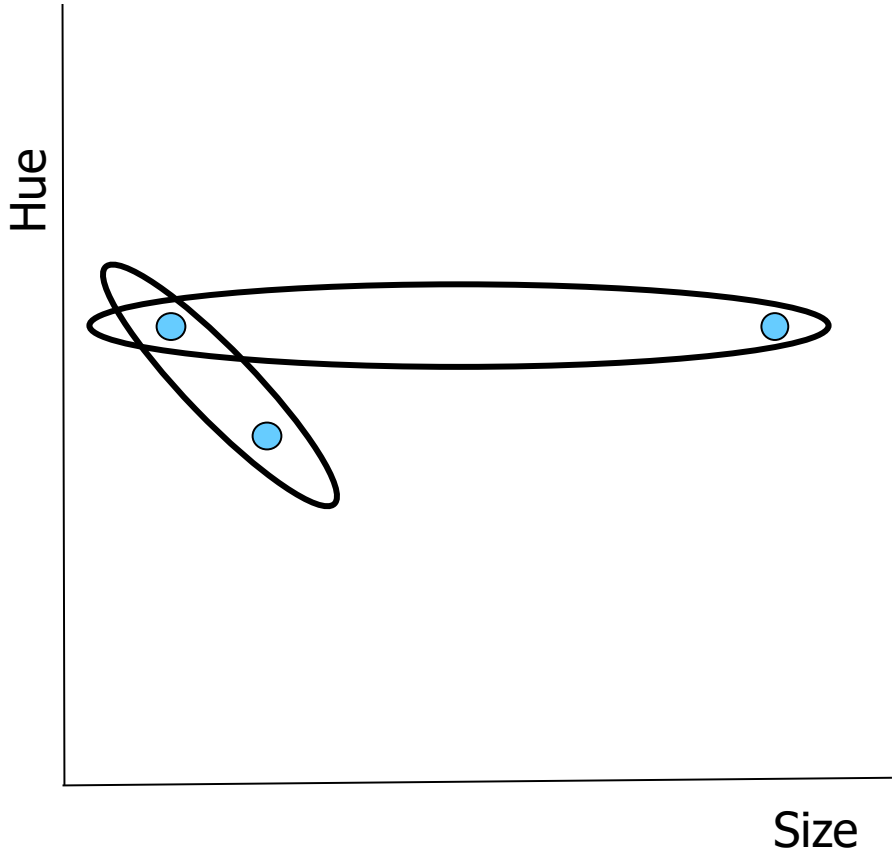
Triad procedure



- Ward (1983)
- Smith and Kemler Nelson (1984)
- Overall similarity classification is enhanced by:
  - Time pressure
  - Cognitive load
  - Impulsivity

Triad procedure – issues of interpretation





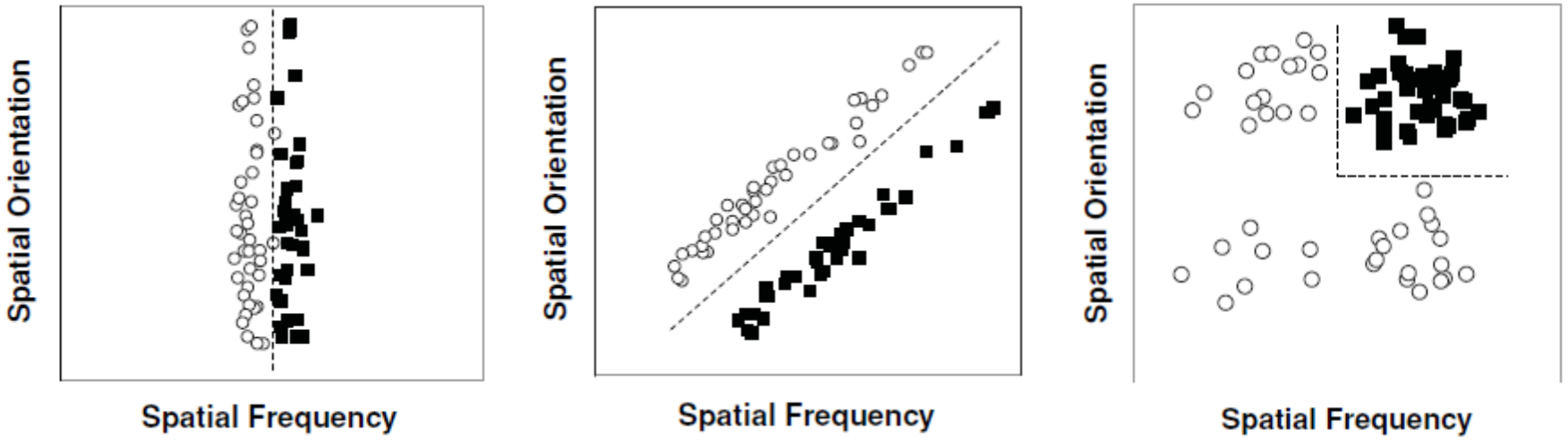
Thompson (1994); Raijmakers et al.,(2004)

Ashby / Maddox Procedure

A. Rule-based (Single dimension)

B. Information Integration

C. Rule-based (Conjunction)

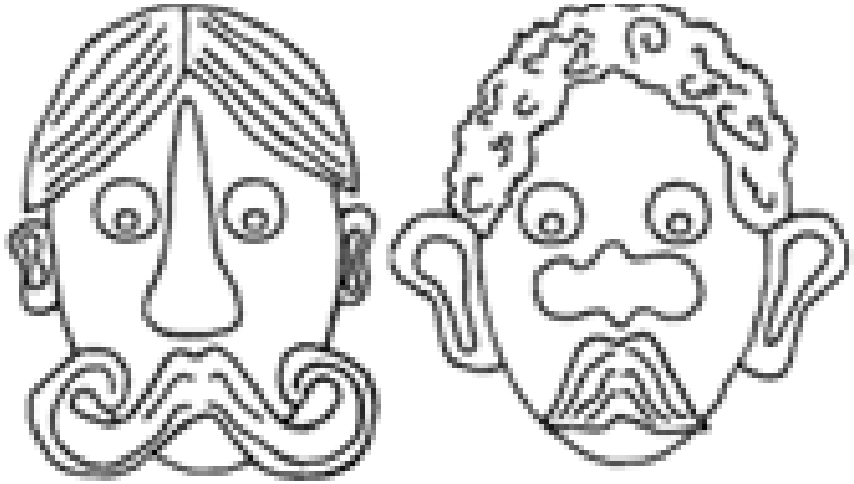


- Zeithamova and Maddox (2006) – Concurrent load affects A more than B.
  - Although see Newell, Dunn & Kalish (2010)
  - Also, more about verbalizability? (see C).

Criterial Attribute Procedure

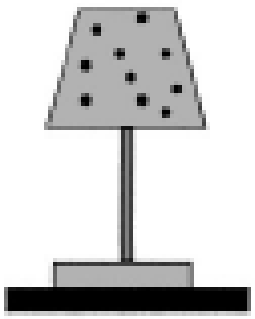
Category A				Category B			
D1	D2	D3	D4	D1	D2	D3	D4
0	0	0	0	1	1	1	1
0	1	0	0	1	0	1	1
0	0	1	0	1	1	0	1
0	0	0	1	1	1	1	0

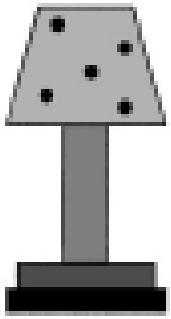
Test	0 1 1 1
	1 0 0 0

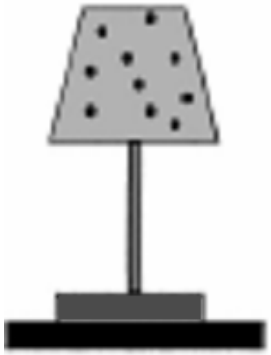


- Incidental training increases OS classification at test, compared to intentional training (Kemler Nelson, 1984).
- Concurrent load during training increases OS classification at test, compared to full attention training (Smith & Shapiro, 1989).
- Test phase conducted under intentional, full-attention conditions in all cases.
- Incidental / divided attention training interferes with participants discovering the criterial attribute during training?

Match-to-standards procedure



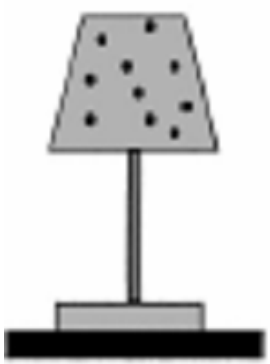




- Regehr & Brooks (1995); Milton & Wills (2004).
- Classification (sorting) without feedback.
- Classification of a set of 10 items (the 2 standards, plus the 8 one-away stimuli).
- 90+% of participants produce one of two kinds of sort:

OS and UD sorting

1 1 1 1



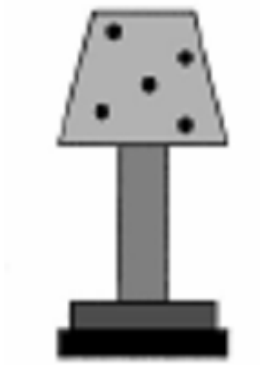
Overall similarity

1 1 1 1
0 1 1 1
1 0 1 1
1 1 0 1
1 1 1 0

Unidimensional

1 1 1 1
1 0 0 0
1 0 1 1
1 1 0 1
1 1 1 0

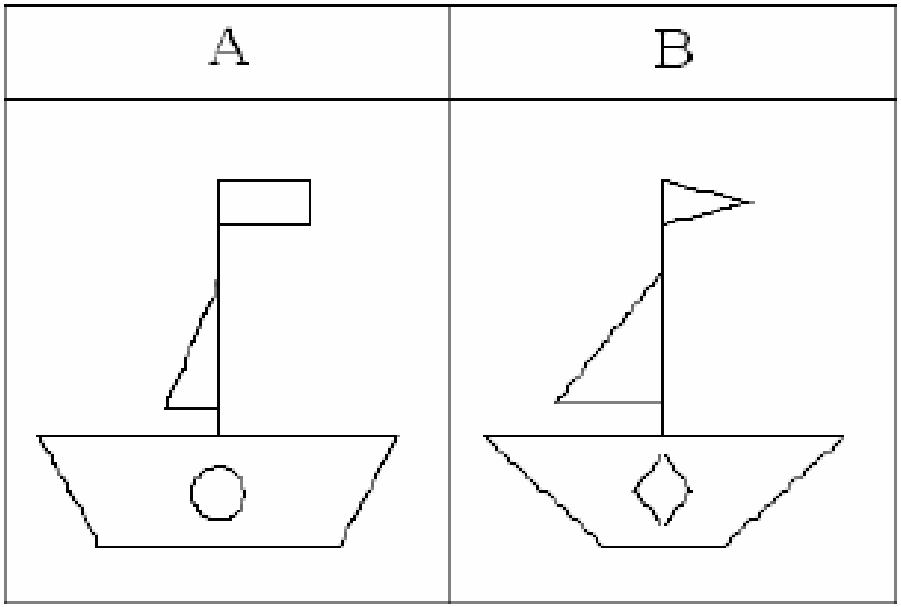
0 0 0 0

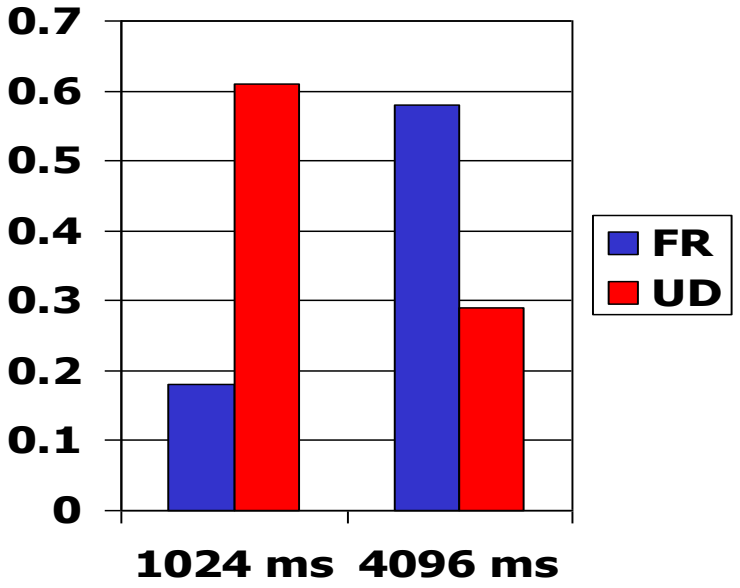


0 0 0 0
1 0 0 0
0 1 0 0
0 0 1 0
0 0 0 1

0 0 0 0
0 1 1 1
0 1 0 0
0 0 1 0
0 0 0 1

Presentation time

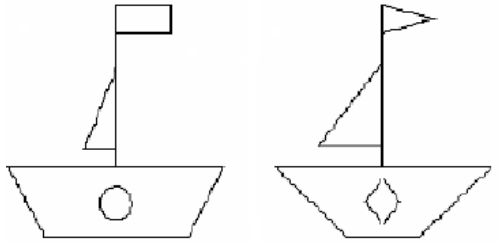


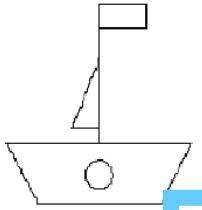


- 12 blocks, DV = probability of sort type.
- Milton, Longmore & Wills (2008)

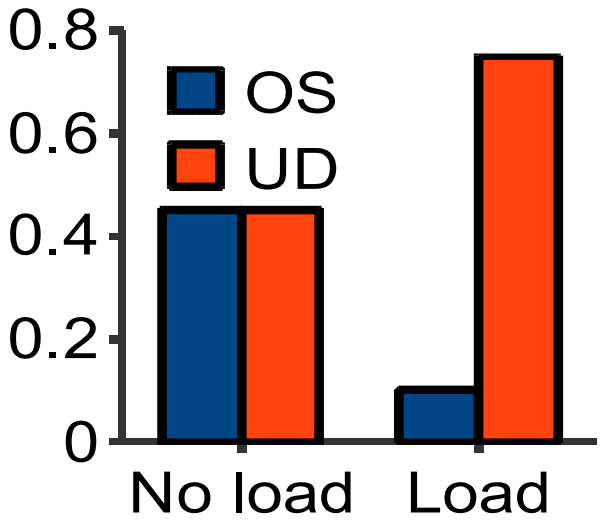
Exp. 1A - Concurrent load

"...11...48 ... 9 ... 87 ... 45 ... 78 ... 23 ... 91 .. 43 ... 82 ..."



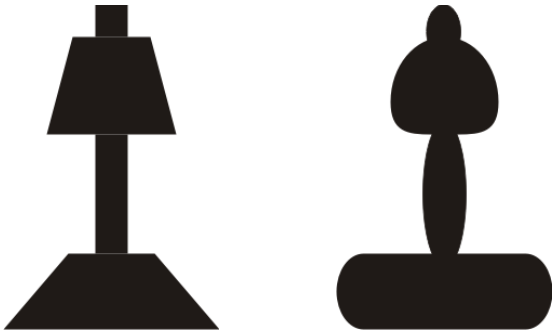


A or B?

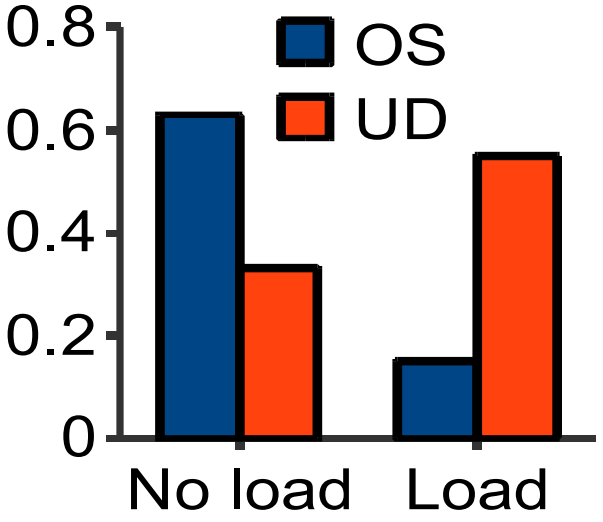


- 12 blocks

Exp 1B - Concurrent load

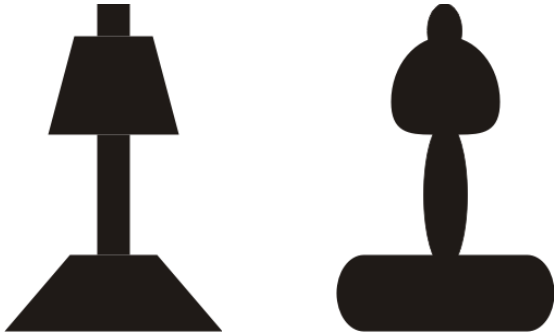


1500ms

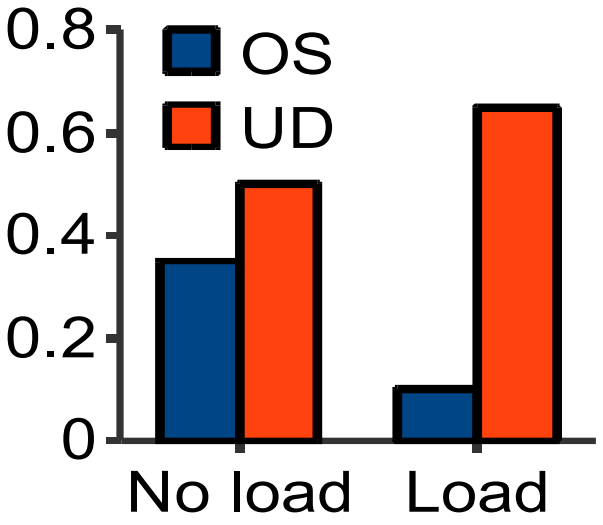


- 12 blocks

Exp. 1C - Concurrent load



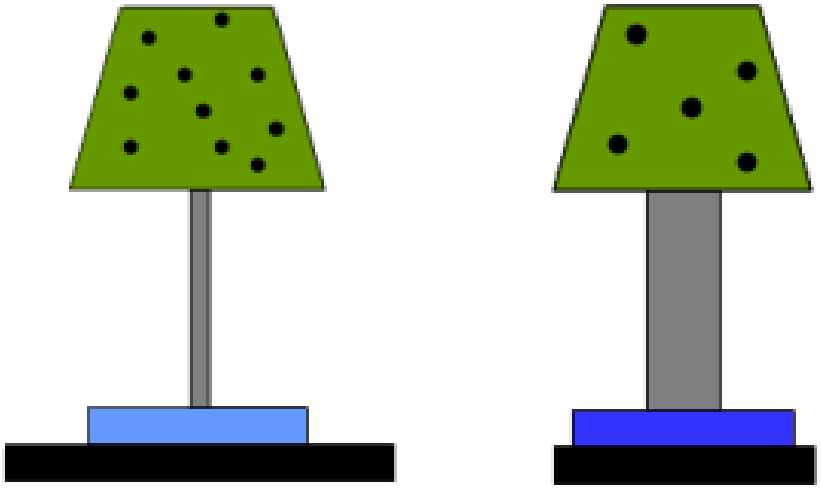
300ms



- 12 blocks

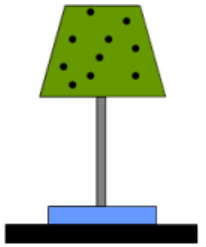
Exp. 2 – Working memory capacity

- Single block of match-to-standards classification.
- Operation span (OSPAN)
- OS sorters' mean span: 3.7
- UD sorters' mean span: 2.3

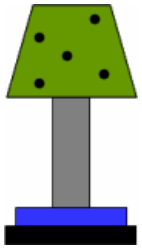


Exp. 3 – Behaving meticulously

- Combined manipulation / individual differences design.
- 6 blocks.

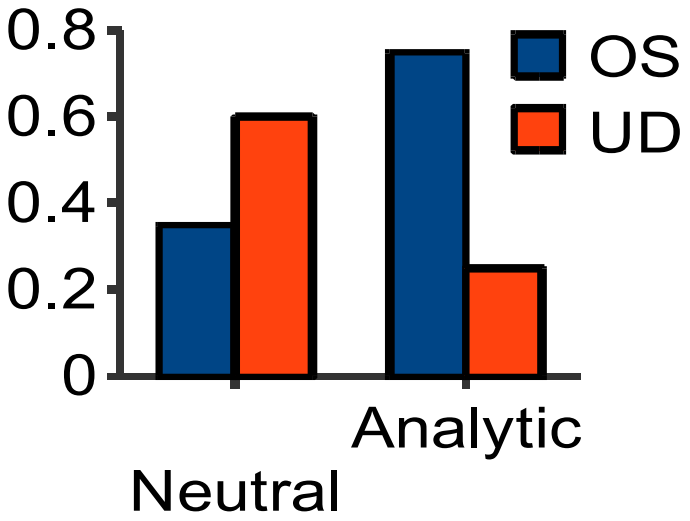


- Meticulous instructions condition
  - *"The pictures you are about to see are quite complex. You should take particular care in your evaluation of how they differ. Study each image in detail. BE METICULOUS! BE CAREFUL!!"*

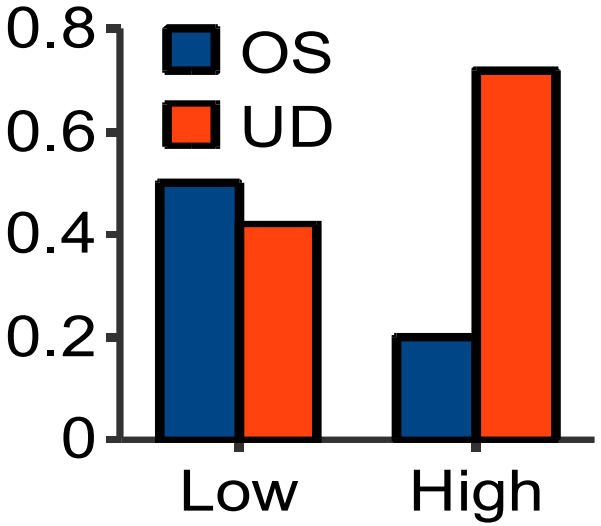


- Standard instructions condition
  - Administer Barratt Impulsivity Scale after classifying.

Exp. 3 – Behaving meticulously



- Effect of instructions



- Median split on impulsivity

Summary

- Overall similarity classification involves the consideration of multiple (experimenter-defined) stimulus dimensions; single-dimension classification just one.
- Time pressure reduces the prevalence of overall similarity classification (Milton, Longmore & Wills, 2008).
- Concurrent load reduces the prevalence of overall similarity classification (Exp. 1), as does limited working memory capacity (Exp. 2).
- Instructions to behave meticulously, and low impulsivity, increase the prevalence of overall similarity classification (Exp. 3).
- More is more.