Thinking hard about family resemblance

Andy Wills
University of Exeter

Post-docs
Fraser Milton, Chris Longmore

Lab funding
ESRC, European Commission

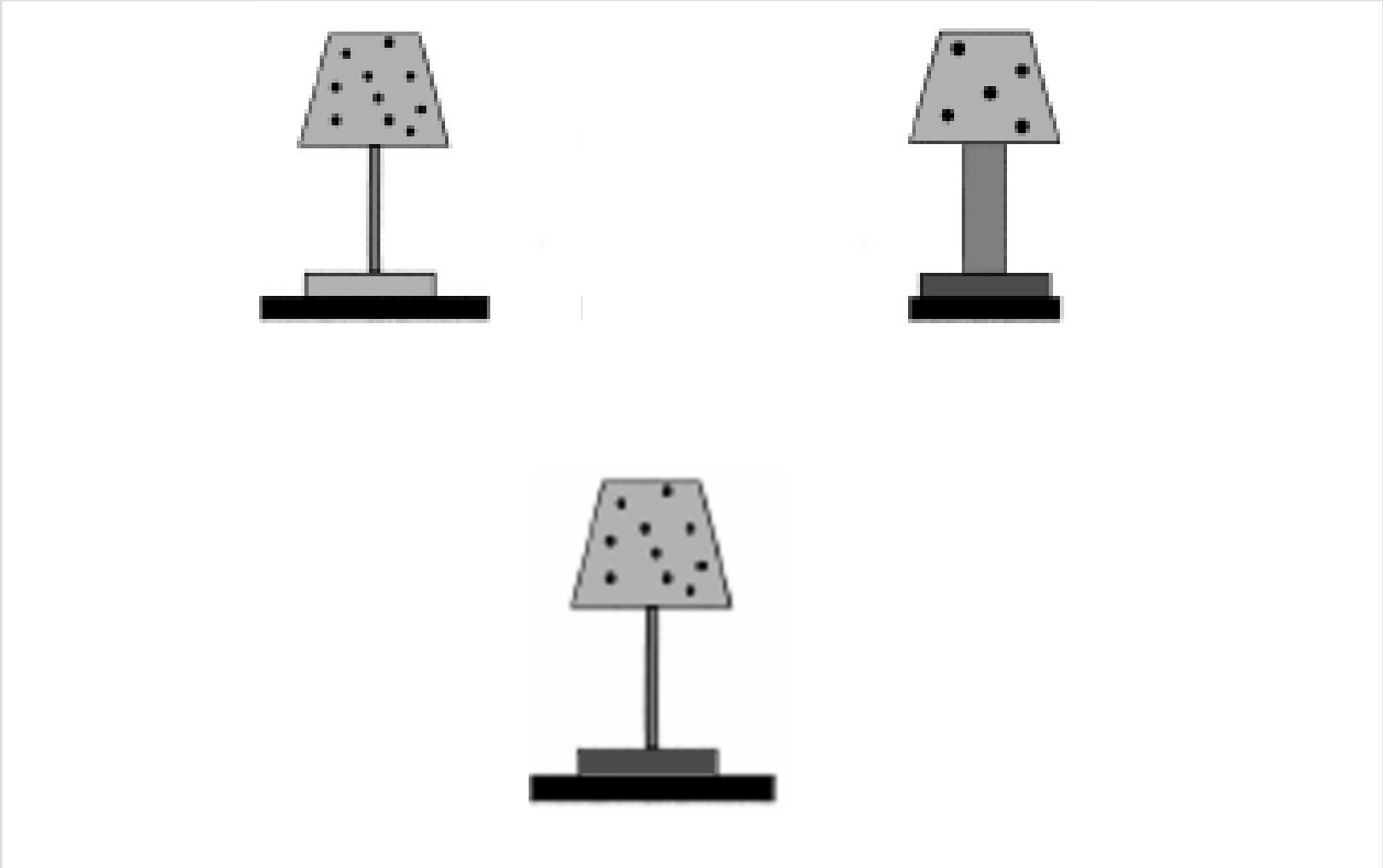
Typical interpretation

- Dimensional classification is
  - analytic
  - effortful
  - explicit
- Overall similarity classification is
  - non-analytic
  - relatively automatic
  - implicit
- COVIS model (Ashby et al., 1998)

On the other hand...

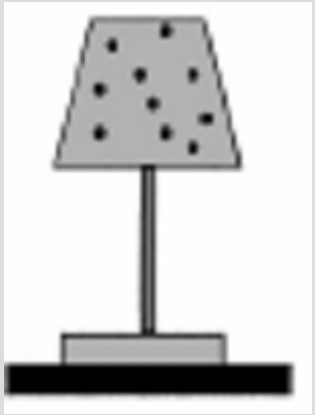
- Single-dimension categories are pretty useless...
  - Most natural categories (Wittgenstein, Rosch) don't take this form, so prediction/communication of afforded actions is likely to be low.
  - One can infer little about an object from its category label (so it has very little communicative value).
- Overall similarity categories, conversely...
  - Better reflect natural categories
  - Allow inductive inference.

Match-to-standards procedure



OS and UD sorting

1 1 1 1



0 0 0 0

Overall similarity

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

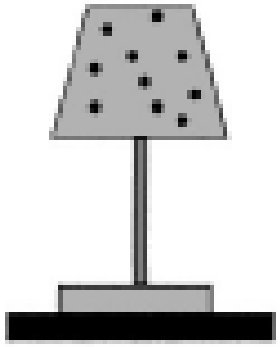
0 0 0 0
1 0 0 0
0 1 0 0
0 0 1 0
0 0 0 1

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

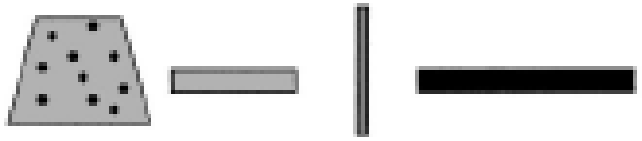
Spatial integration effect



OS 9

UD 9

Spatially integrated



OS 13

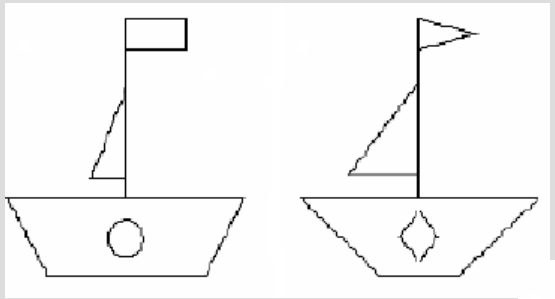
UD 5

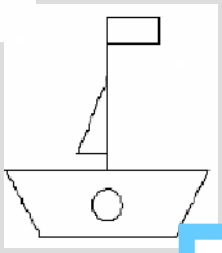
Spatially separate

Milton & Wills (2004)

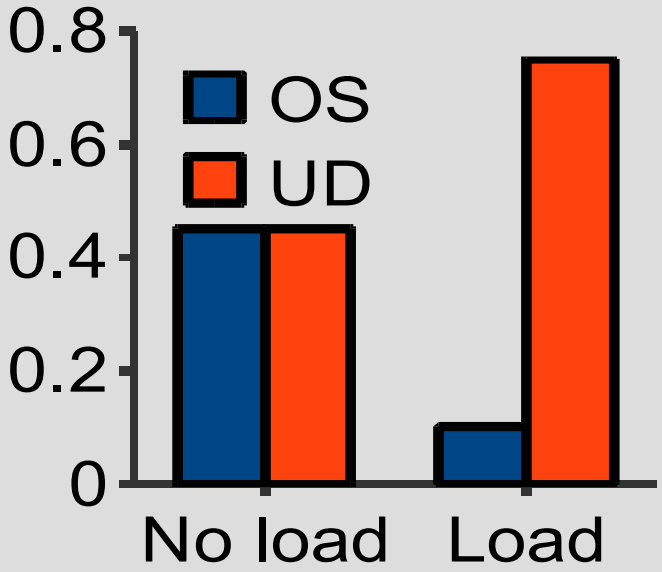
Concurrent load: 2

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



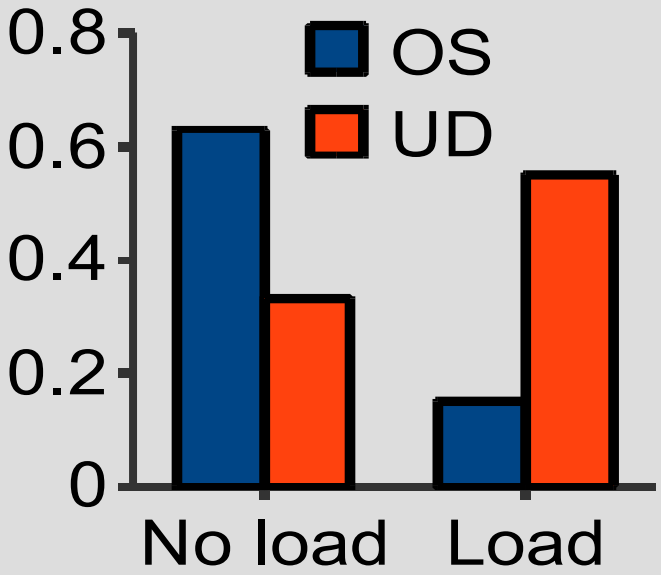


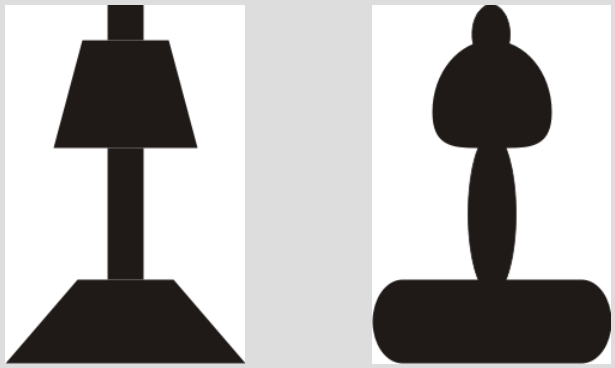
A or B?



Longmore, Milton & Wills (in preparation)

Concurrent load: 3

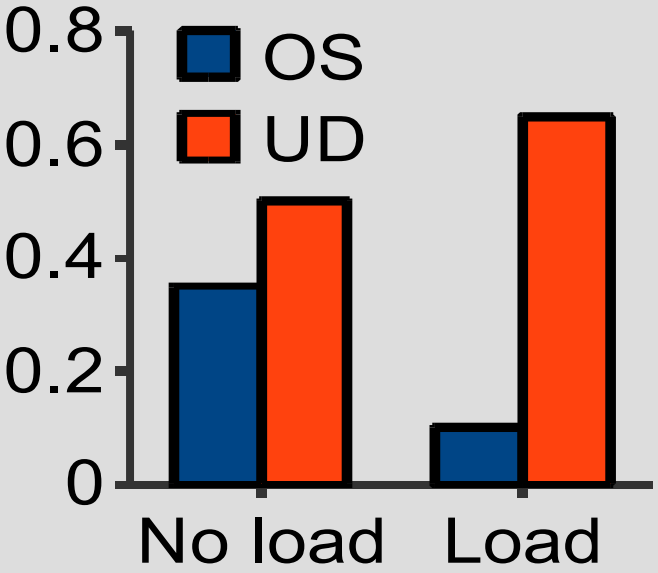


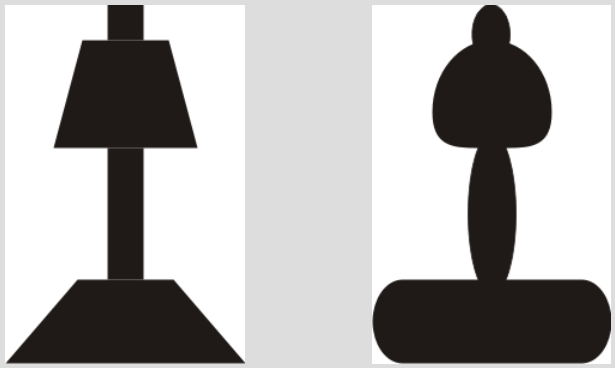


1500ms

Longmore, Milton & Wills (in preparation)

Concurrent load: 4



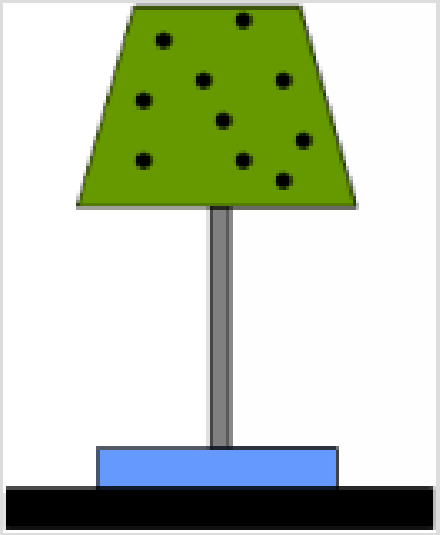


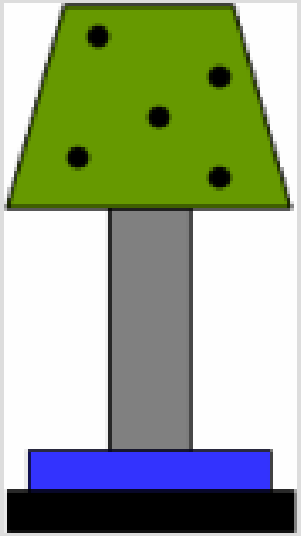
300ms

Longmore, Milton & Wills (in preparation)

Individual differences 1: Working memory capacity

- Operation span (OSPAN)
- OS sorters' mean span: 3.7
- UD sorters' mean span: 2.3

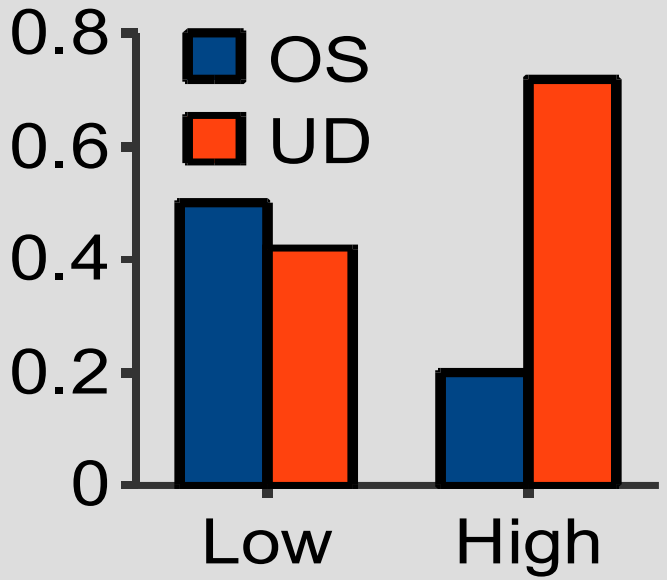




Longmore, Milton & Wills (in preparation)

Individual differences 2: Impulsivity

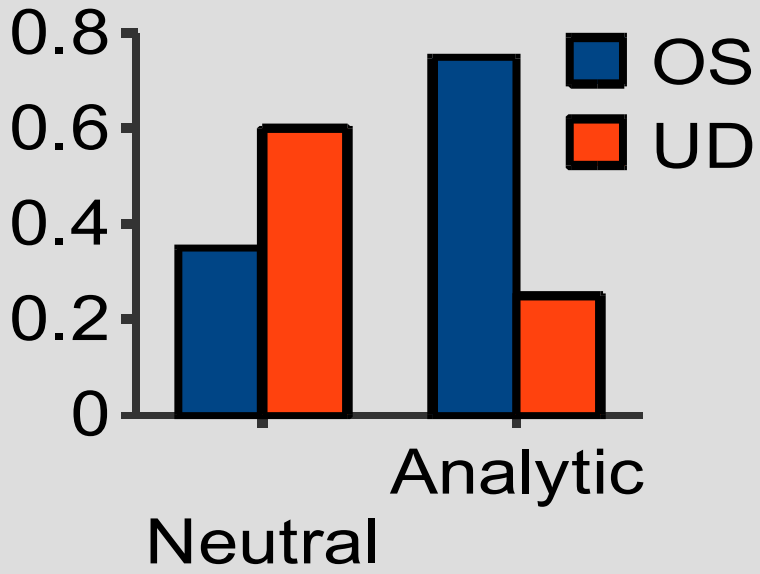
- Barrett Impulsivity Scale
- Median split



Longmore, Milton & Wills (in preparation)

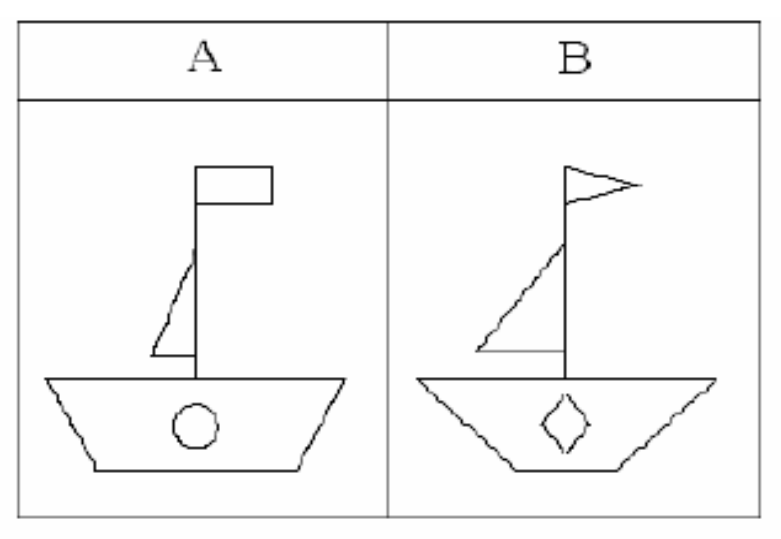
Instructions

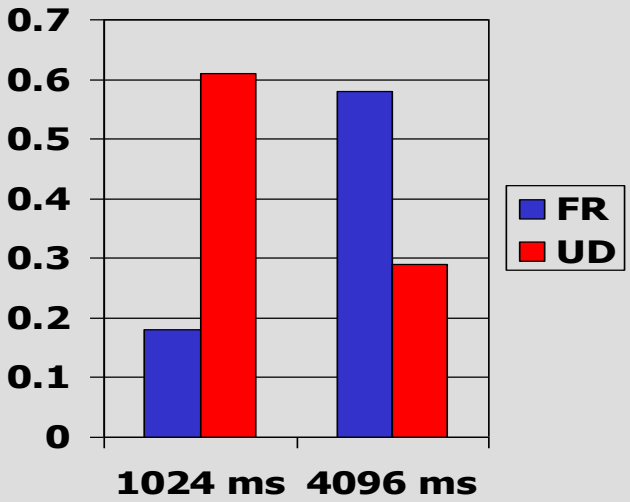
- The pictures you are about to see are quite complex. You should take particular care in your evaluation of how they differ. Study each image in detail. BE METICULOUS! BE CAREFUL!!



Longmore, Milton & Wills (in preparation)

Presentation time: 1





- Milton, Longmore & Wills (in press)

Interim summary

- In the triad task, overall similarity sorting is enhanced by
  - Time pressure
  - Impulsivity
  - “Work on first impressions” instructions
  - Concurrent load
- In the match-to-standards task, all those effects are reversed.
- Why?

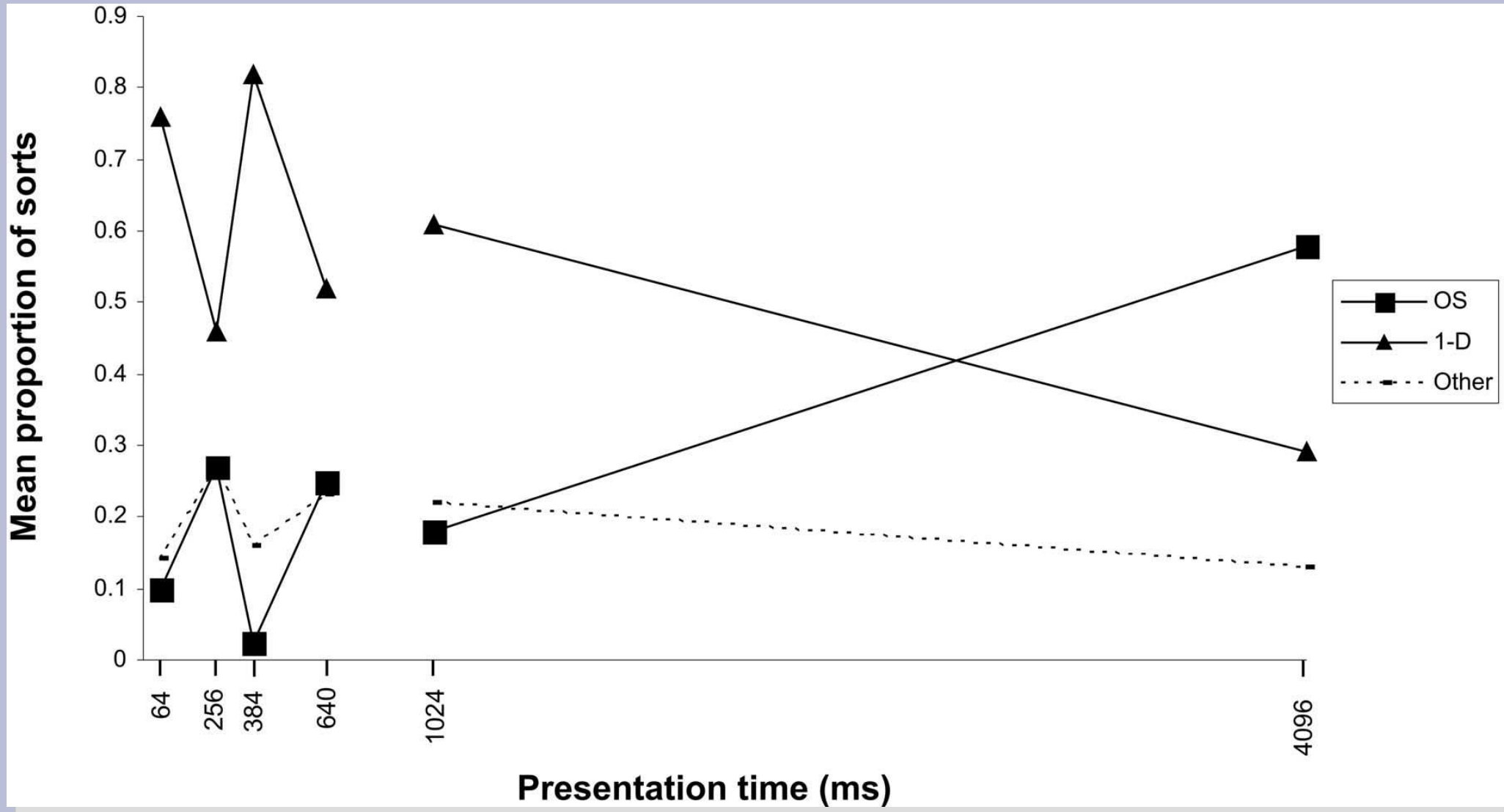
Presentation time: 2

- In the triad task, “high” time pressure is more severe than our “high” time pressure condition.
- Perhaps we're seeing different parts of the phenomenon.

Time and sorting

- The relationship could be quite complex
  - At very short presentation times, sorting might be 1D, as only the most salient dimension is processed.
  - At slightly longer times, participants might see a relatively undifferentiated blob. Sorting would be by OS.
  - At longer times, analysis begins, but only simple (1D) rules have time to be applied.
  - At really long times, participants start considering more complex rules. OS sorting rises again.

Results (Match-to-standards)

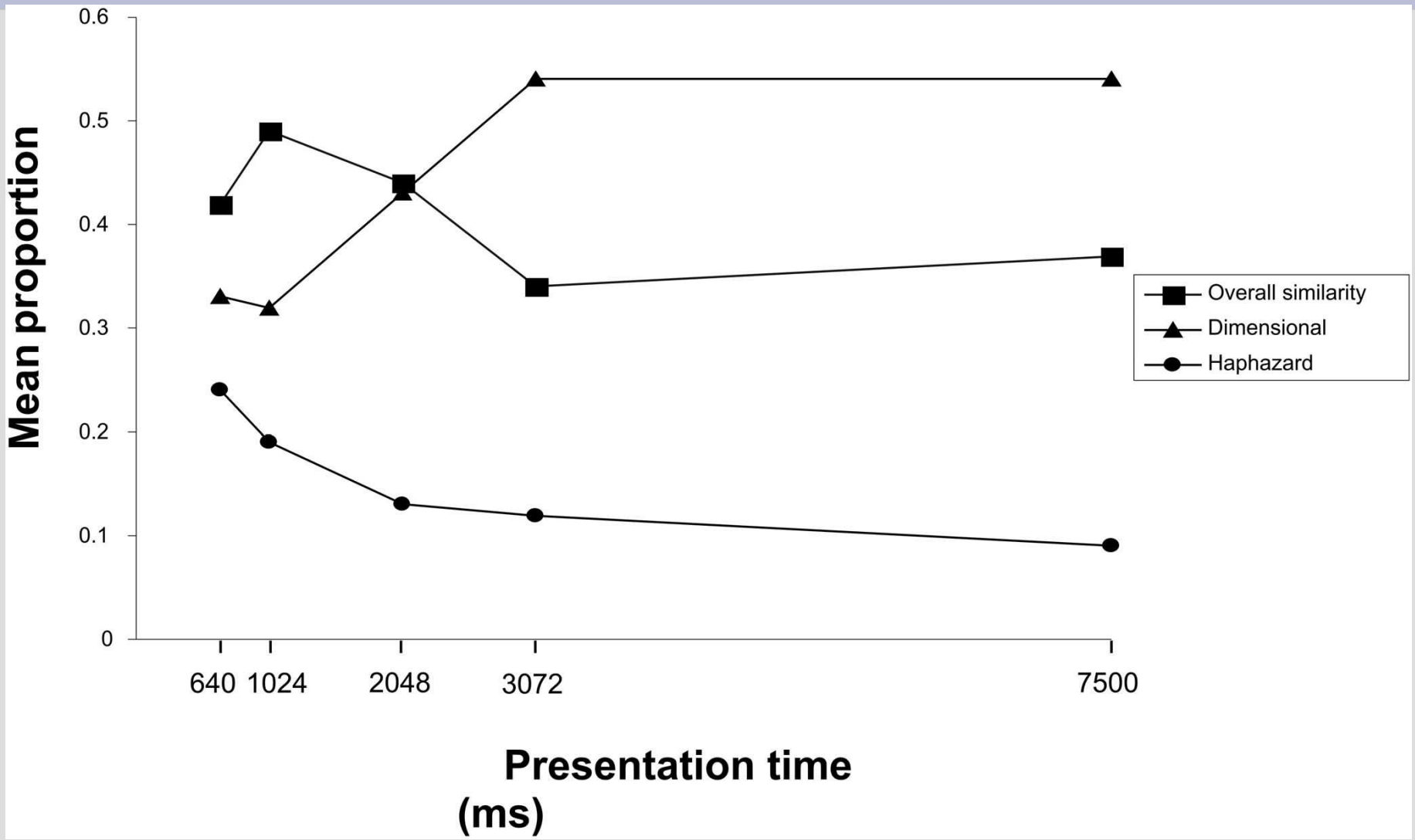


- Milton, Longmore & Wills (in press)

Generality

- Given most of our results, it would clearly be unwise to assume this result was general to all procedures.
- Is the same non-monotonic result seen in the triad task?

Results (Triad task)



- Milton, Longmore & Wills (in press)

Key differences

- We don't see the final rise in overall similarity sorting in triad task.
  - Analytic OS classification is perhaps not common in the triad task.
- With the exception of presentation time, we don't see rises in overall similarity as mental resources are reduced.
  - Non-analytic OS classification is perhaps not common in the match-to-standards task

Conclusions

- It seems unwise to associate a type of classification (OS / UD) with a type of mental process (analytic / non-analytic).
- An analytic / non-analytic distinction seems to have to accept that:
  - Both process types can produce both classification types.
  - Each process only has a “characteristic” classification type within the context of a particular procedure.
  - Small changes in procedure can lead to reversals in characteristic classification type.