Categorization and the Ratio Rule

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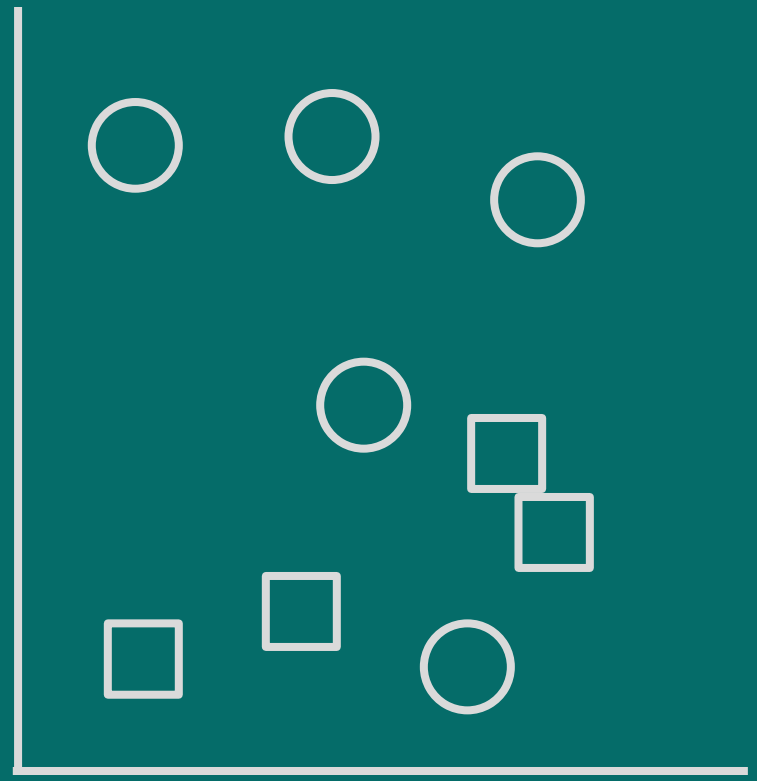
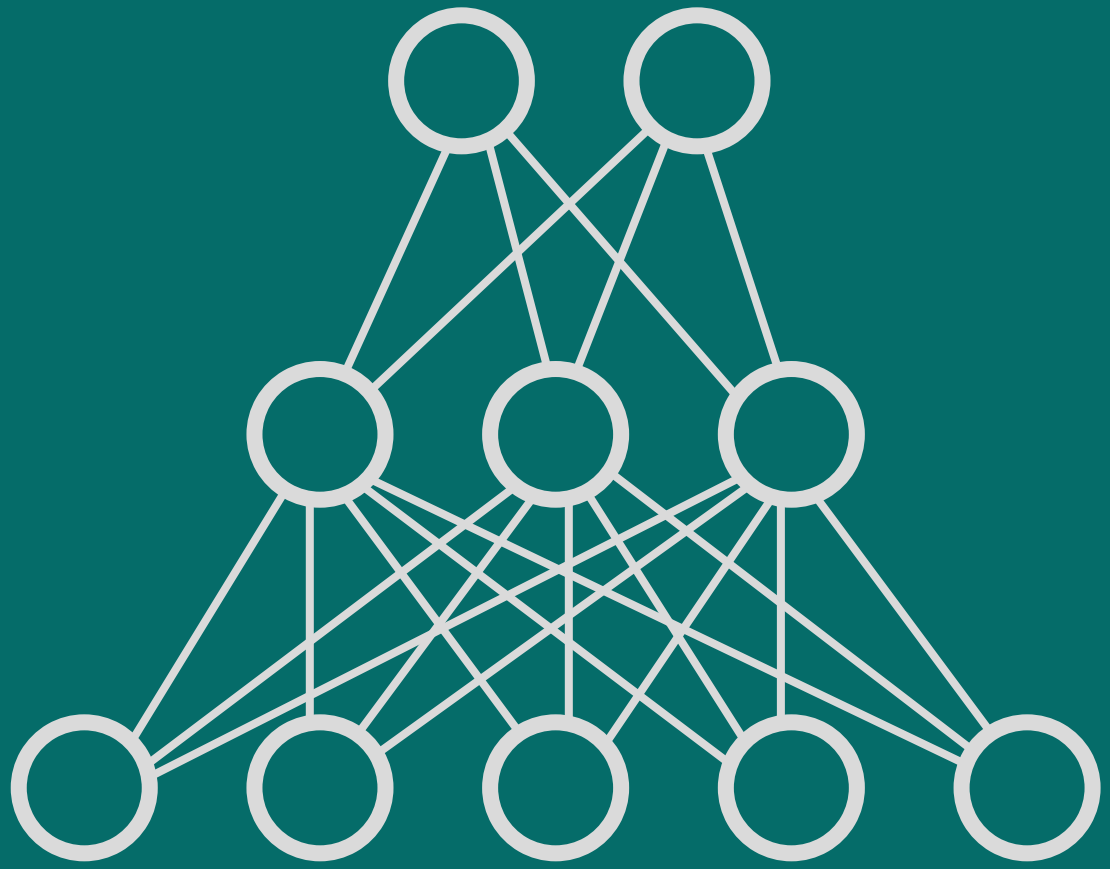
Reference

- Wills, A.J., Reimers, S., Stewart, N., Suret, M. & McLaren, I.P.L. (in press). Tests of the ratio rule in categorization. *Quarterly Journal of Experimental Psychology, Section A.*

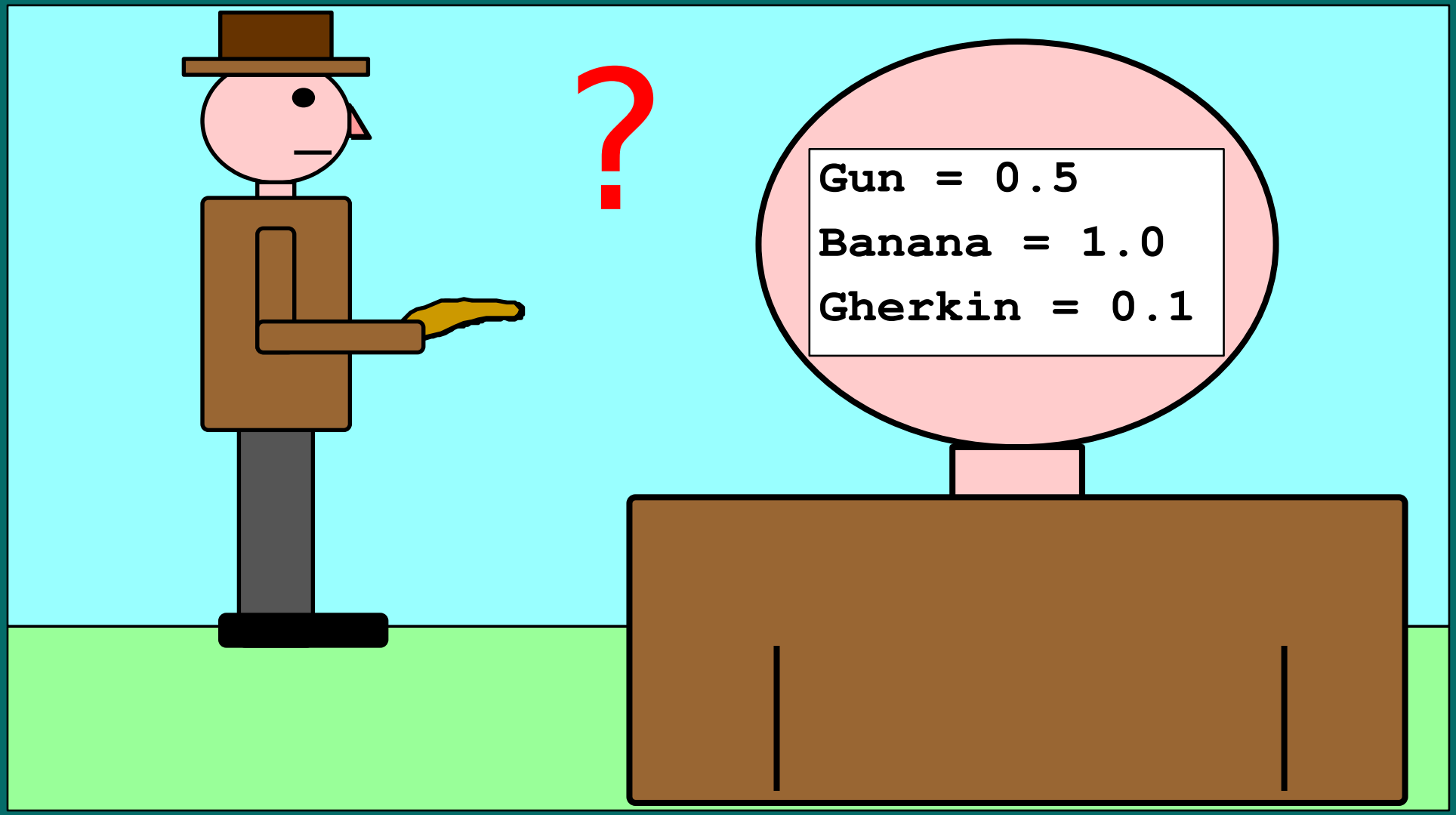
Representations



Representations



Need for action

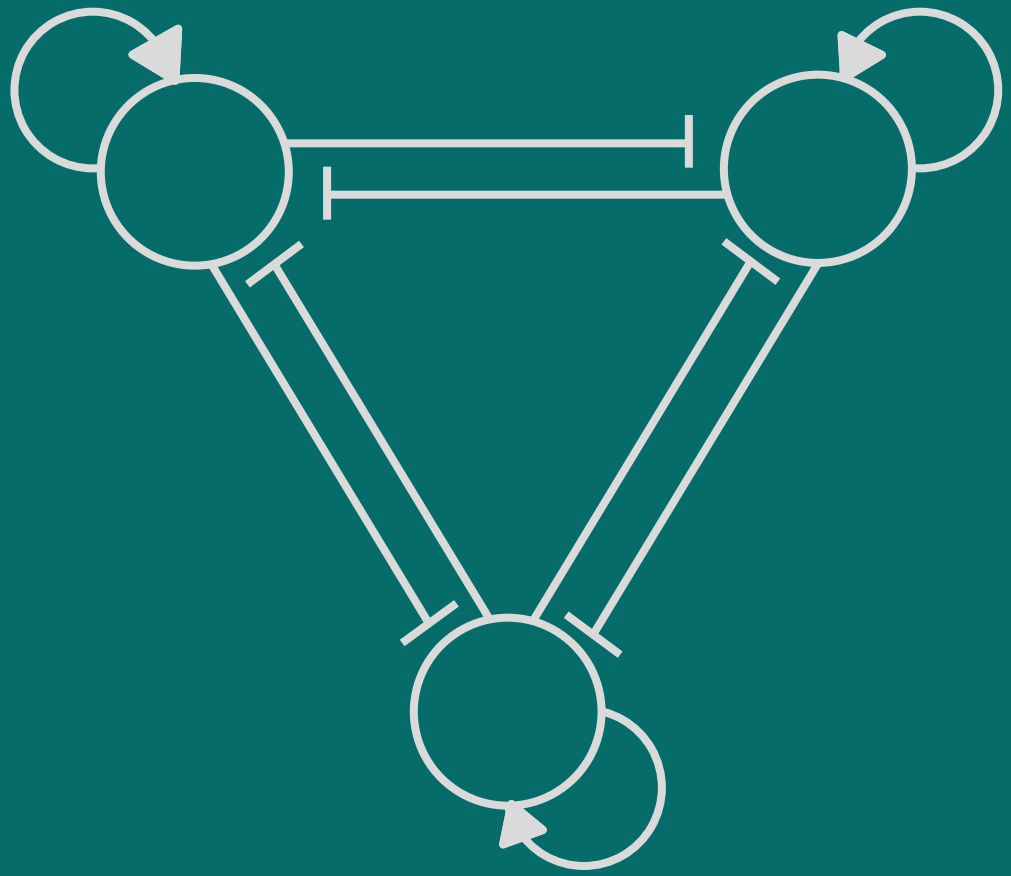


Ratio Rule

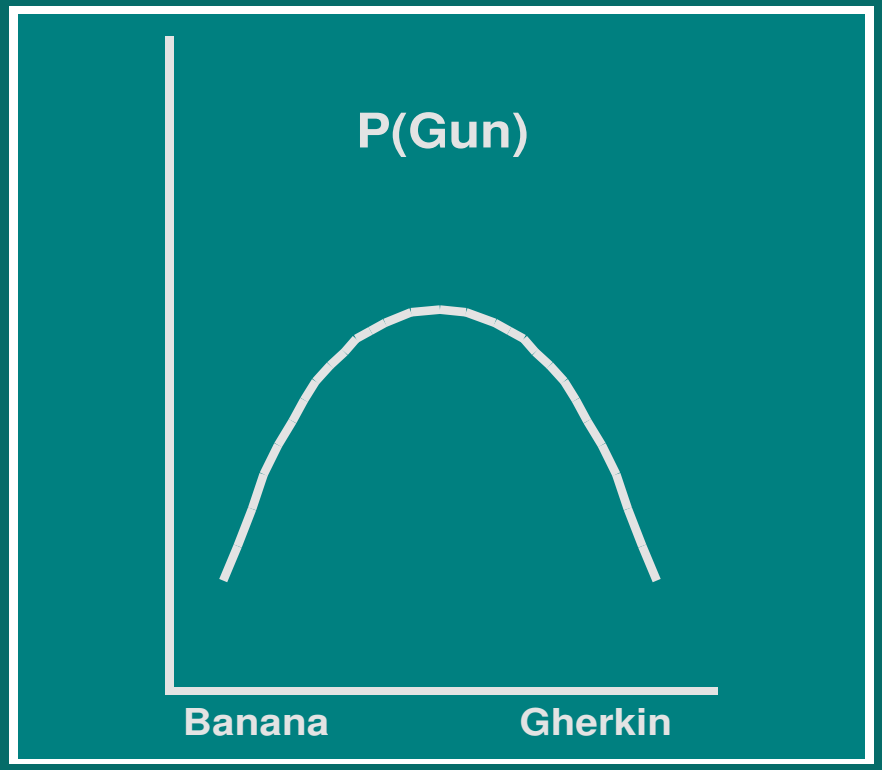
$$P(ba. : gu., ba., gh.) = \frac{\varpi_{\beta\alpha}}{\varpi_{\beta\alpha} + \varpi_{\gamma\upsilon} + \varpi_{\gamma\eta}}$$

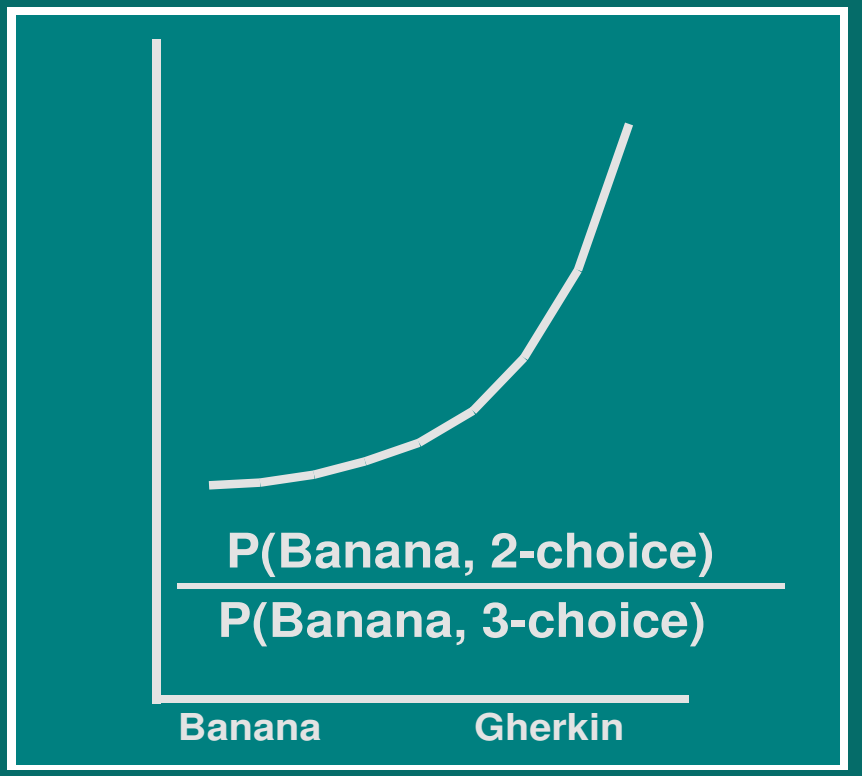
$$P(ba. : ba., gh.) = \frac{\varpi_{\beta\alpha}}{\varpi_{\beta\alpha} + \varpi_{\gamma\eta}}$$

Competitive Decision



Competitions





Ratio Rule predictions

$$P(A : A, B, C) = \frac{\varpi_A}{\varpi_A + (\varpi_B + \varpi_X)}$$

$$\frac{P(B : B, C)}{P(B : A, B, C)} = \frac{\varpi_A}{\varpi_B + \varpi_X} + 1$$

Stimuli

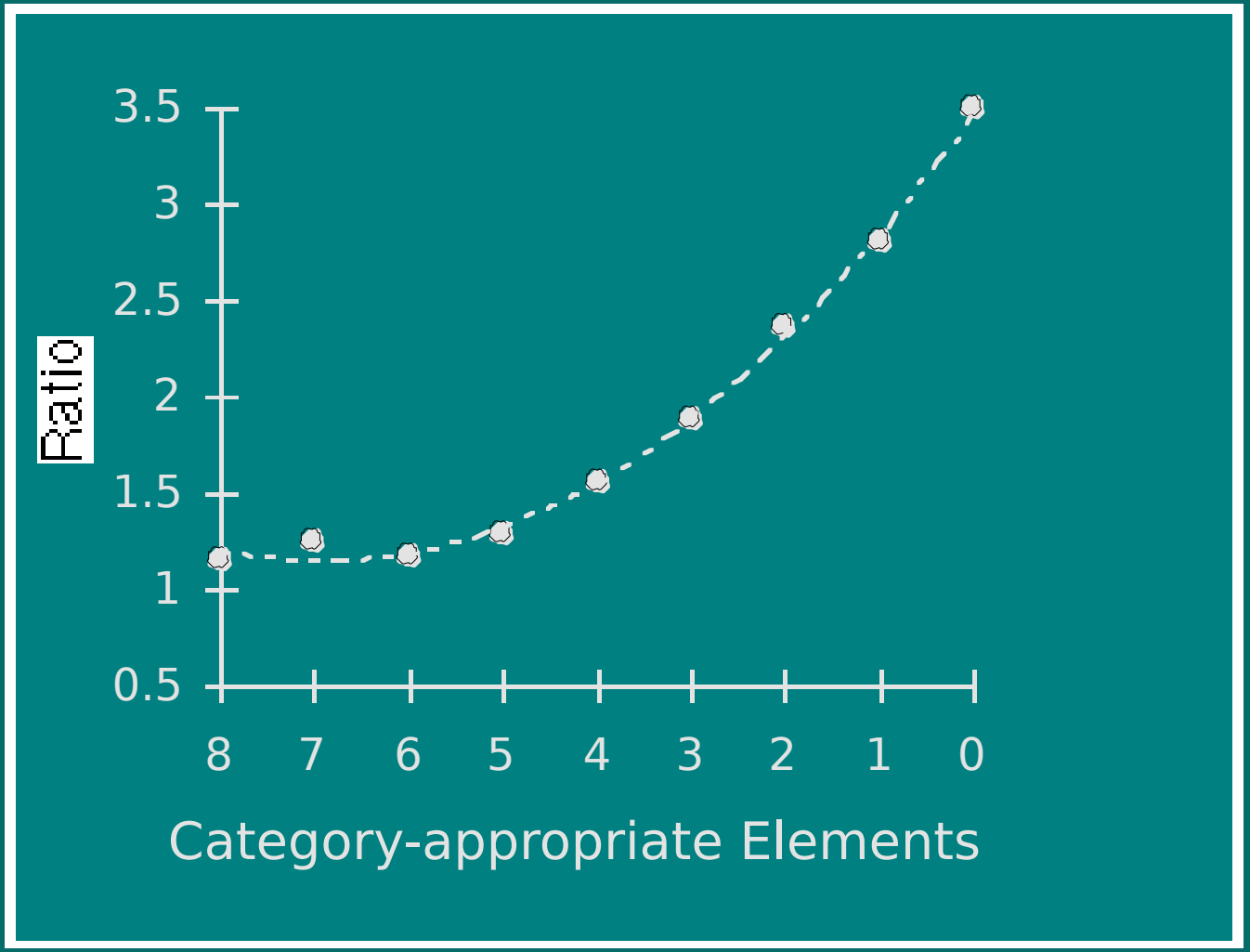
Procedure

- Training:
  - 30 examples of A,B, and C.
- Test:
  - 10 examples of each of the following:

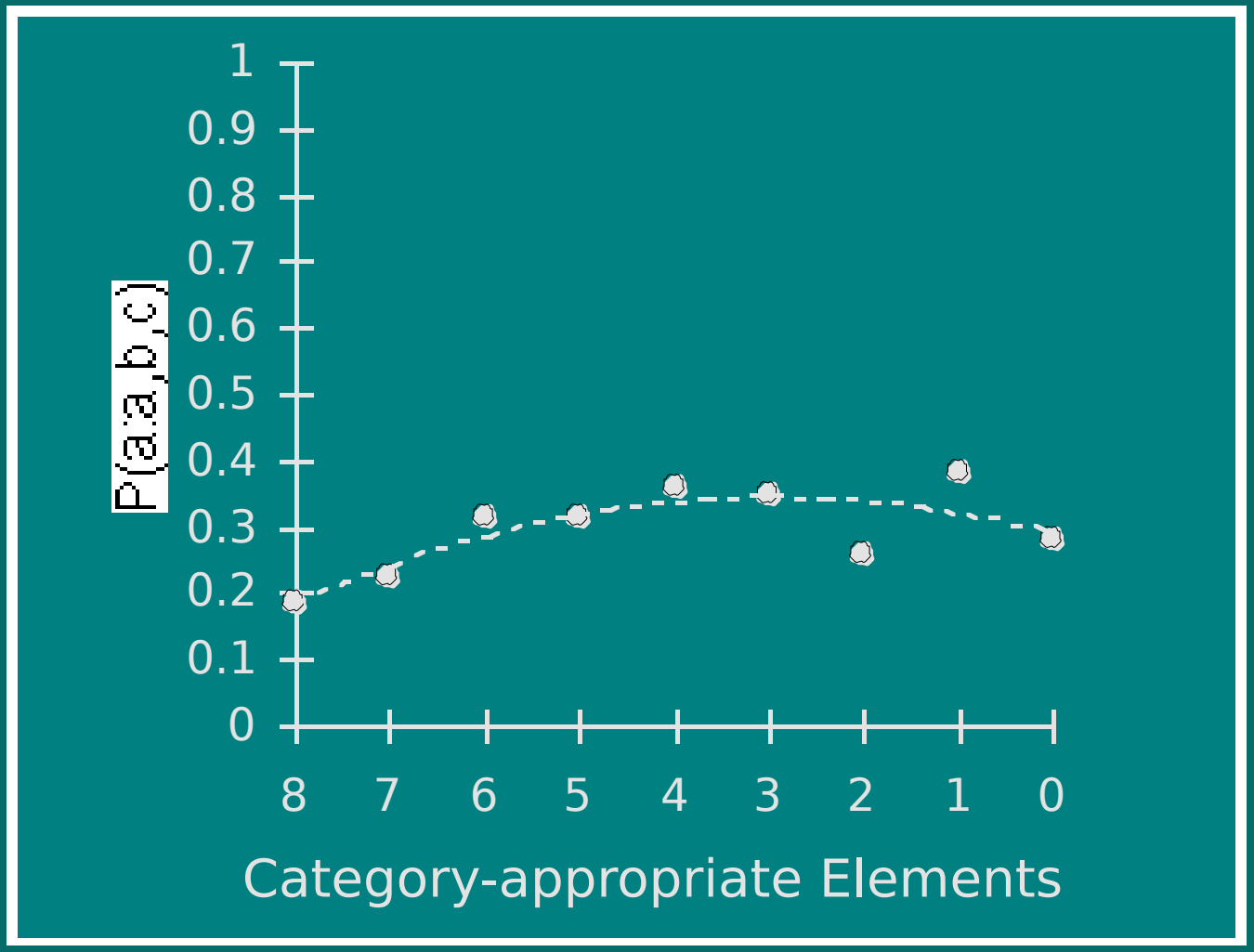
A		4	4	4	4	4	4	4	4
B	8	7	6	5	4	3	2	1	0
C	0	1	2	3	4	5	6	7	8

  - 30 fillers (e.g. 8A,0B,4C)

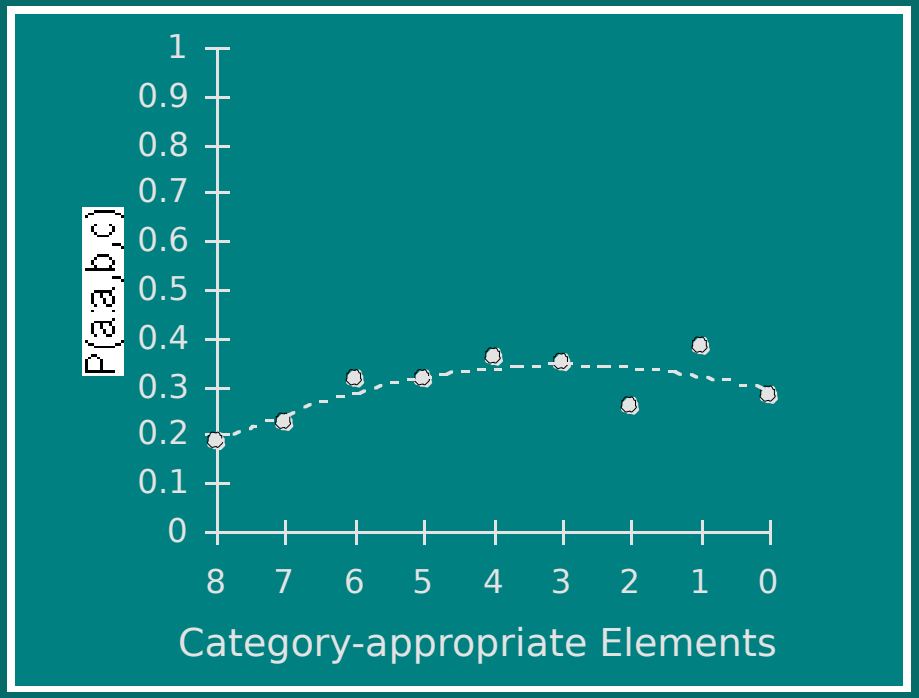
Results

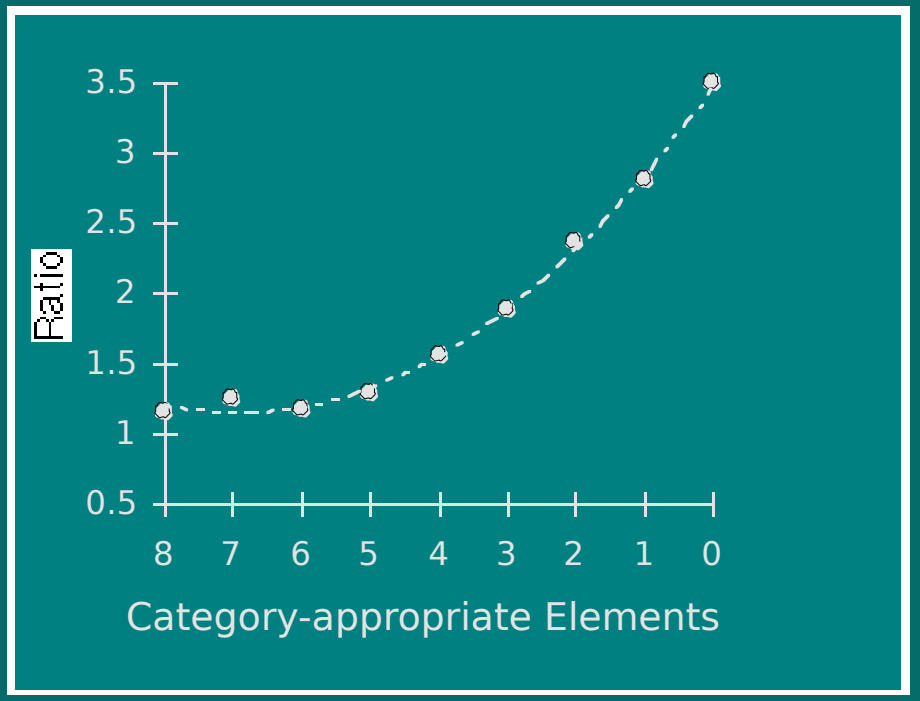

3.5
3
2.5
2
1.5
1
0.5
Ratio
8
7
6
5
4
3
2
1
0
Category-appropriate Elements

Results


P(a,b,c)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
8
7
6
5
4
3
2
1
0
Category-appropriate Elements

Results


P(a,a,b,c)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
8 7 6 5 4 3 2 1 0
Category-appropriate Elements


Ratio
3.5
3
2.5
2
1.5
1
0.5
8 7 6 5 4 3 2 1 0
Category-appropriate Elements

Summary

- Formal theories of categorisation concentrate on representation.
- We also need a theory of action.
- The Ratio Rule is the default theory.
- Considering categorical decisions as ***truly*** competitive seems more appropriate.