Towards exploring adaptive and associatively reactive answer strategies to creativity test queries

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Scope

- Cognitive system series to investigate creative processes;
- Current focus: adaptive switch strategies; current task: the Remote Associates Test (RAT)

Remote Associates Test (Mednick 1971)

- 3-item problems
COTTAGE SWISS CAKE
- Find a 4th item, common to all
CHEESE

comRAT-C

- Solves the RAT computationally (Oltețeanu and Falomir, 2015)

$c_1 = falling, c_2 = Actor, c_3 = Dust$
 $c_4 = ?, \text{ so that}$
 $\exists PT_1 = \{c_1, c_4\}, \exists PT_2 = \{c_2, c_4\}, \exists PT_3 = \{c_3, c_4\}$

$PT_1 = Falling Star, PT_2 = Star Actor, PT_3 = Star Dust$
 $c_4 = Star$

Accuracy

Answer/items known	0 items	1 item	2 items	3 items	Total
Correct	0	0	17	47	64
Plausible	2	11	12	1	26
Not solved	4	23	27	0	54
Total	6	34	56	48	
Accuracy			30.36%	97.92%

Plausible answers

RAT Query	Besides Correct answer	New correct or plausible non-matching answer
French Car Shoe	HORN	COMPANY
Mill Tooth Dust	SAW	GOLD
Change Circuit Cake	SHORT	DESIGN
Cat Number Phone	CALL	HOUSE
Off Military First	BASE	PAY
Child Scan Wash	BRAIN	BODY
Home Sea Bed	SICK	WATER
Cry Front Ship	BATTLE	WAR

compound vs. functional RAT

≥ 2 categories of RAT (Worthen and Clark, 1971)

- Functional associates = semantic relationship (+/- linguistic relation)

BIRD & FEATHER

BLACK & WHITE

- Structural (compound) associates = linguistic relationship (compound joint or separate pairs)

FEATHER & DUSTER

BLACK & MAGIC

comRAT-G (Oltețeanu, Schultheis, Dyer, 2016)

Generating queries computationally, rather than answering them => advantages for cog. psych: sets of controlled queries

- Built 17 mill. query set – compound noun queries

Strategies observed when the query is hard (both F and P low)

a) strength of assoc. prevails over convergent proc.

w_1	w_2	w_3	Conv. answer	Actual answer
trophy	eggs	scales	fish $P(w_{ans} w_1) = 0.1034$; $fr(w_1, w_{ans}) = 33$	case $P(w_{ans} w_1) = 0.2132$ $fr(w_1, w_{ans}) = 68$

b) answer as if the query is functional +/- >strength

w_1	w_2	w_3	Conv. answer	Actual answer
trophy	eggs	scales	fish $P(w_{ans} w_3) = 0.1163$; $fr(w_3, w_{ans}) = 47$	weight $P(w_{ans} w_3) = 0.4797$ $fr(w_3, w_{ans}) = 71$

Low Frequency and Probability, 20 queries, n=24

Correct	Compound	Functional	No Answer	Meaningless
19.71%	29.71% $w_1 = 25.74\%$ $w_2 = 2.79\%$ $w_3 = 1.18\%$	19.71% verified – 13.53% unverified – 6.18%	10%	21%

Conclusion and future work

We observed: Adaptive use of *multiple types* of associates, with strength of association playing an important role (despite clear instruction)

Future work

- Test wider scale with items that can have both functional and compound answers
- Find the threshold where the search mechanisms switched from convergence to being strength of association reliant
- Any visual/linguistic switch?
- Application for robustness of search in computational queries, when not enough knowledge – multi context embedding.

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References

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