Grapheme-Color Synesthesia in Autistic Adults

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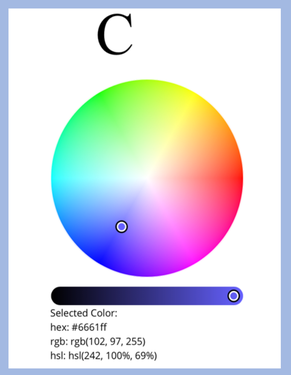
BACKGROUND

- Synesthesia: cognitive representations in one modality (e.g. graphemes, musical notes) trigger an internal sensory experience (e.g. a specific color)
- Reported as more prevalent in autism than in the general population[1]; may be associated with autistic traits, including sensory sensitivities[5]

OBJECTIVES

- Understand the prevalence of grapheme-color synesthesia in autistic (ASD) versus non-autistic (NA) individuals
- Measure self-reported synesthesia and objective grapheme-color task performance
- Examine associations with autistic symptomology and circumscribed interests

METHODS



Participants:
- Recruited through Prolific

Measures:
- Autism Spectrum Quotient (AQ-Short)[2]
- Yale Special Interests Survey (YSIS)[4]
- Two-trial synesthesia assessment, selecting on an RGB color wheel the best match for graphemes A-Z and 0-9

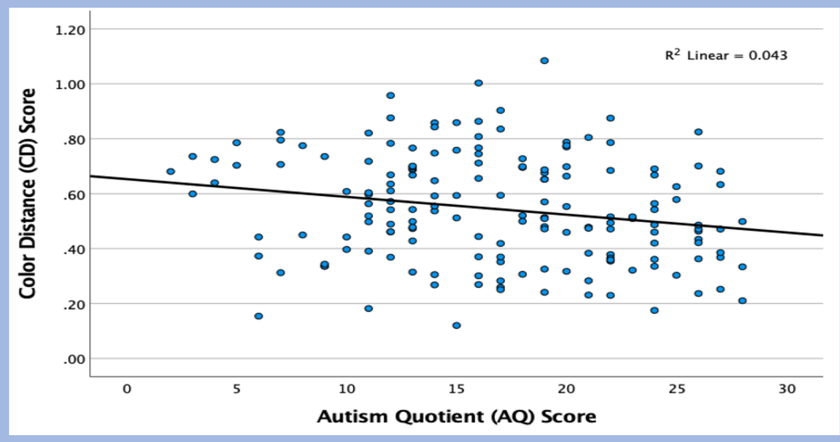
Analysis:
- RGB Euclidean distance formula used to calculate color distance (CD) scores[3]
- Lower CD scores indicate greater consistency
- Threshold of 0.32: cut-off for grapheme-color synesthesia

Autistic traits are associated with synesthesia, but autistic and non-autistic adults perform the same on an objectively measured synesthesia task

	Autistic (ASD; n=120)	Non-autistic (NA; n=47)	F/χ^2	*p*
Age	32 (10.19)	34 (11.77)	3.65	.058
Gender	43% male, 43% female, 3% trans, 11% non-binary or agender	36% male, 64% female, 0% trans, non-binary or agender	10.25	.069
Race	88% white, 3% Black, 2% Asian, 5% multiracial, 2% unknown	79% white, 4% Black, 9% Asian, 6% multiracial, 2% unknown	5.01	.287
Bilingual (% yes)	18%	28%	1.97	.160
AQ-Short Score	19 (5.81) 3-28	12 (4.88) 2-22	3.21	.075
Color Distance Score	.53 (.19)	.58 (.21)	.40	.526
Special Interests	2 (2.01)	1(1.40)	8.02	.432
Word, Number, or Color Special Interests (% yes)	26%	11%	2.90	.089
Hyperlexia Letters, Numbers, or Both	61%	47%	3.33	.344

Note: Data presented as M(SD) or %

RESULTS



- 20% of the ASD group reported experiencing grapheme-color synesthesia, compared to 11% of the NA group, p=.15
- No difference in objective synesthesia (CD scores): 13% of the ASD group and 15% of the NA group scored below the CD threshold, p=.92
- 7/120 (5.8%) autistic and 2/47 (4.3%) NA self-reported synesthesia and had highly color consistent responses
  - Most consistent scores: 0, 2, 4, 5, 6, 9; B, H, M, R, T, Z
- CD and AQ-Short scores: correlated r(165)=-.21, p=.007
- Both groups: those with more circumscribed interests had more color consistent responses: $X^2(8, N = 167) = 24.3$, $p = .002$

CONCLUSIONS

- Increased prevalence (but not significantly) of self-reported synesthesia in autism; no difference in objectively-measured synesthesia between groups
- Correlation between autism traits and grapheme-color synesthesia
- Limitations: mildly affected sample, no sensory questionnaire
- Advantages and disadvantages of increased sensory processing in ASD:

\+ Information integration
\+ Enhancing memory
\+ Enriched experiences
\- Sensory overload
\- Distraction

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