

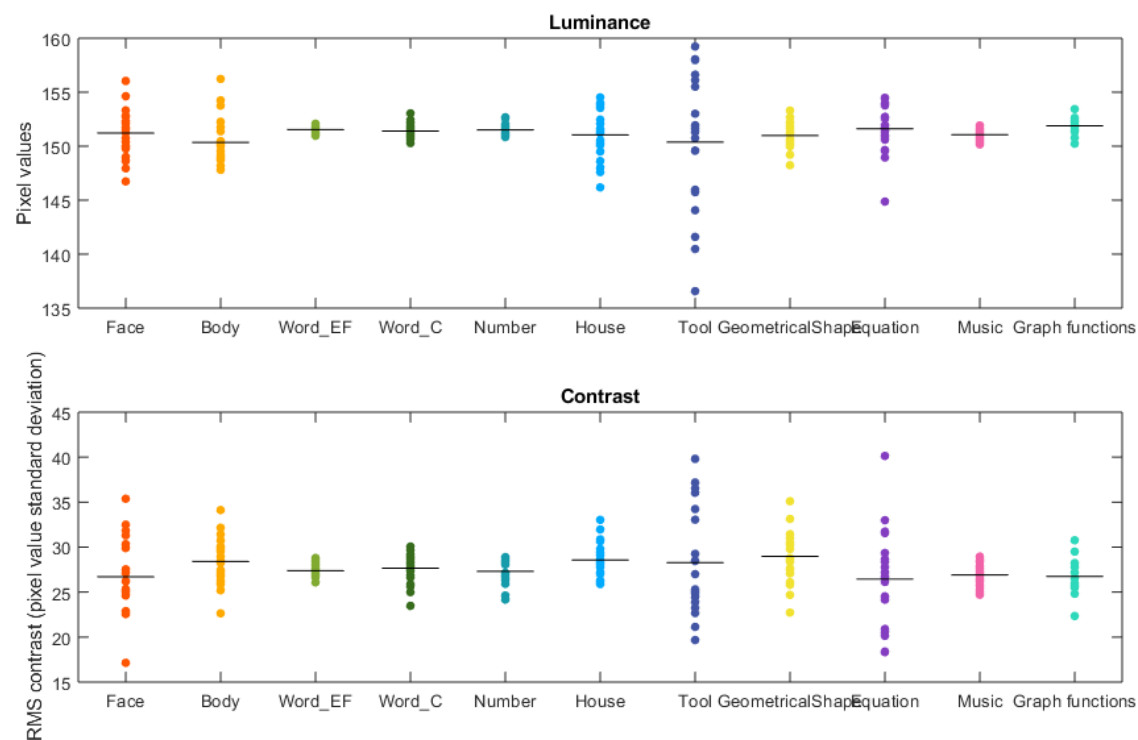
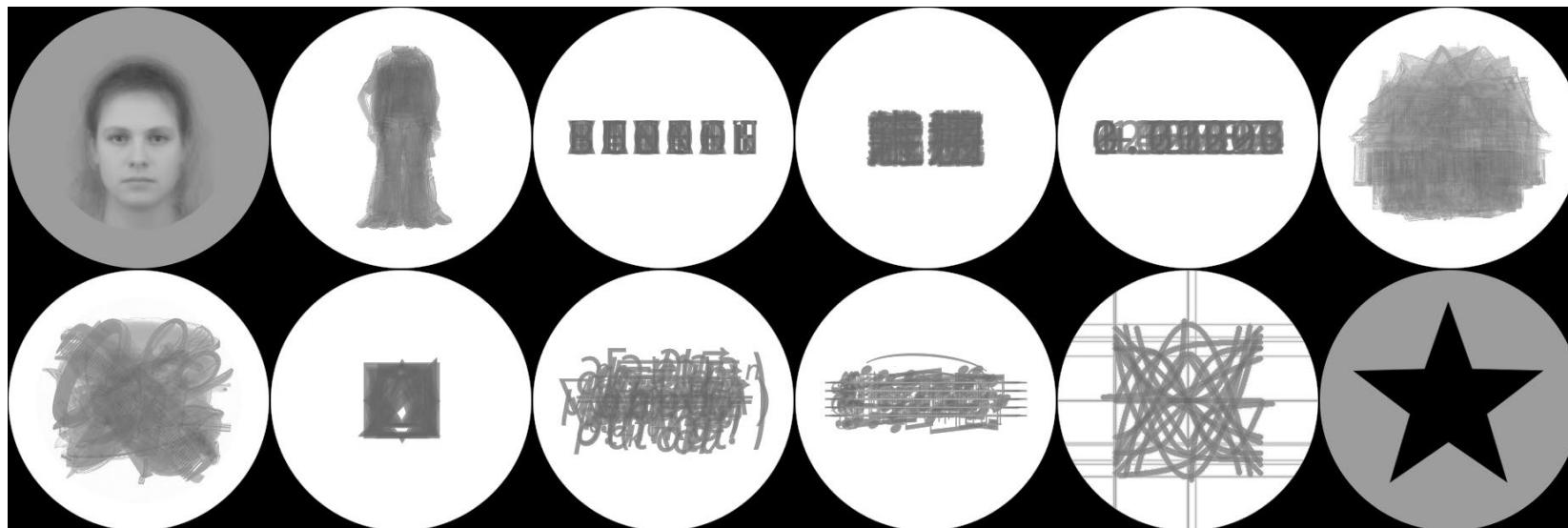
Big40Math localizer stimuli: properties

Categories	Properties	Numbers	Pixels (W, H, resolution=72 dpi)
Faces	Neutral, KDEF	20 (10 males)	Height within 215 px
Bodies	Without head, to avoid possible FFA activation	20 (10 males)	Height within 215 px
WordsEF	6-letter words with similar frequencies (difference within 5 per million) in both English & French. Word frequency ranges from 8.67 to 53.63 per million in film subtitles (Lexique 3.83, BLP)	20 (all uppercase)	Within 223 x 50 px Font: Consolas, letter distance=100, letter width=90%, letter height=94% 66 points
WordsC	2-character Chinese words. Word frequency ranges from 7.24 to 128.15 per million in film subtitles (Subtlex-CH)	20	Within 140 x 67 px Font: Source Han Mono, letter distance=100, letter width=90%, letter height=94% 71.27 points, similar stroke thickness to Consolas
Numbers	Famous mathematical constants, 6 to 7 digits (including the decimal point, +, -)	20	Within 225 x 41 px Font: Consolas, 66 points
Houses	Gray-scale	20	Within 235 x 204 px
Tools	Handheld tools, half in a position graspable by the left hand	20	Within 223x 196 px longer axis within 241 px
Geometrical shapes	10 types of single geometrical shapes (2 each)	20	Within 98 x 103 px
Equations	Famous equations	20	Within 248 x 126 px Fonts: Myriad Pro, Arial Unicode MS, Noto Sans letter width=90%, letter height=94% 66 points, varied letter distances
Music	6-7 symbols, selected from famous classical music pieces, or simple musical components (e.g. arpeggio). 6 with treble clef, 4 with bass clef, 10 without clefs. All elements within one bar. Staff line height similar to the height of WordsEF & numbers.	20	Within 239 x 96 px Font: Bravura Staff line thickness: 0.15 sp
Math graph functions	Famous functions.	20	Within 206 x 194 px Axes thickness=1 px Graph line thickness=7 px, round ends

Task: detecting a star, appearing in half of the object blocks (6th - 20th stimulus)



The range of 20 stimuli for each category



Controlled across categories within the circle:
Mean luminance (pixel value)
mean RMS contrast (SD of pixels across the image).

Literature related to the stimuli:

Chinese words, and the rendering of most stimuli categories:

Zhan, M., Pallier, C., Agrawal, A., Dehaene, S., & Cohen, L. (2023). Does the visual word form area split in bilingual readers? A millimeter-scale 7-T fMRI study. *Science Advances*, 9(14), eadf6140.

Individual categories

Faces:

Lundqvist, D., Flykt, A., & Öhman, A. (1998). The Karolinska directed emotional faces (KDEF). *CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet*, 91-630.

Bodies:

de Gelder, B., & Van den Stock, J. (2011). The Bodily Expressive Action Stimulus Test (BEAST). Construction and Validation of a Stimulus Basis for Measuring Perception of Whole Body Expression of Emotions. *Front Psychol*, 2, 181. doi: 10.3389/fpsyg.2011.00181

Numbers:

9 words and 12 numbers from the category localizer in Amalric & Dehaene (2016)

Amalric, M., & Dehaene, S. (2016). Origins of the brain networks for advanced mathematics in expert mathematicians. *Proc Natl Acad Sci U S A*, 113(18), 4909-4917. doi: 10.1073/pnas.1603205113

Houses, tools:

16 houses and 18 tools from the category localizer in Zhan, Goebel, de Gelder (2018)

Zhan, M., Goebel, R., & de Gelder, B. (2018). Ventral and Dorsal Pathways Differently Related to Visual Awareness of Body Postures under Continuous Flash Suppression. *eNeuro*, ENEURO. 0285-0217.2017.

Geometrical shapes:

Sablé-Meyer, M., Fagot, J., Caparos, S., van Kerkoerle, T., Amalric, M., & Dehaene, S. (2021). Sensitivity to geometric shape regularity in humans and baboons: A putative signature of human singularity. *Proceedings of the National Academy of Sciences*, 118(16), e2023123118.