

Online Supplement

Behavioral Correlations within the Younger Adult Group

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	1													
2. Education	0.84***	1												
3. Stroop Effect	-0.11	-0.01	1											
4. Total Verbal Fluency	0.20	0.16	-0.41*	1										
5. FAS Total	0.20	0.10	-0.36*	0.92***	1									
6. Animals Total	0.13	0.20	-0.35	0.77***	0.47**	1								
7. Vocabulary	0.26	0.48**	-0.07	0.22	0.19	0.19	1							
8. Simple Speed (ms)	0.21	0.15	-0.25	0.02	0.07	-0.08	0.27	1						
9. Complex Speed (ms)	0.24	0.22	-0.07	-0.16	-0.11	-0.19	0.23	0.45*	1					
10. Immediate Recall	-0.06	0.03	-0.05	0.25	0.14	0.35	0.48**	0.13	0.02	1				
11. Delayed Recall	-0.02	0.15	-0.18	0.31	0.14	0.47**	0.47**	0.02	0.07	0.78***	1			
12. Recognition	0.00	0.18	-0.40*	0.15	0.01	0.33	0.32	-0.11	0.03	0.37*	0.51**	1		
13. Nonverbal Working Memory	-0.09	0.15	0.16	-0.23	-0.22	-0.16	0.16	0.14	0.20	0.02	0.16	0.04	1	
14. Naming Accuracy	0.19	0.38*	-0.11	0.23	0.16	0.26	0.69***	0.24	0.12	0.38*	0.39*	0.28	0.18	1

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1. Age	1													
2. Education	0.04	1												
3. Stroop Effect	0.10	0.20	1											
4. Total Verbal Fluency	-0.16	0.35	0.01	1										
5. FAS Total	-0.13	0.38*	-0.06	0.91***	1									
6. Animals Total	-0.02	0.03	0.08	0.33	-0.08	1								
7. Vocabulary	0.03	0.62***	0.15	0.36**	0.29*	0.22	1							
8. Simple Speed (ms)	0.11	-0.24	0.20	0.03	-0.04	0.13	0.02	1						
9. Complex Speed (ms)	0.51**	-0.16	0.30	-0.14	-0.21	0.19	0.11	0.61***	1					
10. Immediate Recall	-0.27	0.19	0.06	0.59**	0.46*	0.34	0.33*	0.16	-0.15	1				
11. Delayed Recall	-0.26	0.15	0.14	0.51**	0.38*	0.29	0.30	0.07	-0.06	0.88***	1			
12. Recognition	0.02	0.20	0.27	0.18	0.14	0.07	0.21	0.24	0.14	0.46**	0.49**	1		
13. Nonverbal Working Memory	-0.36*	-0.29	-0.02	0.23	0.26	-0.15	-0.18	0.01	-0.35	0.10	0.15	0.07	1	
14. Naming Accuracy	-0.43**	0.13	0.09	0.47**	0.40**	0.19	0.12	0.16	-0.46*	0.47**	0.51**	0.16	0.6***	1

Order effects

While conditions were randomized within each run for all participants, run order was only counterbalanced for younger adults. To assess for possible effects of order, we ran a linear regression analysis testing for a main effect of run order on accuracy, or an interaction between age group and run order to determine if there were any differential effects of run order on accuracy between groups.

Behavioral Order Effects

Results indicated there was a main effect of run order, in which participants named pictures more accurately in the second run compared to the first run, $\beta = 0.04$, $F(3, 10780) = 11.08$, $p < .001$. The interaction between group and run order on accuracy was also significant, $\beta = -0.04$, $F(3, 10780) = 4.46$, $p = .03$. To better understand the interaction, we examined the simple effect of run order within each group. Results indicated that older adults were more accurate in the second run than in the first run, $\beta = 0.04$, $F(1, 5383) = 10.69$, $p < .001$, and that there was no significant differences in run accuracies within younger adults, $\beta = 0.004$, $F(1, 5397) = 0.12$, $p = .7$, suggesting that the older adults were driving the main effect of run order on accuracy. We also ran two additional order effects analyses after determining that the older adults were driving the main effect of run order on accuracy to determine whether there were significantly different effects of accuracy between each run. We found that during run one, younger adults performed significantly better than the older adults, $\beta = 0.06$, $F(1, 5383) = 22.8$, $p < .001$; however, during run two, there were no significant differences in accuracy performance between younger and older adults, $\beta = 0.01$, $F(1, 5397) = 3.47$, $p = .06$, meaning that older adults' performance significantly improved during the second run.

fMRI Order Effects

A separate analysis was conducted to determine if there were effects of run order on functional activation. Results indicated that there were no main effects of run order on functional activation.

However, there was a significant interaction between run order and group. Overall, younger adults had more functional activation in the first run compared to the second run in the brainstem, right insula, and left orbital frontal cortex. Older adults had more activation in the brainstem during the second run compared to the first.

List of 180 Picture Names and Associated Lexical Characteristics

Target picture names (item) sorted by frequency condition with their associated lexical characteristics. Age of acquisition ratings for items from Brodeur, Dionne-Dotsie, Montreuil, & Lepage (2010) and Brodeur, Guérard, & Bouras (2014) were obtained from Kuperman, Stadthagen-Gonzalez, and Brysbaert (2012). Name agreement refers to the percent of individuals who responded with the item name in the normed picture databases.

Item	Frequency Condition	Log HAL Frequency	Length	Phonemes	Syllables	Name Agreement	H-Index	Age of Acquisition	Familiarity	Visual Complexity
apron	Low	6.292	5	5	2	95	0.32	6.75 (2.24)	4.57 (0.80)	1.93 (0.97)
avocado	Low	5.704	7	7	4	70	0.74	5.52(1.48)	3.24(1.39)	1.85 (0.83)
awning	Low	4.317	6	4	2	59	1.91	11.06 (4.02)	4.15 (1.04)	1.90 (0.74)
bandage	Low	5.802	7	6	2	42	2.82	5.94 (2.88)	3.84 (1.21)	2.43 (1.14)
beehive	Low	5.366	7	5	2	63	1.55	7.47 (5.05)	3.98 (1.32)	3.56 (1.23)
beret	Low	6.078	5	4	2	54	2.16	10.33 (3.94)	3.61 (1.44)	1.70 (0.94)
bib	Low	6.661	3	3	1	84	0.84	4.53 (4.25)	3.79 (1.30)	2.54 (1.33)
birdie	Low	6.404	6	4	2	38	5.16	6.56 (3.45)	3.86 (1.44)	2.78 (1.34)
broom	Low	6.397	5	4	1	94	0.37	5.50 (2.46)	4.26 (0.91)	2.29 (1.01)
buoy	Low	5.1	4	3	2	62	1.88	9.76 (2.97)	2.80 (1.34)	3.41 (1.19)
cheetah	Low	6.165	7	4	2	32	2.57	4.85 (1.55)	2.23 (1.07)	3.48 (1.12)
crayon	Low	5.727	6	5	2	82	1.13	3.20 (1.47)	4.10 (1.41)	1.92 (1.06)
cupcake	Low	4.369	7	6	2	95	0.32	4.11 (1.23)	4.81 (0.45)	2.26 (1.01)
dolly	Low	6.497	5	4	2	61	2.06	—	4.24 (0.99)	2.05 (0.89)
dropper	Low	5.17	7	5	2	72	1.64	8.56 (3.36)	3.16 (1.52)	2.53 (1.13)
dustpan	Low	2.303	7	6	2	82	0.92	6.47 (2.50)	4.23 (1.04)	2.05 (1.05)
eraser	Low	6.385	6	5	3	92	0.47	4.95 (1.22)	4.33 (1.03)	1.87 (0.83)
faucet	Low	6.084	6	5	2	65	1.91	6.29 (2.80)	4.71 (0.55)	2.02 (0.87)
flask	Low	6.696	5	5	1	56	2.47	10.78 (3.86)	3.55 (1.27)	2.97 (1.20)
fondue	Low	4.466	6	5	2	74	0.7	6.42(1.08)	2.71 (1.15)	3.77 (1.05)
frisbee	Low	6.472	7	6	2	95	0.34	5.50 (1.98)	4.40 (1.06)	1.78 (1.01)
gavel	Low	4.92	5	4	2	58	2.19	9.22 (3.23)	4.14 (0.95)	1.98 (0.95)
gazebo	Low	4.86	6	6	3	72	1.69	9.76 (3.03)	3.76 (1.10)	2.79 (1.12)
giraffe	Low	5.938	7	5	2	97	0.1	2.49(1.04)	3.41(1.41)	3.24 (1.18)

grater	Low	4.86	6	5	2	52	1.18	8.88 (2.74)	4.33 (0.96)	2.69 (1.30)
hubcap	Low	4.19	6	6	2	24	3.56	8.39 (3.27)	4.14 (0.93)	2.38 (1.25)
hyena	Low	4.942	5	5	3	68	1.78	6.61 (2.00)	3.27 (1.07)	3.12 (1.29)
ladle	Low	5.069	5	4	2	57	2.13	9.83 (3.59)	4.16 (1.08)	1.95 (1.12)
ladybug	Low	4.942	7	7	3	93	0.48	4.84 (2.03)	4.69 (0.60)	2.79 (1.49)
leek	Low	5.303	4	3	1	65	1.72	4.79 (1.64)	3.77 (1.14)	2.33 (0.89)
manatee	Low	4.644	7	6	3	8	2.86	6.51 (1.07)	1.64 (0.9)	2.88 (1.02)
mitten	Low	4.934	6	4	2	67	1.18	4.72 (1.74)	4.29 (0.96)	2.28 (1.02)
moth	Low	6.244	4	3	1	67	1.21	4.52 (1.52)	3.24 (1.22)	3.22 (1.16)
mussel	Low	3.989	6	4	2	92	0.51	3.77 (1.14)	3.99 (0.98)	1.8 (0.84)
napkin	Low	5.756	6	6	2	41	2.89	4.79 (2.51)	4.02 (1.16)	2.57 (1.25)
ostrich	Low	6.061	7	6	2	96	0.2	3.54 (1.32)	2.91 (1.1)	3.18 (1.13)
pliers	Low	6.593	6	5	1	85	0.9	7.00 (1.76)	3.77 (1.25)	2.74 (1.04)
plum	Low	6.715	4	4	1	86	0.85	5.50 (2.20)	4.32 (1.04)	2.44 (1.33)
plunger	Low	6.165	7	6	2	84	1.01	9.63 (4.94)	3.95 (1.23)	1.95 (1.05)
raccoon	Low	5.617	7	5	2	97	0.2	6.79 (4.79)	3.81 (1.21)	3.21 (1.28)
radish	Low	4.934	6	5	2	86	0.76	5.25 (1.89)	4.05 (1.23)	2.62 (1.29)
raisin	Low	5.749	6	4	2	83	0.4	4.09 (1.43)	3.64 (1.09)	2.46 (1.14)
rooster	Low	6.246	7	5	2	90	0.46	2.33 (0.83)	3.81 (1.1)	3.1 (1.19)
sandal	Low	4.984	6	5	2	92	0.46	5.21 (2.12)	4.34 (1.07)	2.42 (1.18)
scalpel	Low	5.313	7	7	2	56	2.28	10.73 (3.05)	3.40 (1.23)	2.07 (0.95)
slipper	Low	5.811	7	5	2	82	0.8	5.26 (2.37)	4.15 (1.20)	2.13 (1.08)
stapler	Low	4.331	7	6	3	93	0.1	3.97 (1.31)	4.36 (0.84)	3.09 (1.28)
teabag	Low	3.892	6	5	2	95	0.34	6.67 (2.97)	4.44 (0.99)	2.41 (1.33)
teapot	Low	5.781	6	5	2	86	0.58	4.15 (1.42)	3.58 (1.14)	2.63 (0.88)
thimble	Low	4.736	7	5	2	81	1.12	8.05 (3.10)	3.31 (1.62)	2.28 (1.09)
tinsel	Low	4.949	6	5	2	24	3.09	6.61 (1.79)	4.05 (1.15)	2.24 (1.26)
tongs	Low	5.361	5	4	1	79	1.22	7.78 (2.55)	4.00 (1.10)	1.95 (0.97)
toucan	Low	4.19	6	5	2	58	1.83	5.30 (1.43)	2.3 (1.07)	3.41 (0.91)
tuba	Low	6.028	4	4	2	14	2.24	5.82 (1.36)	2.24 (1.19)	3.73 (1.11)
tulip	Low	6.109	5	5	2	61	1.42	4.28 (1.39)	3.42 (1.2)	2.22 (0.95)

urinal	Low	5.561	6	6	3	89	0.67	8.87 (3.44)	4.10 (1.10)	1.95 (0.96)
vase	Low	6.292	4	3	1	84	1	7.89 (2.59)	3.72 (1.34)	2.54 (1.25)
vulture	Low	5.971	7	5	2	70	1.01	8.89 (2.16)	3.98 (1.11)	3.41 (1.34)
warthog	Low	5.252	7	7	2	38	2.15	7.82 (3.75)	3.45 (1.23)	3.17 (1.36)
whisk	Low	5.704	5	5	1	71	1.55	5.72 (2.54)	3.82 (1.25)	2.49 (1.19)
anchor	Medium	7.925	6	4	2	93	0.45	4.32 (1.57)	4.20 (1.05)	1.85 (0.82)
ant	Medium	7.928	3	3	1	96	0.2	2.03 (0.77)	4.46 (0.89)	2.08 (1)
backpack	Medium	7.567	8	6	2	77	1.34	5.83 (1.94)	4.67 (0.74)	3.38 (1.39)
bacon	Medium	8.054	5	5	2	77	1.01	5.00 (1.91)	4.40 (1.06)	2.05 (1.17)
badger	Medium	7.369	6	4	2	54	2.37	8.74 (2.64)	3.22 (1.19)	3.37 (1.26)
barn	Medium	7.854	4	4	1	71	1.68	4.50 (1.62)	4.00 (0.96)	2.55 (1.23)
beaver	Medium	7.454	6	4	2	100	0	5.21 (1.65)	4.17 (1.17)	3.21 (1.39)
bee	Medium	8.098	3	2	1	61	1.75	2.90 (1.03)	3.46 (1.13)	3.24 (1.23)
bucket	Medium	8.11	6	5	2	58	1.76	5.61 (2.40)	3.95 (1.28)	2.03 (1.01)
buddha	Medium	7.84	5	4	2	45	1.95	—	4.19 (0.92)	2.90 (1.38)
butterfly	Medium	7.494	9	7	3	99	0.1	2.28 (0.97)	4.17 (0.86)	2.59 (1.21)
chalk	Medium	7.416	5	3	1	100	0	4.47 (1.17)	3.66 (1.60)	1.66 (0.94)
clipboard	Medium	7.589	9	8	2	79	1.27	7.76 (1.95)	4.08 (1.22)	2.08 (1.05)
comb	Medium	7.386	4	3	1	87	0.73	5.50 (2.20)	4.38 (1.07)	1.90 (0.97)
compass	Medium	7.549	7	6	2	95	0.33	8.44 (2.38)	4.31 (0.98)	2.69 (1.22)
cooler	Medium	7.849	6	4	2	63	2.04	6.11 (1.53)	4.00 (1.21)	2.03 (1.06)
curtain	Medium	7.577	7	4	2	86	0.87	4.95 (1.23)	4.76 (0.66)	1.86 (0.93)
diploma	Medium	7.304	7	7	3	55	2.04	9.33 (3.16)	4.24 (1.03)	1.67 (0.95)
dolphin	Medium	7.405	7	6	2	99	0.11	3.01 (1.08)	3.19 (1.29)	2.33 (0.97)
dragonfly	Medium	7.526	9	9	3	46	1.87	6.80 (2.89)	4.12 (0.97)	4.03 (1.15)
elbow	Medium	8.132	5	4	2	86	0.77	4.78 (1.70)	4.90 (0.37)	1.88 (1.23)
feather	Medium	7.768	7	4	2	100	0	4.67 (1.81)	3.95 (1.32)	2.49 (1.25)
ferry	Medium	7.832	5	4	2	31	2.85	8.00 (1.94)	4.10 (1.10)	3.55 (1.35)
fridge	Medium	7.377	6	4	1	71	1.16	4.67 (1.33)	4.88 (0.45)	4.22 (1.10)
fries	Medium	7.429	5	4	1	52	1.27	—	4.93 (0.26)	4.03 (1.03)
frog	Medium	8.048	4	4	1	55	1.13	4.32 (1.45)	3.62 (1.26)	3.22 (1.50)

goose	Medium	7.49	5	3	1	52	1.59	3.28 (1.54)	3.28 (1.1)	2.38 (0.92)
harp	Medium	7.419	4	4	1	92	0.3	4.30 (1.37)	2.73 (1.22)	3.33 (1.12)
helicopter	Medium	8.071	10	9	4	90	0.64	6.42 (1.14)	1.49 (0.9)	3.41 (1.01)
kite	Medium	7.76	4	3	1	98	0.16	4.58 (1.64)	4.43 (0.77)	2.94 (1.48)
kiwi	Medium	7.24	4	4	2	83	0.89	7.56 (3.99)	3.83 (1.36)	2.22 (1.16)
ladder	Medium	7.996	6	4	2	95	0.32	4.40 (1.70)	4.60 (0.77)	1.93 (0.92)
lantern	Medium	7.632	7	6	2	60	2.11	8.55 (2.72)	4.02 (1.05)	2.45 (1.04)
lime	Medium	7.643	4	3	1	81	1.12	6.61 (2.99)	3.72 (1.49)	2.24 (1.13)
locker	Medium	7.534	6	4	2	98	0.16	8.22 (2.32)	4.76 (0.48)	1.60 (0.59)
moose	Medium	8.153	5	3	1	95	0.33	5.22 (1.73)	4.29 (0.89)	3.07 (1.54)
mug	Medium	7.404	3	3	1	50	1.72	5.15 (2.03)	4.88 (0.33)	1.38 (0.70)
mummy	Medium	7.884	5	4	2	86	0.85	5.47 (2.34)	4.00 (1.10)	3.52 (1.25)
mushroom	Medium	7.535	8	6	2	100	0	6.44 (2.36)	4.64 (0.63)	2.31 (1.32)
m										
onion	Medium	7.858	5	5	2	99	0	2.72 (1.00)	4.66 (0.62)	1.47 (0.66)
parrot	Medium	7.479	6	5	2	71	1.25	5.58 (1.87)	4.10 (1.08)	3.19 (1.47)
peach	Medium	7.502	5	3	1	89	0.65	2.54 (0.87)	4.29 (1)	1.47 (0.75)
peanut	Medium	7.668	6	5	2	92	0.46	2.87 (1.00)	4.14 (0.92)	1.85 (0.82)
penguin	Medium	7.706	7	7	2	99	0	3.30 (1.10)	2.77 (1.25)	3.09 (1.12)
pill	Medium	7.939	4	3	1	72	1.22	6.06 (2.29)	4.00 (1.19)	1.89 (0.99)
pillow	Medium	7.654	6	4	2	84	0.73	3.47 (1.35)	4.44 (0.91)	2.41 (1.23)
pitcher	Medium	7.359	7	4	2	35	3.42	6.42 (2.22)	4.31 (0.92)	2.46 (1.21)
ruler	Medium	7.902	5	4	2	99	0	2.52 (0.71)	4.58 (0.81)	1.53 (0.6)
scorpion	Medium	7.9	8	8	2	84	0.66	3.94 (1.27)	2.49 (1.22)	3.49 (1.13)
skis	Medium	7.691	4	4	1	81	0.41	4.22 (1.44)	3.04 (1.31)	2.27 (0.97)
sponge	Medium	7.376	6	5	1	90	0.63	5.00 (2.05)	4.26 (1.02)	2.26 (1.12)
spoon	Medium	7.872	5	4	1	92	0.51	2.50 (0.79)	4.56 (0.88)	2.28 (1.19)
squirrel	Medium	7.595	8	7	2	100	0	4.44 (1.92)	4.69 (0.72)	2.88 (1.43)
telescope	Medium	8.109	9	8	3	95	0.34	6.95 (2.50)	4.14 (0.98)	2.40 (1.13)
toaster	Medium	7.569	7	5	2	97	0.18	6.72 (2.30)	4.47 (0.80)	2.95 (1.09)
tomato	Medium	7.667	6	6	3	100	0	2.09 (0.66)	4.81 (0.51)	1.23 (0.45)

tractor	Medium	7.383	7	6	2	99	0	3.05 (1.23)	3.34 (1.21)	3.8 (1.39)
trophy	Medium	7.693	6	5	2	93	0.37	5.55 (1.43)	4.33 (0.82)	2.10 (1.12)
umbrella	Medium	7.565	8	7	3	100	0	5.68 (2.24)	4.54 (0.94)	2.51 (1.27)
violin	Medium	7.857	6	6	2	86	0.66	3.74 (1.52)	3.31 (1.2)	3.47 (1.36)
apple	High	11.095	5	3	2	99	0	1.95 (0.88)	4.87 (0.47)	1.46 (0.78)
arrow	High	8.899	5	3	2	94	0.35	2.84 (0.98)	2.86 (1.32)	1.28 (0.55)
barrel	High	8.83	6	5	2	86	0.87	7.72 (3.92)	4.14 (1.05)	2.07 (1.13)
baseball	High	9.819	8	6	2	87	0.8	4.83 (1.72)	3.82 (1.23)	2.44 (1.21)
battery	High	10.221	7	6	3	95	0.035	5.58 (2.48)	4.58 (0.72)	3.48 (1.25)
brain	High	10.899	5	4	1	86	0.81	4.14 (1.43)	4.09 (1.08)	2.86 (1.4)
branch	High	9.514	6	5	1	40	1.67	5.11 (2.11)	4.32 (1.08)	2.11 (1.07)
bridge	High	9.871	6	4	1	90	0.55	5.58 (2.34)	4.52 (0.67)	2.33 (1.14)
bullet	High	9.029	6	5	2	93	0.48	6.70 (2.13)	4.07 (1.11)	1.71 (0.99)
button	High	10.32	6	4	2	100	0	4.78 (2.07)	4.41 (0.91)	1.62 (0.96)
camera	High	9.822	6	5	2	82	0.93	6.00 (1.71)	4.51 (0.85)	3.44 (1.35)
chain	High	10.057	5	3	1	95	0.3	5.22 (2.13)	3.49 (1.37)	2.15 (1.01)
chair	High	9.83	5	3	1	100	0	1.74 (0.81)	4.78 (0.62)	2.08 (0.95)
chest	High	9.474	5	4	1	33	3.03	5.05 (2.09)	3.90 (1.03)	2.15 (0.85)
clock	High	10.106	5	4	1	92	0.46	4.42 (1.46)	4.46 (0.97)	2.69 (1.28)
computer	High	12.443	8	8	3	67	1.86	9.70 (6.04)	4.88 (0.40)	2.86 (1.37)
cross	High	10.301	5	4	1	88	0.76	4.74 (1.76)	4.55 (0.80)	1.38 (0.66)
crown	High	9.101	5	4	1	88	0.72	7.80 (3.35)	4.43 (1.04)	2.74 (1.47)
diamond	High	9.814	7	6	2	78	1.1	4.51 (1.44)	2.68 (1.26)	3.1 (1.24)
eagle	High	8.831	5	3	2	67	1.61	5.83 (1.86)	4.33 (1.05)	3.19 (1.45)
envelope	High	9.289	8	7	3	100	0	6.25 (2.00)	4.61 (0.68)	1.82 (0.98)
finger	High	10.534	6	5	2	90	0.56	1.47 (0.68)	4.91 (0.36)	1.95 (0.93)
football	High	9.786	8	6	2	98	0.16	4.84 (1.64)	4.69 (0.56)	1.90 (0.88)
glasses	High	9.053	7	6	2	72	1.1	4.35 (1.29)	4.33 (1.15)	2.81 (1.04)
guitar	High	10.118	6	5	2	100	0	2.76 (0.91)	4.27 (0.98)	2.76 (0.98)
hammer	High	8.812	6	4	2	100	0	2.76 (0.84)	4.4 (0.73)	1.77 (0.84)
horse	High	10.08	5	4	1	99	0.11	2.00 (0.77)	3.85 (1.08)	3.34 (1.33)

house	High	11.554	5	3	1	93	0.41	1.43 (0.65)	4.9 (0.3)	2.67 (1.24)
keyboard	High	10.472	8	6	2	37	2.86	9.32 (2.56)	4.43 (0.86)	2.83 (1.23)
level	High	11.776	5	4	2	74	1.5	6.00 (1.37)	3.43 (1.46)	2.54 (1.01)
match	High	10.465	5	3	1	92	0.46	5.72 (1.87)	4.41 (1.07)	1.90 (1.19)
mirror	High	10.208	6	3	1	55	2.25	4.89 (1.97)	3.11 (1.53)	3.46 (1.57)
mouse	High	10.541	5	3	1	86	0.91	4.94 (1.76)	4.33 (0.87)	2.88 (1.48)
orange	High	9.509	6	5	2	100	0	1.87 (0.82)	4.84 (0.41)	1.18 (0.45)
paint	High	9.678	5	4	1	28	3.48	4.45 (1.32)	4.49 (0.78)	2.07 (1.03)
pants	High	9.223	5	5	1	79	1.12	3.23 (1.75)	4.72 (0.60)	1.56 (0.72)
phone	High	11.861	5	3	1	51	1.86	4.11 (1.49)	4.72 (0.56)	3.13 (1.42)
piano	High	9.135	5	5	3	96	0.25	3.16 (1.22)	3.51 (1.21)	3.81 (1.37)
plane	High	9.835	5	4	1	100	0	2.19 (0.82)	4.33 (0.92)	2.87 (1.17)
plant	High	10.136	5	5	1	84	0.91	3.95 (1.65)	4.15 (1.01)	2.85 (1.33)
plate	High	9.251	5	4	1	92	0.48	3.84 (1.26)	4.64 (0.74)	1.72 (0.94)
printer	High	10.612	7	6	2	87	0.85	7.61 (2.93)	4.39 (0.82)	3.39 (1.26)
record	High	11.035	6	5	2	49	2.07	6.30 (2.60)	4.48 (0.86)	1.64 (0.82)
scale	High	10.114	5	4	1	84	0.84	8.85 (3.57)	4.13 (1.13)	2.90 (1.37)
scanner	High	9.284	7	5	2	53	2.23	11.37 (3.20)	4.26 (0.89)	2.88 (1.35)
screw	High	9.164	5	4	1	90	0.37	3.34 (1.12)	4.13 (0.97)	1.96 (0.85)
shield	High	9.549	6	4	1	96	0.32	3.72 (1.15)	2.47 (1.15)	3.25 (1.31)
shirt	High	9.006	5	3	1	99	0.1	2.39 (1.08)	4.78 (0.5)	2.23 (0.88)
skull	High	8.896	5	4	1	43	1.16	4.00 (1.34)	3.68 (1.22)	3.24 (1.31)
speaker	High	9.709	7	5	2	87	0.85	6.11 (1.81)	4.13 (1.06)	2.97 (1.14)
sword	High	9.726	5	4	1	97	0.21	2.70 (1.04)	3.06 (1.29)	1.8 (0.76)
table	High	10.935	5	4	2	100	0	1.73 (0.71)	4.91 (0.4)	1.53 (0.62)
television	High	10.024	10	8	4	24	3.48	4.11 (1.76)	4.76 (0.49)	1.78 (0.99)
thread	High	10.954	6	4	1	65	1.62	7.06 (2.92)	3.77 (1.35)	2.18 (1.17)
tongue	High	9.613	6	3	1	92	0.22	1.75 (0.71)	4.8 (0.61)	2.46 (1.28)
tower	High	10.079	5	3	1	78	0.78	3.03 (1.15)	3.43 (1.07)	3.15 (1.05)
train	High	10.059	5	4	1	93	0.41	2.34 (1.18)	4.51 (0.68)	3.44 (1.39)
turkey	High	9.533	6	4	2	62	1.61	3.95 (1.18)	3.90 (1.10)	3.14 (1.44)

watch	High	10.95	5	3	1	87	0.65	4.33 (1.61)	4.41 (1.12)	3.08 (1.31)
wheel	High	9.871	5	4	1	51	2.41	4.40 (2.09)	4.33 (0.95)	2.05 (0.99)

List of Practice Items Used in the Mock Scanner

Age of acquisition ratings for items from Brodeur, Dionne-Dotsie, Montreuil, & Lepage (2010) and Brodeur, Guérard, & Bouras (2014) were obtained from Kuperman, Stadthagen-Gonzalez, and Brysbaert (2012).

Item	Log HAL Frequency	Length (letters)	Age of Acquisition	Familiarity	Name Agreement	H-Index	Number of Phonemes	Number of Syllables	Visual Complexity
basketball	6.51	9	5.30 (2.20)	4.79 (0.47)	95	0.32	9	4	1.83 (1.06)
blackberry	6.67	6	8.95 (6.20)	4.24 (1.00)	70	1.57	4	2	2.68 (1.16)
cactus	5.69	8	6.72 (2.95)	4.14 (1.00)	93	0.44	7	3	2.74 (1.19)
cymbal	4.87	10	9.94 (2.90)	4.12 (1.03)	81	1.14	8	3	1.85 (1.04)
dalmatian	9.98	4	6.06 (2.71)	4.55 (0.71)	71	1.15	4	1	3.00 (1.55)
dartboard	5.92	9	8.44 (3.60)	4.46 (0.87)	100	0	7	2	2.76 (1.26)
funnel	9.19	10	8.44 (1.62)	4.63 (0.83)	97	0.18	9	3	1.59 (0.81)
harmonica	9.41	4	7.32 (2.19)	4.31 (0.98)	100	0	3	1	2.50 (1.15)
hippopotamus	3.85	9	3.00 (0.99)	2.86 (1.22)	82	0.76	8	2	2.33 (1.02)
lollipop	4.76	10	3.89 (1.75)	4.76 (0.66)	83	0.93	9	4	1.57 (0.70)
mascara	5.68	9	9.21 (3.12)	4.18 (1.18)	26	3.02	7	3	2.32 (1.09)
pipe	5.95	6	8.17 (2.23)	3.81 (1.25)	50	2.5	5	2	1.73 (0.95)
rhinoceros	7.1	6	6.00 (2.83)	4.29 (0.97)	51	1.14	6	2	3.02 (1.33)
treadmill	4.68	12	11.15 (4.97)	4.67 (0.65)	90	0.61	11	5	2.62 (1.10)
wolf	5.71	7	4.50 (1.79)	4.24 (1.05)	86	0.85	7	3	3.07 (1.47)

Models Used During the Mixed-Effects Logistic Regression Analysis

The model that was run to obtain the main effects of Frequency, Age, and Frequency x Age Interaction between younger and older adults:

$$\text{Accuracy} = \text{Frequency Condition (re-coded)} * \text{AgeGroup (centered)} + (1 + \text{Frequency Condition (re-coded)}) | \text{Participant} + (1 | \text{Item})$$

This second model was run to determine if any of the properties of the words that varied across frequency conditions explained the overall frequency effects. The second model included main effects of Frequency, Age, and Frequency x Age, as well as the main effects of Name Agreement, Age of Acquisition, and Familiarity:

$$\text{Accuracy} = \text{Frequency Condition (recoded)} * \text{AgeGroup (centered)} + \text{Name Agreement} + \text{Age of Acquisition} + \text{Familiarity} + (1 + \text{Frequency Condition (recoded)}) | \text{Participant} + (1 | \text{Item})$$

The scoring rubric used for determining correct picture-naming responses.

Correct Response	Alternative Acceptable Responses
frisbee	frisbees, disc, discs
ladybug	ladybug, ladybird, ladybirds
plum	plums
urinal	urinals
faucet	faucets
manatee	manatees
cupcake	cupcakes
tinsel	garland, garlands
beehive	beehives, hive, hives, nest, nests
dropper	droppers
stapler	staplers
broom	brooms
grater	graters
moth	moths
toucan	toucans
eagle	eagles
shield	shields
hammer	hammers
sword	swords
table	tables
orange	oranges, clementine, clementines, tangerine, tangerines
pants	slacks, trousers
crown	crowns
scanner	scanners
horse	horses
cross	crosses
chest	chests, box, boxes
television	televisions, T.V., T.V.'s
football	footballs
battery	batteries
ant	ants
onion	onions
lantern	lanterns
harp	harps
chalk	—
mug	mugs
skis	ski
ladder	ladders
pitcher	pitchers

sponge	sponges
compass	compasses
curtain	curtains
squirrel	squirrels
trophy	trophies
buddha	buddhas
guitar	guitars
plant	plants
finger	fingers
phone	phones, telephone, telephones
brain	brains
mouse	mice
scale	scales
clock	clocks
tower	towers, watchtower, watchtowers
wheel	wheels
plate	plates, dish, dishes, china
speaker	speakers
keyboard	keyboards
printer	printers
apple	apples
birdie	birdies, shuttlecock, shuttlecocks
bib	bibs
hyena	hyenas
slipper	slippers
leek	leeks
tuba	tubas
buoy	buoys
beret	berets
tulip	tulips
whisk	whisks
raisin	raisins
hubcap	hubcaps, rim, rims
cheetah	cheetahs
gazebo	gazebos, pagoda, pagodas, pavilion, pavilions
teapot	teapots, kettle, kettles
bacon	—
umbrella	umbrellas
moose	—
elbow	elbows
barn	barns
lime	limes
scorpion	scorpions

feather	feathers
bucket	buckets
kiwi	kiwis
peach	peaches, apricot, apricots
cooler	coolers
spoon	spoons
telescope	telescopes
diploma	diplomas, certificate, certificates
screw	screws, bolt, bolts
glasses	spectacles
mirror	mirrors
match	matches, matchstick, matchsticks
tongue	tongues
house	houses, cottage, cottages
turkey	turkeys
record	records, vinyl, vinyls
button	buttons
piano	pianos
baseball	baseballs
shirt	shirts
level	levels
chair	chairs
paint	paints, paint can, paint cans
backpack	backpacks, knapsack, knapsacks
beaver	beavers
ruler	rulers
penguin	penguins
helicopter	helicopters, chopper, choppers
mushroom	mushrooms, fungus, fungi
goose	geese
peanut	peanuts
kite	kites
dolphin	dolphins
fries	fry
dragonfly	dragonflies
anchor	anchors
parrot	parrots
violin	violins, viola, violas
dustpan	dustpans
crayon	crayons
dolly	dollys
napkin	napkins
awning	awnings

giraffe	giraffes
radish	radishes
gavel	gavels
scalpel	scalpels
bandage	bandages
tongs	—
apron	aprons
vulture	vultures
mitten	mittens
ostrich	ostriches
clipboard	clipboards
ferry	ferries, ferry boat, ferry boats
toaster	toasters
tomato	tomatoes
badger	badgers
pill	-pills, capsule, capsules
mummy	mummies
fridge	fridges, refrigerator, refrigerators
pillow	pillows, cushion, cushions
tractor	tractors
locker	lockers
bee	bees, bumblebee, bumblebees
frog	frog, frogs, toad, toads
butterfly	butterflies
comb	combs
flask	flasks
avocado	avocados
fondue	—
thimble	thimbles
sandal	sandals
eraser	erasers
pliers	—
mussel	mussels
raccoon	raccoons
teabag	teabags, tea, teas
plunger	plungers
warthog	warthogs
rooster	roosters
vase	vases
ladle	ladles
train	trains
camera	cameras
chain	chains

watch	watches
arrow	arrows
branch	branches, stick, sticks
computer	computers, desktop, desktops, PC, PC's
bullet	bullets
barrel	barrels
thread	threads, spool, spools, string, strings
envelope	envelopes
bridge	bridges
skull	skulls
diamond	diamonds, jewel, jewels, gem, gems
plane	planes, airplane, airplanes
