

Meredith A. Shafto¹, Lise Abrams², Lori E. James³, & Cam-CAN

¹University of Cambridge ²Pomona College ³University of Colorado Colorado Springs

Background

1. TOTs & aging

- Tip-of-the-tongue states (TOTs): word finding failures with successful semantic retrieval but phonological retrieval failure
- TOTs increase with age due to age-related declines in:
 - Language-specific transmission from semantics to phonology
 - Domain-general cognitive control systems important for TOT recovery

2. TOTs & emotion

- TOTs previously linked to emotional stimuli¹ and stressful states²
- Anxiety → **increased** TOTs in older adults, **decreased** TOTs in middle-aged adults³
- Age interaction explained via *Attentional Control Theory*: moderate anxiety boosts performance, but impairs performance in older adults due to declining attention

3. Current study:

- Emotional responsivity: online positive and negative ratings of valenced videos
- TOT factors: identify language-specific & domain-general processes underpinning TOT performance

4. Research Questions: Does emotional responsivity...

- ...relate to TOT performance?
- ...relate to language-specific as well as domain-general TOT processes?
- ...benefit older adults' processing for language-specific processing?

Method

1. Participants

Population-based sample from the Cam-CAN cohort⁴

	N	Age Mean	Age Range	% Female	% University	% Memory worry
All	289	53.17	18-88	52.6	61.2	27.7
Younger	78	30.13	18-39	51.3	74.4	12.8
Middle	119	51.76	40-64	53.8	64.7	25.2
Older	92	74.52	65-88	52.2	45.7	43.5

2. Emotional Responsivity Task⁵

- 24 30-second videos: neutral, negative, or positive
- Participants give videos positive and negative ratings from 0-10



Negative example:
9/11 Footage



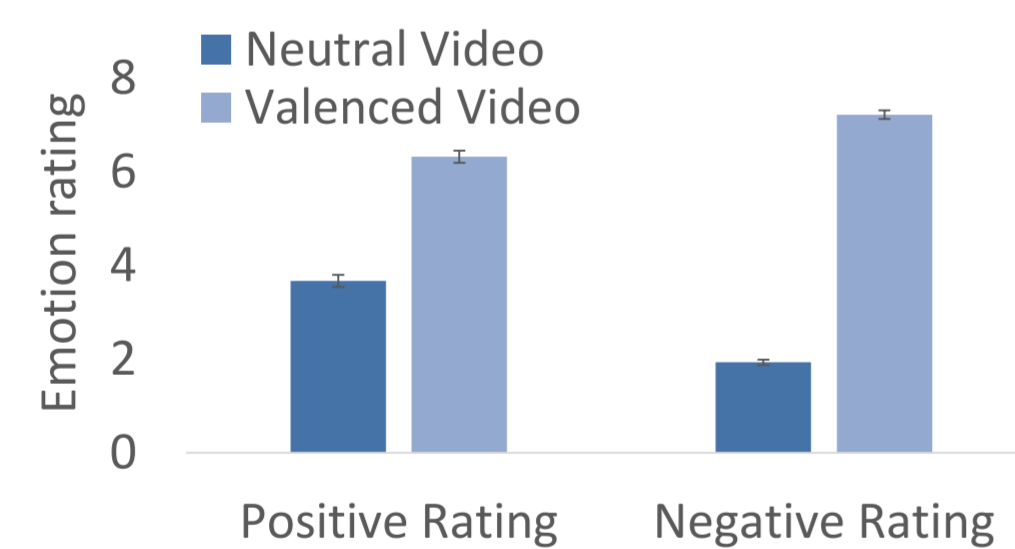
Neutral example:
Cooking show



Positive example:
Children dancing

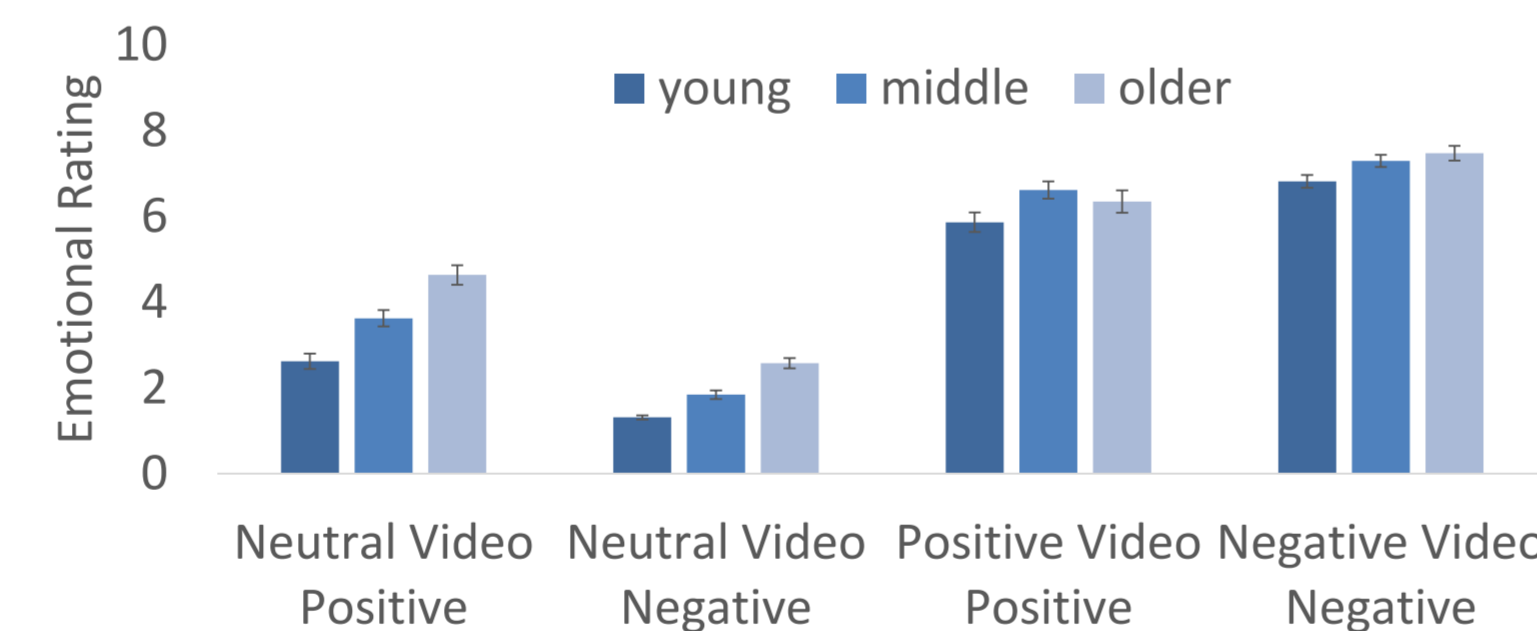
Neutral and Valenced Video Ratings

Ratings were higher for valenced compared to neutral videos



Both positive and negative ratings increase with age

Emotion responsivity by Age group



3. Tip of the Tongue (TOT) Task

- 50 faces of public figures
- Participants say name, "Don't Know", or "TOT"



Measures:

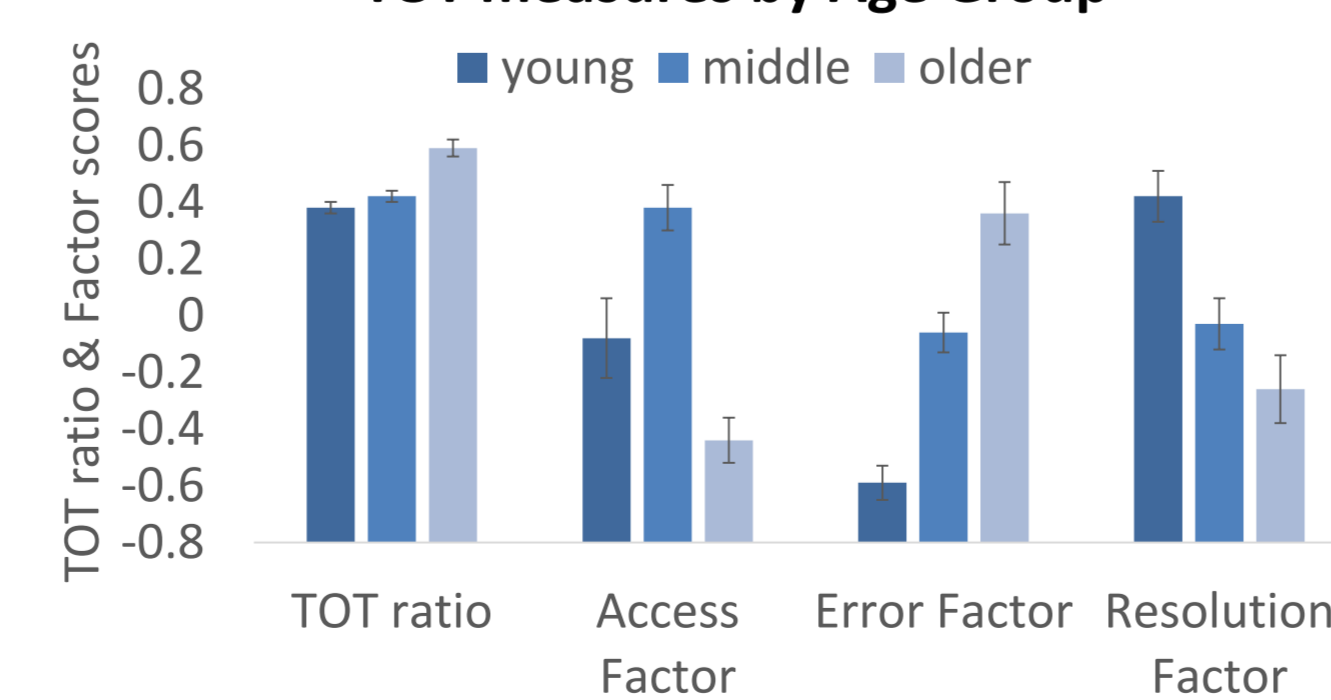
- TOT ratio: TOT/[Know + TOT]
- TOT factors: results of PCA on all response types from TOT task

TOT factors: Original Means and Factor Loadings

	Mean	Factor 1: Access	Factor 2: Errors	Factor 3: Resolution
Correct	0.31	.870	-.237	.324
Don't Know	0.29	-.882	-.238	.285
Incorrect	0.09	.206	.743	-.001
Semantic	0.02	.021	.634	.349
Null	0.01	-.167	.473	-.079
TOT	0.25	-.004	-.068	-.958

Older adults have worse performance on all TOT measures

TOT measures by Age Group



Results

1. Regressions for All Participants

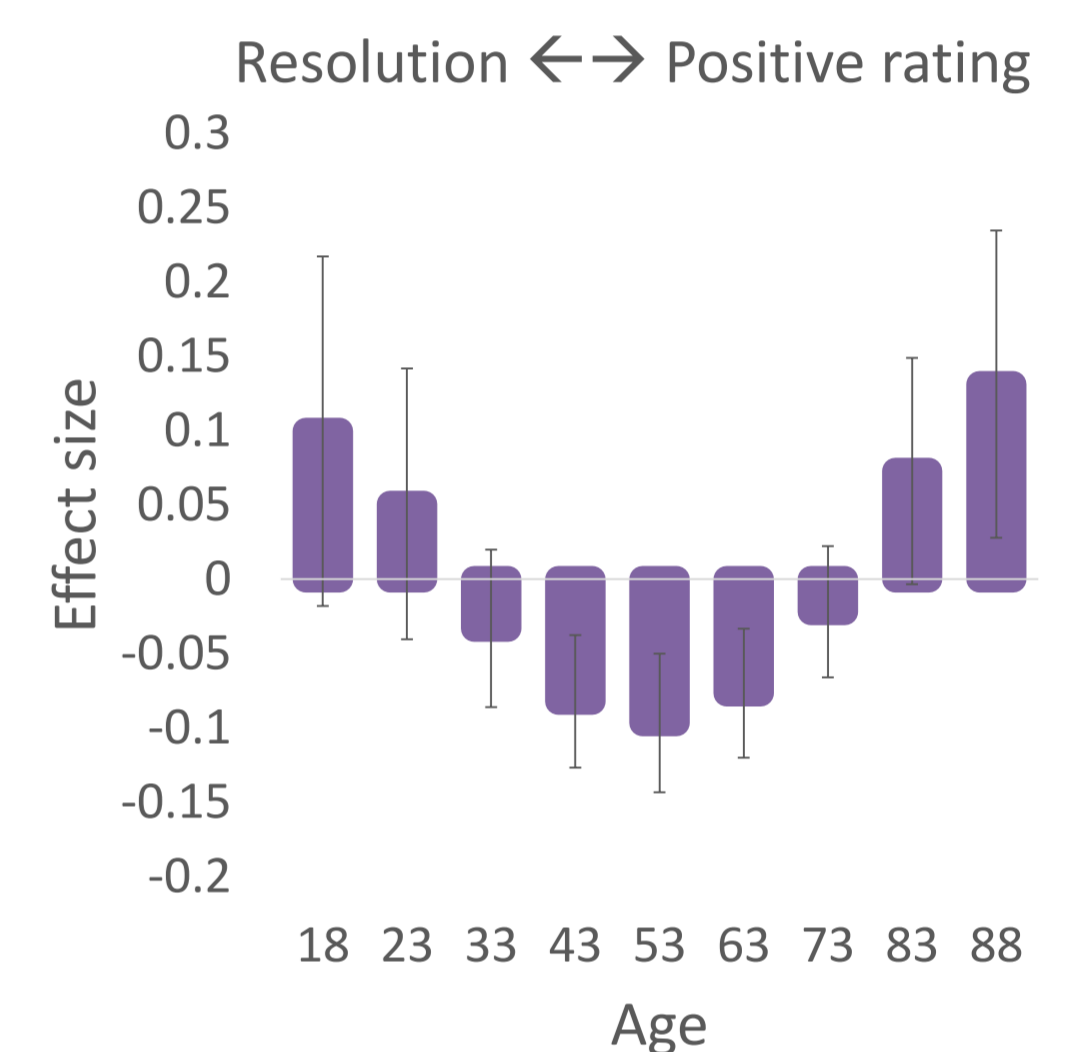
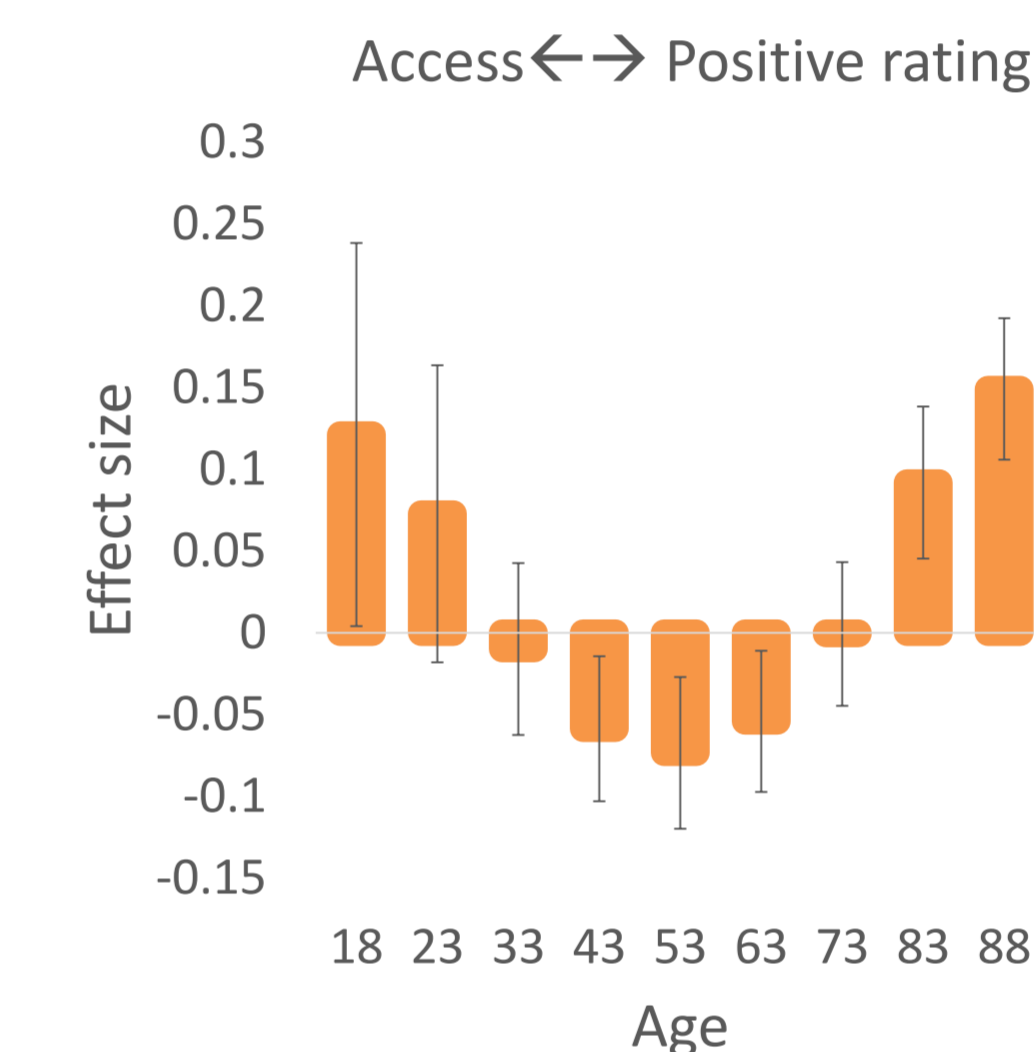
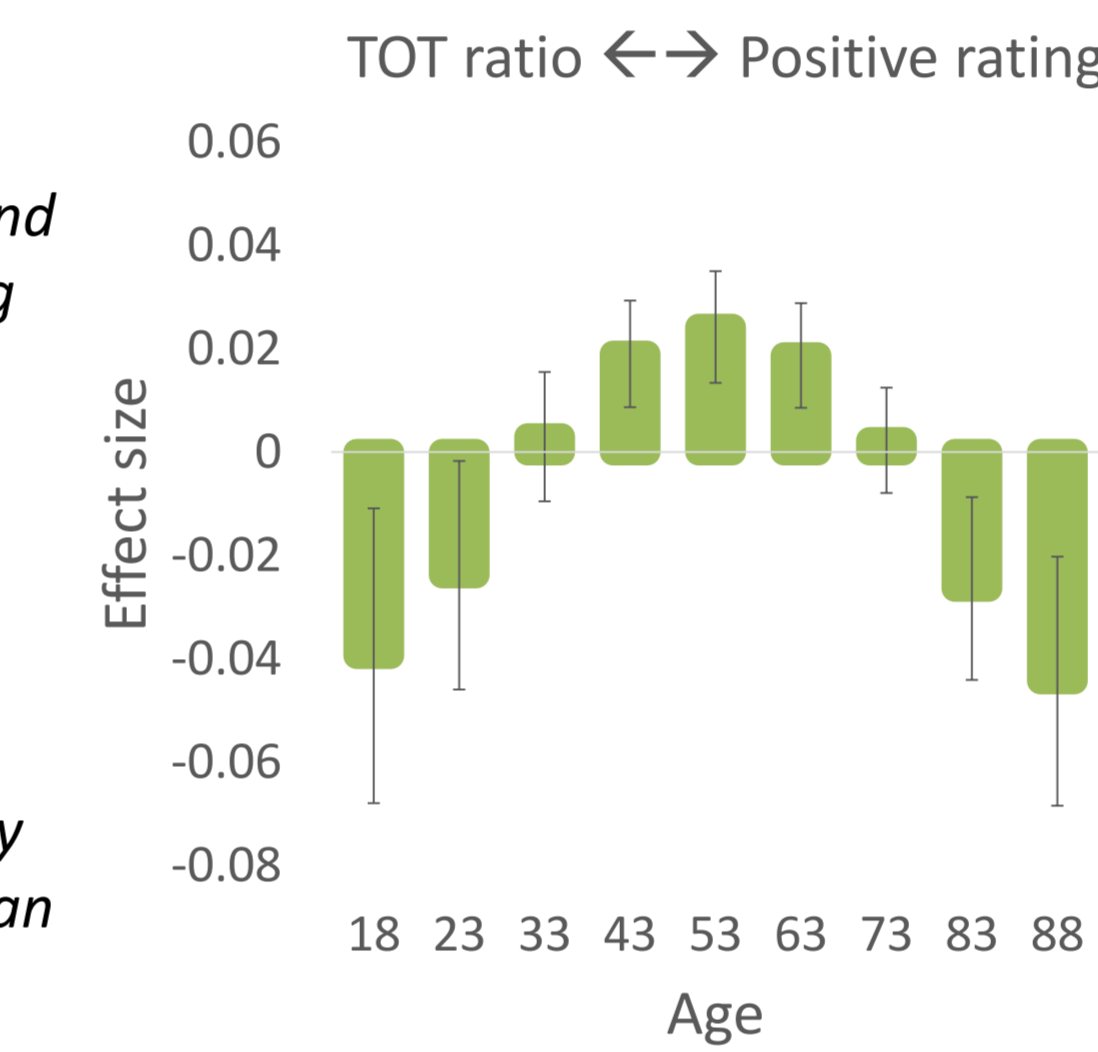
- 4 Regressions: emotion ratings predicting TOT measures
- Controlled for ratings to neutral videos, education, and memory concerns
- Interactions with Age and Age² for TOT ratio, Access Factor, and Resolution Factor

	Control variables				Predictors: Interactions between Emotion ratings and Age								R ²	F
	University education	Memory concerns	Neutral Video / Positive Rating	Neutral Video / Negative Rating	Age	Age ²	Positive Video/Rating	Negative Video/Rating	Age x Positive Rating	Age x Negative Rating	Age ² x Positive Rating	Age ² x Negative Rating		
TOT ratio	-.18**	.06	.14 [†]	-.06	-.82**	1.07**	1.60*	-.89	.95*	-.51	-.196*	1.14	.24	7.17**
Access Factor	..10 [†]	-.05	-.05	.04	2.18**	-2.32**	-1.17 [†]	.19	-.70 [†]	.03	1.44 [†]	-.22	.21	6.11**
Error Factor	-.03	-.09	.21**	-.02	.97**	-.63 [†]	.66	.43	.35	.32	-.88	-.65	.20	5.85**
Resolution Factor	.14*	-.04	-.06	<.01	-.67 [†]	.53	-.128 [†]	.69	-.73 [†]	.49	1.50 [†]	-1.02	.16	4.22**

Standardized coefficients: [†]p < .10 *p < .05 **p < .01

2. Age Interactions follow-up: Effect sizes by Age

- Effect sizes estimated for models with Age and Age² moderators using PROCESS⁶
- Plots of effect size against age for TOT ratio, Access Factor, and Resolution Factor
- Reversing relation of Emotional Responsivity and TOTs across lifespan



3. Age Interactions follow-up: Regressions within age groups

- Regressions repeated within age group (including age covariate, but without age interactions)*
- Younger: No significant relationships between positive ratings and TOT measures
- Middle aged: Higher positive ratings associated with **worse** performance for TOT ratio and Access Factor
- Older: Higher positive ratings associated with **better** performance for Access Factor

*see mshafto.com/psychonomics2018 for age group regression tables

Summary

Does Emotional Responsivity...

...relate to TOT performance?



Current findings

Yes: Emotional responsivity is related to TOT measures



Questions for future research

Why is effect only for positive ratings? In keeping with evidence relating positive emotion with priming⁷

...relate to language-specific as well as domain-general TOT processes?



Yes: Access (language specific) and Resolution (domain-general) Factors are related to Emotional Responsivity



Why are the age interactions for Access and Resolution Factors not distinct? Need to relate responsivity to other language-specific and domain-general processes.

...benefit older adults' processing for language-specific processing?



Yes: Access Factor had a positive relationship to Emotional Responsivity for older adults



Why are middle aged impaired by responsivity? It's not clear, possibly because little research has examined TOTs or emotional processing in middle age.

References

- Abrams, L., Davis, D. K., & James, L. E. (2016, November). *Saying emotionally arousing words decreases tip-of-the-tongue states*. Poster presented at the 57th annual meeting of the Psychonomic Society, Boston, MA
- James, L. E., Schmank, C., Castro, N., & Buchanan, T. W. (2018). Tip of the tongue states increase under evaluative observation. *Journal of Psycholinguistic Research*, 47(1), 169–178. <http://doi.org/10.1007/s10936-017-9524-9>
- Shafto, M. A., James, L. E., Abrams, L., & CAN, C.-. (2018). Age-related changes in word retrieval vary by self-reported anxiety but not depression symptoms. *Aging, Neuropsychology, and Cognition*, 1–14. <http://doi.org/10.1080/13825585.2018.1527284>
- Shafto, M. A., Tyler, L. K., Dixon, M., Taylor, J. R., Rowe, J. B., Cusack, R., ... Matthews, F. E. (2014). The Cambridge Centre for Ageing and Neuroscience (Cam-CAN) study protocol: A cross-sectional, lifespan, multidisciplinary examination of healthy cognitive ageing. *BMC Neurology*, 14(204), 204. <http://doi.org/10.1186/s12883-014-0204-1>
- Schweizer, S., Grahn, J., Hampshire, A., Mobbs, D., & Dalgleish, T. (2013). Training the emotional brain: improving affective control through emotional working memory training. *Journal of Neuroscience*, 33(12), 5301–5311.
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling
- Hänze, M., & Hesse, F. W. (1993). Emotional influences on semantic priming. *Cognition and Emotion*, 7(2), 195–205.

