Project Notes:

Project Title: The Effect of Age on Emotional Response to Color-Based Visual Stimuli
Name: Ryan Dillon

Note Well: There are NO SHORT-cuts to reading journal articles and taking notes from them. Comprehension is paramount. You will most likely need to read it several times so set aside enough time in your schedule.

Contents:

Knowledge Gaps:

This list provides a brief overview of the major knowledge gaps for this project, how they were resolved and where to find the information.

Knowledge Gap	Resolved By	Information is located	Date resolved

Literature Search Parameters:

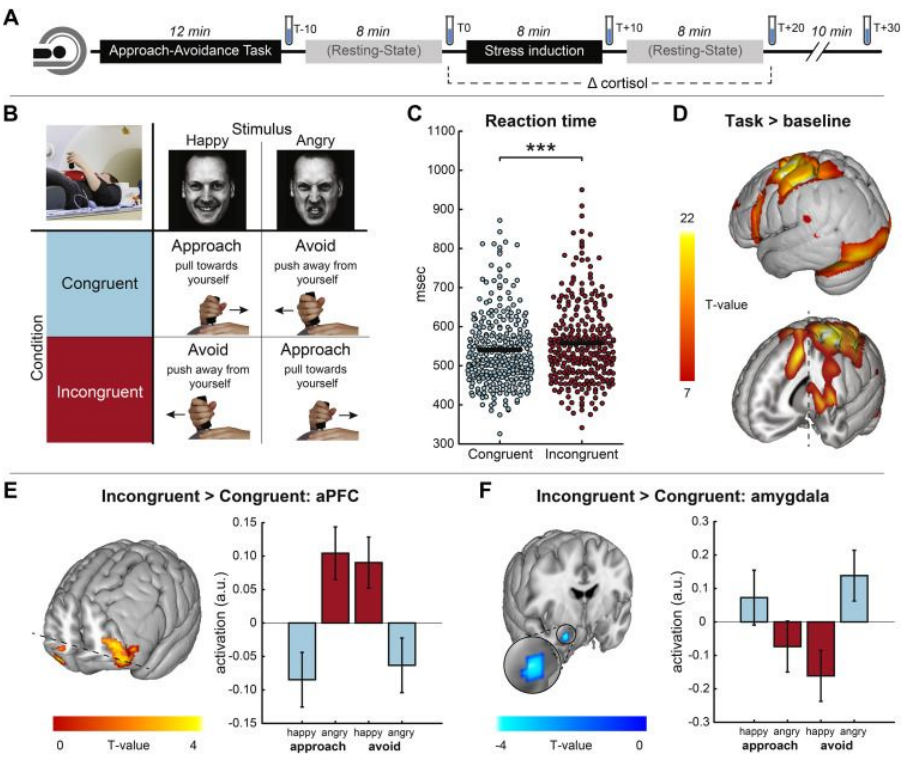
These searches were performed between (Start Date of reading) and XX/XX/2019.
List of keywords and databases used during this project.

Database/search engine	Keywords	Summary of search

Article #1 Notes: Frontal Control Over Automatic Emotional Action Predicts Acute Stress Responsivity

Article notes should be on separate sheets

Source Title	Frontal Control Over Automatic Emotional Action Predicts Acute Stress Responsivity
Source Author	Kaldewaij R., Roelofs K.
Source citation	Kaldewaij, R., Koch, S. B., Zhang, W., Hashemi, M. M., Klumpers, F., & Roelofs, K. (2019). Frontal Control Over Automatic Emotional Action Tendencies Predicts Acute Stress Responsivity. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*. doi: 10.1016/j.bpsc.2019.06.011
Original URL	https://www.ncbi.nlm.nih.gov/pubmed/31492567
Source type	Journal article
Keywords	Emotions, responsiveness, social interaction, stress
Summary of key points	• Controlling emotional actions is crucial for everyday social interaction • Experiment was conducted byl magnetic resonance imaging social-emotional approach-avoidance task which included both impulsive and controlled emotional actions • Emotion control was induced by approach avoidance task

Important Figures	 This figure shows the timeline of the experiment performed on the subjects, as well as the results of the testing.
Reason for interest	I was interested in the impact that this experiment had on the stress response, as well as the emotional actions that resulted from the experiment.
Notes	• Objective was to predict the stress response of the hypothalamic-pituitary-adrenal axis • They tested whether or not a reduced amount of frontal control over social approach-avoidance actions would signal a larger hypothalamic-pituitary-adrenal axis reactivity to following social stress exposure to the subject • After being exposed to magnetic resonance imaging, they were put into a stress induction, and a socially evaluated cold pressor task, and a mental arithmetic test. • Results included self reported negative effect • This included longer reaction times and more errors by the participants • More stress induction led to increases in stress measures • Researchers concluded that instrumental control over social approach avoidance actions could possibly signal stress responsiveness in major stress systems in the human body
Follow up Questions	• Why were most of the participants men? Did the women's

	data vary from the average for the overall trial? ● Was the arithmetic hard, or more stressful? ● How many participants self reported a negative effect as a result of the stress induction?

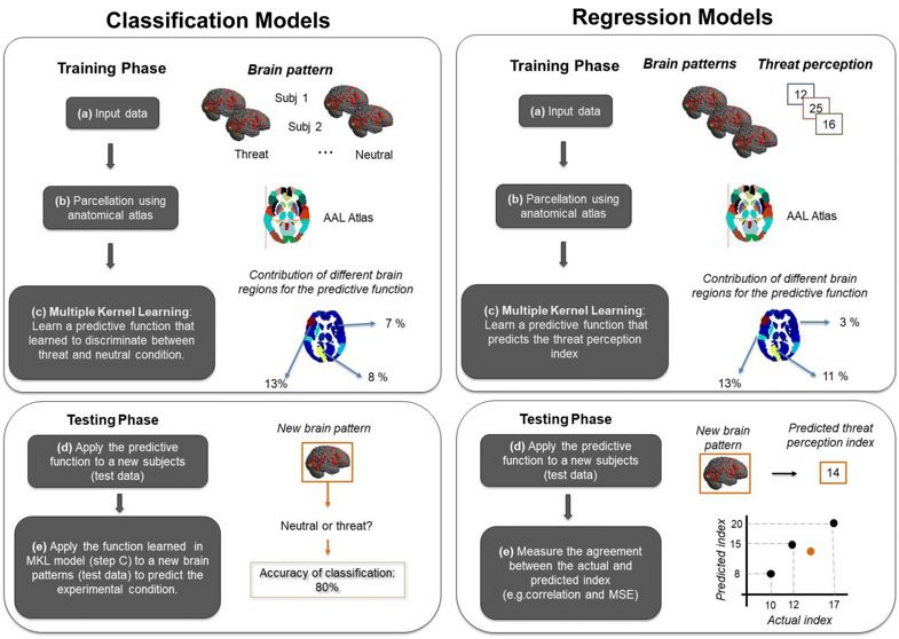
Introduction Notes:

- Control over social cues is especially important as to not overwork the major stress systems
- Problem: Direct evidence is missing to link frontal emotional control capacities with stress responsiveness
- Issues with frontal functioning play a role in affective disorders like depression and anxiety
- Recent study found a link between reduced prefrontal cortex (PFC) activation and increased cortisol after stress (in patients with and without depression)
- Their study measured PFC activation during a social emotional task to see if it predicts cortisol stress responsiveness
- Emotional regulation relies on control of the PFC
- Hypothesis: that low aPFC activation during emotional action would be linked with somewhat stronger cortisol increases after the following stress induction.

Article #2 Notes: How do you perceive threat? It's all in your level of brain activity.

Article notes should be on separate sheets

Source Title	How do you perceive threat? It's all in your level of brain activity.
Source Author	Fernandes O Jr., Oliveira L.
Source citation	Fernandes, O., Portugal, L. C. L., Alves, R. D. C. S., Arruda-Sanchez, T., Volchan, E., Pereira, M. G., … Oliveira, L. (2019). How do you perceive threat? It's all in your pattern of brain activity. *Brain Imaging and Behavior*. doi: 10.1007/s11682-019-00177-6
Source type	Journal article
Keywords	Perception, threat, emotional, stimuli (original link: https://www.ncbi.nlm.nih.gov/pubmed/31446554)
Summary of key points	• Objective was to determine whether subtle changes in emotional context during threat perception could be detected by MVPA • Also investigated to see if it was possible to differentiate a person's threat perception from their patterns of whole-brain activity to threatening stimuli using regression models. • Ultimately, they were successful in measuring the threat perception based on directed towards and directed away emotional contexts

Important Figures	 This figure details how the models were created and implemented in a testing phase
Reason for interest	I was interested in this because it involves negative feelings as a reaction to outside stimuli, which is what I am thinking of looking
Notes	• Used multi-voxel pattern analysis (MVPA) to look at subtle differences in emotional context • The stimulus was directed both towards and way from the viewer in order to stimulate several different defensive responses • They were able to accurately predict the threat perception index from the patterns of brain activation • This, however, was only in the directed away context • Threat perception was much more intense in the directed towards the viewer context • Less intense in the directed away context • This was why the model was able to capture the subtle differences in subjective threat perception better in the directed away context
Follow up Questions	

Introduction Notes:

- fMRI helps gain insight into how emotional representations are encoded in brain activity
- Multi voxel pattern analysis (MVPA) has been increasingly used over the past fifteen years in order to analyze neuroimaging data using pattern recognition techniques
- It's difficult, however, to get individual inferences at the voxel level, making it difficult to analyze specific brain regions

- Brain regions are therefore ranked according to their contributions to the model
- One study classified nine emotions based on patterns in brain activity during emotional states
    - Another study measured six different emotions induced by short movies/mental imagery
- Research Question: “Does the accuracy of MVPA for discriminating emotional and neutral brain states vary according to the threat level induced by different threat contexts? “
- Used two different contexts: directed away or towards the viewer
    - This may change the perception of threat imminence
- In previous study, reaction time was reduced when the threat was directed towards the viewer
- Hypothesis: “a higher accuracy would be achieved for discriminating between emotional versus neutral brain states in the directed towards context than in the directed away context.”
- To solve this, they used both a MKL classification model and a MKL regression model

Article #3 Notes: Framing deductive reasoning with emotional content: An fMRI study

Article notes should be on separate sheets

Source Title	Framing deductive reasoning with emotional content: An fMRI study
Source Author	Brunetti, M., Romani, GL.
Source citation	
Source type	Journal article
Keywords	Emotional reasoning; deductive reasoning (original link:https://www.ncbi.nlm.nih.gov/pubmed/24747514)
Summary of key points	
Important Figures	
Reason for interest	
Notes	● This study looked at the influence of emotions on reasoning abilities ● They used neuroimaging to look at this ● Both neutral and negative stimuli were presented to the viewer ● Both neutral and negative content were presented to the viewers ● Viewers were placed in an MRI and asked to validate the logic of situations that they were presented ● fMRI data showed that the medial prefrontal cortex was deactivated, and the lateral prefrontal cortex was activated ● Hypothesis was confirmed, as performance in identifying logical solutions was negatively impacted when presented with the negative content ● Concluded that emotional states do affect reasoning abilities in individuals ○ There was a delayed reaction as well
Follow up Questions	● What are syllogisms? ● Do some more research on the prefrontal cortex (lateral and medial)

Article #4 Notes: Color associations to emotion and emotion-laden words: A collection of norms for stimulus construction and selection.

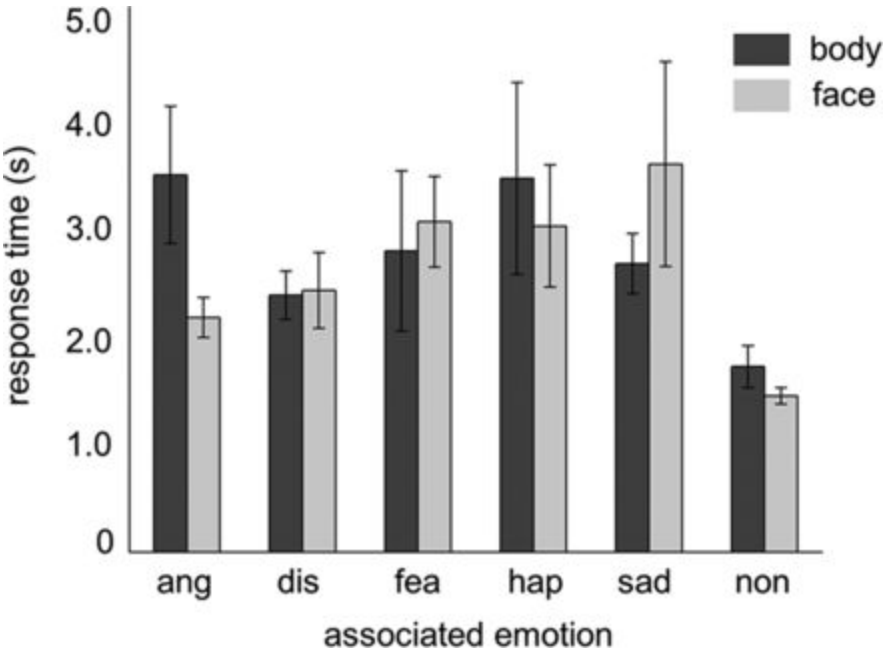
Article notes should be on separate sheets

Source Title	Color associations to emotions and emotion-laden words: A collection of norms for stimulus construction and selection
Source Author	Sutton, T.M., Altarriba, J.
Source citation	Sutton, T. M., & Altarriba, J. (2015). Color associations to emotion and emotion-laden words: A collection of norms for stimulus construction and selection. *Behavior Research Methods*, *48*(2), 686–728. doi: 10.3758/s13428-015-0598-8
Original URL	https://www.ncbi.nlm.nih.gov/pubmed/25987304
Source type	Journal article
Keywords	Color, emotions, association, stimuli
Summary of key points	
Important Figures	The figures for this article solely included very long tables, and were not easy to interpret, and would not be helpful to include here
Reason for interest	Colors in images influence emotional response, so this information may fill a knowledge gap regarding the psychology of colors
Notes	• People often correlate emotions with colors, often associating brighter colors with happier terms, and vice versa with darker colors and sadder words • Prior study found that we associate good/bad based on the brightness of a color/image • Hue is also a factor • Color was also correlated with better memory recall ○ Emotional > neutral memories • Experiment used 35 negative emotion words, 55 negative emotion-laden words, 29 positive emotion words, and 41 positive emotion-laden words • Not all subjects gave a response for every word

	● Red was most common for negative, and negative emotion-laden ● Yellow was most common for positive emotion, and white was most common for positive emotion-laden ● Results show that positive and negative emotions are correlated with different colors rather than being similar
Follow up Questions	● Clarify the difference between emotional and emotion-laden words?

Article #5 Notes: Abstract representations of associated emotions in the human brain.

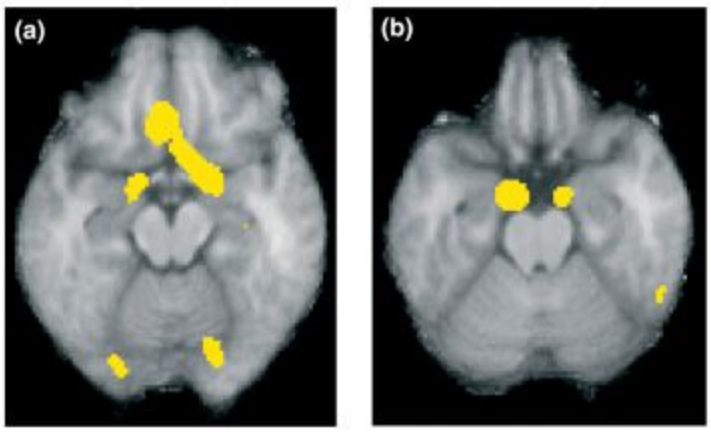
Article notes should be on separate sheets

Source Title	Abstract representations of associated emotions in the human brain.
Source Author	Kim, J., Schultz, J., Rohe, T., Wallraven, C., Lee, S.-W., Bulthoff, H. H.
Source citation	Kim, J., Schultz, J., Rohe, T., Wallraven, C., Lee, S.-W., & Bulthoff, H. H. (2015). Abstract Representations of Associated Emotions in the Human Brain. *Journal of Neuroscience*, *35*(14), 5655–5663. doi: 10.1523/jneurosci.4059-14.2015
Original URL	https://www.ncbi.nlm.nih.gov/pubmed/25855179
Source type	Journal article
Keywords	Association, emotional, MVPA, fMRI
Summary of key points	
Important Figures	

Reason for interest	It related to some aspects more geared towards neuroscience, and showed how emotions could be represented in different ways in the brain
Notes	● Different parts of the brain show emotions more abstractly ● These representations should be activated by the experience of an emotional event ● In this experiment, participants learned correlations between emotional and non emotional stimuli ● They then saw if these emotional signals could be decoded by the use of fMRI ● 5 emotions were used overall: anger, disgust, fear, happiness, sadness ● Two different human body movements were viewed in clips: emotional body movements and dynamic facial expressions ● 3 sections of testing: learning, test, fMRI session ● 10 blocks of 5 trials ● Association between fractal and emotional stimuli was examined after the learning part ● Identify emotions correlated with the stimuli ● Objective was to use fMRI to determine regions of the brain representing emotions ● Accuracy and response time were both measured during the testing phase of the experiment ● These four regions of the brain were shown to hold abstract representations of emotions: PCC, precuneus, MPFC, and angular gyrus in the right hemisphere.
Follow up Questions	

Article #6 Notes: Human emotion and memory: interactions of the amygdala and hippocampal complex.

Article notes should be on separate sheets

Source Title	Human emotion and memory interactions of the amygdala and hippocampal complex
Source Author	Phelps EA
Source citation	Phelps, E. A. (2004). Human emotion and memory: interactions of the amygdala and hippocampal complex. *Current Opinion in Neurobiology*, *14*(2), 198–202. doi: 10.1016/j.conb.2004.03.015
Original URL	https://www.ncbi.nlm.nih.gov/pubmed/15082325
Source type	Journal article
Keywords	Connections, amygdala, memory, emotions
Summary of key points	
Important Figures	 Amygdala activity during positive vs negative visual stimuli
Reason for interest	It shows the connections between the amygdala and the hippocampus, filling in a knowledge gap regarding a neuroscience component, as well as how emotion and memory are connected

Notes	● Several memory systems exist that are interconnected neurally ● In prior experiments that focused on the effects of emotion on memory, researchers focused on amygdala and hippocampal complex ● The two systems are able to work independently of each other, but also have more subtle connections ● The amygdala is capable of influencing episodic memory that is linked to the hippocampal region ● Emotional memories are more vivid and tend to last longer ● 2 stages of memory ○ Encoding, where stimuli are experienced for the first time ○ retention/storage, where the amygdala can influence the storage of memories ● Right and left amygdala can have differentiated roles depending on the subject ○ Left for memory of emotional stimuli in females, while it is the right amygdala for males ● There is proof of the opposite happening, episodic memory influencing amygdala rather than the other way around\ ○ Fear conditioning, events associated with fear/trauma ○ Emotional significance of the event is stored ● Concluded that both amygdala and hippocampus use two independently working memory systems that are able to interact and work together when emotions need to be associated with memories
Follow up Questions	

Article #7 Notes: The Evidence Base for Generational Differences: Where Do We Go From Here?

Article notes should be on separate sheets

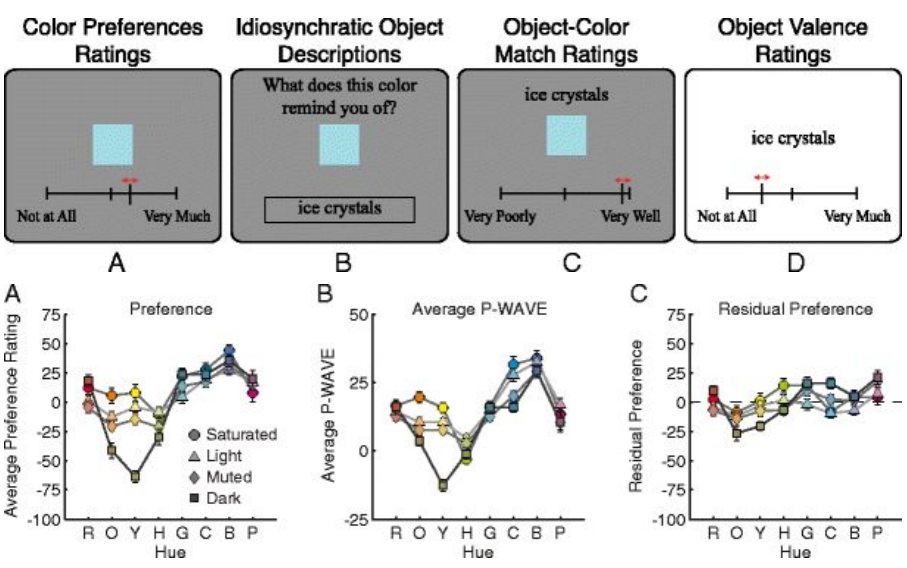
Source Title	The Evidence Base for Generational Differences: Where Do We Go from Here
Source Author	Parry, E., Urwin, P.
Source citation	Parry, E., & Urwin, P. (2017). The Evidence Base for Generational Differences: Where Do We Go from Here? *Work, Aging and Retirement*, *3*(2), 140–148. doi: 10.1093/workar/waw037
Original URL	https://academic.oup.com/workar/article/3/2/140/2960078
Source type	Journal article
Keywords	Generations, gap, differences
Summary of key points	
Important Figures	As this was an experiment that analyzed previous datapoint, there are no significant figures that add a lot to the understanding of the article
Reason for interest	This experiment questions and investigates the validity of the generational gap theory, and if people are actually psychologically different based on when they were born.

Notes	• They argued that the approach of most generational studies is flawed, due to how they already have set categories in mind and then test for differences between those
	• They addressed this issue by simply looking for original patterns in the data
	• There are several theoretical definitions of a generation
	  ○ Some say that that are no sound explanations
	  ○ Group that shares birth years, age, location, significant life events
	  ○ A “social location”
	• They might share “an identity of responses” or collective memory

	● Their theoretical background is based off of these ● “Period effects” are the effect of an event or trend on people’s outlook and behaviors for a short period of time - these behaviours may not last for long enough to be significant ● Some events and trends give long lasting effects, effectively “scarring” a generation. These may be major historical/social events ● These shared characteristics or behaviors do not affect or impact the previous or following generations, making a gap ● “Cut off” points may or may not exist ● At the conclusion, the researchers came up with an alternate hypothesis - “ Generations may be distinct points on a more general social journey” ● This suggests that society is evolving as a whole, and generations are the results of continuing trends that become more and more noticeable
Follow up Questions	

Article #8 Notes: Ecological influences on individual differences in color preference

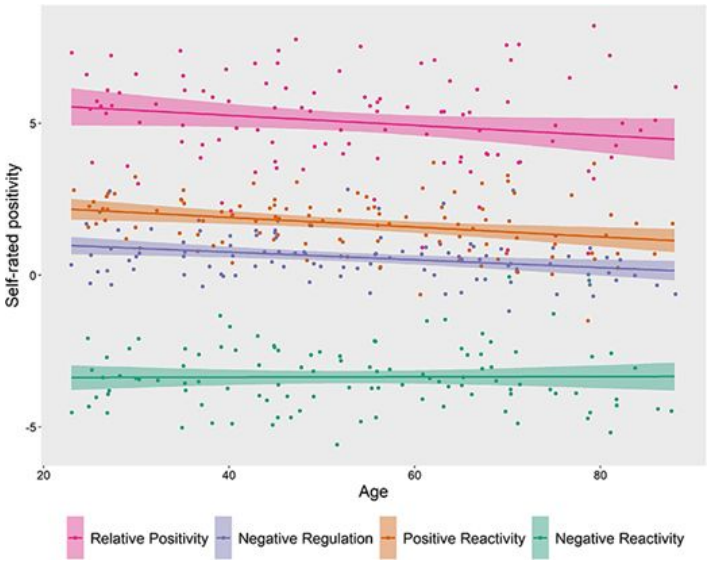
Article notes should be on separate sheets

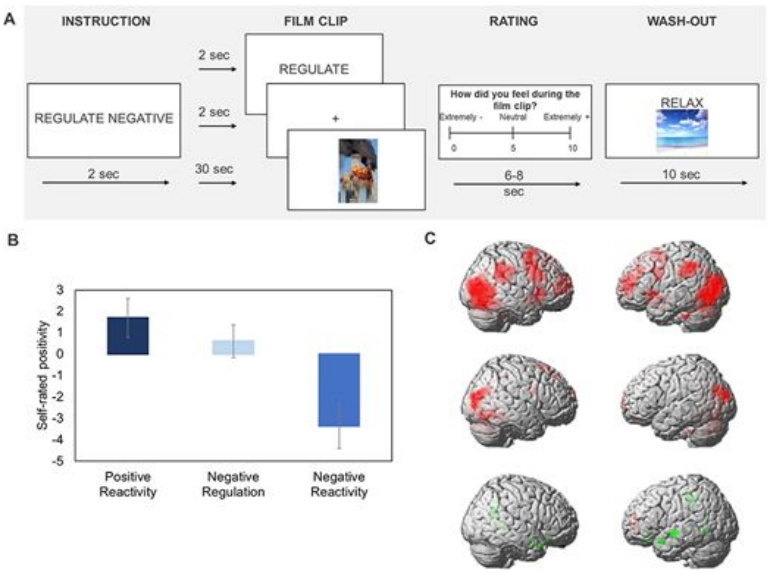
Source Title	Ecological influences on individual differences in color preference.
Source Author	Schloss, K. B., Hawthorne-Madell, D., & Palmer, S. E.
Source citation	Schloss, K. B., Hawthorne-Madell, D., & Palmer, S. E. (2015). Ecological influences on individual differences in color preference. *Attention, Perception, & Psychophysics*, *77*(8), 2803–2816. doi: 10.3758/s13414-015-0954-x
Original URL	https://link.springer.com/article/10.3758%2Fs13414-015-0954-x
Source type	Journal article
Keywords	Color preferences, association
Summary of key points	
Important Figures	
Reason for interest	Provides information on prior experiment regarding color association and preference
Notes	• The ecological valence theory (EVT) states that a persons preference for a color is determined by their preference for all objects that are the same color

	● Color preference in psychology has largely been inconclusive due to high variability between individuals ● Avg hue preferences peak at blue, and fall around yellow to yellow green ● Larger preference to more saturated colors ● May also increase with increased lightness ● Another possibility is that individual preferences are determined by differences in photoreceptors ● Ecological theory is that it is adaptive for organisms to be close to objects that are colored nicely rather than colors that they dislike or think are dangerous ● Positive emotions >>> negative emotions ● The researchers calculated the weighted effective valence estimate (WAVE) for each color, which was used in the initial procedure ● The four tasks in the important figures were completed by each participant ● The variability of the color preference for each individual was tested
Follow up Questions	

Article #9 Notes: Age-related decline in positive emotional reactivity and emotion regulation in a population-derived cohort

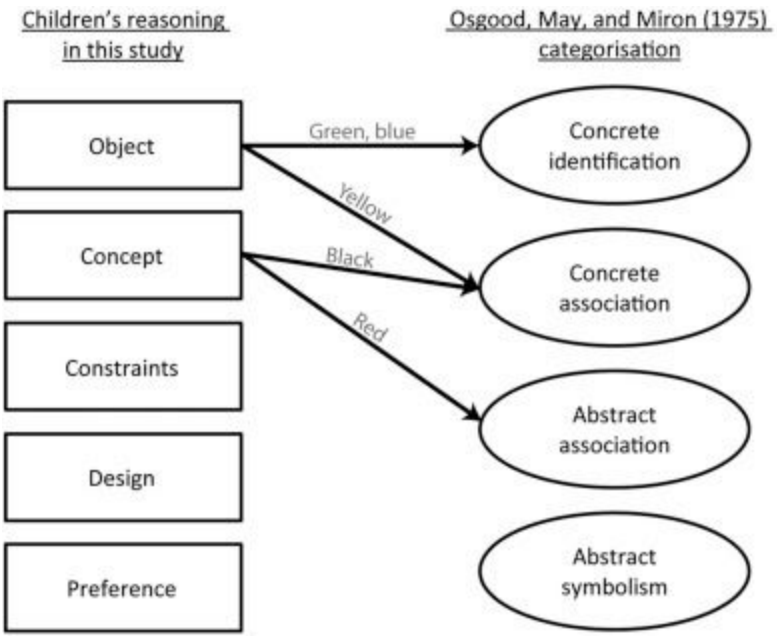
Article notes should be on separate sheets

Source Title	Age-related decline in positive emotional reactivity and emotion regulation in a population-derived cohort.
Source Author	Schweizer, S., Stretton, J., Belle, J. V., Price, D., Calder, A. J., Camcan, & Dalgleish, T.
Source citation	Schweizer, S., Stretton, J., Belle, J. V., Price, D., Calder, A. J., Camcan, & Dalgleish, T. (2019). Age-related decline in positive emotional reactivity and emotion regulation in a population-derived cohort. *Social Cognitive and Affective Neuroscience*, *14*(6), 623–631. doi: 10.31234/osf.io/2eypg
Original URL	https://academic.oup.com/scan/article/14/6/623/5497467
Source type	Journal article
Keywords	Aging, positivity, emotional regulation
Summary of key points	
Important Figures	

	
Reason for interest	This shows that as people age, their emotional well being increases, which may show a possible trend that may occur in my project
Notes	• The article begins by stating the contradiction that as cognitive and physical decline increases with age positivity tends to increase • During this experiment, they gave an emotion reactivity and regulation task to the participants • No support was found for increased positive emotional reactivity • They found decreased positivity across the lifespan, which contradicts what has been previously found in other experiments • The “age related positivity effect” has been proven in many experiments, but not this one • The Aging Brain Model was also not supported by this experiment (increased positivity as age increases is a result of decreasing amygdala reactivity to negative stimuli)
Follow up Questions	

Article #10 Notes: Children's choice: Color associations in children's safety sign design

Article notes should be on separate sheets

Source Title	Childrens choice: Color associations in childrens safety sign design
Source Author	Siu, K. W. M., Lam, M. S., & Wong, Y. L.
Source citation	Siu, K. W. M., Lam, M. S., & Wong, Y. L. (2017). Childrens choice: Color associations in childrens safety sign design. *Applied Ergonomics*, *59*, 56–64. doi: 10.1016/j.apergo.2016.08.017
Original URL	https://www.sciencedirect.com/science/article/pii/S0003687016301703
Source type	Journal article
Keywords	Color association, children, warning
Summary of key points	
Important Figures	
Reason for interest	This experiment shows one instance of younger children's color association, which I hadn't looked much into yet

Notes	● Color communicates messages to children who can't read or understand written warnings ● In order for children to get the right message, the sign designers need to take into account what they associate colors with ● The children were given uncolored safety signs also written in Chinese ● Each child produced 12 total drawings, for a total of 357 drawings in all ● They had free choice of whatever color marker that they wanted to use for each phrase ● After, the kids were asked 3 standard questions about their color and drawing choices ● Their explanations were put into five categories (concept, object, constraints, design, and preference) ● Overall, they found several trends ○ Red, orange, yellow for prohibition/warnings ○ Blue for water ○ Many combinations of the colors green-black and blue-black ○ Black used for general objects ● The table above shows a color association network that the results were put into and used to analyze ● Cultural issue was not addressed ○ No way to know how it affected the results (conducted in Hong Kong)
Follow up Questions	