Steven Tompson Dissertation
Hypotheses and Analysis Plan

The primary aims of this dissertation are to identify the neural mechanisms that facilitate decision-related attitude change and examine how social, cultural, and biological factors influence these processes.

Design: The current study had participants from the United States and East Asia complete a modified free choice paradigm while their brain activity was measured in an MRI scanner. Participants first rated 144 posters, then chose one option from each of 72 pairs of posters, then rated the posters again. On half of the trials participants completed the task for themselves (i.e., rated how much they liked the poster or chose which poster they would like to own) and on the remaining half the participants completed the task for a close friend (i.e., rated how much their friend liked the poster or chose which poster their friend would like to own).

Measures:

1. Attitude change (post-choice rating minus pre-choice rating) for the chosen option in each choice
2. Attitude change (post-choice rating minus pre-choice rating) for the rejected option in each choice
3. Spreading of Alternatives (Attitude Change for chosen option minus Attitude Change for rejected option) for each choice
4. Brain activation in a priori ROIs (identified using Chua et al., 2011; Jarcho et al., 2011; Kitayama et al., 2013; Sharot et al., 2009)

Aim #1: To test whether in-choice neural mechanisms identified in previous fMRI research (Jarcho et al., 2011; Kitayama et al., 2013) predict increased preference for the chosen option and decreased preference for the rejected option.

I propose that a network of brain regions involved in detecting conflict (dorsal anterior cingulate cortex [dACC], processing visceral affective responses (anterior insula [aINS], and processing and updating subjective value (ventral striatum [vSTR]), will influence choice-justifying attitude change. I predict that brain activation in our a priori ROIs during the choice will predict subsequent attitude change. Furthermore, using pattern classification techniques, the pattern of activation within each of our a priori ROIs during the choice will predict subsequent attitude change.

Aim #2: To test whether post-choice neural mechanisms identified in previous fMRI research (Qin et al., 2011; Tompson et al., under review) predict increased preference for the chosen option and decreased preference for the rejected option.

I propose that a network of brain regions involved in evaluating self-relevance of information and connecting it to episodic memories (medial prefrontal cortex [mPFC] and posterior cingulate cortex/precuneus [PCC/Pcu]) will predict choice-justifying attitude change. I predict that changes in brain activation in our a priori ROIs from pre-choice to post-choice track attitude change. Furthermore, using pattern classification

techniques, the pattern of activation within each of our a priori ROIs during the choice will predict post-choice attitude change.

Aim #3: To test whether in-choice and/or post-choice neural mechanisms identified in Aims #1 and #2 are attenuated for choices made for a close friend.

Previous behavioral evidence suggests that European Americans are more likely to justify choices that they make for themselves than choices that they make for a close friend (Hoshino-Browne et al., 2004). I hypothesize that the network of brain regions identified above (dACC, aINS, vSTR, mPFC, and PCC/Pcu) will be attenuated when individuals make choices for a close friend (vs. make choices for the self). Thus, in-choice affective processing and post-choice cognitive processing (measured by dACC, aINS, vSTR, mPFC, and PCC/Pcu activation) should be greater for personal choices than social choices for European Americans. Greater in-choice and post-choice activation of our a priori ROIs should then lead to greater choice-justifying attitude change, such that European Americans show greater attitude change for personal than social choices.

Exploratory Analyses:

Aim #4: To explore what patterns of neural activation East Asian participants might show.

I hypothesize that the network of brain regions identified above (dACC, aINS, vSTR, mPFC, and PCC/Pcu) will influence cultural differences in attitude change. Previous behavioral evidence suggests that Asians are more likely to justify choices that they make for a close friend than choices for themselves, whereas European Americans are more likely to justify choices that they make for themselves (Hoshino-Brown et al., 2004). Thus, one might anticipate that the neural mechanisms identified above should be more involved for choices for a close friend for Asian participants.

Moreover, recent evidence from a meta-analysis of cross-cultural differences in neural activation suggests that East Asians are more likely than European Americans to recruit regions involved in mentalizing (evaluating the mental states of others and perspective-taking) including dorsal mPFC, temporo-parietal junction (TPJ), and temporal pole (TP; Han & Ma, 2014). Thus, it is possible that regions may be involved in promoting and facilitating attitude change for East Asians. However, given the paucity of evidence on neural mechanisms of attitude change in East Asian participants, this analysis is entirely exploratory.

Aim #5: To explore whether dopaminergic genes such as DRD4 moderate cultural differences in neural activation.

Previous research has found that the DRD4 gene moderates cultural differences in self-reported beliefs and values (Kitayama et al., 2014). Specifically, carriers of the 2R/7R variants of the DRD4 variable number tandem repeat (VNTR) show greater cultural differences than non-carriers. Thus, it is possible that carriers of the 2R/7R variants will also show greater cultural differences in neural activation than non-carriers.

References

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