

Lecture 7: Emotion: neuroeconomic investigations

1. We left off wondering whether we should think of emotions as *indicators* of preference or as *causes* of preferences, and whether these options can be empirically compared. We now review the (limited) experimental evidence.
2. In ultimatum games, people in the role of Player II often reject low offers rather than express a preference for any amount of money over nothing (as they would do if their only relevant preference were for more money over less). To what extent does this reflect a cognitive preference for states judged to be fair over states judged to be unfair, and to what extent is it an expression of emotional anger? A neuroeconomic study was used to test a model in which both subjects' reports of fairness judgments and subjective arousal (indicated by skin conductance measurement) were included as independent variables. The latter was found to have a larger regression coefficient than the former. This suggests emotion as a cause of preference. To date, the experiment has not been repeated under fMRI.
3. In another study, subjects were cued with rapidly presented pictures of (respectively) neutral, happy and angry faces while making consumption decisions over liquids. Some subjects were thirsty, others weren't. Subjects were not consciously aware of having seen the faces, nor did they report differences in affect that reflected the differences in what they'd seen. However, thirsty subjects offered more for liquid, and drank more, following presentations of happy than of neutral faces and of neutral than of angry faces. This also suggests emotion as a cause rather than an indicator of

preference.

4. The somatic marker hypothesis is the name of the idea that emotions aid decisions by motivating preferences. The crucial experiments on which this hypothesis was based used the *Iowa Gambling Task* (IGT). Experimenters found that subjects with damage to orbitofrontal cortex (OFC) had difficulty learning to prefer decks of cards that delivered higher expected payoffs with lower variance to decks that delivered lower expected payoffs with higher variance. This was thought to show that emotions are causes of preference because OFC was thought to be part of the *limbic system*. However, neuroscientists have subsequently come to doubt that there is such a system. Damage to OFC could impair IGT performance in any number of ways other than interference with emotional response.
5. Phelps reports an experiment by Talmi *et al* in which subjects were conditioned to a CS+ and a CS-. During extinction of the conditioning, they indicated preferences over available rewards by squeezing handgrips. Subjects squeezed harder when presented with the CS+. This was also correlated with higher levels of activity in the dopamine reward circuit, especially NAcc. This only seems to suggest a comment on the impact of emotion to the extent that reward system activation is regarded as an emotional response. It is far from obvious to me that such an association is justified or helpful.
6. A study found that less aroused subjects – who had been instructed to reduce arousal in themselves by deliberate cognitive framing – showed less loss aversion in a gambling task than controls. This result offers no comment on the question of whether emotions are indicators or causes of preferences. It seems more natural to interpret the subject of the experiment as cognitive framing itself, rather than

emotion.

7. In general, can one infer the influence of emotions on economic behavior merely by observing that a certain brain area is active during an experimental task? Phelps argues that one could do so only if one had independent evidence that the brain area in question was highly selective in its response. No area standardly associated with emotion – neither amygdala nor anterior insula – satisfies this requirement.
8. This review raises a more fundamental question (which Phelps doesn't address): is emotion really a useful concept in neuroscience (and, therefore, in neuroeconomics) in the first place? Emotion seems to be a portmanteau idea that ropes together arousal, mood, exogenous preference and perhaps more. It therefore isn't surprising that selectivity for emotional response in a well-delineated brain area isn't found. Perhaps the traditional cognitive / emotional opposition should be dropped not because emotions influence all cognitive judgments but because there's no one kind of process that 'emotion' picks out. One might better express the insight intended by the somatic marker hypothesis by saying: cognitive judgments are highly causally complex in their neural provenance, and seldom resemble logical arguments. (Perhaps they *never* resemble logical arguments except when people *explicitly* construct such arguments using public language.)