Spontaneous blink rate correlates with financial risk taking

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Dopamine has long been thought to play a role in risky decision-making, with higher baseline levels of dopamine thought to drive risk seeking behavior. Despite this progress, the exact nature of the relationship between dopamine and risk taking is incompletely understood. For one thing, dopamine has different effects on different receptors, which are themselves distributed differently in different areas of the brain. Moreover, some studies have found that dopamine genes and drugs have different effects depending on range of other factors including gender, sensation seeking and whether the risks involve gains or losses.

In this work we sought to shed more light on dopamine’s role in risk taking by using a remarkable relationship between the rate at which someone blinks and the amount of D2-related dopamine in striatum (Karson, 1983; Elsworth et al., 1991). We therefore hypothesized that if blink rate reflects dopamine and dopamine drives risk taking, then we should see a positive relationship between individual differences in blink rate and risk taking across the population.

To investigate the relationship between blink rate and risk seeking, we measured blink rates and financial risk taking in 45 participants ranging in age from 18 to 59. Blink rates were measured by manually counting blinks in videos of the participants “staring into space”. Financial risk taking was measured using a survey in which each question offered participants a choice between a certain outcome (e.g. 100% chance of $240) and a risky outcome (e.g. 25% chance of $1000). The survey consisted of nine questions and included questions with both gain and loss framing of the outcomes.

Consistent with previous work linking dopamine to risky decisions, we found a strong positive correlation between blink rate and the number of risky choices a participant made (Spearman’s $\rho(43) = 0.57$, $p = 4.45 \times 10^{-5}$). Contrary to prior findings, we found that this correlation was not dependent on age or gender and was identical for both gain and loss framing.

These findings suggests that D2-related dopamine plays a crucial and quite general role in determining financial risk taking across the population. In addition our work demonstrates the potential of spontaneous blink rate as a simple method of probing dopamine for decision-making research.