

Dorsomedial prefrontal cortex as an integrative hub for information gathering

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Main findings

1. Decision likelihood increased with **trial number** (urgency), **total accumulated evidence**, and **recent evidence updates (ΔEV)**.
2. Making a decision was associated with greater activation in the **dmPFC** and LC, while withholding a decision engaged the vmPFC.
3. The dmPFC, engaged by both urgency and ΔEV , serves as an **integration center** where distinct brain circuits processing separate cognitive signals converge.

Introduction



How do we decide when we have enough information to make a choice?

Humans **vary** significantly in how much they explore before deciding.

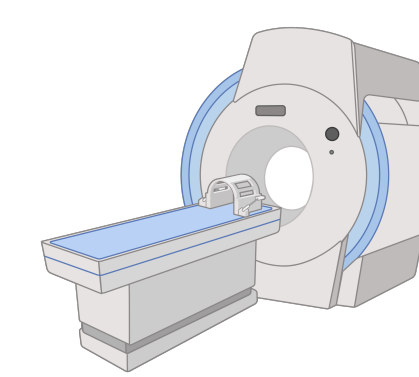
Critically **biases in information gathering are common in multiple psychiatric disorders** such as Obsessive-Compulsive Disorder and Schizophrenia.

Our aim was to identify the brain regions underlying key factors that drive information gathering during decision-making.

Methods

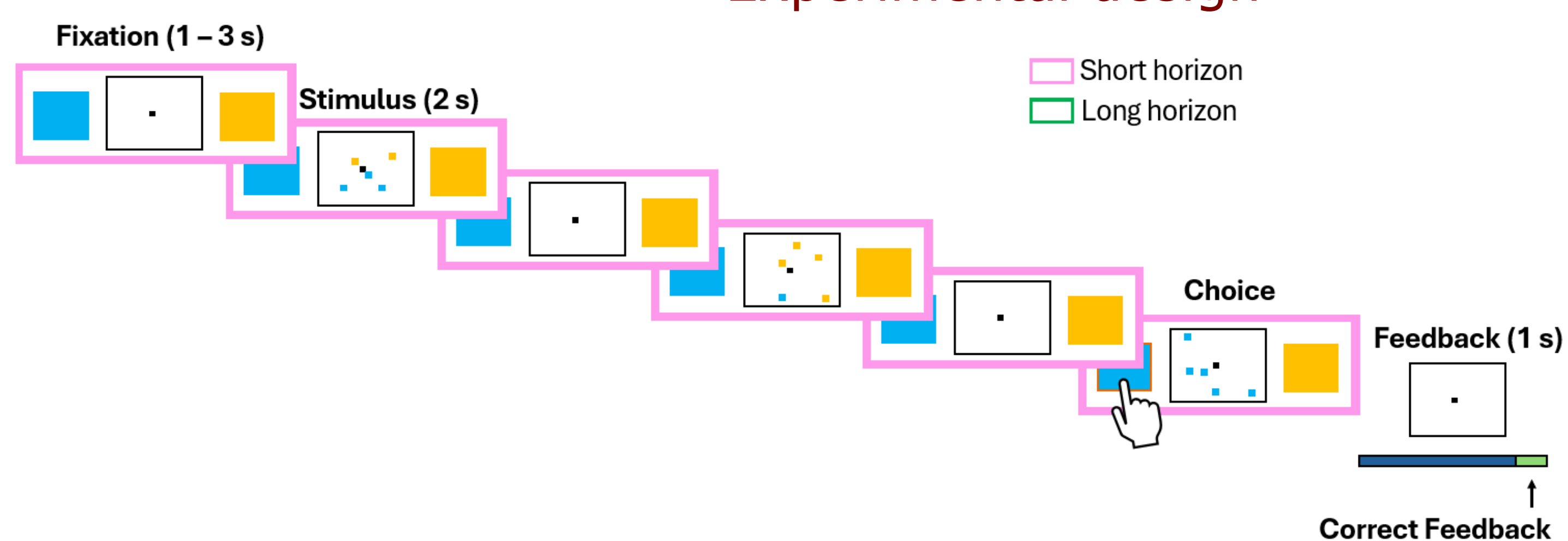


29 adults (44% female;
27.8 ± 7.9 years)



fMRI task of **4 blocks** of 40 games each.
For each game either **short** or **long** horizon

Experimental design

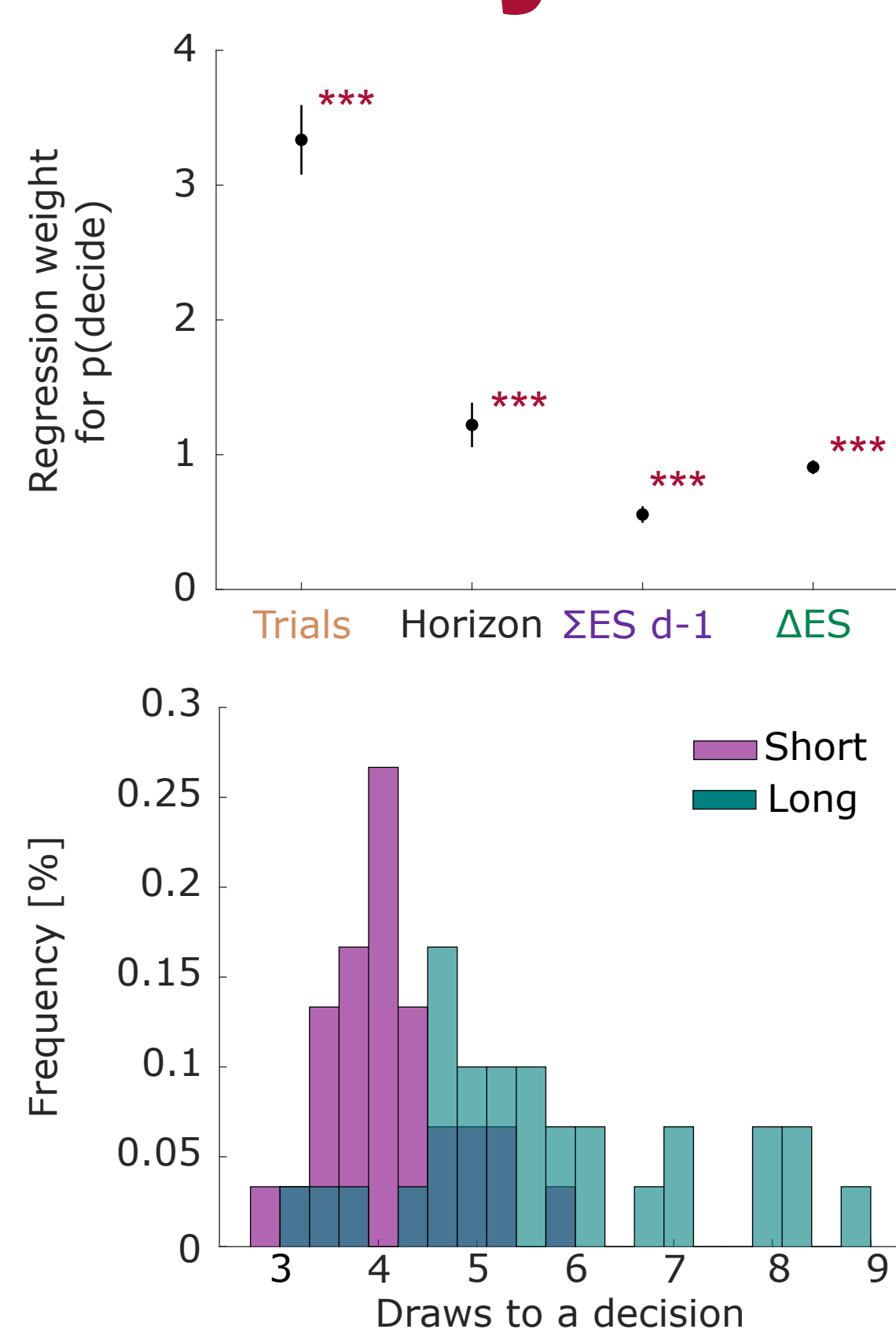


Participants had to select the colour they thought was the most abundant in a given game

Regression analysis

We confirmed that **Decision probability** on a given trial was significantly influenced by:

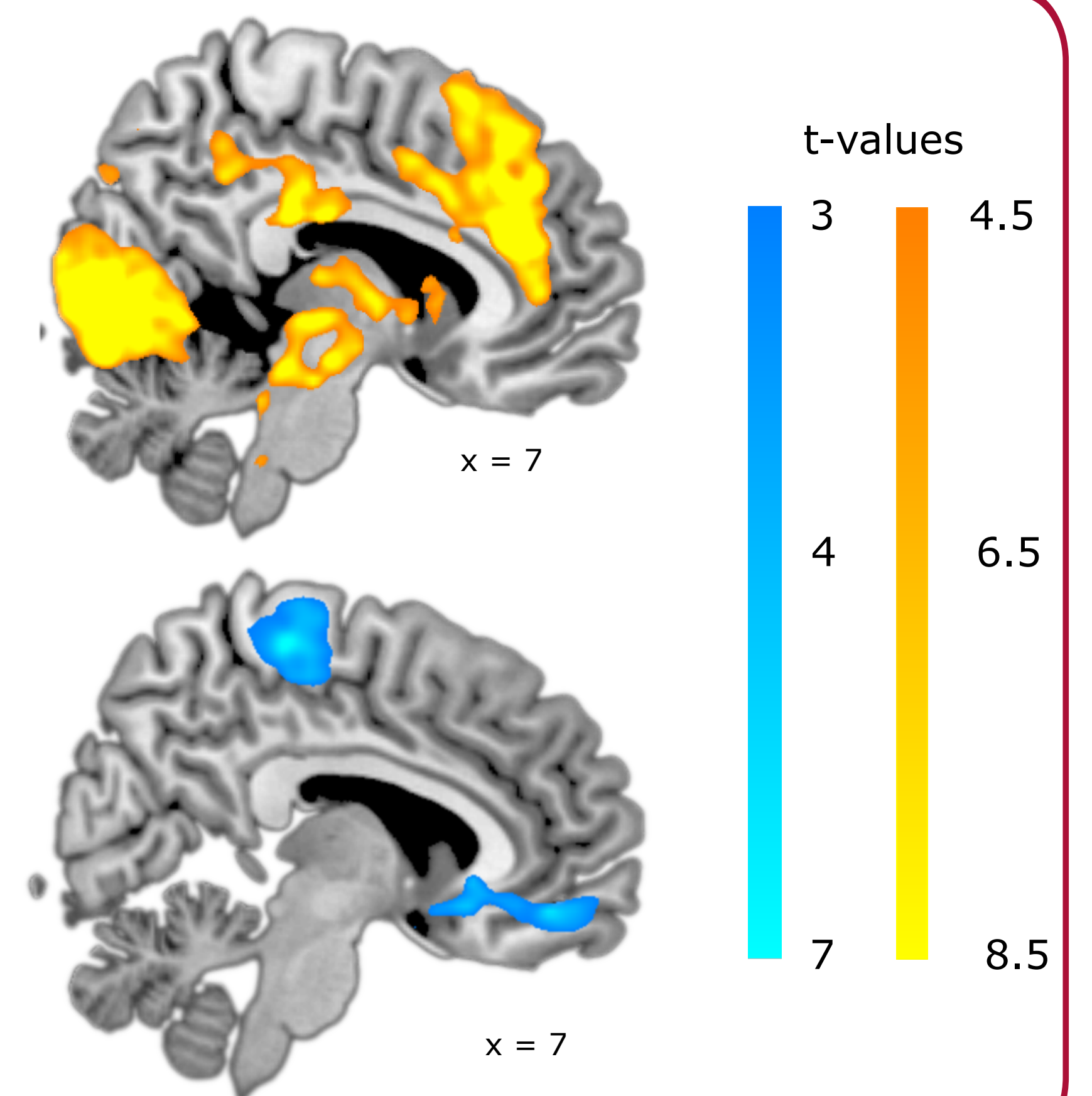
- **Trial number** acting as an urgency signal
- **$\Sigma ES d^{-1}$** (Total Evidence strength): The cumulative strength of evidence supporting one of the options
- **ΔES** (Change in evidence strength): Recency-weighted updates in information



When to decide?

P(decide): The probability of making a decision was **positively associated** with activation in the **dorsomedial prefrontal cortex (dmPFC)** and the **ventral tegmental area/substantia nigra (VTA/SN)** and the **Locus Coeruleus (LC)**.

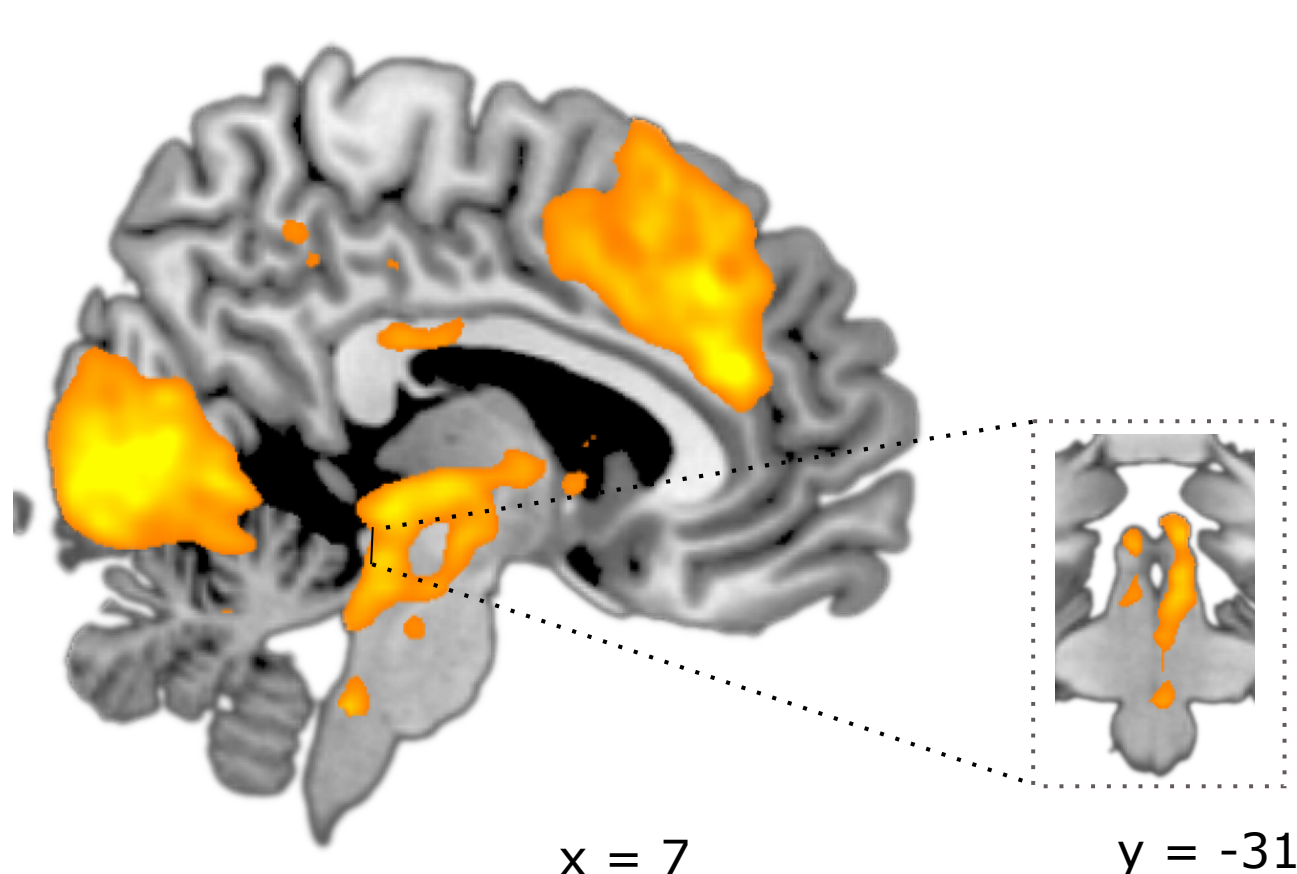
P(gathering information): The probability of withholding a decision was linked to **greater activation in the ventromedial prefrontal cortex (vmPFC)**.



Components Influencing Choice

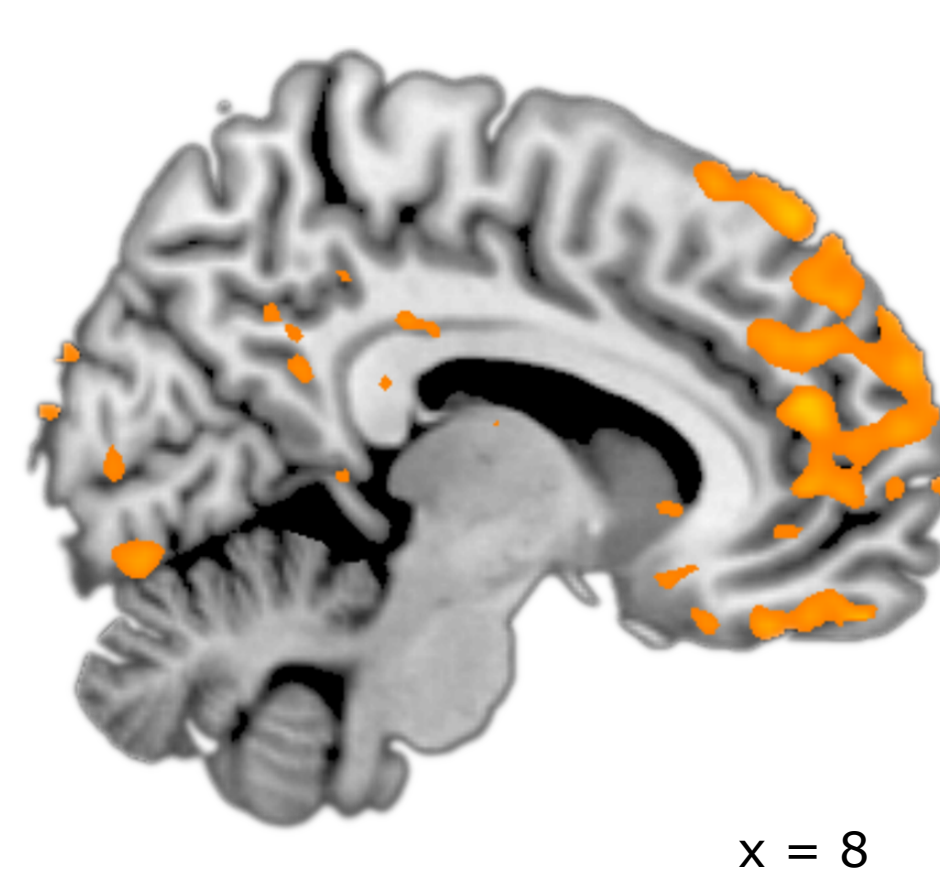
Trial number

Positively associated with activation in the **dmPFC**, the **VTA/SN** and the **LC**



$\Sigma ES d^{-1}$

Positively associated with activation in the **dmPFC** and **vmPFC**



ΔES

Positively associated with activation in the **vmPFC** and **ventral striatum** and negatively associated with activation in the **dmPFC**.

