**Supplementary Methods**

*Apparatus - details*

Each chamber contained a side wall with two 4cm wide retractable levers, positioned equidistantly, 10cm apart and 5cm from the grid floor. Placed 3cm above each lever was a round disc (2cm diameter) that could be illuminated by a 2.5W, 24V light bulb, which served as a stimulus light. The whole chamber was illuminated by a red 1.8W, 17V house light positioned at the top right corner of the chamber. Six operant chambers were additionally equipped with 3 spaced equally along the length of the chamber, 1cm above the grid floor, thus enabling locomotor activity during self-administration sessions to be measured simultaneously.

*Behavioural procedures*

Each session was initiated manually by three rapid presses by the experimenter on one of the two levers, thereby designating the active or drug lever, as opposed to the second, inactive lever on which responding had no programmed consequence. These presses on the active lever had no consequence other than the initiation of the session. The active and inactive levers were counterbalanced across rats.

*Histological assessment*

Every alternate 60_m section was taken and mounted on a glass slide coated with gelatin, and stained for Nissl substance with Cresyl Violet. In some animals with lesions of the NAc shell, sections were taken and immunocytochemistry performed for the visualisation of the neuron-specific marker NeuN, using monoclonal antibodies (mAb 377, Chemicon International, UK) using a standard Vectatstain, Avidin-Biotin procedure.

*Statistical analyses*
Rate of responses during establishment of the cocaine dose-response curve were analysed using three-way ANOVA with lesion as the between-group factor and repeated measures on dose and lever.

Locomotor activity data was analysed as the total number of beam breaks in each 2hr session with lesion as the between-group factor and test day as the repeated measure.

Response patterns obtained during second-order schedules training were analysed quantitatively using the following dependent measures; 1) post-reinforcement pause (PRP) duration, which was calculated as the mean time between a cocaine infusion and the first active lever press following the infusion within a single 2hr session for each schedule. The PRP duration was analysed using two-way ANOVA with lesion as the between-group factor and training schedule as the within-group factor; 2) post-conditioned reinforcement pause (PCRft) duration, which was analysed by measuring the time between a response-contingent CS presentation and the first proceeding active lever press in a single 2hr self-administration session under the FR10(FR10:S) schedule. A two-way ANOVA was then conducted with lesion as the between-group factor and state (pre- or post cocaine) as the repeated measure. 3) Rate of responding, which was calculated by measuring the mean rate of responding for the period before and after the first infusion in three 2hr self-administration sessions under the FR10(FR10:S) schedule. Two-way ANOVA was conducted with lesion as the between-group factor and cocaine state as the repeated measure.