

Supplementary Materials

Video recordings of SDM91 acquiring a food pellet from the smallest wells of the modified dexterity board in the last pre-lesion testing session (supplementary video SDM91 last prelesiontest well A.avi and SDM91 last prelesiontest well B.avi), at 6 weeks post-lesion (SDM91 post6 well B 1.avi and SDM91 post6 well D.mp4) and at 7 weeks post-lesion (SDM91 post7 well C.avi). Note that precision grasp was used in each of these post-lesion trials and that while returning to the cage the hand bumped the side of the cage portal, causing loss of the pellet from grasp. Such bumping of the hand on the side of the cage portal was not observed in pre-lesion testing.

Video recordings of SDM91 performing the mMAP flat surface task before the lesion (SDM91 pre-lesion flat surface.avi) and at after the lesion (SDM91 post-lesion flat surface.avi). Note the greater difficulty performing this relatively easy task in the post-lesion period and, in one trial, SDM91 first grasped the cereal with the correct (impaired) hand, dropped and recovered it with the other hand.

Supplementary Methods

mMAP Performance Scores

These were computed for each trial in the mMAP task based on the total absolute 3D impulse (3D force-time integral) of forces applied while manipulating the carrot chip, duration of manipulation of the target (as determined from recordings of applied forces) and outcome (no attempt/unsuccessful attempt/successful acquisition of food target – see below) as described in the equation below (McNeal et al., 2010). The scores were normalized to each animal's best pre-lesion performances as described below.

$$TAImp(n) = \int F_x dt + \int F_y dt + \int F_z dt \quad (1)$$

TAImp (n) – Total Absolute Impulse of trial n

\int - integral over duration of trial t with respect to time (dt)

F_x - Absolute value of Force applied in left/right direction

F_y - Absolute value of Force applied in anterior-posterior direction

F_z - Absolute value of Force applied in vertical direction

If outcome ≥ 2 (i.e., successful grasp and lift/manipulation of the carrot chip) then (2)

$$PS_{mMAP}(n) = \{100 * ((TAImp(n) - \text{Min TAImp}) / \text{TAImp range}) + 100 * ((\text{Dur}(n) - \text{MinDur}) / \text{Dur Range})\} * \text{Outcome}(n)$$

$$\text{if } PS_{mMAP}(n) < 200 \text{ then } PS_{mMAP}(n) = 200$$

Else

$$PS_{mMAP}(n) = \{100 * ((\text{MaxTAImp} - \text{TAImp}(n)) / \text{TAImp Range}) + 100 * ((\text{MaxDur} - \text{Dur}(n)) / \text{DurRange})\} * \text{Outcome}(n)$$

$$\text{If } PS_{mMAP}(n) > 200 \text{ then } PS_{mMAP}(n) = 200$$

Where:

$PS_{mMAP}(n)$ – performance score on mMAP trial n

Outcome(n) – success on trial n (0 for no attempt with the correct hand, 1 for unsuccessful attempt with the correct hand, 2 if the carrot chip is successfully grasped and lifted over the rod but then dropped and not removed from the food chamber, 3 if the carrot chip is successfully grasped and lifted over the rod but then dropped and removed from the food chamber, 4 for successful acquisition without dropping the carrot chip)

MinTAImp – minimum single trial pre-lesion total absolute impulse within a difficulty level for either hand

MaxTAImp - maximum single trial pre-lesion total absolute impulse with a difficulty level for either hand

TAImp Range – maximum single trial pre-lesion total absolute impulse – MinTAImp

Dur(n) – duration of trial n

MaxDur - maximum single trial duration during pre-lesion tests

MinDur – minimum single trial duration during pre-lesion tests

DurRange – MaxDur – MinDur

mDB Performance Scores

These were computed for each trial in the mDB task from reach and grasp durations, reach accuracy (distance of the index tip from the target), grip aperture when the index first touched the mDB platform containing the food pellet and number of times during manipulation that contact is lost between the digit and pellet. An overall performance score ($PS_{mDB}(n)$) as well as reach ($RS(n)$) and manipulation ($MS(n)$) performance scores were computed (McNeal et al., 2010). The scores were normalized to each animal's best pre-lesion performances as described below.

$$PS_{mDB}(n) = (100 * (Rdur(n) + Gapp(n) + Mdur(n) + Acc(n) + C(n))) * Outcome \quad (3)$$

$$\text{If } outcome \geq 1 \text{ then } PS_{mDB}(n) \geq 50$$

Where:

- $PS_{mDB}(n)$ - performance score on mDB trial n
- $Outcome(n)$ - multiplier (0 = no attempt, 1 = failure, 2 = successful retrieval of pellet) on trial n
- $Rdur(n)$ - (maximum pre-lesion reach duration – reach duration on trial n) / (maximum – minimum pre-lesion reach duration)
- $Mdur(n)$ - (maximum pre-lesion manipulation duration – manipulation duration on trial n) / (maximum – minimum pre-lesion manipulation duration)
- $Acc(n)$ - (maximum pre-lesion pellet-index distance at touchdown – pellet-index distance at touchdown on trial n) / (maximum – minimum pre-lesion pellet-index distance at touchdown)
- $Gapp(n)$ - (maximum thumb-finger distance – thumb-finger distance on trial n) / (maximum – minimum pre-lesion thumb-finger distance)
- $C(n)$ - 1 / (1 + number of times contact is lost between a digit and pellet on trial n)

$$RS(n) = mr(n) * (100 * (Rdur(n) + Gapp(n) + Acc(n))) \quad (4)$$

Where: RS = reach score, $mr(n)$ = multiplier (0 = no attempt, 1 = dexterity board contacted) on trial n; $Rdur(n)$, $Gapp(n)$, $Acc(n)$ as defined for equation 1

$$MS(n) = Outcome(n) * (100 * (Mdur(n) + C(n))) \quad (5)$$

Where: $MS(n)$ = manipulation score; $Outcome(n)$, $Mdur(n)$, $C(n)$ defined as for equation 1