

# Capturing Connectional Information: An MRI-based Anatomical Reference System

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## Introduction

One of the most important unsolved problems in neuroscience is the wiring diagram of the human brain. Different approaches have been used in an attempt to elucidate the connections in the cerebrum in terms of their topographic arrangement [1] as well as in the forms of matrices [2]. Our group has formulated an MRI-based topographic system of human cerebral connectivity [1]. In the present study a list of the connections of each cerebral parcellation unit (PU) has been compiled in matrix form. This connectivity matrix reflects the current body of experimental animal and human data.

## Methods

To map the cerebral corticocortical, corticothalamic, corticostriatal, corticopontine, hippocampal-cortical and amygdala-cortical connectivity, a meta-analysis of relevant human and non-human primate literature was conducted. Coding of connections was as follows: 1 was assigned to U-fibers and short intragyral and juxtagyral (both intralobar and juxtalobar) connections, 2 was assigned to medium-range intralobar (non-juxtagyral) connections, and 3 was assigned to long-range connections (intra- and interlobe association, corticothalamic, corticostriatal, corticopontine, hippocampal-cortical and amygdala-cortical).

## Results

49 cortical, 7 thalamic, 10 striatal, one corticopontine, one hippocampal cortical, and one amygdala cortical PU matrices have been formulated.

## Discussion

Cortical areas relate to other cortical and subcortical regions following a general scheme of connectivity, allowing for integrated functioning within the central nervous system. Knowledge of connections is relevant for formulating and testing hypotheses in cognitive and clinical neuroscience.

## References

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 Stephan KE, Kamper L, Bozkurt A, Burns GA, Young MP, Kotter R. Advanced database methodology for the Collation of Connectivity data on the Macaque brain (CoCoMac). *Philosophical Transactions of the Royal Society of London Series B: Biological Sciences*. 2001 Aug 29; 356(1412): 1159-86.

Table 1

PU: M	Connectivity Summary
AG	3
AO	3
CP	3
F2	3
F3a	3
F3b	3
F3c	3
F3d	3
F3e	3
F3f	3
F3g	3
F3h	3
F3i	3
F3j	3
F3k	3
F3l	3
F3m	3
F3n	3
F3o	3
F3p	3
F3q	3
F3r	3
F3s	3
F3t	3
F3u	3
F3v	3
F3w	3
F3x	3
F3y	3
F3z	3
F3aa	3
F3ab	3
F3ac	3
F3ad	3
F3ae	3
F3af	3
F3ag	3
F3ah	3
F3ai	3
F3aj	3
F3ak	3
F3al	3
F3am	3
F3an	3
F3ao	3
F3ap	3
F3aq	3
F3ar	3
F3as	3
F3at	3
F3au	3
F3av	3
F3aw	3
F3ax	3
F3ay	3
F3az	3
F3ba	3
F3bb	3
F3bc	3
F3bd	3
F3be	3
F3bf	3
F3bg	3
F3bh	3
F3bi	3
F3bj	3
F3bk	3
F3bl	3
F3bm	3
F3bn	3
F3bo	3
F3bp	3
F3bq	3
F3br	3
F3bs	3
F3bt	3
F3bu	3
F3bv	3
F3bw	3
F3bx	3
F3by	3
F3bz	3
F3ca	3
F3cb	3
F3cc	3
F3cd	3
F3ce	3
F3cf	3
F3cg	3
F3ch	3
F3ci	3
F3cj	3
F3ck	3
F3cl	3
F3cm	3
F3cn	3
F3co	3
F3cp	3
F3cq	3
F3cr	3
F3cs	3
F3ct	3
F3cu	3
F3cv	3
F3cw	3
F3cx	3
F3cy	3
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F3dg	3
F3dh	3
F3di	3
F3dj	3
F3dk	3
F3dl	3
F3dm	3
F3dn	3
F3do	3
F3dp	3
F3dq	3
F3dr	3
F3ds	3
F3dt	3
F3du	3
F3dv	3
F3dw	3
F3dx	3
F3dy	3
F3dz	3
F3ea	3
F3eb	3
F3ec	3
F3ed	3
F3ee	3
F3ef	3
F3eg	3
F3eh	3
F3ei	3
F3ej	3
F3ek	3
F3el	3
F3em	3
F3en	3
F3eo	3
F3ep	3
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F3es	3
F3et	3
F3eu	3
F3ev	3
F3ew	3
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