1. Parameters' tables

Table superscript references: **1**: Bugaysen et al. (2010), **2**: Baufreton (2005), **3**: Beurrier et al. (1999), **3**: Connelly et al. (2010), **4**: Dayan and Abbott (2001), **5**: Fountas (2016), **6**: Galarreta and Hestrin (1997), **7**: Humphries et al. (2010), **8**: Humphries (2009), **9**: Humphries et al. (2009), **10**: Humphries, in code., **11**: Izhikevich (2007), **12**: Lindahl et al. (2013), **13**: Loucif et al. (2008), **14**: Moyer et al. (2007), **15**: Mahon (2000), **16**: Oorschot (1996), **17**: Richards et al. (1997), **18**: Tomkins et al. (2014), **19**: Tateno and Robinson (2011), $*$: Manually tuned. ★: Local search.

Connection	**Receptor**	**Connection type**	**Probability**	λ	G	E	τ
Ctx → MSN	AMPA	One-to-one		10.0 [5]	6.1 [9]	0.0 [18,14]	6.0 [18]
	NMDA	One-to-one		10.0 [5]	3.05 [9]	0.0 [18,14]	160.0 [18]
MSN → MSN	GABAA	All-to-all	0.32 [18]	$uniform(1.0, 2.0)$ [10]	0.25 $*$	-60.0 [18,14]	11.0 [6]
MSN → SNr	GABAA	All-to-all	0.033 [5]	1.0 [5]	57.66 ★	-80.0 [5,4]	5.2 [5,3,12]
SNr → SNr	GABAA	All-to-all	0.1 [5]	1.0 [5]	0.3254 ★	-80.0 [5,4]	3.0 [5,4]
Ctx → STN	AMPA	One-to-one		2.5 [5]	0.0215 $*$	0.0 [5,4]	2.0 [5,4]
	NMDA	One-to-one		2.5 [5]	$\times 0.6$ [5]	0.0 [5,4]	100.0 [5,4]
STN → GPe	AMPA	All-to-all	0.3 [5]	2.0 [5]	0.3 $*$	0.0 [5,4]	2.0 [5,4]
	NMDA	All-to-all	0.3 [5]	2.0 [5]	$\times 0.36$ [5]	0.0 [5,4]	100.0 [5,4]
GPe → STN	GABAA	All-to-all	0.1 [5]	4.0 [5]	0.518 [5]	-84.0 [5,2,12]	8.0 [5,2,12]
GPe → GPe	GABAA	All-to-all	0.1 [5]	1.0 [5]	0.765 [5]	-65.0 [5,12]	5.0 [5,12]
MSN → GPe	GABAA	All-to-all	0.033 [5]	5.0 [5]	10.0 $*$	-65.0 [5,12]	6.0 [5,12]
STN → SNr	AMPA	All-to-all	0.3 [5]	1.5 [5]	3.392 ★	0.0 [5,4]	2.0 [5,4]
	NMDA	All-to-all	0.3 [5]	1.5 [5]	$\times 0.2$ [5]	0.0 [5,4]	100.0 [5,4]
GPe → SNr	GABAA	All-to-all	0.1066 [5]	3.0 [5]	59.672 ★	-80.0 [5,4]	2.1 [5,3,12]

Table 1: Synaptic and connectivity parameters.

Parameter	**MSN D1**	**MSN D2**
N	1146 [18,7]	1146 [18,7]
C	15.0 [18,8]	15.0 [18,9]
k	1.0 [18,11]	1.0 [18,11]
v_t	-30.0 [18,8]	-30.0 [18,8]
v_r	-80.0 [18,11]	-80.0 [18,11]
v_{peak}	40.0 [18,11]	40.0 [18,11]
a	0.01 [18,15,11]	0.01 [18,15,11]
b	-20.0 [18,11]	-20.0 [18,11]
c	-55.0 [18,11]	-55.0 [18,11]
d	91.0 [18,11]	91.0 [18,11]
I_{F-I}	25.0 $*$	25.0 $*$
I_{sim}	0.0 [18]	0.0 [18]
ϕ_1	0.3 [18,9]	0.3 [18,9]
ϕ_2	0.3 [18,9]	0.3 [18,9]
β_1	6.3 [8]	6.3 [8]
β_2	0.215 [8]	0.215 [8]
α	0.0 [18,8]	0.032 [18,8]
K	0.0289 [18,8]	0.0 [18,8]
L	0.331 [18,8]	0.0 [18,8]

Table 2: MSN parameters.

Parameter	STN RB	STN LLRS	STN NR
N	28 [5,16]	12 [5,16]	7 [5,16]
C	23.0 [5]	40.0 [5]	30.0 [5]
k	0.439 [5]	0.3 [5]	0.105 [5]
v_t	-41.4 [5,3]	-50.0 [5,3]	-43.75 [5,3]
v_r	-56.2 [5,13]	-56.2 [5,13]	-58.5 [5,13]
v_{peak}	15.4 [5,3]	15.4 [5,3]	15.4 [5,3]
a_1	0.021 [5]	0.05 [5]	0.44 [5]
b_1	4.0 [5]	0.2 [5]	-1.35 [5]
c	-47.7 [5]	-60.0 [5]	-52.34 [5]
d_1	17.1 [5]	1.0 [5]	17.65 [5]
I_{F-I}	56.1 [5]	25.0 [5]	-1.0 [5]
I_{sim}	56.1 [5]	8.0 [5]	-18.0 [5]
a_2	0.123 [5]	0.001 [5]	0.32 [5]
b_2	0.015 [5]	0.3 [5]	3.13 [5]
d_2	-68.4 [5]	10.0 [5]	92.0 [5]
v_{r2}	-60.0 [5]	-60.0 [5]	-43.2 [5]
w_1	0.1 [5]	0.01 [5]	0.001 [5]
w_2	0.0 [5]	0.0 [5]	1.0 [5]
β_1	0.5 [5]	0.5 [5]	0.5 [5]
β_2	0.5 [5]	0.5 [5]	0.5 [5]

Table 3: STN parameters.

Parameter	**GPe A**	**GPe B**	**GPe C**	**SNr**
N	7 [5,16]	131 [5,16]	17 [5,16]	3000 $*$
C	55.0 [5]	68.0 [5]	57.0 [5]	172.1 [5]
k	0.06 [5]	0.943 [5]	0.099 [5]	0.7836 [5]
v_t	-42.0 [5,1]	-44.0 [5,1]	-43.0 [5,1]	-51.8 [5,17]
v_r	-50.7 [5,1]	-53.0 [5,1]	-54.0 [5,1]	-64.58 [5,19]
v_{peak}	38.0 [5,1]	25.0 [5,1]	34.5 [5,1]	9.8 [5,17]
a	0.29 [5]	0.0045 [5]	0.42 [5]	0.113 [5]
b	4.26 [5]	3.895 [5]	7.0 [5]	11.057 [5]
c	-57.4 [5]	-58.36 [5]	-52.0 [5]	-62.7 [5]
d	110.0 [5]	0.353 [5]	166.0 [5]	138.4 [5]
I_{F-I}	107.0 [5]	52.0 [5]	187.5 [5]	150.0 [5]
I_{sim}	167.0 [5]	64.0 [5]	237.5 [5]	690.4 $*$
β_1	0.5 [5]	0.5 [5]	0.5 [5]	0.5 [5]
β_2	0.5 [5]	0.5 [5]	0.5 [5]	0.5 [5]

Table 4: GPe and SNr neurons parameters.

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