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Supplemental Information

A circuit logic for sexually shared and dimorphic aggressive behaviors in *Drosophila*

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Table S1. Genotypes of flies used in each experiment. Related to all figures.

Figure 1	Abbreviation	Genotypes
1B-C		Canton-S
Figure 2	Abbreviation	Genotypes
2B		Eb5-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2)
2C	Eb5>CsChr Eb5>GFP	Eb5-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2) Eb5-Gal4(attp40) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
2D-ii & 2Ei		Eb5-Gal4(attp2) x UAS-C3PA-GFP (III)
2Diii-v	CAP driver	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
2Eii	pC1 driver	NP2631; dsx-Flp x 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5)
2Eiii	MAP driver	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
Figure 3	Abbreviation	Genotypes
3Ai, 3Aiii, & 3B	CAP>CsChr (tester) CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
3Aii	MAP>CsChr (tester) MAP>GFP (control)	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
3C	CAP>Kir2.1 (tester) CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
Figure 4	Abbreviation	Genotypes
4A	CAP>CsChr (tester)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
4B	CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
		Eb5LexA(attp18); 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-IVS-jGCaMP7b(vk5) x Eb5-Gal4(attp40); 22F05-Gal80(attp2)
Figure 5	Abbreviation	Genotypes
5A & 5D	CAP>CsChr (tester) CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
	MAP>CsChr (tester) MAP>GFP (control)	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
5B	MAP>Kir2.1 (tester) MAP>GFP (control)	Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
5C	CAP>MAP>CHR+MAP>Kir2.1 CAP>MAP>CHR+Empty>Kir2.1	Eb5-LexA(attp18);+; Eb5-AD(vk27); 22F05-DBD(attp2) x 13xLexAop2-IVS-Syn21-Chrimson-tdTomato-3.1(su(Hw)attp5); pJFRC49-10xUAS-eGFP::Kir2.1(attp2) Eb5-LexA(attp18);BDP-AD(attp40); BDP-DBD(attp2) x 13xLexAop2-IVS-Syn21-Chrimson-tdTomato-3.1(su(Hw)attp5); pJFRC49-10xUAS-eGFP::Kir2.1(attp2)
Figure 6	Abbreviation	Genotypes
6Ai	MAP neurons	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
6Aii	CAP(Chrimson)->MAP(jG7b)	Eb5LexA(attp18); 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-IVS-jGCaMP7b(vk5) x Eb5-Gal4(attp40); 22F05-Gal80(attp2)
6Bi	fpC1 neurons	26E01-AD(attp40); dsx-DBD x 20xUAS-CsChrimson-mVenus(attp2)
6Bii	CAP(Chrimson)->fpC1(jG7b)	Eb5LexA(attp18); 13xLexAop2-Chrimson::tdT3.1(su(Hw)attp5); 20xUAS-jGCaMP7b(vk5) x 26E01-AD(attp40); dsx-DBD
6C	fpC1-Chrimson	dsx-Flp x 26E01-Gal4(attp2) x 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5)
6Cii	fpC1>STOP	dsx-Flp x BDPGal4U(attp2); 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5)
6D	fpC1>Kir2.1 fpC1>GFP	26E01-AD(attp40); dsx-DBD x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) 26E01-AD(attp40); dsx-DBD x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
6E	CAP>Chrimson+ fpC1>Kir2.1 CAP>Chrimson+ Empty>Kir2.1	Eb5LexA(attp18); 13xLexAop2-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); pJFRC49-10xUAS-eGFP::Kir2.1(attp2) x 26E01-AD(attp40); dsx-DBD Eb5LexA(attp18); 13xLexAop2-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); pJFRC49-10xUAS-eGFP::Kir2.1(attp2) x BDP-AD(attp40); BDP-DBD(attp2)
Figure 7	Abbreviation	Genotypes
7Ai	CAP->MAP	Eb5LexA(attp18); 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-IVS-jGCaMP7b(vk5) x Eb5-Gal4(attp40); 22F05-Gal80(attp2)
7Aii	CAP->fpC1	Eb5LexAop2-Chrimson::tdT3.1(su(Hw)attp5); 20xUAS-jGCaMP7b(vk5) x 26E01-AD(attp40); dsx-DBD
7B & 7C	CAP>CsChrimson CAP>GFP	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
Figure S1	Abbreviation	Genotypes
S1A & S1C	Wild-type approach	Canton-S
S1B	CAP-induced approach	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
S1D	Wild-type approach	Canton-S
Figure S2	Abbreviation	Genotypes
S2A	R60G08>CsChrimson BDP>CsChrimson	R60G08-Gal4(attp2) x 20xUAS-CsChrimson-mVenus(attp2) BDPG4U(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
S2B		R60G08-Gal4(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
S2C	R60G08+FlpON R60G08+oldFlp+FlpON R60G08+FlpOFF R60G08+oldFlp+FlpOFF	R60G08-Gal4(attp2) x 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5) R60G08-Gal4(attp2) x old-Flp(attp40); 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5) R60G08-Gal4(attp2) x 20xUAS-FRT-Chrimson::tdT3.1-FRT-myrTopHal2(vk5) R60G08-Gal4(attp2) x old-Flp(attp40); 20xUAS-FRT-Chrimson::tdT3.1-FRT-myrTopHal2(vk5)
Figure S3	Abbreviation	Genotypes
S3A	Eb2-Gal4(attp2) Eb3-Gal4(attp2) Eb4-Gal4(attp2) Eb5-Gal4(attp2)	Eb2-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2) Eb3-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2) Eb4-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2) Eb5-Gal4(attp40) x 20xUAS-CshChrimson-mVenus(attp2)
S3B	60G08 neurons Eb5 neurons 60G08+Eb5- neurons	R60G08-Gal4(attp2) x 20xUAS-IVS-Syn21-Chrimson-tdTomato-3.1(su(Hw)attp5) Eb5-Gal4(attp2) x 20xUAS-CsChrimson-mVenus(attp2) R60G08-Gal4(attp2) x 20xUAS-IVS-Syn21-Chrimson-tdTomato-3.1(su(Hw)attp5); Eb5-Gal80(attp2)
S3C-ii	Eb5 vs dsx-Gal4	Eb5LexA(attp18); 20xUAS-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-jGCaMP7b(vk5) x dsx-Gal4
S3Ciii	Eb5 vs FruM	Eb5LexA(attp18) x 13xLexAop2-CsChrimson::tdT3.1(vk5)
S3Eii	CAP vs Eb5	Eb5LexA(attp18); 10xUAS-nls::tdTomato(vk22); 13xLexAop2-nls::GFP(vk40) x Eb5-Gal4(attp40); 22F05-Gal80(attp2)
S3Eiii-iv	MAN vs Eb5	Eb5LexA(attp18); 10xUAS-nls::tdTomato(vk22); 13xLexAop2-nls::GFP(vk40) x Eb5-AD(vk27); 22F05-DBD(attp2)
Figure S4	Abbreviation	Genotypes
S4Ai	MAP	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2)
S4Aii	MAP>CsChr MAP>GFP(control)	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
S4B	Eb5-Gal4 CAP MAP fpC1	Eb5-Gal4(attp40) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2) 26E01-AD(attp40); dsx-DBD x 20xUAS-CsChrimson-mVenus(attp2)
S4D		NP2631; Eb5-AD(vk27); 22F05-LexADB(attp2) x 10xUAS-nls::tdTomato(vk22); 13xLexAop2-nls::GFP(vk40)
S4Ei	fpC1>CsChrimson	26E01-AD(attp40); dsx-DBD x 20xUAS-CsChrimson-mVenus(attp2)
S4Eii	fpC1+FlpON fpC1+oldFlp+FlpON fpC1+FlpOFF fpC1+oldFlp+FlpOFF	26E01-AD(attp40); dsx-DBD x 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5) 26E01-AD(attp40); dsx-DBD x old-Flp(attp40); 20xUAS-FRT-myrTopHal2-FRT-Chrimson::tdT3.1(vk5) 26E01-AD(attp40); dsx-DBD x 20xUAS-FRT-Chrimson::tdT3.1-FRT-myrTopHal2(vk5) 26E01-AD(attp40); dsx-DBD x old-Flp(attp40); 20xUAS-FRT-Chrimson::tdT3.1-FRT-myrTopHal2(vk5)
S4F	MAP>GCaMP7b fpC1>GCaMP7b	Eb5LexA(attp18); 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-IVS-jGCaMP7b(vk5) x Eb5-Gal4(attp40); 22F05-Gal80(attp2) Eb5LexA(attp18); 13xLexAop2-Chrimson::tdT3.1(su(Hw)attp5); 20xUAS-jGCaMP7b(vk5) x 26E01-AD(attp40); dsx-DBD
Figure S5	Abbreviation	Genotypes
S5A	Eb5>CsChr (tester)	Eb5-Gal4(attp40) x 20xUAS-CsChrimson-mVenus(attp2)
S5B	CAP>CsChr (tester) CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x 20xUAS-CsChrimson-mVenus(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC82-20xUAS-IVS-Syn21-GFP-p10(attp2)
S5C-ii	CAP>Kir2.1 (tester) CAP>GFP (control)	Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) Eb5-Gal4(attp40); 22F05-Gal80(attp2) x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
S5Ciii	MAP>Kir2.1 (tester) MAP>GFP(control)	Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) Eb5-AD(vk27); 22F05-DBD(attp2) x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
S5Ciii	fpC1>Kir2.1 (tester) fpC1>GFP (control)	26E01-AD(attp40); dsx-DBD x pJFRC49-10xUAS-eGFP::Kir2.1(attp2) 26E01-AD(attp40); dsx-DBD x pJFRC81-10xUAS-IVS-Syn21-GFP-p10 (attp2)
S5D	MAP>CsChr fpC1>CsChr	Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-CsChrimson-mVenus(attp2) 26E01-AD(attp40); dsx-DBD x 20xUAS-CsChrimson-mVenus(attp2)
Figure S6	Abbreviation	Genotypes
S6A		Eb5LexA(attp18); 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 13xLexAop-IVS-jGCaMP7b(vk5) x Eb5-Gal4(attp40); 22F05-Gal80(attp2)
S6B		Eb5-AD(vk27); 22F05-DBD(attp2) x 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 20xUAS-IVS-jGCaMP7b(vk5)
S6C		26E01-AD(attp40); dsx-DBD x 20xUAS-IVS-Syn21-Chrimson::tdT3.1(su(Hw)attp5); 20xUAS-IVS-jGCaMP7b(vk5)
Figure S7	Abbreviation	Genotypes
S7A	Eb5>Chrimson + tk>Kir2.1 Eb5>Chrimson + Empty>Kir2.1	tk-Gal4; Eb5LexA(attp40) x 13xLexAop2-Chrimson::tdT3.1(su(Hw)attp5); 10xUAS-eGFP::Kir2.1(attp2) Eb5LexA(attp40) x 13xLexAop2-Chrimson::tdT3.1(su(Hw)attp5); 10xUAS-eGFP::Kir2.1(attp2)
S7B	tk>Chrimson + Eb5 > Kir2.1 tk>Chrimson + Empty > Kir2.1	tk-Gal4; Eb5LexA(attp40) x 13xLexAop2-eGFP::Kir2.1(attp40); 20xUAS-Chrimson::tdT3.1(vk5) tk-Gal4 x 13xLexAop2-eGFP::Kir2.1(attp40); 20xUAS-Chrimson::tdT3.1(vk5)

Table S2. Behavioral classifier performance. Related to Figure 1.

Classifiers	Performance		No. of training frames			
	Precision (%) = TP/(TP+FP)	Recall (%) = TP/(TP+FN)	True Positive (TP)	True Negative (TN)	False Positive (FP)	False Negative (FN)
Approach	92.2	89.6	879 (92.2%)	1431 (93.3%)	74 (7.8%)	102 (6.7%)
Lunging	94.4	87.1	304 (94.4%)	1388(96.9%)	18(5.6%)	45(3.1%)
Headbutting	78.4	89.9	1344 (78.4%)	1147(88.4%)	371(21.6%)	151 (11.6%)

Precision (TP/(TP+FP)): percentage of the detected behavioral frames that were true positives

Recall (TP/(TP+FN)): percentage of the true behavioral frames that were detected

True Positive (TP): percentage of the frames in which animals displayed certain behavior and were correctly detected by the classifier

True Negative (TN): percentage of the frames in which animals did not display certain behavior and were correctly distinguished by the classifier

False Positive (FP): percentage of the frames in which animals did not display certain behavior but were incorrectly detected by the classifier

False Negative (FN): percentage of the frames in which animals displayed certain behavior but were not detected by the classifier

