# Viz showing Martinotti Cell Projection from L5 to L1 in NTC samples

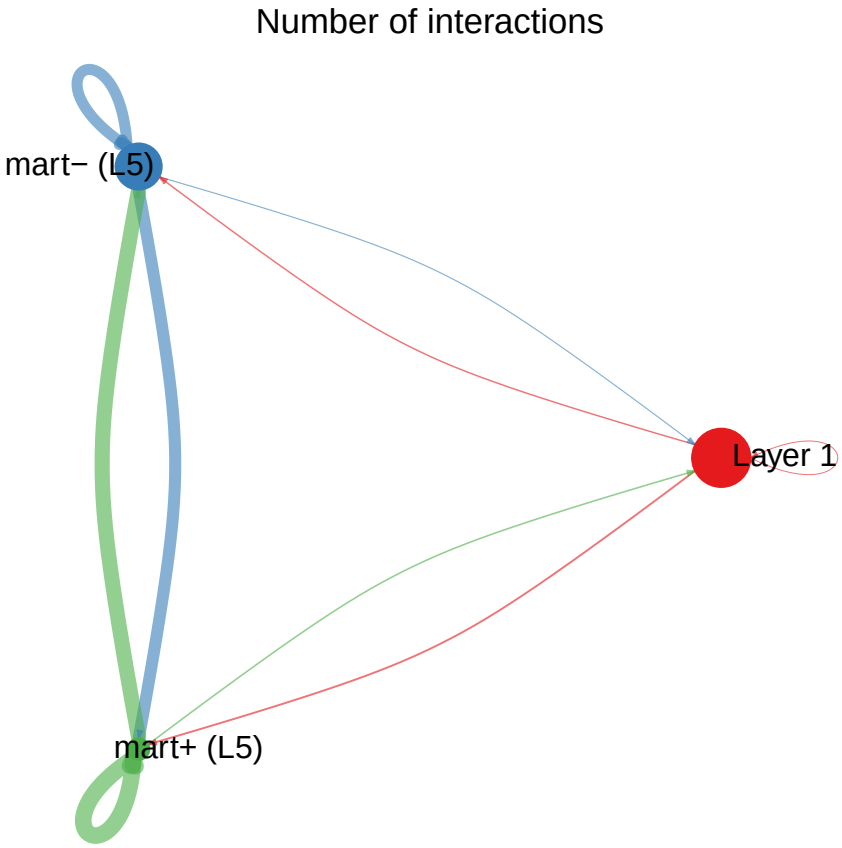
This report documents a follow-up analysis to validate the layer-layer communication using Martinotti Cell projection as postivie control.

In this analyis, we subset the NTC samples to only contain L1 (spd07) and L5(spd05) spots. Additionally, we use `logcounts(RELN) > 0` or `logcounts (PANTR1)>0` as criteria to call martinotti+/- spots in layer 5. For further details on deciding the threhold to call martinotti+/- spots in Layer 5, pleases see report `Ligand_expression_in_L5.pdf`. With the martinotti+/- &L1 subset data, we run `cellchat` with the dataset.

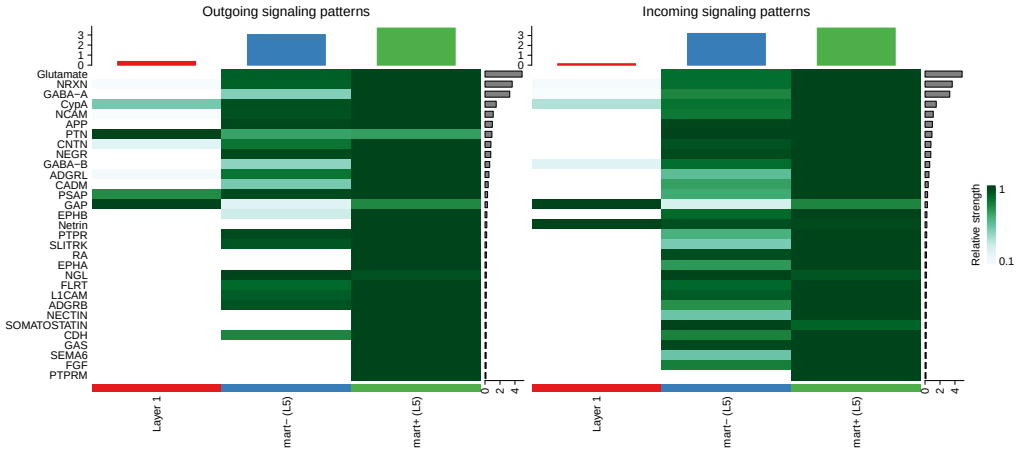
## Results

### Overall pattern

There's more connection within Layer 5 (communication between Martinotti+/- spots) than the number of connection from Layer 5 to Layer 1, which makes sense.

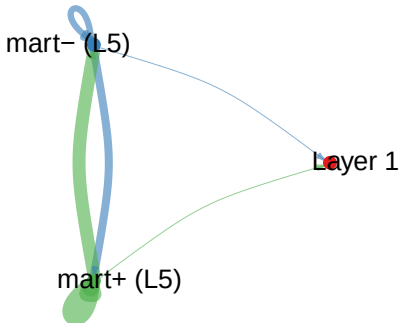

Number of interactions
mart− (L5)
Layer 1
mart+ (L5)

It looks like there are still a lot of `GABA-A` communication. While it is not shown here, but this time there's `SST` signals.s



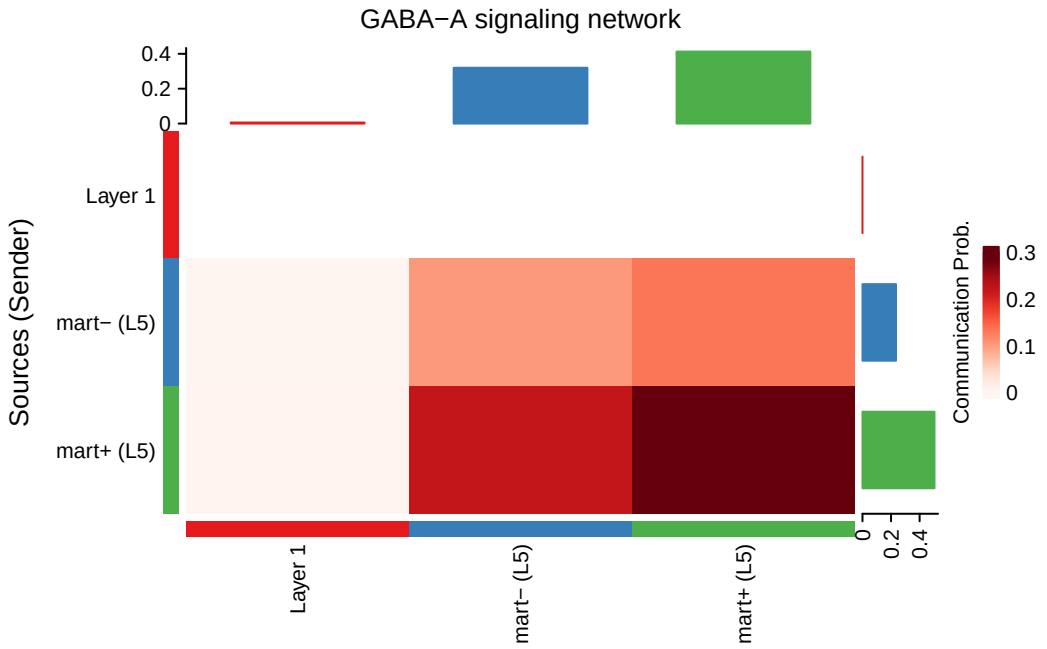

## GABA pathways

It looks like that there are communication pattern from Martinotti+ spots to Layer 1.




Here is another quick view for for the explaination. There's still a lot of GABA-A signaling mainly within the martinotti+spots and there's also sending from martinotti+ spots to layer 1.

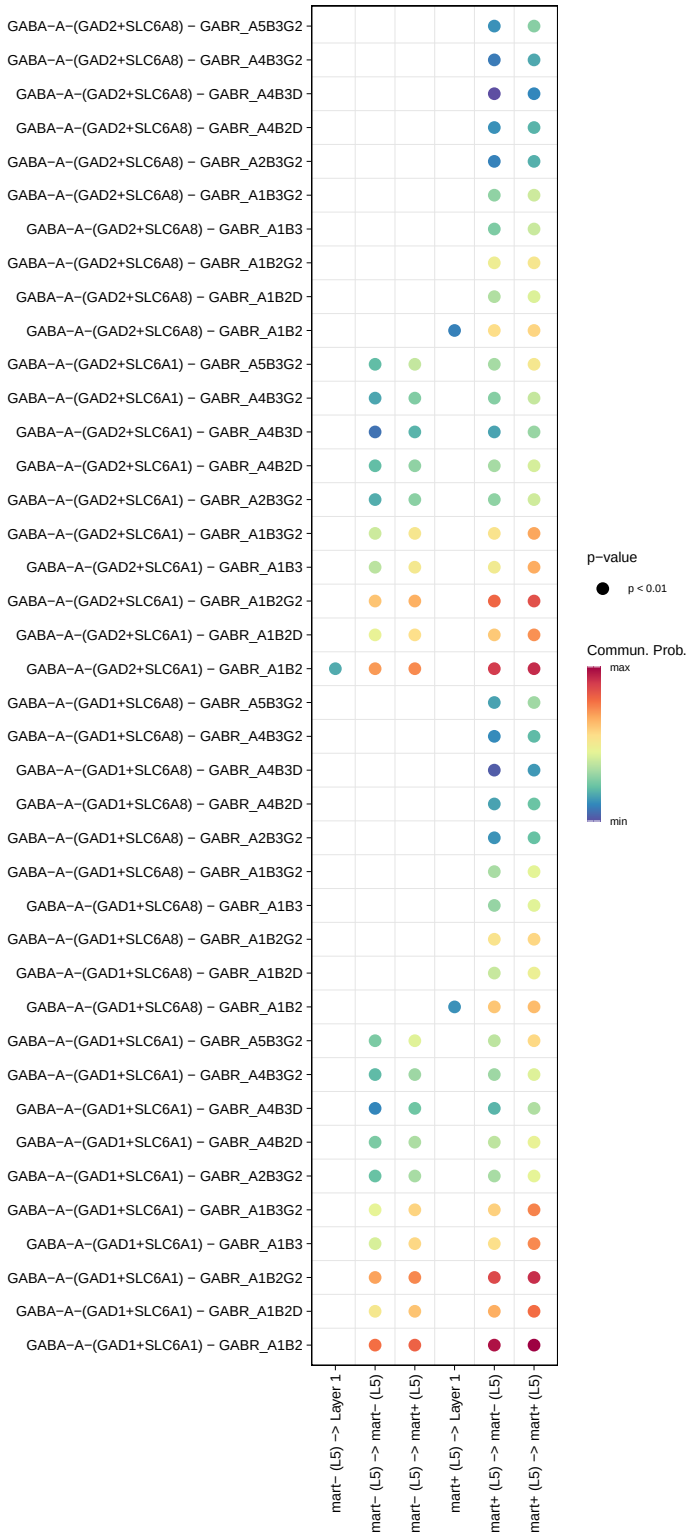
`Do heatmap based on a single object`




**LR pairs in the `GABA_A` path**

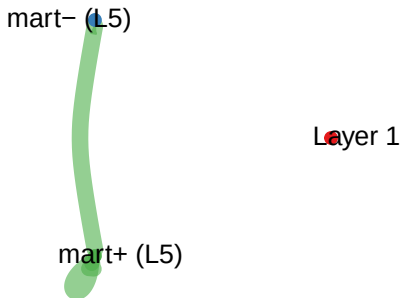
So the pathway `GABA-A-(GAD1+SLC6A8) - GABR_A1B2` and `GABA-A-(GAD2+SLC6A8) - GABR_A1B2` are idenitified to communicate from Martinotti+ spots to L1 spots. It is interesting that `GABA-A-(GAD2+SLC6A1) - GABR_A1B2` is now showing that it is from Martinotti - spots to Layer 1. But Boyi thinks it could be that some of the Martinotti+ spots are misclassified as Martinotti- spots. But overall 2 out of 3 GABA-A LR pairs we previously identifed from the overall layer-layer communication remain detected after we calling Martinotti+ spots.

`Comparing communications on a single object`


GABA−A−(GAD2+SLC6A8) − GABR_A5B3G2
GABA−A−(GAD2+SLC6A8) − GABR_A4B3G2
GABA−A−(GAD2+SLC6A8) − GABR_A4B3D
GABA−A−(GAD2+SLC6A8) − GABR_A4B2D
GABA−A−(GAD2+SLC6A8) − GABR_A2B3G2
GABA−A−(GAD2+SLC6A8) − GABR_A1B3G2
GABA−A−(GAD2+SLC6A8) − GABR_A1B3
GABA−A−(GAD2+SLC6A8) − GABR_A1B2G2
GABA−A−(GAD2+SLC6A8) − GABR_A1B2D
GABA−A−(GAD2+SLC6A8) − GABR_A1B2
GABA−A−(GAD2+SLC6A1) − GABR_A5B3G2
GABA−A−(GAD2+SLC6A1) − GABR_A4B3G2
GABA−A−(GAD2+SLC6A1) − GABR_A4B3D
GABA−A−(GAD2+SLC6A1) − GABR_A4B2D
GABA−A−(GAD2+SLC6A1) − GABR_A2B3G2
GABA−A−(GAD2+SLC6A1) − GABR_A1B3G2
GABA−A−(GAD2+SLC6A1) − GABR_A1B3
GABA−A−(GAD2+SLC6A1) − GABR_A1B2G2
GABA−A−(GAD2+SLC6A1) − GABR_A1B2D
GABA−A−(GAD2+SLC6A1) − GABR_A1B2
GABA−A−(GAD1+SLC6A8) − GABR_A5B3G2
GABA−A−(GAD1+SLC6A8) − GABR_A4B3G2
GABA−A−(GAD1+SLC6A8) − GABR_A4B3D
GABA−A−(GAD1+SLC6A8) − GABR_A4B2D
GABA−A−(GAD1+SLC6A8) − GABR_A2B3G2
GABA−A−(GAD1+SLC6A8) − GABR_A1B3G2
GABA−A−(GAD1+SLC6A8) − GABR_A1B3
GABA−A−(GAD1+SLC6A8) − GABR_A1B2G2
GABA−A−(GAD1+SLC6A8) − GABR_A1B2D
GABA−A−(GAD1+SLC6A8) − GABR_A1B2
GABA−A−(GAD1+SLC6A1) − GABR_A5B3G2
GABA−A−(GAD1+SLC6A1) − GABR_A4B3G2
GABA−A−(GAD1+SLC6A1) − GABR_A4B3D
GABA−A−(GAD1+SLC6A1) − GABR_A4B2D
GABA−A−(GAD1+SLC6A1) − GABR_A2B3G2
GABA−A−(GAD1+SLC6A1) − GABR_A1B3G2
GABA−A−(GAD1+SLC6A1) − GABR_A1B3
GABA−A−(GAD1+SLC6A1) − GABR_A1B2G2
GABA−A−(GAD1+SLC6A1) − GABR_A1B2D
GABA−A−(GAD1+SLC6A1) − GABR_A1B2
mart− (L5) −> Layer 1
mart− (L5) −> mart− (L5)
mart− (L5) −> mart+ (L5)
mart+ (L5) −> Layer 1
mart+ (L5) −> mart− (L5)
mart+ (L5) −> mart+ (L5)
p−value
p < 0.01
Commun. Prob.
max
min

## SST pathways

There is some significant communication of SOMATOSTATIN signaling pathway. However, the significantly identified SST pathway is within the L5 layer instead of extending to Layer 1.

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Comparing communications on a single object
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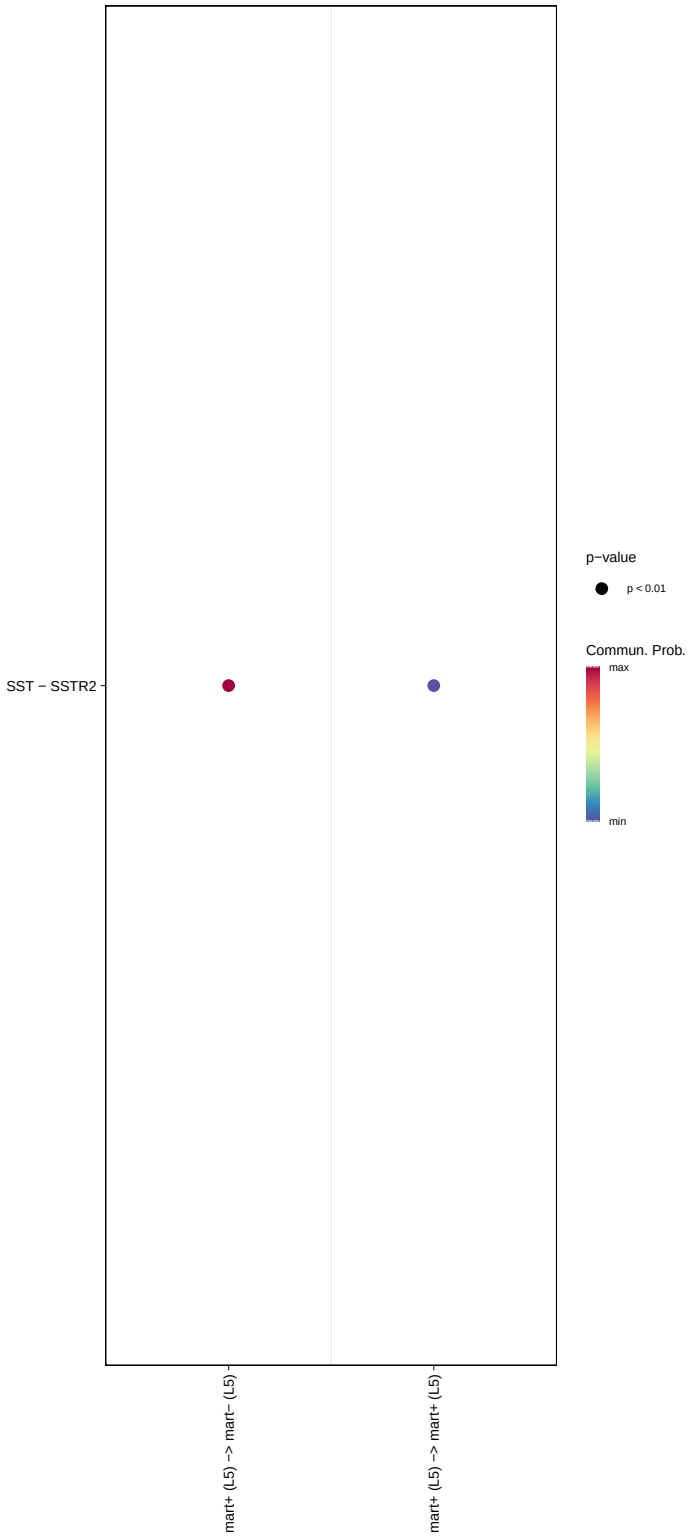
SST − SSTR2
mart+ (L5) −> mart− (L5)
mart+ (L5) −> mart+ (L5)
p−value
p < 0.01
Commun. Prob.
max
min