

Perceptual rather than physical numerosity is encoded in human and learned neural networks

Supplementary Information

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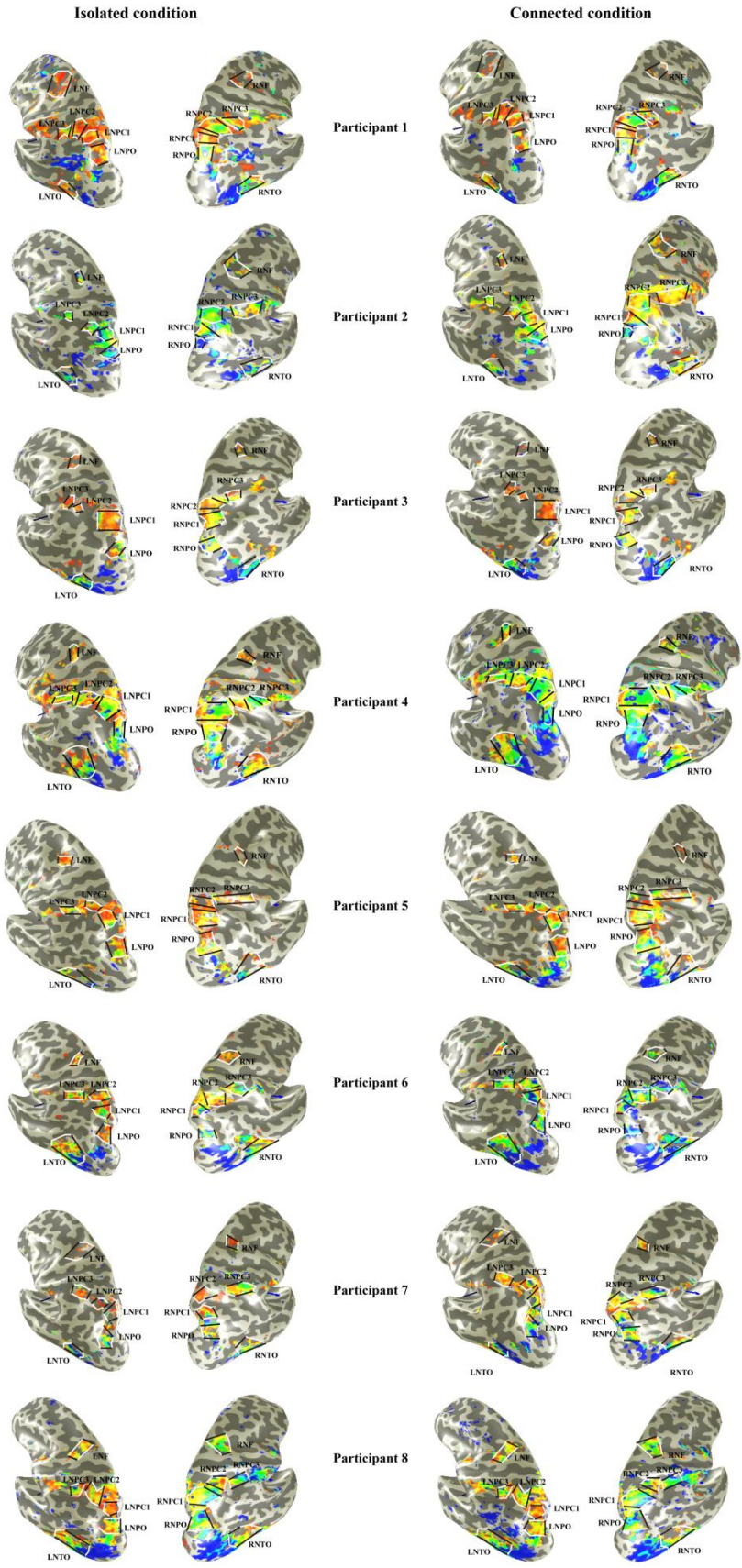
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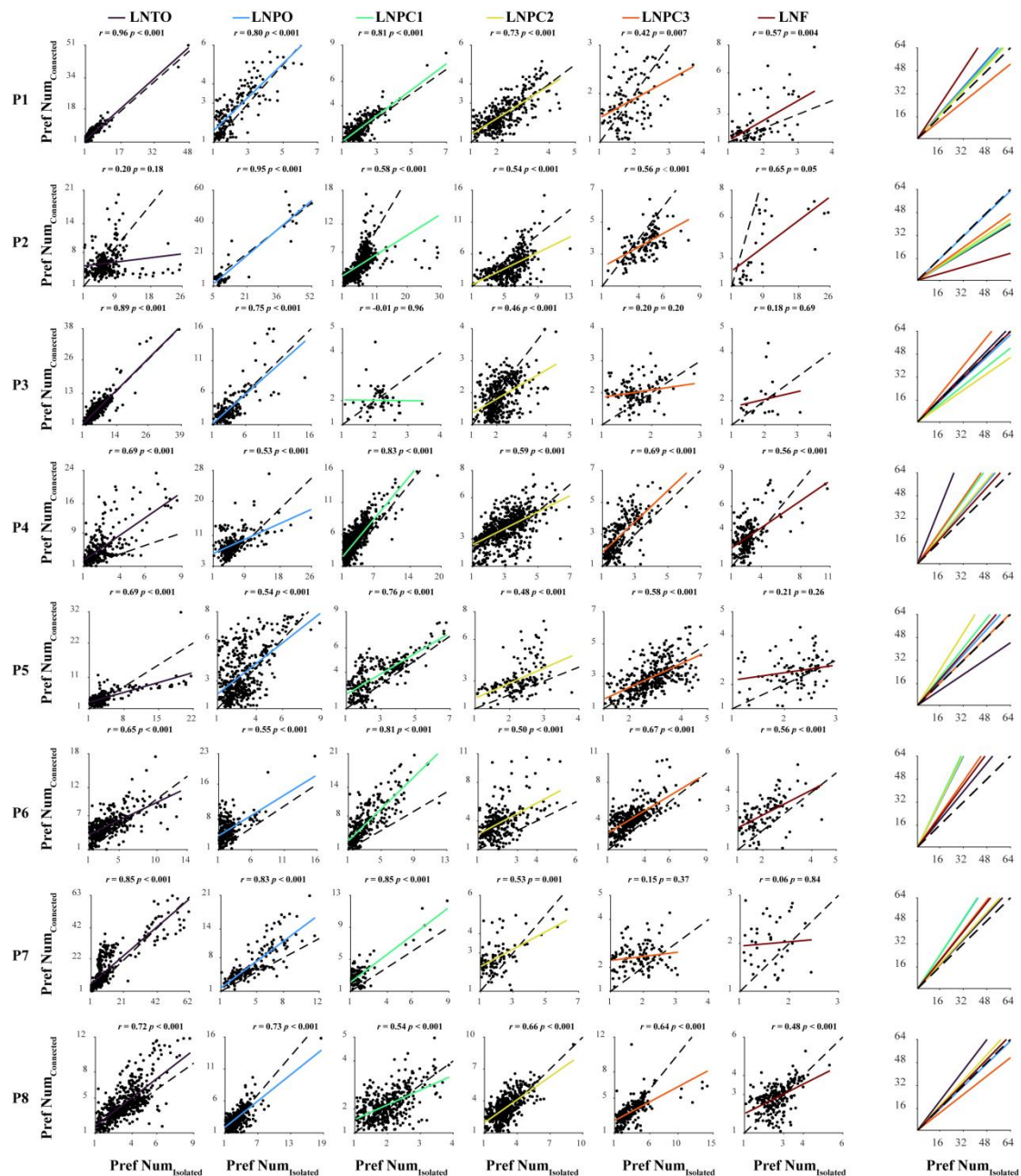
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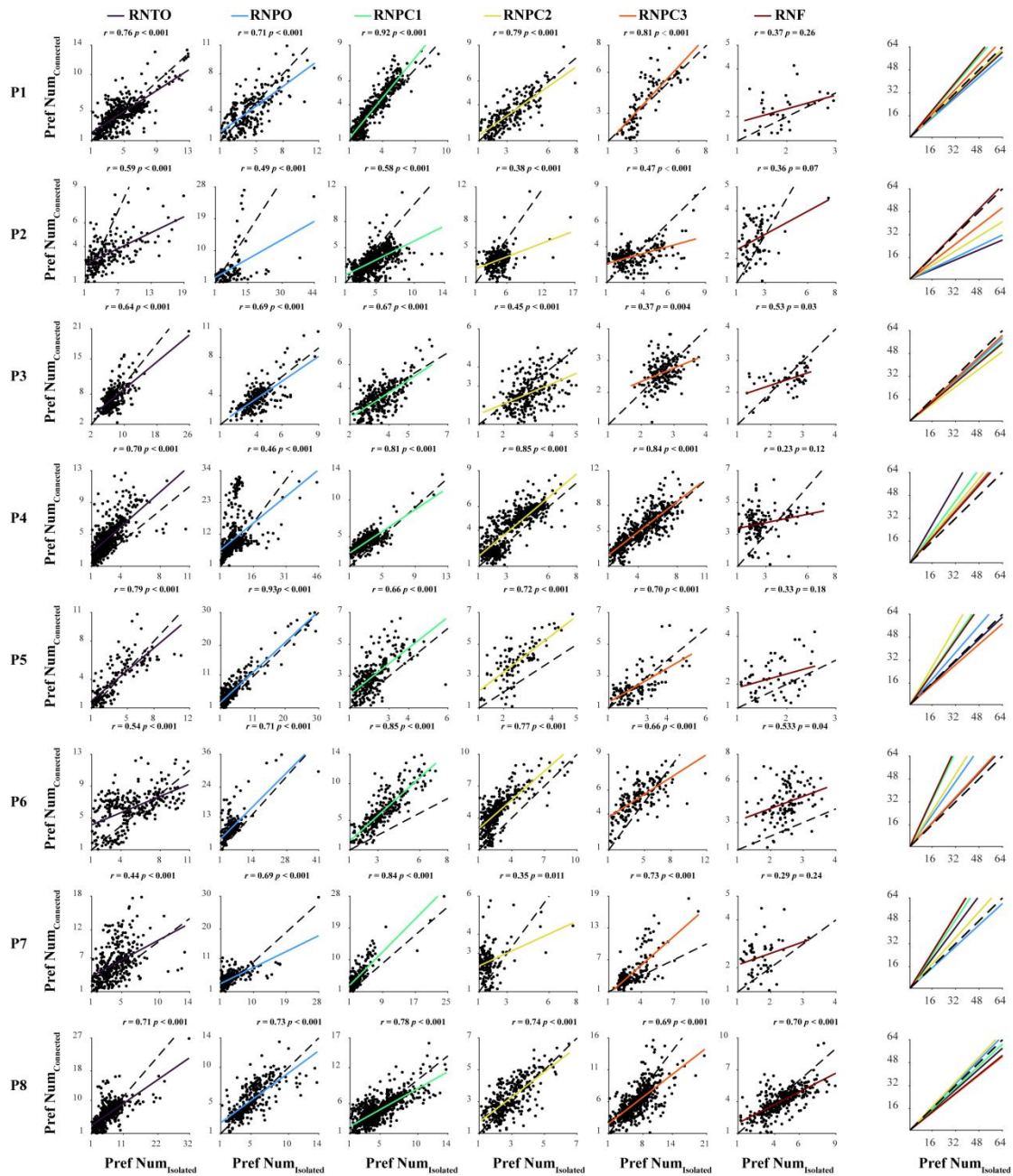
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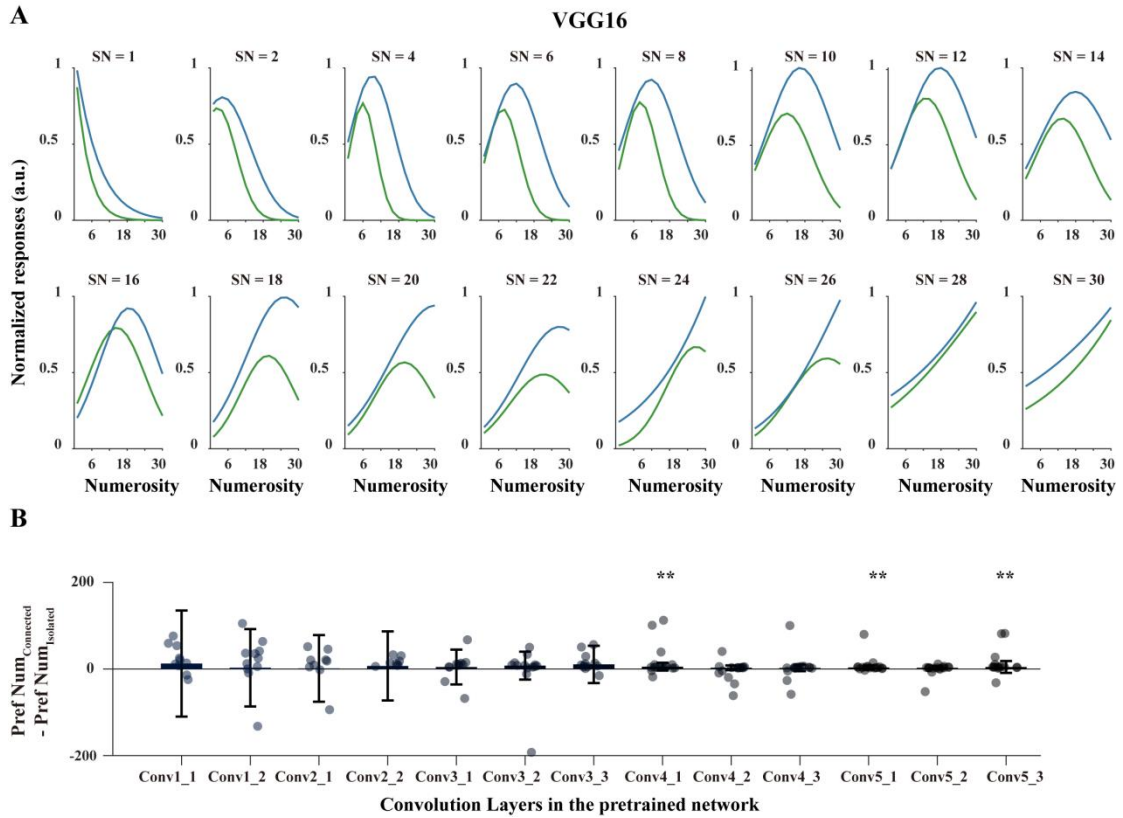
Supplementary Figure 1. Numerosity maps of all participants in the left and right hemisphere in the isolated and connected conditions.



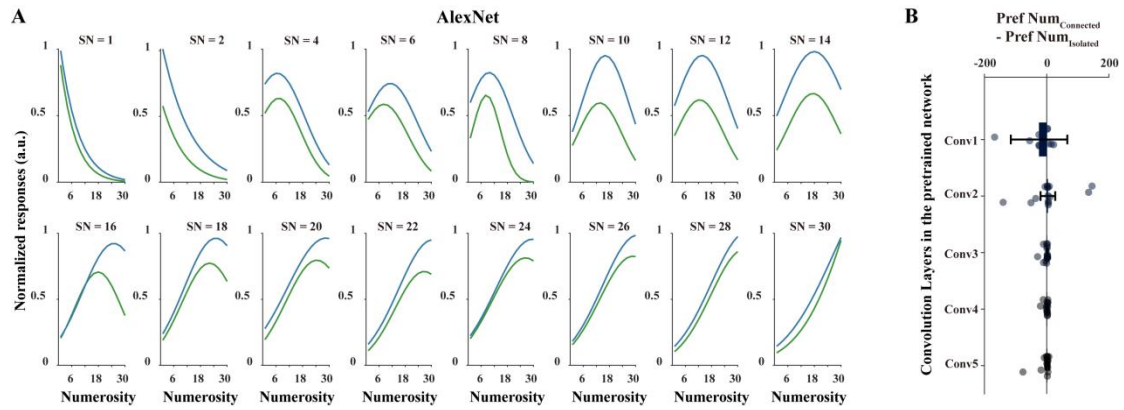
Supplementary Figure 2. Correlations between numerosity preferences estimated from isolated and connected condition in the left hemisphere indicate similar numerosity selectivity among individual maps and participants (P1 – P8). Dots show the estimates from individual recording sites (variance explained > 30% and vertical distance to dashed line within three standards), coloured lines indicate the best linear fits between the two estimates, the dashed line shows unity (i.e. identical estimates). Texts in legends indicate the Pearson correlation coefficients (r) and statistical significance (p).



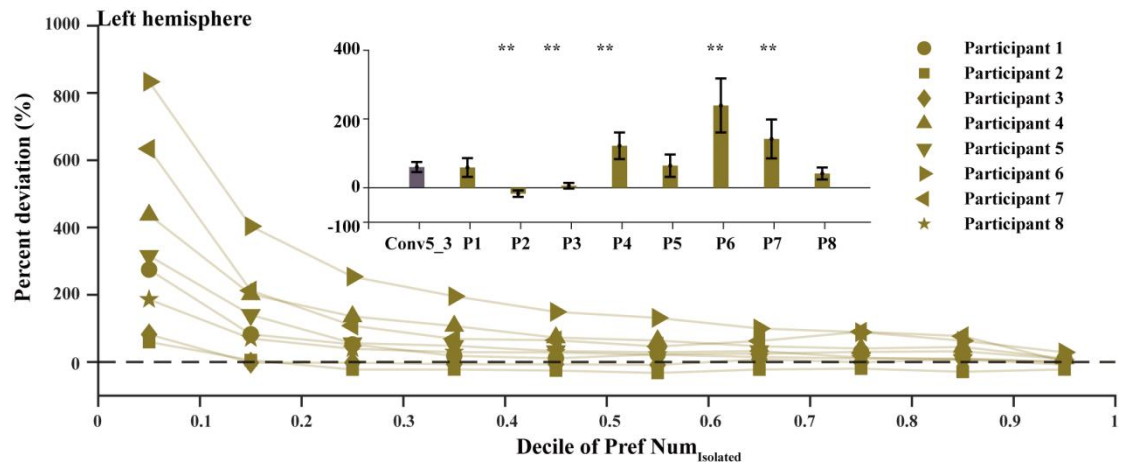
Supplementary Figure 3. Correlations between numerosity preferences estimated from isolated and connected condition in the right hemisphere indicate similar numerosity selectivity among individual maps and participants (P1 – P8). Dots show the estimates from individual recording sites (variance explained $> 30\%$ and vertical distance to dashed line within three standards), coloured lines indicate the best linear fits between the two estimates, the dashed line shows unity (i.e. identical estimates). Texts in legends indicate the Pearson correlation coefficients (r) and statistical significance (p).



Supplementary Figure 4. The preferred numerosity differences of VGG16 between isolated and connected condition. (A) The model-fit tuning responses for each selective numerosity categories (SN = 1, SN = 2, ... SN = 30) in the isolated and connected condition in the Conv5_3 layer. **(B)** Quantification of the differences between preferred numerosity (PN) estimates of the isolated and connected conditions, in all the convolutional layers in the pre-trained VGG16. Bars indicated the averaged difference across all selective units. Dot represents the preferred numerosity estimated by gaussian function in each selective numerosities and layer. Black asterisks indicate significant differences in the PN between isolated and connected dots. ** indicates $p < 0.01$.



Supplementary Figure 5. The preferred numerosity differences of AlexNet between isolated and connected condition. (A) The model-fit tuning responses for each selective numerosity categories (SN = 1, SN = 2, ... SN = 30) in the isolated and connected condition in the Conv5 layer. **(B)** Quantification of the differences between preferred numerosity estimates of the isolated and connected conditions, in all the convolutional layers in the pre-trained AlexNet. Bars indicated the averaged difference across all selective units. Dot represents the preferred numerosity estimated by gaussian function in each selective numerosities and layer.



Supplementary Figure 6. The percentage deviation plotted as a function of preferred numerosity estimates in the left hemisphere of individual participant. Various visual shapes represent different participant. Right op inserted panels show mean value of percent deviations of each participant and Conv5_3. The black asterisks indicate significant differences between the human participant and Conv5_3. ** indicates $p < 0.01$.