Supplementary Information for

Plasticity based on compensatory effector use in the association but not primary sensorimotor cortex of people born without hands

Ella Striem-Amit, Gilles Vannuscorps, and Alfonso Caramazza

Correspondence should be addressed to Ella Striem-Amit, Email: striemamit@fas.harvard.edu

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Supplementary Methods

Participants: Dysplasic Subject D1 had three residual fingers attached to the shoulder (see **Table S1**). Dysplasic Subjects D2 and D3 had bilateral dysplasic malformations with totally missing upper limbs on both sides (a complete absence of arm, forearm, hand and fingers). Dysplasic Subject D4 had a shortened right arm (± 10 cm humerus). Dysplasic Subject D5 had one residual finger attached to the shoulder. The dysplasic individuals D1, D2, D4 and D5, apart from the congenitally missing hands, had a typically developed body. D3 had a shorter right leg (functionally corrected using a below knee leg and foot prosthesis).

Dysplasic Subjects D1 and D3 report no history of prosthesis use. D2 occasionally used a wood composite prosthesis with locking elbow and hooks controlled by cables attached to leg straps from 3 to 7 years old, a wood composite prosthesis with electronic elbow and three pronged hooks controlled by micro switches in shoulder harness from 7 to 11 years old and a composite prosthesis with myoelectric elbows and cosmetic hands from 11 to 15 years old. D4 used switch-based right and left arms prostheses as a child and still uses occasionally a switch-based right arm prosthesis as an adult. D5 used myoelectric and manual prostheses five hours a day between 3 and 14 years old. All the subjects who have used prostheses report having used these prostheses mainly, if not uniquely, to pull, maintain in place or push objects but not to manipulate, and used objects for their functional use (e.g., eating with a fork) with their feet.

Experimental design: During the motor experiment, flexing of the hands and feet entailed movements of closing of the palm (drawing the fingers together), flexing of the shoulder lifts it slightly, flexing of the abdomen tightens it, and flexing of the lips pursed the lips together.

A supplementary somatosensory experiment with four out of the five dysplasic subjects was carried out in a block design fMRI experiment. Lower face (including the lips), either side of the abdomen, shoulders and feet received natural tactile stimulation in separate blocks (6 s touch and 6 s rest) in randomized order. The natural tactile stimulation was preformed manually using a 4-cm-width paramagnetic paint brush to an auditory cue (metronome), by a trained experimenter, as previously used efficiently for somatotopic mapping in typically developed subjects;(1, 2). In each stimulation block, the body surface was stimulated by brushing the subjects' skin in a back-and-forth movement along the main body axis. Each body part was stimulated 3 times in each of the three runs of the experiment, in randomized order. Eight catch trials in which the brushing direction was perpendicular to the rostral-caudal direction were present in each run of the experiment, requiring response (foot button press; to ensure subjects attention) and were removed from further analysis. Only runs where the subjects responded in 75% of the catch trials were used for analysis, leaving 3 runs for D1, and 2 runs for subjects D2, D4 and D5.

Functional Imaging: The BOLD fMRI measurements were obtained in a Siemens Tim Trio 3-T scanner at the Center for Brain Science at Harvard University with a 6-channel birdcage head coil. Functional images were acquired with a T2*-weighted gradient echo EPI (GE-EPI) sequence that employed multiband RF pulses and Simultaneous Multi-Slice (SMS) acquisition (factor of 3) (3, 4). The SMS-EPI acquisitions used a modified version of the Siemens WIP 770A. We used 69 slices of 2mm thickness. The data in-plane matrix size was 108x108, field of view (FOV) 21.6cm x 21.6cm, time to repetition (TR) = 2000ms, flip angle = 80˚ and time to echo (TE) = 28ms.

3D anatomical volumes were collected using T1-weighted images using a MPRAGE T1-weighted sequence. Typical parameters were: FOV= 25.6cm X 25.6cm, data matrix: 256x256x256 (1mm iso voxel), TR=2530ms, TE=1.64, 3.5, 5.36, 7.22ms, flip angle = 7°.

The first two images of each scan (during the first baseline rest condition) were excluded from the analysis because of non-steady state magnetization. Functional MRI data preprocessing included head motion correction, slice scan time correction and high-pass filtering (cutoff frequency: 3 cycles/scan) using temporal smoothing in the frequency domain to remove drifts and to improve the signal to noise ratio. No data included in the study showed translational motion exceeding 2 mm in any given axis, or had spike-like motion of more than 1 mm in any direction.

Group comparisons were conducted using both frequentist (t-test and mixed effects ANOVA; with Group and Body-part factors; **Fig. 1D**, **Fig. 2F**) and sensitive Bayesian analyses ((5, 6); **Fig. 1C**, **Fig. 2H**, **Figs. S3G and S8B**), appropriate for testing small samples of unique populations and patients. The Bayes Factor is the probability of the data under one hypothesis relative to the probability of the data given another (H1/H0; H0 signifying no group difference, H1 signifying a difference between the groups) and, therefore, allows evaluating the strength of the evidence in the data for both alternatives. The Bayes factor (BF10) was calculated by first computing a two-samples independent two-tailed t test between the groups on the effect in question (e.g. in **Fig. 1C**, on the activation for each body part movements). BFs were computed based on the resulting t values using the MATLAB (MathWorks, Natick, MA) function t2smpf provided by Sam Schwarzkopf (www.sampendu.wordpress.com/bayes-factors; (6)). The JZS prior was selected (6), with the default Cauchy prior width r = 0.707.

To link our findings to the anatomic characterization of these regions, activation for some of the contrats was overlayed on the probabilistic cytoarchitectonic atlas (7-9) of the somatosensory (10), motor (11) and inferior parietal (12, 13) regions, imported from SPM toolbox (14) into Brainvoyager and transformed to Talairach space (see **Figs. S6, S7**).

Functional connectivity data analysis and MRI acquisition: A dataset of spontaneous BOLD fluctuations for the investigation of intrinsic (rest state; (82)) FC was collected while the subjects lay supine in the scanner without any external stimulation or task. The pulse sequence used was gradient-echo EPI with parallel imaging (factor of 4). The data in-plane matrix size was 108x108, field of view (FOV) 21.6cm x 21.6cm, time to repetition (TR) = 1500ms, flip angle = 75˚ and time to echo (TE) = 28ms. 68 slices of 2mm thickness (with 0.2mm spacing) were used to obtain full coverage of the subjects' brain, and 400 whole-brain images were collected in one functional scan. The first two images of each scan were excluded from the analysis because of non-steady state magnetization. Ventricles and white matter signal were sampled using a grow-region function embedded in the Brain Voyager from a seed in each individual brain. Using MATLAB ventricle and white matter time-courses were regressed out of the data and the resulting time course was filtered to the frequency band-width of 0.1-0.01 Hz (in which typical spontaneous BOLD fluctuations occur). The resulting data were then imported back onto BrainVoyager for further analyses.

Single subject data were registered to cortical space (as was done with the task data), and were spatially smoothed with a two-dimensional 4 vertex half-width Gaussian. The seed regions-of-interest (ROI) was defined for the sensorimotor hand region (100% overlap of controls individual activation for hand movement, $p < 0.001$ each). Individual time courses from this seed ROI were sampled from each of the participants, z-normalized and used as individual predictors in single-subject GLM analyses. For each group, FC parameter estimate values were sampled from regions showing full overlap probability of individual subjects' activation for each other body part (right foot, abdomen right shoulder and mouth), and averaged by group (**Fig. S8B**). for group comparison of FC patterns, ANOVA, t-test and Bayesian statistics were used as in for task activation comparisons. Plotting the FC of the hand area with the cortical areas of the other tested body parts shows that no specific increase in preferential connectivity exists in the dysplasics to the primary foot region (**Fig. S8A**). The Bayes factor (BF_{10}) was calculated from computing a two-samples independent t-test between the groups on FC to the hand area (**Fig. S8B**).

In addition to computing the whole-brain functional connectivity of the left-hemisphere hand ROI, functional connectivity between the right and left sensorimotor hand ROIs and correlation to the global signal (e.g. (15)) were compared between the groups. The right hemisphere hand ROI defined by 100% subjects' activation for moving the left hand in the controls, comparable to the definition of the left hemisphere ROI. Bilateral functional connectivity between the hand ROIs did not differ between the groups ($p > 0.55$), in accordance with the bilateral sensorimotor deprivation. Functional connectivity to the global signal was assessed by correlating the time-course of the hand ROI with the averaged resting-state time-course across all grey-matter voxels, at a single subject level. No difference in correlation was found between the groups ($p > 0.10$), although the relatively low p value suggests the group size may not permit conclusive findings in this case. No group difference was found also when computing correlation with the global signal excluding the sensorimotor strip ($p > 0.49$).

Supplementary Figures

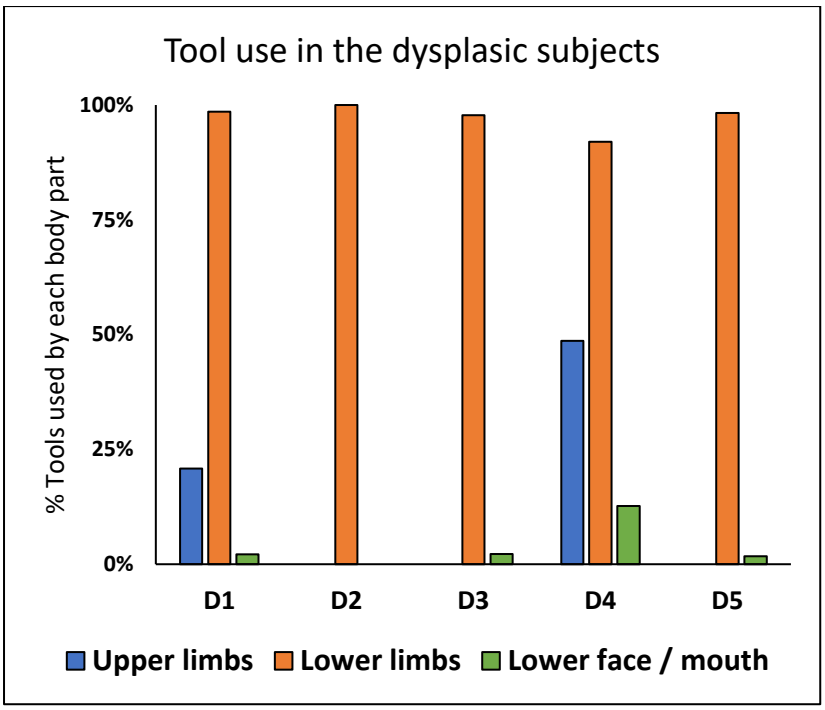


Figure S1: Everyday tool-use by the dysplasic subjects

The dysplasic individuals were provided, over a month before the scan, with a list of 187 tools and small graspable objects and noted for each which body part they use it with (upper limbs, lower limbs, mouth, multiple body parts can be marked for the same item) or if they have never used it before to achieve its typical function. The figure depicts the percentage of using each body part, for the items they reported to have used before, for each dysplasic individual. All the dysplasic subjects reported to use tools with their lower limbs for the clear majority of tools they have experienced using. Foot tool-use accounted for a minimum of 92% of the used tools, although some tools were jointly manipulated by the lower face or remaining upper limbs in specific individuals (in subjects D1 and D4).

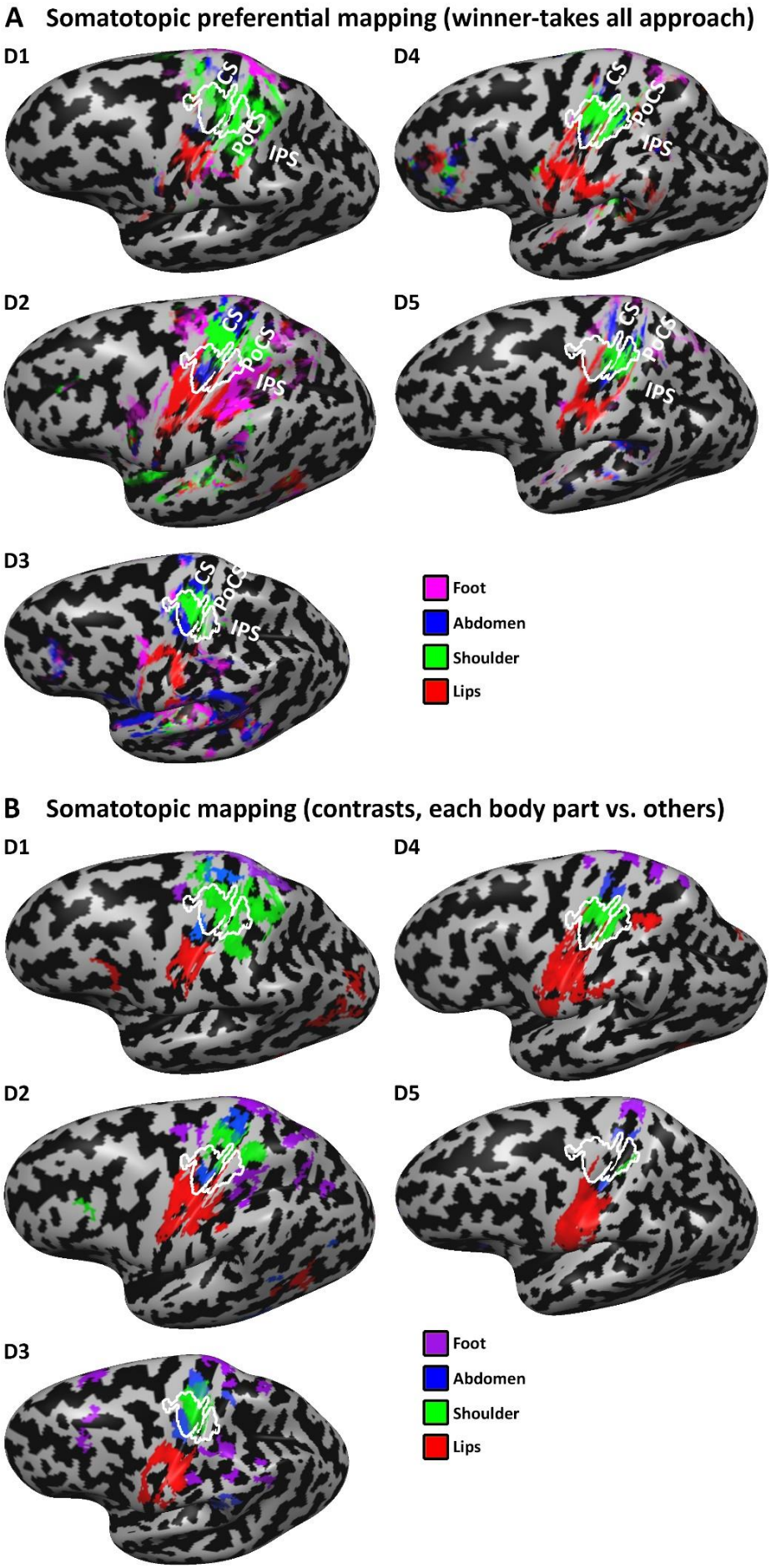


Figure S2: Somatotopic mapping in individual dysplasic subjects

Preferred body part responses for flexing movements for the dysplasic individuals (unsmoothed data) largely replicates the group patterns (**Fig. 2B**), showing a preference of the lateral sensorimotor cortex (the typical hand area

is delineated in white) to movements of the shoulder and abdomen and not of the foot, despite the extensive use of the feet to perform typically manual fine-motor tasks. Findings are presented for a winner-takes-all analysis (each vertex is colored according to highest activation; **A**) and in GLM contrasts of each body part vs. the remaining body parts (**B**; e.g. green represents a significant contrast of shoulder > foot, abdomen and lips; $p < 0.05$ corrected) in the individual unsmoothed data. The sensorimotor hand area, delineated in white, represents the area activated by right hand movement in all (100%) of the control participants, aligned to the dysplasics cortices according to the pattern of cortical folding. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

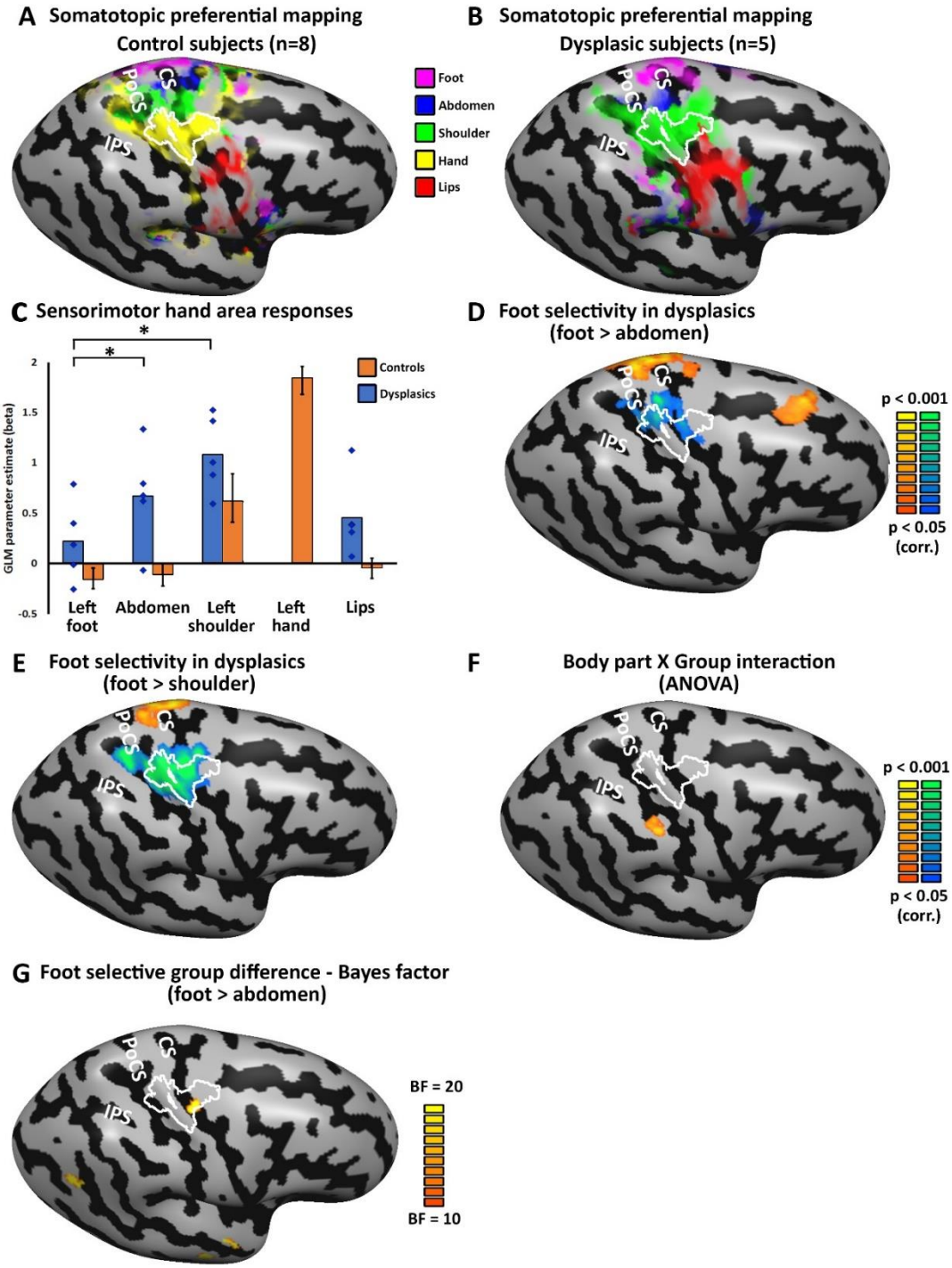


Figure S3: The sensorimotor hand area in the dysplasics does not show selectivity for the foot, right hemisphere (RH) data

A. Preferred body part responses for contraction movements (winner-takes-all approach) for the control subjects follows the standard Penfield homunculus. The right hemisphere (RH) sensorimotor hand area is delineated in white, representing the core area activated by left hand movement in all (100%) of the control participants (each at $p < 0.05$ corrected), to account for inter-subject variability. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

B. Preferred body part responses for flexing movements for the dysplasic group shows a preference for shoulder movements in the RH hand area, replicating the findings in the left hemisphere, despite the use of the right foot compensatorily as an effector. Interestingly, the right postcentral sulcus-IPS border does not show strong preference for the contralateral foot, in contrast to what is found in the left hemisphere. This difference may be due to the footedness of the subjects (all dominantly right footed, see relatedly (16)).

C. Sensorimotor responses were sampled from the RH hand area, showing that this region in the dysplasics is more activated by proximal body parts (shoulder; $p < 0.005$ and abdomen/trunk; $p < 0.01$) than by foot movements. Error bars for the control group (orange bars) represent standard error of the mean. Individual data points (blue diamonds) are presented for the five dysplasic individuals in addition to the group average.

D. Foot movement selectivity (over abdomen movement) in the dysplasics can be found in the superior frontal cortex, but not in the hand primary sensorimotor cortex, which shows the reverse preference.

E. Movement selectivity comparing the shoulder and foot in the dysplasics shows a robust preference to shoulder movement (a proximal, non-compensatory body part) rather than to foot movement in the hand area, replicating the findings in the left hemisphere for the primary sensorimotor cortex. Interestingly, no foot preference is found in the aIPS for the left (non-dominant) foot.

F. Overall body part selectivity (comparing movement of all shared body parts; e.g. lips, shoulder, abdomen and foot) differs between the dysplasics and controls (ANOVA Body part X Group interaction) in the inferior parietal lobule.

G. Bayes factor (BF_{10}) for difference between the groups in their differential activation to left foot movement (vs. abdomen movement) is shown. The dysplasics show different selectivity level for left foot movement as compare to the controls in three cortical loci, including the sensorimotor hand area. However, the group difference in found in the primary sensorimotor hand area in this analysis reflects a preference of the dysplasics group towards the abdomen movement (compare to panel **D**). A direct comparison of the selectivity to left foot movement (vs. abdomen movement) between the dysplasics and control subjects using frequentist analysis did not yield significant results.

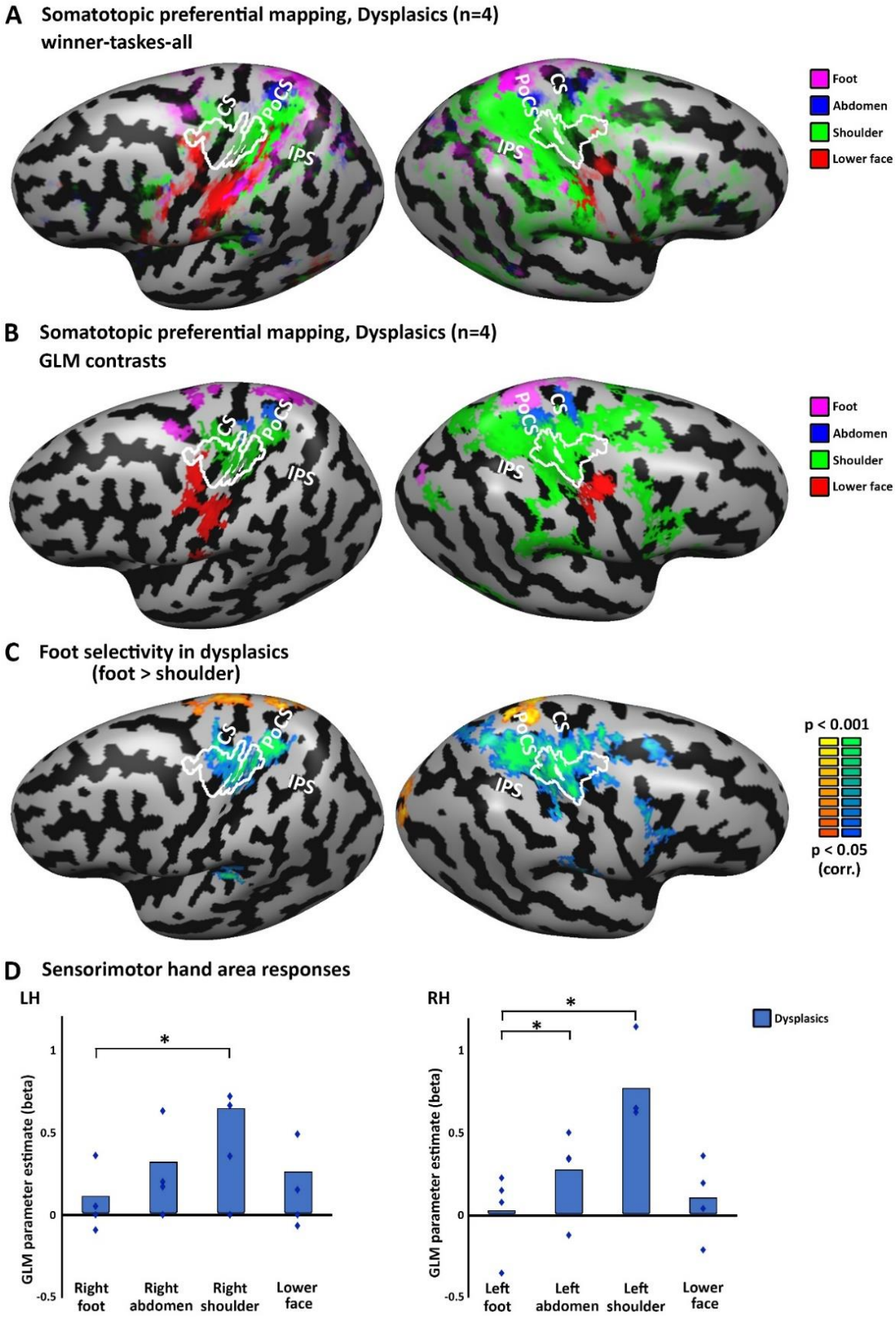


Figure S4: Selectivity for the shoulder in the hand area of the dysplasics in passive tactile stimulation

A-B. Preferred body part responses for tactile stimulation for the dysplasic group shows a preference for contralateral shoulder stimulation in the hand area in both hemispheres, despite the extensive use of the feet (mainly right foot) to perform typically manual fine-motor tasks. Findings are presented for a winner-takes-all analysis (each vertex is colored according to highest activation in the group average; **A**) and in GLM contrasts of each body part vs. the remaining body parts (**B**; e.g. green represents a significant contrast of shoulder > foot, abdomen and lips; $p < 0.05$ corrected). The sensorimotor hand area, delineated in white, represents the area activated by contralateral hand

movement in all (100%) of the control participants. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

C. The hand primary sensorimotor cortex shows robust selectivity for shoulder over foot in the dysplasics also in passive tactile stimulation. Interestingly, the aIPS's significant preference for the foot is only found in the active motor experiment and not in passive tactile stimulation.

D. Sensory responses were sampled from the sensorimotor hand areas in both hemispheres, showing that these regions in the dysplasics are more activated by the shoulder than by foot tactile stimulation ($p < 0.005$ for both comparisons, left foot > left abdomen is also significant at $p < 0.05$). Individual data points (blue diamonds) are presented for the five dysplasic individuals in addition to the group average (blue bars).

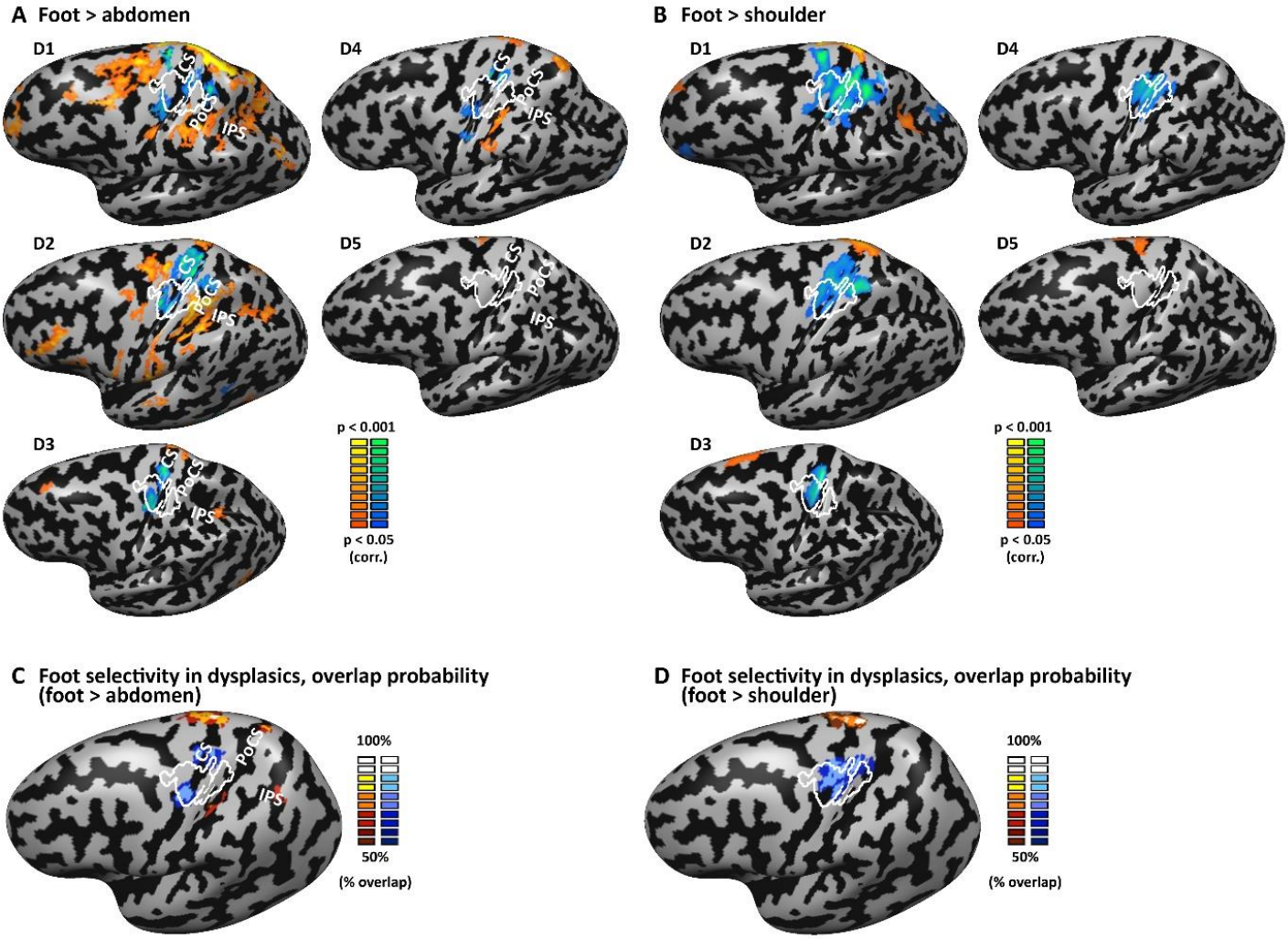


Figure S5: Selective foot activation in the dysplasic individuals

A. Foot movement selectivity (over abdomen movement) in the dysplasic individuals (unsmoothed data, $p < 0.05$ corrected) can be found among other areas in the IPS, superior parietal lobule and premotor cortex, but almost nowhere (apart from small cluster in subject D2) in the hand primary sensorimotor cortex (delineated in white). In contrast, most subjects show significantly higher activity for abdomen movement in the hand region. The sensorimotor hand area, delineated in white, represents the area activated by right hand movement in all (100%) of the control participants, aligned to the dysplasics cortices according to the pattern of cortical folding. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

B. Even more robustly, the hand sensorimotor cortex of nearly all individual dysplasics shows significant preference for shoulder movement over foot movement.

C. Probabilistic mapping of the individual subject activation for foot movement over abdomen movement (calculated from the maps appearing in panel **A**) further attests to the consistency of the preference for abdomen movement in the hand area. Each cortical vertex is colored according to the percentage of subjects showing significant activation (red) or deactivation (blue).

D. Similarly to C, Probabilistic mapping of the individual subject activation for foot movement over shoulder movement (calculated from the maps appearing in panel **B**) further attests to the consistency of the preference for shoulder movement in the hand area.

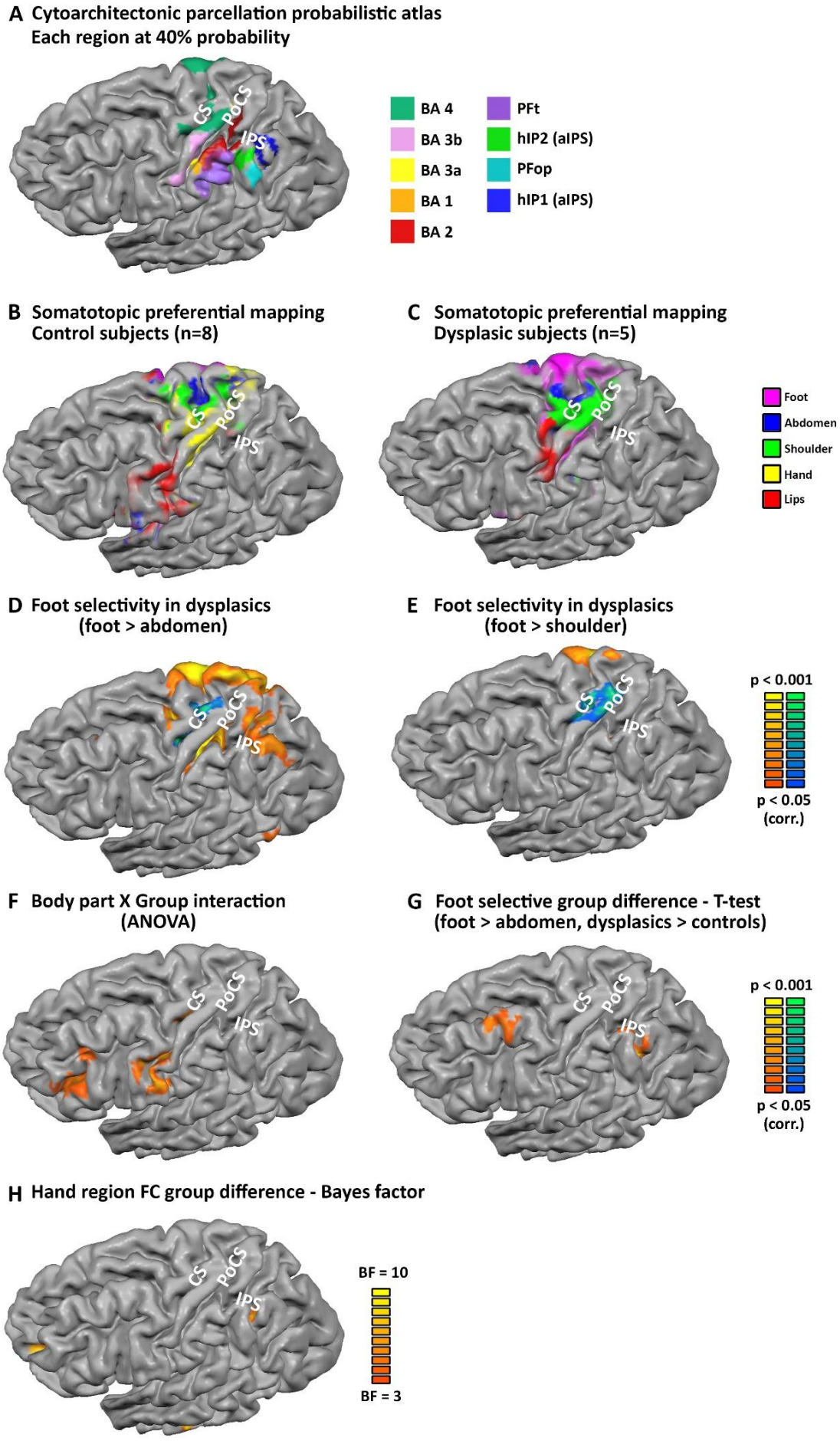


Figure S6: Somatotopic findings presented on grooved (uninflated) cortical reconstructions

A. Probabilistic cytoarchitecture parcellations (7, 9) for the motor, somatosensory and inferior parietal lobule presented on the grooved (uninflated/folded) cortical reconstruction used to present the somatotopic findings. Colors mark the different regions from anterior to posterior: Dark green – BA 4, pink – BA 3b, yellow – BA 3a, orange – BA 1, red – BA 2, purple – area PFt, cyan – area PFop, light green – hIPS2, blue – area hIPS1.
B – G. findings of **Figure 2**, Selectivity for the compensatorily used foot in the dysplasics is found in associative somatosensory cortex, but not primary sensorimotor hand area – presented on the grooved left cortical reconstruction to facilitate the recognition of the anatomical landmarks. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

B. Comparable to **Fig. 2A:** Preferred body part responses for contraction movements (winner-takes-all approach) for the control subjects follows the standard Penfield homunculus. The sensorimotor hand area is delineated in white, representing the core area activated by right hand movement in all the control participants (each at $p < 0.05$ corrected), to account for inter-subject variability.

C. Comparable to **Fig. 2B:** Preferred body part responses for contraction movements for the dysplasic group shows a preference for shoulder (and to some extent abdomen, in the motor cortex) movements in the hand area, despite the extensive use of the feet to perform typically manual fine-motor tasks. Curiously, preferential activation for abdomen movement was found also on the anterior inferior border of the hand region, in the depth of the central sulcus, in agreement with evidence of a potential discontinuity in the motor cortex surrounding the hand area (17, 18). This abdomen preference is not found in passive tactile stimulation of the body; compare to **Fig. S4.**

D. Comparable to **Fig. 2D:** Foot movement selectivity (over abdomen movement, representing a control body part that does not serve compensatorily as an effector) in the dysplasics can be found in the superior parietal lobule and premotor cortex, but not in the hand primary sensorimotor cortex, which shows the reverse preference. For individual subject maps see **Fig. S5**.

E. Comparable to **Fig. 2E:** Movement selectivity comparing the shoulder and foot in the dysplasics shows a robust preference to shoulder movement (a proximal, non-compensatory body part), rather than to foot movement, in the hand area. For individual subject maps see **Fig. S5**.

F. Comparable to **Fig. 2F:** Overall body part selectivity (comparing movement of all shared body parts; e.g. lips, shoulder, abdomen and foot) differs between the dysplasics and controls (ANOVA Body part X Group interaction) in the frontal lobe and in the sensorimotor hand area.

G. Comparable to **Fig. 2G:** A direct comparison of the selectivity to right foot movement (vs. abdomen movement) between the dysplasics and control subjects shows potential for plasticity specific to the compensatorily used foot in the association cortices, in the angular/supramarginal gyri and middle frontal gyrus, but not in the primary sensorimotor cortex.

H. Comparable to **Fig. 2H:** Bayes factor (BF) for difference between the groups in their differential activation to right foot movement (vs. abdomen movement) is shown. The dysplasics show different selectivity level for right foot movement compared with the controls in various cortical loci, including the sensorimotor hand area. However, the group difference found in the primary sensorimotor hand area in this analysis reflects a preference in the dysplasics group toward the abdomen movement (compare with **D**).

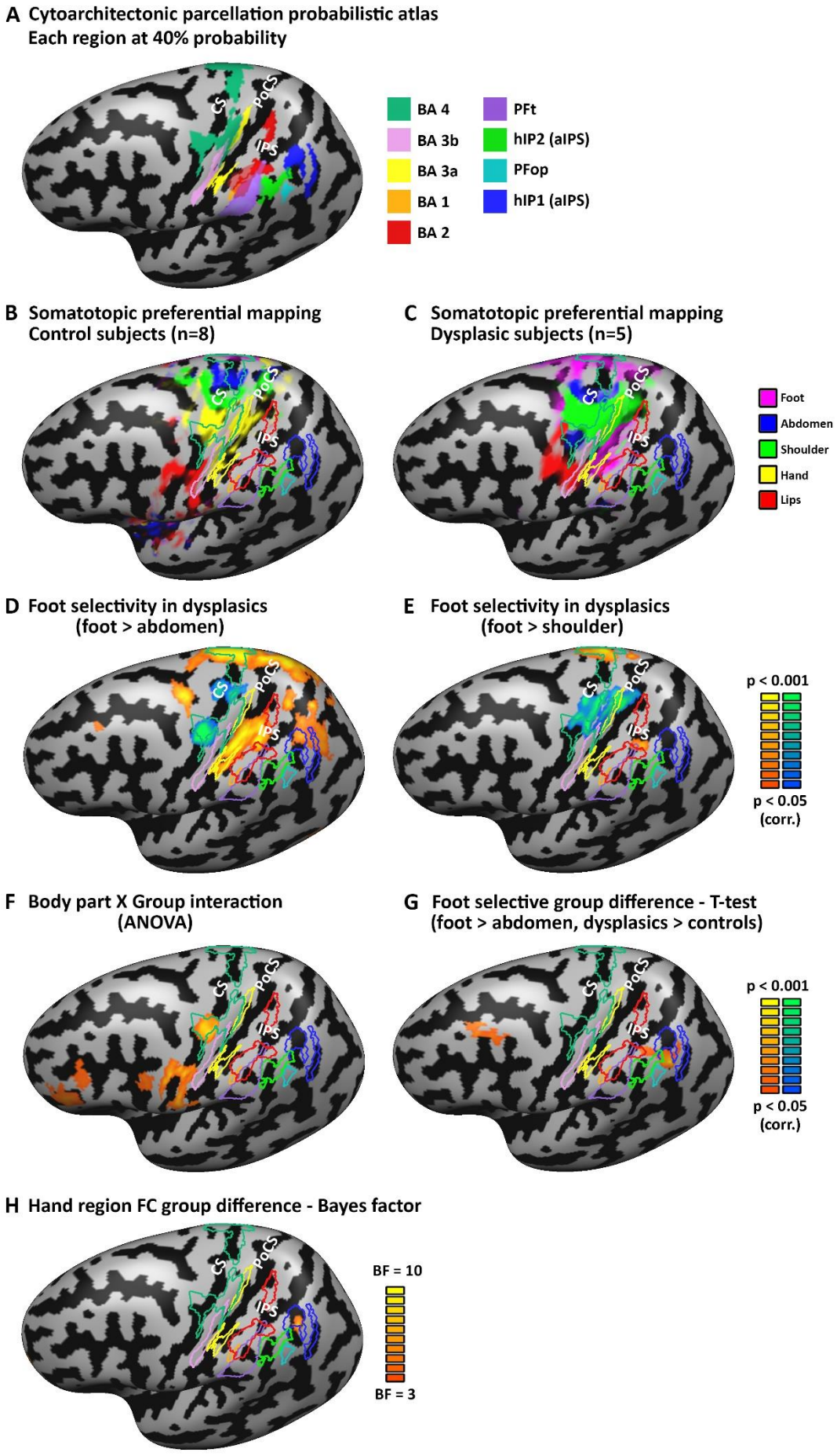


Figure S7: Somatotopic findings presented with probabilistic cytoarchitecture parcellations

A. Probabilistic cytoarchitecture parcellations (7, 9-14, 19) for the somatosensory, motor and inferior parietal lobule presented on the cortical reconstruction used to present the somatotopic findings. Colors mark the different regions

from anterior to posterior: Dark green – BA 4, pink – BA 3b, yellow – BA 3a, orange – BA 1, red – BA 2, purple – area PFt, cyan – area PFop, light green – hIPS2, blue – area hIPS1.
B – G. findings of **Figure 2**, "Selectivity for the compensatorily used foot in the dysplasics is found in associative somatosensory cortex, but not primary sensorimotor hand area" presented along with probabilistic cytoarchitecture parcellations, to facilitate the recognition of the anatomical and functional regions. Color delineations mark the different regions; colors as in panel **A**. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

B. Comparable to **Fig. 2A:** Preferred body part responses for contraction movements (winner-takes-all approach) for the control subjects follows the standard Penfield homunculus. The sensorimotor hand area is delineated in white, representing the core area activated by right hand movement in all the control participants (each at $p < 0.05$ corrected), to account for inter-subject variability.

C. Comparable to **Fig. 2B:** Preferred body part responses for contraction movements for the dysplasic group shows a preference for shoulder (and to some extent abdomen, in the motor cortex) movements in the hand area, despite the extensive use of the feet to perform typically manual fine-motor tasks. Curiously, preferential activation for abdomen movement was found also on the anterior inferior border of the hand region, in the depth of the central sulcus, in agreement with evidence of a potential discontinuity in the motor cortex surrounding the hand area (17, 18). This abdomen preference is not found in passive tactile stimulation of the body; compare to **Fig. S4.**

D. Comparable to **Fig. 2D:** Foot movement selectivity (over abdomen movement, representing a control body part that does not serve compensatorily as an effector) in the dysplasics can be found in the superior parietal lobule and premotor cortex, but not in the hand primary sensorimotor cortex, which shows the reverse preference. For individual subject maps see **Fig. S5**.

E. Comparable to **Fig. 2E:** Movement selectivity comparing the shoulder and foot in the dysplasics shows a robust preference to shoulder movement (a proximal, non-compensatory body part), rather than to foot movement, in the hand area. For individual subject maps see **Fig. S5**.

F. Comparable to **Fig. 2F:** Overall body part selectivity (comparing movement of all shared body parts; e.g. lips, shoulder, abdomen and foot) differs between the dysplasics and controls (ANOVA Body part X Group interaction) in the frontal lobe and in the sensorimotor hand area.

G. Comparable to **Fig. 2G:** A direct comparison of the selectivity to right foot movement (vs. abdomen movement) between the dysplasics and control subjects shows potential for plasticity specific to the compensatorily used foot in the association cortices, in the angular/supramarginal gyri and middle frontal gyrus, but not in the primary sensorimotor cortex.

H. Comparable to **Fig. 2H:** Bayes factor (BF) for difference between the groups in their differential activation to right foot movement (vs. abdomen movement) is shown. The dysplasics show different selectivity level for right foot movement compared with the controls in various cortical loci, including the sensorimotor hand area. However, the group difference found in the primary sensorimotor hand area in this analysis reflects a preference in the dysplasics group toward the abdomen movement (compare with **D**).

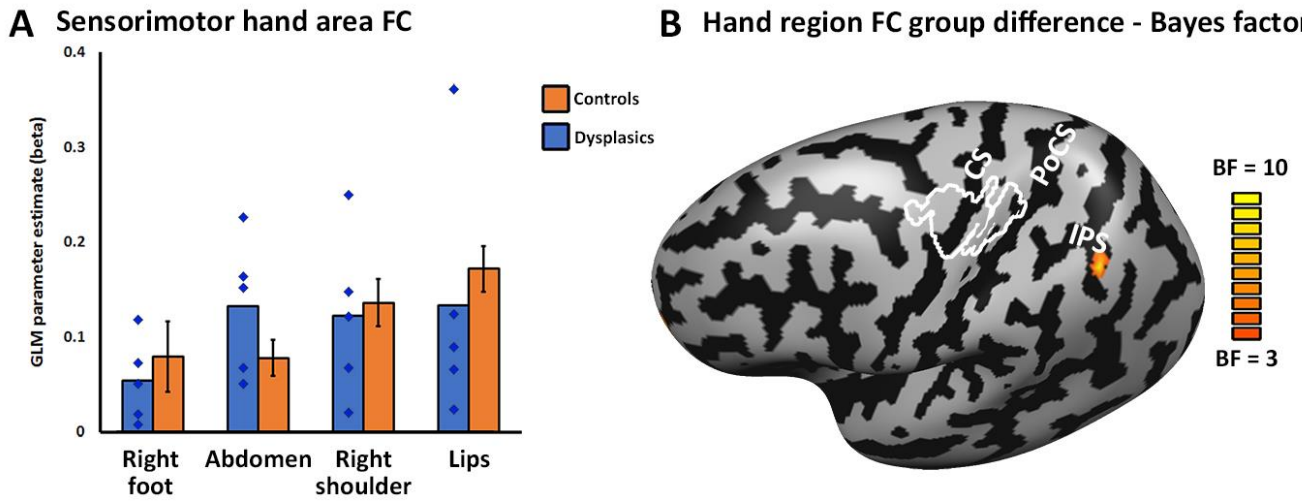


Figure S8: The sensorimotor hand area in the dysplasics does not show enhanced functional connectivity to the compensatorily used foot region

A. Functional connectivity (FC) between the sensorimotor hand area and sensorimotor areas for the right foot, abdomen, right shoulder and mouth (defined per group) are shown for each group. The hand sensorimotor cortex of the dysplasics does not show increased FC to the foot area. Error bars for the control group represent standard error of the mean. Individual data points are presented for the five dysplasic individuals.

B. Bayes factor (BF_{10}) for difference between the groups in their FC from the sensorimotor hand area is shown, not revealing any increased connectivity to foot sensorimotor areas, or otherwise any strong connectivity differences between the groups, except at the inferior parietal lobule, in the mIPS. No group effect found in an ANOVA mixed effects analysis. CS – Central sulcus, PoCS – Post-central sulcus, IPS – Intraparietal sulcus.

Table S1: Characteristics of the dysplasic subjects

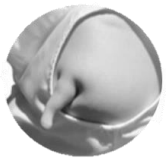
Subject ID	Age	Gender	Causes of dysplasia	Hand Prosthesis use	Years of education	Upper limb structure
D1	21	F	Unknown	None	15	
D2	54	M	Thalidomide	Past use of functional and cosmetic prostheses (see SI methods)	12	Completely missing upper limbs bilaterally
D3	27	F	Unknown	None	15	Completely missing upper limbs bilaterally
D4	37	M	Unknown	Past and current occasional use of functional prostheses	17	Completely missing upper limb on the other side 
D5	31	F	Genetic	Past use of functional prostheses	15	Completely missing upper limb on the other side 

Table S2: List of tools all five dysplasic subjects reported to have already used to achieve their typical function with their lower limbs, and with them only*

Bowl scraper	Cooking strainer	Glue stick	Kitchen sponge	Razor	Syringe
Calculator	Correction pen	Hair brush	Match	Rolling pin	Tambourine
Can opener	Elastic band	Hairdryer	Nail	Scissors	Thermometer
Cards	Erasing gum	Hand fan	Nail polish	Screw	Toaster
Chess pawn	File	Hole punch	Paper clip	Sewing needle	Toothbrush
Comb	Frisbee	Iron	Pencil sharpener	Spinning top	Vegetable peeler
Computer mouse	Garlic press	Kettle	Protractor	Stapler	Yo-yo

*The instruction the dysplasic subjects were given was the following:

Please indicate your experience in using the listed objects by putting X in the appropriate column (columns were “I use it with my upper limb(s)”; “I use it with my lower limb(s)”; “I use it with my mouth”; “I have never used it to achieve its typical function”; “I would be able to use it to achieve its typical function, if I had the opportunity to try”; “?”.).

If you have already used the object to achieve its typical function (e.g., using a hammer to put on a nail, using a sword to sword fight and so on), please indicate whether you used your upper limbs, lower limbs or mouth to use it. If you use an object with a combination of several body parts or if you use indifferently different body parts to use it, please put X in all the appropriate columns (for instance lower limbs and mouth). If you have never used a given tool to achieve its typical function, that is, if you have never touched it or if you have only transported it, then put X in the column “I have never used it to achieve its typical function” and, then, indicate whether you estimate that you would nevertheless be able to use it to achieve its typical function if you were given the opportunity by putting a X in the last column, or not, by letting the last column empty. If you don’t know the object, or if you are not sure of what it refers to, or if you are not sure of your response, put a X in the column “?”.

Supplementary References

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