Appendix C. The intervention method to improve LPD symmetry

We analyzed the therapist intervention during the clinical NDT rehabilitation conducted by therapists. Table 1 shows the asymmetry of the LPD of the subjects. In general, $Asym_{LPD}$ was improved after the treatment ($\bar{A}$) by therapist guidance. However, only five out of ten were improved after the treatment by the following motor intervention: $Asym_{LPD}$

$$F(t) = \frac{(\bar{F}_{\max} - \bar{F}_{\min})}{2} \times \sin(2\pi ft) + \frac{(\bar{F}_{\max} + \bar{F}_{\min})}{2}$$

where $\bar{F}_{\max}$ and $\bar{F}_{\min}$ represent the maximum and minimum forces, respectively, while f is the frequency. Furthermore, we set $\bar{F}_{\max} = 6$ lb , $\bar{F}_{\min} = 1$ lb, and f =1 Hz to simplify the experiments.

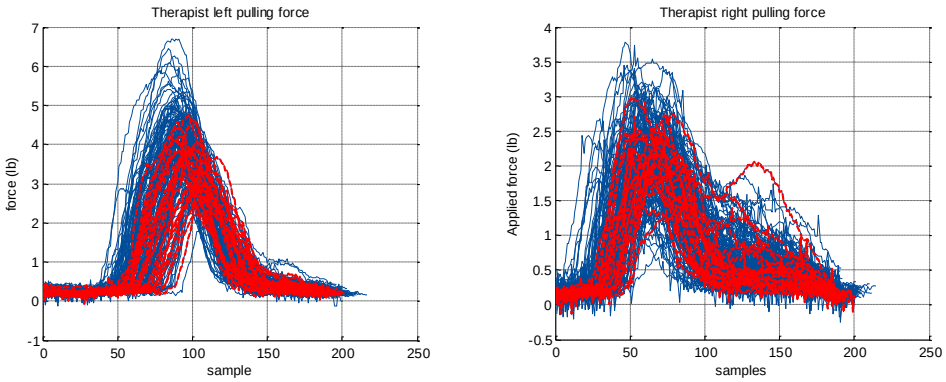
We analyzed the subjects' LPD and the therapists' intervention in the following three scenarios: (1) the applied forces when $Asym_{LPD}$ is better; (2) $Asym_{LPD}$ when the applied forces are delayed; (3) the influences of delayed forces on the asymmetry of swing phases.

Table 1. Asymmetry of LPD.

(mm)	Therapist guiding			NDT trainer guiding		
Subject	A_{th}	B_{th}	$\bar{A}_{th}$	A_{mot}	B_{mot}	$\bar{A}_{mot}$
P1	27	28	28	30	31	31
P2	-22	-17	-7	-15	-18	-12
P3	-40	-46	-39	-47	-46	-39
P4	9	10	5	0.2	4	-0.2
P5	37	47	35	36	22	31
P6	13	15	4	9	16	7
P7	14	17	10	19	14	14
P8	-32	-25	-28	-23	-29	-30
P9	-25	-20	-9	-8	-7	-12
P10	-26	-28	-24	-25	-29	-27

(1) We selected each subject's gaits with the best 10% $Asym_{LPD}$ during the walking test and the corresponding therapist's intervention forces, as shown in Figure 1. The blue lines represent all applied forces, while the red lines represent the applied force with the best 10% $Asym_{LPD}$. We noted that the

applied forces were delayed when $Asym_{LPD}$ was better. It is inferred the lateral symmetry might be improved by delaying the intervention forces.



(a) Left force by therapists (b) Right force by therapists

Figure 1. Intervention analyses for LPD.

(2) Second, we calculated the delay time in applying force after HS, as shown in Figure 2. The red star represents the gaits with longer delayed time and the corresponding $Asym_{LPD}$. The results showed that $Asym_{LPD}$ tended to be better when the applied forces were delayed.

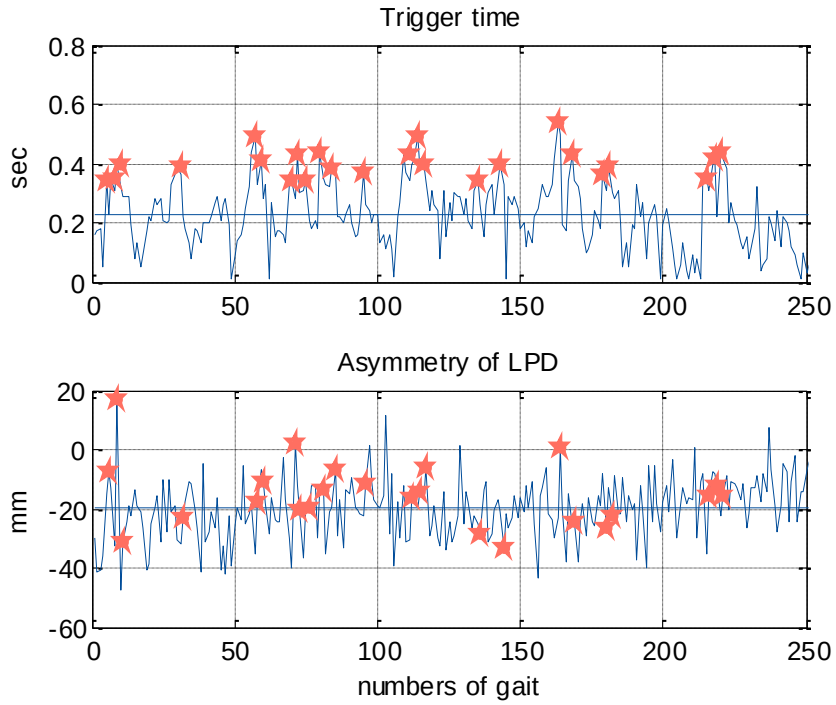


Figure 2. Trigger time versus $Asym_{LPD}$

(3) We calculated the average delay time of all gaits (labelled as $Time^{all}$) and the average delay time with the best 10% $Asym_{LPD}$ (labelled as $Time^{10\%}$). The results are shown in Table 2. The average $Asym_{LPD}$ of all gaits and the best 10% gaits are labelled as $Asym_{LPD}^{all}$ and $Asym_{LPD}^{10\%}$, respectively. The average $Asym_{SP}$ of all gaits and the best 10% gaits are labelled as $Asym_{SP}^{all}$ and $Asym_{SP}^{10\%}$, respectively. The results indicated that $Asym_{LPD}$ was improved when the applied force was delayed, and the time delay seemed to have no particular effect on the asymmetry of swing phases $Asym_{SP}$.

Table 2. Time delay and the impacts on $Asym_{LPD}$ and $Asym_{SP}$.

Subject	$Time^{all}$ (sec)	$Asym_{LPD}^{all}$ (mm)	$Asym_{SP}^{all}$ (mm)	$Time^{10\%}$ (sec)	$Asym_{LPD}^{10\%}$ (mm)	$Asym_{SP}^{10\%}$ (mm)
P1	0.17	29	24	0.56	29	25
P2	0.38	-17	26	0.66	-15	24
P3	0.45	-46	30	0.86	-44	31
P4	0.30	11	0	0.63	8	8
P5	0.22	48	29	0.43	47	38
P6	0.66	23	40	0.84	16	41
P7	0.39	23	23	0.56	22	24
P8	0.60	-17	38	1.16	-16	39
P9	0.23	-20	28	0.40	-18	26
P10	0.12	-27	-5	0.33	-25	-5