

Transfer of motion direction learning to an opposite direction enabled by double raining: A replication of Liang et al. (2015)

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Abstract (Zhang & Yang, 2014)
Motion direction learning is a fundamental perceptual skill. In a previous study, Liang et al. (2015) showed that learning to discriminate between two motion directions (e.g., leftward and rightward) led to a transfer of learning to the opposite direction (e.g., rightward and leftward). This transfer was observed even when the two directions were presented in opposite hemifields. The present study replicates the findings of Liang et al. (2015) using a different set of motion directions (e.g., up and down) and a different set of hemifields (e.g., left and right). The results show that learning to discriminate between two motion directions led to a transfer of learning to the opposite direction, even when the two directions were presented in opposite hemifields. The transfer was observed for both the direction and the speed of the motion. The transfer was also observed when the two directions were presented in the same hemifield. The results suggest that the transfer of learning is not limited to the direction and speed of the motion, but also extends to the hemifield of the motion.

Introduction
Motion direction learning is a fundamental perceptual skill. In a previous study, Liang et al. (2015) showed that learning to discriminate between two motion directions (e.g., leftward and rightward) led to a transfer of learning to the opposite direction (e.g., rightward and leftward). This transfer was observed even when the two directions were presented in opposite hemifields. The present study replicates the findings of Liang et al. (2015) using a different set of motion directions (e.g., up and down) and a different set of hemifields (e.g., left and right). The results show that learning to discriminate between two motion directions led to a transfer of learning to the opposite direction, even when the two directions were presented in opposite hemifields. The transfer was observed for both the direction and the speed of the motion. The transfer was also observed when the two directions were presented in the same hemifield. The results suggest that the transfer of learning is not limited to the direction and speed of the motion, but also extends to the hemifield of the motion.

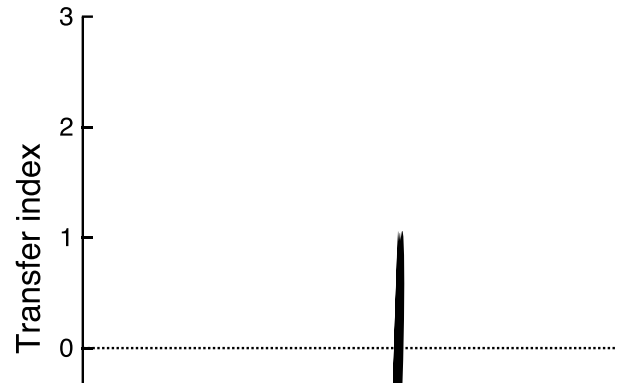
Methods
The experiment was conducted using a computerized motion direction learning task. Participants were shown a sequence of motion directions and were required to discriminate between two directions. The directions were presented in either the same hemifield or opposite hemifields. The results show that learning to discriminate between two motion directions led to a transfer of learning to the opposite direction, even when the two directions were presented in opposite hemifields. The transfer was observed for both the direction and the speed of the motion. The transfer was also observed when the two directions were presented in the same hemifield. The results suggest that the transfer of learning is not limited to the direction and speed of the motion, but also extends to the hemifield of the motion.

Results
The results show that learning to discriminate between two motion directions led to a transfer of learning to the opposite direction, even when the two directions were presented in opposite hemifields. The transfer was observed for both the direction and the speed of the motion. The transfer was also observed when the two directions were presented in the same hemifield. The results suggest that the transfer of learning is not limited to the direction and speed of the motion, but also extends to the hemifield of the motion.

Citation: Zhang, J.-Y., & Yang, C. (2016). The transfer of motion direction learning to an opposite direction enabled by double raining: A replication of Liang et al. (2015). *Journal of Vision*, 16(3):29, 1-4, doi:10.1167/16.3.29.

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, $TI \geq 1$
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 , $TI = 0.62 \pm 0.21$ ($F_{1,2} = 4.13, df = 5, p = 0.009$)
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 $TI = 1.20 \pm 0.36$ ($F_{1,2} = 2.63, df = 10, p = 0.025$)
 , $TI = 1$)
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TI 18 (2014) 2 L (2015) 0.77 ± 0.17 . I (X, X, & , 2016). W 24, TI = $0.78 \pm 0.13,$ 18 ($p < 0.001$ TI = 0, $p = 0.037$ TI

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B , K., & S , R. (1982). A *Science*, 218(4573), 697 698.

D , B. A., & L , . L. (1998). P *Proceedings of the National Academy of Sciences, USA*, 95(23), 13988 13993.

H , S. C., & S , A. R. (2014). P *Journal of Neuroscience*, 34(25), 8423 8431.

K , A., & S , D. (1991). W : E *Proceedings of the National Academy of Sciences, USA*, 88(11), 4966 4970.

L , J., F , M., & L , . (2015). S *Journal of Vision*, 15(10):3, 1 10, :10.1167/15.10.3. P M A

M , T., G , J., P , D., & T , M. (2015). L : P *Vision Research*, 108, 93 102.

M , J. D., & D , M. V. (1996). T *Spatial Vision*, 10(1), 51 58.

S , A., V , R., & O , G. A. (1995). H : R *Journal of Physiology*, 483(P 3), 797 810.

W , R., C , L. J., & , C. (2013). T TDT *Journal of Vision*, 13(5):9, 1 9, :10.1167/13.5.9. P M A

W , R., W , J., , J., X , X., , X., ... L, W. (). P *Journal of Neuroscience*.

W , R., , J., K , S. A., L , D. M., & , C. (2012). T *Vision Research*, 61, 33 38.

W , R., , J., K , S. A., L , D. M., & , C. (2014). V : A *Journal of Vision*, 14(13):12, 1 12, :10.1167/14.13.12. P M A

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- Xu, L. Q., Wang, J., Wu, R., Koenig, S. A., Lippman, D. M., & Cline, C. (2008). Cerebellar long-term depression of visual evoked potentials. *Current Biology*, *18*(24), 1922–1926.
- Xu, L. Q., Wang, J., Wu, R., Koenig, S. A., Lippman, D. M., & Cline, C. (2016). Long-term depression of visual evoked potentials in the cerebellum. *Investigative Ophthalmology & Visual Science*, *55*(4), 2020–2030. PMID: 27041414.
- Xu, L. Q., Wang, J., Wu, R., Koenig, S. A., Lippman, D. M., & Cline, C. (2014). Prolonged time course of TPE in the cerebellum. *Investigative Ophthalmology & Visual Science*, *53*(12), 5397–5404. PMID: 25000000.
- Xu, L. Q., Wang, J., Wu, R., Koenig, S. A., Lippman, D. M., & Cline, C. (2010). Rapid depression of visual evoked potentials in the cerebellum. *Journal of Neuroscience*, *30*(37), 12323–12328.