

---

## References

- Abeeles S, Bock O (2001) Mechanisms for sensorimotor adaptation to rotated visual input. *Exp Brain Res* 139, 248-253.
- Abrams RA, Meyer DE, Kornblum S (1990) Eye-hand coordination: oculomotor control in rapid aimed limb movements. *J Exp Psychol Hum Percept Perform* 16, 248-267.
- Abrams RA, Van Dillen L, Stemmons V (1994) *Multiple sources of spatial information for aimed limb movements*. In: Umiltà C, Moscovitch M (eds) *Attention and Performance XV*. MIT Press, Cambridge, MA, pp 267-290.
- Adamovitch S, Berkinblit M, Smetanin B, Fookson O, Poizner H (1994) Influence of movement speed on accuracy of pointing to memorized targets in 3D space. *Neurosci Lett* 172, 171-174.
- Adamovitch S, Berkinblit M, Fookson O, Poizner H (1999) Pointing in 3D space to remembered targets II: effects of movement speed toward kinaesthetically defined targets. *Exp Brain Res* 125, 200-210.
- Andersen RA, Essick GK, Siegel RM (1985) Encoding of spatial location by posterior parietal neurons. *Science* 230, 456-458.
- Andersen RA (1995) Encoding of intention and spatial location in the posterior parietal cortex. *Cereb Cortex* 5, 457-469.
- Bard C, Turrell Y, Fleury M, Teasdale N, Lamarre Y, Martin O (1999) Deafferentation and pointing with visual double-step perturbations. *Exp Brain Res* 125, 410-416.
- Batista AP, Buneo CA, Snyder LH, Andersen RA (1999) Reach plans in eye-centered coordinates. *Science* 285, 257-260.
- Battaglia-Mayer A, Ferraina S, Marconi B, Bullis JB, Lacquaniti F, Burnod Y, Baraduc P, Caminiti R (1998) Early motor influences on visuomotor transformations for reaching: a positive image of optic ataxia. *Exp Brain Res* 123, 172-189.
- Battaglia-Mayer A, Ferraina S, Mitsuda T, Marconi B, Genovesio A, Onorati P, Lacquaniti F, Caminiti R (2000) Early coding of reaching in the parietooccipital cortex. *J Neurophysiol* 83, 2374-2391.

- Baud-Bovy G, Viviani P. (1998) Pointing to kinaesthetic targets in space. *J Neurosci* 18, 1528-1545.
- Berkinblit MB, Fookson OI, Smetanin B, Adamovich SV, Poizner H (1995) The interaction of visual and proprioceptive inputs in pointing to actual and remembered targets. *Exp Brain Res* 107, 326-330.
- Bock O (1986) Contribution of retinal versus extraretinal signals towards visual localisation in goal-directed movements. *Exp Brain Res* 64, 476-482.
- Bock O, Eckmiller R (1986) Goal-directed arm movements in absence of visual guidance: evidence for amplitude rather than position control. *Exp Brain Res* 62, 451-458.
- Bock O (1992) Adaptation of aimed arm movements to sensorimotor discordance: evidence for direction independent gain control. *Behav Brain Res* 51, 41-50.
- Bock O, Arnold K (1993) Error accumulation and error correction in sequential pointing movements. *Exp Brain Res* 95, 111-117.
- Boussaoud D, Bremmer F (1999) Gaze effects in the cerebral cortex: reference frames for space coding and action. *Exp Brain Res* 128, 170-180.
- Brenner E, Van Damme WJM (1999) Perceived distance, shape and size. *Vision Res* 39, 975-986.
- Brenner E, Smeets JBJ (2000) Comparing extra-retinal information about distance and direction. *Vision Res* 40, 1649-1651.
- Brotchie PR, Andersen RA, Snyder LH, Goodman SJ (1995) Head position signals used by parietal neurons to encode locations of visual stimuli. *Nature* 376, 232-235.
- Buneo CA, Jarvis MR, Batista AP, Andersen RA (2002) Direct visuomotor transformations for reaching. *Nature* 416, 632-636.
- Burbaud P, Doegle C, Gross C, Bioulac B (1991) A quantitative study of neuronal discharge in areas 5, 2, and 4 of the monkey during fast arm movements. *J Neurophysiol* 66, 429-443.

- Burnod Y, Baraduc P, Battaglia-Mayer A, Guigon E, Koechlin E, Ferraina S, Lacquaniti F, Caminiti R (1999) Parieto-frontal coding of reaching: an integrated framework. *Exp Brain Res* 129, 325-346.
- Caminiti R, Johnson PB, Urbano A (1990) Making arm movements within different parts of space: dynamic aspects in the primate motor cortex. *J Neurosci* 10, 2039-2058.
- Carrozzo M, McIntyre J, Zago M, Lacquaniti F (1999) Viewer-centered and body-centered frames of reference in direct visuomotor transformations. *Exp Brain Res* 129, 201-210.
- Choe CS, Welch RB (1974) Variables affecting the intermanual transfer and decay of prism adaptation. *J Exp Psychol* 102, 1076-1084.
- Cisek P, Kalaska JF (2002a) Modest gaze-related discharge modulation in monkey dorsal premotor cortex during a reaching task performed with free fixation. *J Neurophysiol* 88, 1064-1072.
- Cisek P, Kalaska JF (2002b) Simultaneous encoding of multiple potential reach directions in dorsal premotor cortex. *J Neurophysiol* 87, 1149-1154.
- Clower DM, Boussaoud D (2000) Selective use of perceptual recalibration versus visuomotor skill acquisition. *J Neurophysiol* 84, 2703-2708.
- Cohen MM (1967) Continuous versus terminal visual feedback in prism aftereffects. *Percept Mot Skills* 24, 1295-1302.
- Cohen YE, Andersen RA (2000) Reaches to sounds encoded in an eye-centered reference frame. *Neuron* 27, 647-652.
- Cohen YE, Andersen RA (2002) A common reference frame for movement plans in the posterior parietal cortex. *Nat Rev Neurosci* 3, 553-562.
- Craske B (1967) Adaptation to prisms: change in internally registered eye-position. *Br J Psychol* 58, 329-335.
- Cunningham HA, Welch RB (1994) Multiple concurrent visual-motor mappings: implications for models of adaptation. *J Exp Psychol Hum Percept Perform* 20, 987-999.

De Graaf JB, Denier van der Gon JJ, Sittig AC (1996) Vector coding in slow goal-directed arm movements. *Percept Psychophys* 58, 587-601.

Desmurget M, Jordan M, Prablanc C, Jeannerod M (1997a) Constrained and unconstrained movements involve different control strategies. *J Neurophysiol* 77, 1644-1650.

Desmurget M, Rossetti Y, Jordan M, Meckler C, Prablanc C (1997b) Viewing the hand prior to movement improves accuracy of pointing performed toward the unseen contralateral hand. *Exp Brain Res* 115, 180-186.

Desmurget M, Pélisson D, Rossetti Y, Prablanc C (1998) From eye to hand: planning goal-directed movements. *Neurosci Biobehav Rev* 22, 761-788.

Efstathiou A, Bauer J, Greene M, Held R (1967) Altered reaching following adaptation to optical displacements of the hand. *J Exp Psychol* 73, 113-120.

Efstathiou A (1969) Effects of exposure time and magnitude of prism transform on eye-hand coordination. *J Exp Psychol* 81, 235-240.

Engel KC, Flanders M, Soechting JF (2002) Oculocentric frames of reference for limb movement. *Arch Ital Biol* 140, 211-219.

Ferraina S, Johnson PB, Garasto MR, Battaglia-Mayer A, Ercolani L, Bianchi L, Lacquaniti F, Caminiti R (1997) Combination of hand and gaze signals during reaching: activity in parietal area 7 m of the monkey. *J Neurophysiol* 77, 1034-1038.

Flanders M, Helms Tillery SI, Soechting JF (1992) Early stages in a sensorimotor transformation. *Behav Brain Sci* 15, 309-362.

Foley JE (1974) Factors governing interocular transfer of prism adaptation. *Psychol Rev* 81, 183-186.

Foley JM (1980) Binocular distance perception. *Psychol Rev* 87, 411-434.

Galletti C, Battaglini PP, Fattori P (1993) Parietal neurons encoding spatial locations in craniotopic coordinates. *Exp Brain Res* 96, 221-229.

- Georgopoulos AP, Camaniti R, Kalaska JF, Massey JT (1983) Spatial coding of movement: a hypothesis concerning the coding of movement by motor cortical populations. *Exp Brain Res (Suppl)* 7, 327-336.
- Georgopoulos AP, Kettner RE, Schwartz AB (1988) Primate motor cortex and free arm movements to visual targets in three-dimensional space II: coding of the direction of movement by a neuronal population. *J Neurosci* 8, 2928-2937.
- Georgopoulos AP (1991) Higher order motor control. *Annu Rev Neurosci* 14, 361-377.
- Ghahramani Z, Wolpert DM (1997) Modular decomposition in visuomotor learning. *Nature* 386, 392-395.
- Ghez C, Gordon J, Ghilardi MF (1993) Programming of extent and direction in human reaching movements. *Biomed Res* 14, Suppl 1, 1-5.
- Ghilardi MF, Gordon J, Ghez C (1995) Learning a visuomotor transformation in a local area of work space produces directional biases in other areas. *J Neurophysiol* 73, 2535-2539.
- Gogel WC (1969) The sensing of retinal size. *Vision Res* 9, 1079-1094.
- Gordon J, Ghilardi MF, Ghez C (1994) Accuracy of planar reaching movements. *Exp Brain Res* 99, 97-111.
- Grea H, Desmurget M, Prablanc C (2000) Postural invariance in three-dimensional reaching and grasping movements. *Exp Brain Res* 134, 155-162.
- Haggard P, Newman C, Blundell J, Andrew H (2000) The perceived position of the hand in space. *Percept Psychophys* 68, 363-377.
- Hamilton CR (1964) Intermanual transfer of adaptation to prisms. *Am J Psychol* 77, 457-462.
- Harris CS (1963) Adaptation to displaced vision: visual, motor, or proprioceptive change? *Science* 140, 812-813.
- Hay JC, Langdon B, Pick HL Jr (1971) Spatial parameters of eye-hand adaptation to optical distortion. *J Exp Psychol* 91, 11-17.

Held R, Efstathiou A, Greene M (1966) Adaptation to displaced and delayed visual feedback from the hand. *J Exp Psychol* 72, 887-891.

Jakobson LS, Goodale MA (1989) Trajectories of reaches to prismatically-displaced targets: evidence for 'automatic' visuomotor recalibration. *Exp Brain Res* 78, 575-587.

Jeannerod M (1997) *The cognitive neuroscience of action*. Blackwell, Oxford.

Kalaska JF, Caminiti R, Georgopoulos AP (1983) Cortical mechanisms related to the direction of two-dimensional arm movements: relations in parietal area 5 and comparison with motor cortex. *Exp Brain Res* 51, 247-260.

Kalil RE, Freedman SJ (1966) Intermanual transfer of compensation for displaced vision. *Percept Mot Skills* 22, 123-126.

Kitazawa S, Kohno T, Uka T (1995) Effects of delayed visual information on the rate and amount of prism adaptation in the human. *J Neurosci* 15, 7644-7652.

Kitazawa S, Kimura T, Uka T (1997) Prism adaptation of reaching movements: specificity for the velocity of reaching. *J Neurosci* 17, 1481-1492.

Krakauer JW, Pine ZM, Ghilardi MF, Ghez C (2000) Learning of visuomotor transformations for vectorial planning of reaching movements. *J Neurosci* 20, 8916-8924.

Kutz DF, Dannenberg S, Werner W, Hoffmann KP (1997) Population coding of arm-movement-related neurons in and below the superior colliculus of *Macaca mulatta*. *Biol Cybern* 76, 331-337.

Lacquaniti F, Guigon E, Bianchi L, Ferraina S, Camaniti R (1995) Representing spatial information for limb movement: role of area 5 in the monkey. *Cereb Cortex* 5, 391-409.

Lacquaniti F (1997) *Frames of reference in sensorimotor coordination*. In: Boller F, Grafman J (eds) *Handbook of neuropsychology*, vol 11, Elsevier, Amsterdam, pp 27-64.

Lacquaniti F, Caminiti R (1998) Visuo-motor transformations for arm reaching. *J Neurosci* 10, 195-203.

- McIntyre J, Stratta F, Lacquaniti F (1997) Viewer-centered frame of reference for pointing to memorized targets in three-dimensional space. *J Neurophysiol* 78, 1601-1618.
- McIntyre J, Stratta F, Lacquaniti F (1998) Short-term memory for reaching to visual targets: psychophysical evidence for body-centered reference frames. *J Neurosci* 18, 8423-8435.
- McIntyre J, Stratta F, Droulez J, Lacquaniti F (2000) Analysis of pointing errors reveals properties of data representations and coordinate transformations within the central nervous system. *Neural Comput* 12, 2823-2855.
- Messier J, Kalaska JF (1997) Differential effect of task conditions on errors of direction and extent of reaching movements. *Exp Brain Res* 115, 469-478.
- Messier J, Kalaska JF (1999) Comparison of variability of initial kinematics and endpoints of reaching movements. *Exp Brain Res* 125, 139-152.
- Messier J, Kalaska JF (2000) Covariation of primate dorsal premotor cell activity with direction and amplitude during a memorized-delay reaching task. *J Neurophysiol* 84, 152-165.
- Morrison, DF (1990). *Multivariate Statistical Methods*. McGrawhill: Singapore.
- Norris SA, Greger BE, Martin TA, Thach WT (2001) Prism adaptation of reaching is dependent on the type of visual feedback of hand and target position. *Brain Res* 905, 207-219.
- Pine ZM, Krakauer JW, Gordon J, Ghez C (1996) Learning of scaling factors and reference axes for reaching movements. *Neuroreport* 7, 2357-2361.
- Polit A, Bizzi E (1979) Characteristics of motor programs underlying arm movements in monkeys. *J Neurophysiol* 42, 183-194.
- Prablanc C, Echallier JF, Komilis E, Jeannerod M (1979) Optimal response of eye and hand motor systems in pointing at a visual target. *Biol Cybern* 35, 113-124.
- Prablanc C, Pélisson D, Goodale MA (1986) Visual control of reaching movements without vision of the limb. *Exp Brain Res* 62, 293-302.

Press WH, Flannery BP, Teukolsky SA, Vetterling WT (1988) *Numerical Recipes in C*. Cambridge University Press, Cambridge.

Redding GM, Wallace B (1996) Adaptive alignment and strategic perceptual-motor control. *J Exp Psychol Hum Percept Perform* 22, 379-394.

Rosenbaum DA (1980) Human movement initiation: specification of arm, direction, and extent. *J Exp Psychol General* 109, 444-474.

Rosenbaum DA, Meulenbroek RJ, Vaughan J (1999a) Remembered positions: stored locations or stored postures. *Exp Brain Res* 124, 503-512.

Rosenbaum DA, Meulenbroek RJ, Vaughan J, Jansen C (1999b) Coordination of reaching and grasping by capitalizing on obstacle avoidance and other constraints. *Exp Brain Res* 128, 92-100.

Rossetti Y, Stelmach G, Desmurget M, Prablanc C, Jeannerod M (1994) The effect of viewing the static hand prior to movement onset on pointing kinematics and variability. *Exp Brain Res* 101, 323-330.

Rossetti Y, Desmurget M, Prablanc C (1995) Vectorial coding of movement: vision, kinaesthesia, or both? *J Neurophysiol* 74, 457-463.

Schlag-Rey M, Schlag J, Dassonville P (1992) How the frontal eye field can impose a saccade goal on superior colliculus neurons. *J Neurophysiol* 67, 1003-1005.

Scott SH, Sergio LE, Kalaska JF (1997) Reaching movements with similar hand paths but different arm orientations. II. Activity of individual cells in dorsal premotor cortex and parietal area 5. *J Neurophysiol* 78, 2413-2426.

Seidler RD, Bloomberg JJ, Stelmach GE (2001) Context-dependent arm pointing adaptation. *Behav Brain Res* 119, 155-166.

Smeets JBJ (1992) What do fast goal-directed movements teach us about equilibrium-point control. *Behav Brain Sci* 15, 796-797.

Snyder LH, Grieve KL, Brotchie P, Andersen RA (1998) Separate body- and world-referenced representations of visual space in parietal cortex. *Nature* 394, 887-891.



- Snyder LH (2000) Coordinate transformations for eye and arm movements in the brain. *Curr Opin Neurobiol* 10, 747-754.
- Soechting JF, Flanders M (1989a) Sensorimotor representations for pointing to targets in three-dimensional space. *J Neurophysiol* 62, 582-594.
- Soechting JF, Flanders M (1989b) Errors in pointing are due to approximations in sensorimotor transformations. *J Neurophysiol* 62, 595-608.
- Soechting JF, Helms Tillery SI, Flanders M (1990) Transformation from head- to shoulder-centered representation of target direction in arm movements. *J Cogn Neurosci* 2, 32-43.
- Stuphorn V, Bauswein E, Hoffmann KP (2000) Neurons in the primate superior colliculus coding for arm movements in gaze-related coordinates. *J Neurophysiol* 83, 1283-1299.
- Taub E, Goldberg IA (1973) Prism adaptation: control of intermanual transfer by distribution of practice. *Science* 180, 755-757.
- Van Beers RJ, Sittig AC, Denier van der Gon JJ (1998) The precision of proprioceptive position sense. *Exp Brain Res* 122, 367-377.
- Van Beers RJ, Sittig AC, Denier van der Gon JJ (1999) Integration of proprioceptive and visual position-information: An experimentally supported model. *J Neurophysiol* 81, 1355-1364.
- Van Beers RJ, Wolpert DM, Haggard P (2001) When feeling is more important than seeing in sensorimotor adaptation. *Current Biology* 12, 834-837.
- Van den Dobbelen JJ, Brenner E, Smeets JBJ (2001) Endpoints of arm movements to visual targets. *Exp Brain Res* 138, 279-287.
- Van den Dobbelen JJ, Brenner E, Smeets JBJ (2003) Adaptation of movement endpoints to perturbations of visual feedback. *Exp Brain Res*, in press.
- Van Lawick-Goodall J (1970) *Tool-using in primates and other vertebrates*. In: Hinde RA (ed) *Advances in the Study of Behaviour*. Academic Press. New York, pp 195-249.

Vetter P, Goodbody SJ, Wolpert DM (1999) Evidence for an eye-centered spherical representation of the visuomotor map. *J Neurophysiol* 81, 935-939.

Vetter P, Wolpert DM (2000) Context estimation for sensorimotor control. *J Neurophysiol* 84, 1026-1034.

Vindras P, Desmurget M, Prablanc C, Viviani P (1998) Pointing errors reflect biases in the perception of the initial hand position. *J Neurophysiol* 79, 3290-3294.

Vindras P, Viviani P (1998) Frames of reference and control parameters in visuomanual pointing. *J Exp Psychol Hum Percept Perform* 24, 569-591.

Vindras P, Viviani P (2002) Altering the visuomotor gain: Evidence that motor plans deal with vector quantities. *Exp Brain Res* 147, 280-295.

Wallace B, Redding GM (1979) Additivity in prism adaptation as manifested in intermanual and interocular transfer. *Percept Psychophys* 25, 133-136.

Wann JP, Ibrahim SF (1992) Does limb kinaesthesia drift? *Exp Brain Res* 91, 162-166.

Welch RB, Choe CS, Heinrich DR (1974) Evidence for a three-component model of prism adaptation. *J Exp Psychol* 103, 700-705.

Welch RB (1978) *Perceptual modification: adapting to altered sensory environments*. Academic Press, New York.

Welch RB (1986) *Adaptation of space perception*. In: Boff KR, Kaufman L, Thomas JR (eds) *Handbook of perception and human performance*, Vol 1: Sensory processes and perception. Wiley, New York, pp 24.1-24.45.

Welch RB, Bridgeman B, Anand S, Browman, KE (1993) Alternating prism exposure causes dual adaptation and generalisation to a novel displacement. *Percept Psychophys* 54, 195-204.

Werner W, Dannenberg S, Hoffmann KP (1997a) Arm-movement-related neurons in the primate superior colliculus and underlying reticular formation: comparison of neuronal activity with EMGs of muscles of the shoulder, arm and trunk during reaching. *Exp Brain Res* 115, 191-205.

Werner W, Hoffmann KP, Dannenberg S (1997b) Anatomical distribution of arm-movement-related neurons in the primate superior colliculus and underlying reticular formation in comparison with visual and saccadic cells. *Exp Brain Res* 115, 206-216.

Wessberg J, Stambaugh CR, Kralik JD, Beck PD, Laubach M, Chapin JK, Kim J, Biggs SJ, Srinivasan MA, Nicolelis (2000) Real-time prediction of hand trajectory by ensembles of cortical neurons in primates. *Nature* 408, 361-365.

Xing J, Andersen RA (2000) Models of the posterior parietal cortex which perform multimodal integration and represent space in several coordinate frames. *J Cogn Neurosci* 12, 601-614.

Zipser D, Andersen RA (1998) A back-propagation programmed network that simulates response properties of a subset of posterior parietal neurons. *Nature* 331, 679-684.

