

SYMPOSIUM 3

Laterality: Hands, Feet, Eyes, and Ears.

Symposium in Memory of Phil Bryden

(Organized by Barbara Bulman-Fleming and I. Chris MacManus)

Dermal Ridge Asymmetry and Brain Organization. Doreen Kimura, University of Western Ontario.

Task Difficulty and Hand Performance. Pamela J. Bryden, University of Waterloo.

It is widely accepted that virtually all people are more proficient with one hand than the other hand on skilled unimanual tasks. Studies have shown that the degree of hand preference is related to the level of skill required for a particular task, such that there are weak hand preferences for unskilled activities and strong hand preferences for skilled activities. Within-task comparisons have revealed a constant difference between the hands when task difficulty is manipulated for various unimanual tasks, including the Annett pegboard. However, our group has recently undertaken studies comparing different tasks and we have shown that performance asymmetries between the hands do increase as a function of the degree of task difficulty. Research will be presented on the extent of manual asymmetries both within tasks and among tasks of differing difficulty, and findings with respect to current manual asymmetry theories will be discussed.

Complementarity of Cerebral Function. M.B. Bulman-Fleming and M.P. Bryden, University of Waterloo.

Although the left hemisphere is considered to subserve language functions, and the right hemisphere is more involved in emotion and visuospatial processing, we do not fully understand why this complementarity exists. The present paper presents several alternative models. Data from studies in which verbal and nonverbal functions have been assessed in the same normal subjects will be presented. The focus will be on those studies in which both left- and right- hemisphere functions are assessed at the same time. Procedures for distinguishing between the various models of complementarity will be described, and arguments relating to a hybrid model advanced.

Footedness Is a Better Predictor Than Handedness of Cerebral Lateralization. Lorin J. Elias, University of Waterloo.

A tremendous amount of experimental work has attempted to identify reliable behavioural predictors of cerebral lateralization. Preferred handedness has been the most popular predictor, but some recent reports suggest that preferred footedness may serve as a more accurate predictor of functional laterality, especially in the left-handed population. The studies described here sought to test this claim by selectively recruiting individuals with either “crossed” lateral

preferences (right-handed and left-footed or left-handed and right-footed) or “uncrossed” lateral preferences (right-handed and right-footed or left-handed and left-footed) and testing these individuals with verbal or non-verbal dichotic listening tasks. In one experiment, language lateralization was assessed in 32 participants with the Fused Dichotic Words Test (FDWT), and lateral preference for both handedness and footedness was assessed using self-report questionnaires. Ear advantage on this dichotic task varied significantly with preferred foot ($p < .001$) but not with preferred hand. In a subsequent study, 32 participants were recruited such that the factors of handedness, footedness, and gender were completely crossed. Lateralization of emotional perception was assessed with two blocks of the Emotional Words Test (EWT), and lateral preference for both handedness and footedness was assessed using self-report questionnaires. Ear advantage on the emotional dichotic task varied significantly with preferred foot ($p = .003$) but not with preferred hand. Cerebral lateralization may be more related to preferred foot than to other lateralized behaviours.

Phil Bryden's Last Project: Pulling Together All the Different Lateralities. I. Chris McManus, University College & St. Mary's Hospital.

Phil Bryden had speculated for a number of years about the form of a ‘grand unifying theory’ for explaining the inter-relations of the various lateralities. There were several themes. Michael Peters had already shown that handedness could be fractionated into two separable parts, writing hand and throwing hand, and relatively recently with Clare Porac, Phil and I had found that distinction clarified the otherwise numerically difficult association of handedness and eye dominance—as it were, restoring a higher order symmetry to it. Phil’s dichotic work with Barbara Bulman-Fleming had also managed to measure simultaneously the extent of cerebral lateralisation for processing phonemes and emotions, and shown that they were only weakly correlated—what he called ‘statistical complementarity’, a relation perhaps mediated via a common gene that also controlled handedness. Phil’s interest also developed in footedness, and Lorin Elias in Phil’s lab showed recently that footedness better predicted lateralisation for language and emotion than did handedness. Other variables needing to be stirred into this pot were the clear familial trends in handedness, seeming cross-cultural differences in handedness and its familial trends, and the obvious necessity for identifying the neural loci of the various effects, all of which Phil was working on. This paper will look at how Phil was thinking about these associations and trying to collect the data necessary for assessing them properly.

Babes in Arms: Which Side Are You On? Early and Recent Accounts and Explanations of Lateral Biases for Cradling Infants. Lauren Julius Harris, Michigan State University.

Nearly four decades ago, the psychologist Lee Salk (1961) reported finding that a majority of mothers of newborn infants held their infants preferentially on the left side. Today, the left-cradling bias has been confirmed in dozens of studies. These studies also have attempted to explain the bias by identifying the circumstances governing its appearance, for example, whether it is related to the handedness of the holder or to a postural bias on the part of the infant, is commoner in some individuals than others (e.g., females more than males, parents more than non-parents, adults more than children), is shown only for infants rather than, say, for dolls or other inanimate objects, or is even unique to *human* beings holding *human* infants.

The discovery of the cradling bias is often credited to Salk (1961) himself. In fact, the bias was first reported in the far more distant past, but little if any of the earlier reports seem to be known today. My goal in this paper, therefore, is fourfold: first, to review the older literature on lateral bias for cradling; second, to review current studies; third, to evaluate past and current explanations; fourth, to propose a new, integrative model.