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Developmental Patterns in the Cytoarchitecture of the Human Cerebral Cortex from Birth to Six Years Examined by Correspondence Analysis

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This paper uses correspondence analysis to examine the developmental patterns in the cytoarchitecture of the human cerebral cortex from birth to 72 months. The study is based on data collected by the late J. L. Conel, which consists of over 4 million individual measurements of six microscopic neuroanatomic features for each of six cortical layers in 46 cytoarchitecturally distinct regions. We analyze 1,727 profiles of development over eight agepoints (term birth, 1,3,6,15, 24, 48, and 72 postnatal months) resulting from the combinations of neuroanatomic feature and layer and brain cytoarchitecture region in the Conel data. The profiles for any given combination of feature and layer are found to be remarkable similar in all regions of the brain, and therefore the developmental patterns of different cytoarchitectural regions are not distinguishable from one another. Developmental change is most rapid at the earlier stages; of the total change in profile patterns observed, more than a their between birth and 6 months, about a third between 6 and 15 months, and less than a third occurs between 15 and 72 months. The majority of the variance in developmental profiles is accounted for by the 6 microscopic, neuroanatomic features. Correspondence analysis shows that Conel's data are highly consistent and reliable.