line-imprinted fish stopped at this stream only when morpholine was released into it; at all other times they continued past the stream. Furthermore, salmon from the unexposed group never stopped at this stream when morpholine was present. The EEG studies reported here, together with census and ultrasonic tracking information, indicate that the exposed group of salmon had been imprinted to morpholine and had retained this information for 18 months (*23*).

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24. We thank A. Scholz, S. Drzeweicki, and R. Smith for extensive assistance in the field and A. Dizon, R. Horrall, and D. Madison for advice in these studies. We also thank J. Hildreth, E. Mueller, and R. Poff. Supported by training grant T900192 with the Federal Water Quality Administration; National Science Foundation grants GB7616 and GB343; University of Wisconsin Sea Grant, Department of Commerce, NOAA 2-35209; the Wisconsin Department of Natural Resources; and the city of South Milwaukee.

8 June 1973; revised 10 August 1973 ■

Near Identity of Cognitive Structure in Two Ethnic Groups

Abstract. *As part of a large-scale family study in Hawaii, Americans of either Japanese or European ancestry were administered a battery of 15 cognitive tests. Principal component analyses (varimax rotations) yielded the same four major cognitive factors for each of the two ethnic groups, and these factors are defined by strikingly similar factor loadings.*

A large-scale family study is currently in progress in Hawaii, with the primary objective of assessing genetic and environmental bases of performance on various tests of cognitive ability. The project is a collaborative effort between investigators at the University of Hawaii and the University of Colorado, with administrative headquarters in the Behavioral Biology Laboratory, University of Hawaii. Data are being obtained on 15 cognitive variables (*1*), various environmental indices, blood group and enzyme systems, and dermatoglyphics. During the initial year of the project, data were obtained on 262 Americans of Japanese ancestry (AJA) and 782 Americans of European ancestry (AEA) (*2*). Although this represents only a small fraction of the subjects we plan to test, one highly stable relationship is beginning to emerge from the partial data set. In view of the current controversy about the heritable nature of group differences in intellectual functioning, we are presenting these initial results now. In brief, we find a highly similar cognitive structure in AJA and AEA subjects.

Guttman and Guttman (*3*) called attention to the desirability of employing intercorrelation patterns, rather than means or variances, in cross-ethnic studies of mental traits because the lat-

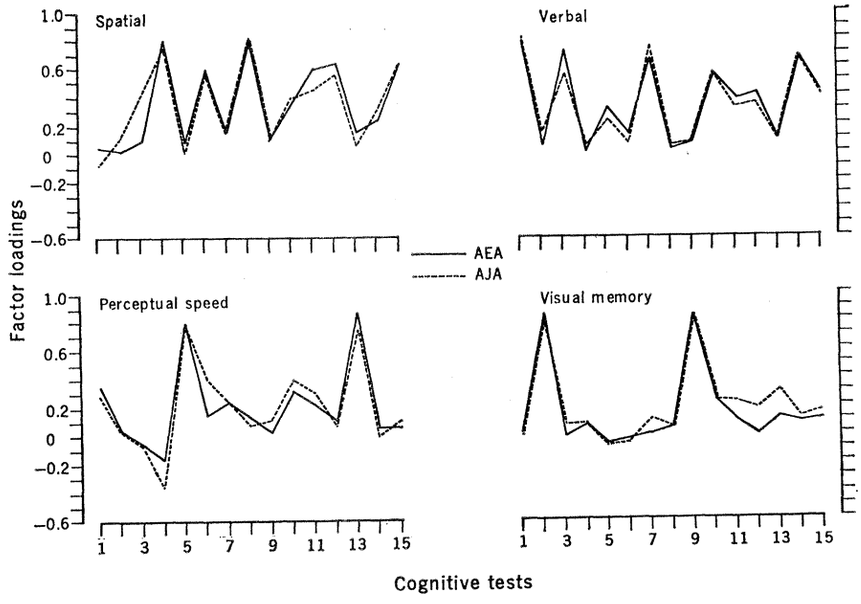

Fig. 1. Loadings of 15 cognitive tests on four factors in Americans of Japanese (*AJA*) and of European (*AEA*) ancestry.

ter are sensitive to possible environmental differences between groups. Lesser *et al.* (*4*), Stodolsky and Lesser (*5*), and Werner *et al.* (*6*), for example, compared profiles of mean values or mean factor scores of children of various ethnic backgrounds and reported substantial group differences. Guttman and Guttman, on the other hand, examined intercorrelations of achievement scores of Israeli-born children whose parents' origins were in Israel, Iraq, Persia, or Europe and North America. Despite large differences in mean scores among groups, the same simplex pattern of intercorrelations was observed in each group. This result was interpreted as possibly indicating a biological basis for the simplex pattern which is independent of environmental factors (*7*).

In the present study, phenotypic correlations among the 15 cognitive variables were obtained for both ethnic groups and subjected to principal component analyses with varimax rotations. Communalities of 1 were used, and the number of factors retained for rotation was equal to the number of eigenvalues greater than 1 (*8*). Four readily interpretable factors emerged for both racial groups: spatial visualization, verbal, perceptual speed and accuracy, and visual memory (*9*). Common factor loadings of the 15 cognitive tests on the varimax-rotated principal components for the two ethnic groups are graphed in Fig. 1.

The high similarity of the factor loading profiles of the two ethnic groups is obvious. Coefficients of congruence (*10*) of the loadings, computed for each factor to assess this similarity, were as follows: spatial visualization, 0.96; verbal, 0.99; perceptual speed and accuracy, 0.96; and visual memory, 0.96. We interpret these results as indicating the essentially identical structure of intellect of the two different ethnic groups as represented in Hawaii. However, further research will be required to clarify whether this isomorphism is principally cultural or connatural.

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1. The 15 cognitive variables in order of administration, test times allowed, and estimated reliabilities are as follows: (i) Primary Mental Abilities (PMA) vocabulary, 3 minutes, .96; (ii) visual memory, 1 minute of exposure and 1 minute of recall, .76; (iii) things (a fluency test, two parts, 3 minutes each, .79; (iv) mental rotations, 10 minutes, .88; (v) subtraction and multiplication, two parts, 2 minutes each, .96; (vi) Elithorn mazes ("lines and dots"), shortened form, 5 minutes, .89; (vii) Educational Testing Service (ETS) word beginnings and endings, two parts, 3 minutes each, .76; (viii) ETS card rotations, two parts, 3 minutes each, .88; (ix) visual memory (delayed recall), 1 minute, .78; (x) PMA pedigrees (a reasoning test), 4 minutes, .72; (xi) ETS hidden patterns, two parts, 2 minutes each, .92; (xii) paper from board, 3 minutes, .83; (xiii) ETS number comparisons, two parts, 1.5 minutes each, .82; (xiv) Whiteman test of social perception (verbal), 10 minutes, .43; and (xv) Raven's progressive matrices, modified form, 20 minutes, .89. References and more details concerning these cognitive tests and the estimation of their reliabilities will be provided in a subsequent paper.
2. The AJA sample was composed of 79 fathers, 89 mothers, 49 sons, and 45 daughters. The AEA sample included 242 fathers, 231 mothers, 148 sons, and 161 daughters. At the time of testing, children ranged in age from 13 to 31 years, whereas parental ages were 32 to 56 years. The numbers of fathers and mothers are unequal within racial groups because of interracial marriages. Offspring of these interracial marriages were not included in the present analysis.
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6 August 1973; revised 5 October 1973

Hydrolysis of the Lectin of Otala lactea

The partially purified lectin which agglutinates blood group A (and AB) (anti-A) and which is found in the snail *Otala lactea* was lightly treated with *p*-phenylazobenzoyl chloride [an "acylation" type of reaction, which causes an increase in anti-A activity (*1*)] and then hydrolyzed by crystalline papain. Three smaller fragments were obtained, with sedimentation constants 1.8, 2.2, and 4.2, respectively, all of which possess anti-A activity. This result suggests the presence in the original lectin molecule of at least three combining groups.

This recalls the work of Hammarström and Kabat (*2*), who found six specific combining groups in the anti-A lectin of the snail *Helix pomatia*, and that of Springer and Desai (*3*), who found between five and eight combining groups on the anti-H (O) lectin (agglutinate A_2 cells and O cells) of the eel *Anguilla rostrata*.

Since most antibodies apparently have only two specific combining groups per molecule, this leads us to suggest that the larger number in lectins (or at least in some lectins) may represent another significant difference between lectins and antibodies. This difference might explain, for example, why the anti-H (O) eel lectin was found by Springer and Desai (*3*) to precipitate specifically with certain molecularly dispersed monosaccharides —a finding that is hard to explain on the basis of the "lattice" theory of specific precipitation.

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24 October 1973