

## Correspondence

### Ethnicity Versus Early Environment:

Comment on 'Early Childhood Music Education and Predisposition to Absolute Pitch: Teasing Apart Genes and Environment' by Peter K. Gregersen, Elena Kowalsky, Nina Kohn, and Elizabeth West Marvin [2000]

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#### To the Editor:

Absolute pitch (AP)—the ability to identify or produce a musical note in the absence of a reference note—is very rare and is the subject of considerable speculation [cf. Ward, 1999]. In a widely quoted study, Gregersen et al. [2000] reported findings indicating a higher prevalence of AP among Asians than Caucasians, and they argued from their findings that ethnicity is a predisposing factor in the acquisition of AP. We here present a reanalysis of the data obtained by Gregersen et al., and argue that their conclusion concerning ethnicity is unwarranted. Instead, taking those respondents with early childhood in the North American Continent, we found no significant difference between East Asians<sup>1</sup> and Caucasians in the prevalence of AP. Further, for East Asians with early childhood in East Asia, the prevalence of AP was significantly higher than for both East Asians and Caucasians with early childhood in the North American Continent. This pattern of results argues strongly that some environmental factor is responsible for the differences in the prevalence of AP that were obtained in their survey.

Gregersen et al. [2000] surveyed music students who were enrolled in music theory classes in the

United States. They state: 'There was a marked increase in the rate of AP among Asian students (42/80<sup>2</sup>; 47.5%) compared with Caucasian students (75/834; 9.0%). The relatively higher rate in Asians was present among all the major ethnic subgroups—Japanese (26% AP+), Korean (37% AP+), and Chinese (65% AP+)...' adding that there was no significant difference between the Asian and Caucasian respondents in prevalence of early musical training. Their report has been widely interpreted as demonstrating a higher prevalence of AP among individuals of Asian descent, based on genetic factors. For example, Zatorre [2003], citing this report as evidence, wrote: 'The second hint of a genetic factor is that AP may be differentially distributed across different human populations, with persons of Asian descent, for example, having a much greater incidence of AP than those of other backgrounds. . . the higher incidence has been reported among Asian-Americans who often speak only English.'

However, Gregersen et al. omitted to state that the large majority of the Asian respondents had designated an Asian country as their 'country of early music education,' and so had presumably spent their

<sup>2</sup>Note that this fraction is incorrect; the correct fraction is 38/80. However, the percentage is correct.

<sup>1</sup>We included in our analysis of the Asian data only the responses of those who reported their ethnic affiliation specifically as 'Chinese,' 'Japanese,' or 'Korean', and for whom 'country of early music education' fell unambiguously into the category either of 'North American Continent' or of 'East Asia'. Asia includes countries such as India, Pakistan, Iraq, and Iran, whose populations are ethnically quite diverse, and different from those of East Asia; 'Pacific Islander' is consistent with a number of different ethnicities.

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TABLE I. Prevalence of AP by Ethnicity and Region of Early Childhood

	Ethnic affiliation			
	Chinese	Japanese	Korean	Caucasian
Early childhood in North American Continent				
Total n	6	6	7	719
n with AP	3	1	0	67
Early childhood in East Asia				
Total n	21	7	19	1
n with AP	14	3	10	0

early childhood in Asia. In our reanalysis we grouped separately those respondents who had designated their ethnicity as Caucasian on the one hand, and Chinese, Japanese, or Korean (hereafter referred to as East Asian) on the other, and we analyzed separately the data from those with early childhood in the U.S. or Canada (hereafter referred to as the North American Continent) on the one hand, and in East Asia on the other. Table I displays the numbers of respondents in each of these groups and subgroups, together with the numbers of those who stated that they possessed AP.

Considering respondents with early childhood in the North American Continent, we noted that there was no significant difference between East Asians and Caucasians in prevalence of AP ( $P > 0.10$ ) (All tests were Fisher exact Probability Tests (two-tailed)). This lack of significance persisted when comparison was made between the East Asians with early childhood in the North American Continent and the other Caucasian respondents; that is, including those with early childhood in Europe, Australia, and elsewhere ( $P > 0.10$ ). However, East Asians with early childhood in East Asia had a significantly higher prevalence of AP than did Caucasians with early childhood in the North American Continent ( $P < 0.0001$ ). Further, this difference was significant for each of the East Asian subgroups taken separately (Asian Chinese vs. North American Caucasians ( $P < 0.0001$ ); Asian Japanese vs. North American Caucasians ( $P = 0.02$ ); Asian Koreans vs. North American Caucasians ( $P < 0.0001$ )). In addition, East Asians with early childhood in East Asia had a significantly higher prevalence of AP than did East Asians with early childhood in the North American Continent ( $P < 0.02$ ).

The question then arises that why the East Asians with early childhood in East Asia showed a higher prevalence of AP than did the other groups. As Gregersen et al. point out, type of early music education might be a factor; however, in comparing respondents with early musical education of the *fixed do* type rather than *moveable do* type (the factor most likely to influence the possession of AP), the authors showed that this could not explain their pattern of results. We have argued elsewhere [Deutsch, 2002; Deutsch et al., 2004, 2006] that

exposure to tone language in infancy, such as Mandarin and Cantonese, can predispose the individual to acquire AP. In tone languages, words take on entirely different meanings depending on the pitches in which they are enunciated [Yip, 2002]. It is interesting to note that in the study of Gregersen et al. [2000], the prevalence of AP was higher as a trend among the Chinese groups than among the Korean or Japanese groups. However, it should also be noted that the Japanese language and certain dialects of the Korean language (specifically those from the Kyengsang and Hamkyeng provinces) are pitch accent languages, in which pitch also plays a role in attributing lexical meaning [Tsujimura, 1996; Sohn, 1999]. Exposure to these languages in infancy could therefore also play a role in creating a predisposition to acquire AP.

In summary, on re-examining the data from Gregersen et al. [2000], we found that, among East Asians with early childhood in the North American Continent, the prevalence of AP did not differ significantly from its prevalence among Caucasians with early childhood in the North American Continent, or among all Caucasian respondents taken together. However, there was a much larger prevalence of AP among East Asians with early childhood in East Asia relative to the other groups. Based on this reanalysis, the conclusion by Gregersen et al. that ethnicity is a predisposing factor in the acquisition of AP is unwarranted; instead their data point to an environmental factor as a strong determinant of the predisposition to acquire AP.

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