Not-So-Cosmic Gender Differences

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Pop culture likens the differences between the sexes to planetary origins other than Earth. It might explain volumes if men are from Mars, but differences between men and women are often more subtle.

Dennis McFadden of the University of Texas at Austin studies one of these subtle, sometimes quiet, sometimes booming, differences between the sexes: Gender differences in the human auditory system.

In his presentation, “The Auditory System as a Window Onto Human Prenatal Development and Sexual Differentiation,” McFadden said that in general, women have somewhat greater hearing sensitivity than men (by about 3 decibels) and are more susceptible to noise exposure at high frequencies. Men are typically a bit better at locating sounds, detecting signals in complex masking tasks, and performing tasks that involve processing slight differences between the ears.

McFadden believes that understanding these differences could lead to a greater understanding of development and sexual differentiation.

“In the same way that prenatal exposure to androgens is believed to alter higher brain structures,” McFadden said, “it may also alter the mechanics of simple, lower level structures like the inner ear.”

HEAR, HEAR
It was difficult to determine when these differences started because children were mistakenly thought to have poorer hearing than adults do. In fact, McFadden said that what was mistaken for poor hearing was actually difficulty in communication, such as with infants, or a shorter attention span.

A more objective measure of hearing sensitivity was needed.

McFadden explained that in the inner ear, the cochlea receives, processes, and analyzes sounds, as well as produces sounds of its own. These sounds can be measured with a miniature microphone placed in the external ear canal. Referred to as *otoacoustic emissions*, these echolike sounds provide a potential objective measure of hearing damage in the inner ear and, conversely, of hearing sensitivity.

McFadden explained that there are two types of otoacoustic emissions. One is known as a click-evoked otoacoustic emission (CEOAE). He said that the “normal-hearing” inner ear produces a highly individualistic sound in response to a weak click presented to the ear.

The other is a spontaneous otoacoustic emission (SOAE). Although our ears are constantly producing these steady tones, said McFadden, we typically do not hear them, presumably due to some form of perceptual habituation. SOEAs remain fairly stable over time, or at least up until the onset of hearing

loss.

McFadden said otoacoustic emissions generally show sex differences similar to those found in hearing sensitivity. Females tend to have more SOAEs and stronger CEOAEs (by 2 or 3 decibels), and these sex differences seem to be present from birth.

In McFadden's and others' studies of twins, females having a male co-twin had otoacoustic emissions that resembled males more than they did other females. McFadden said the possible explanation is prenatal "masculinization" because of hormone exposure. Increased androgen levels due to the presence of a male twin could possibly lead to increased exposure and resulting male characteristics in the female twin.

According to McFadden, women who take oral contraceptives show a shift in the masculine direction in auditory measures. A woman's hearing sensitivity fluctuates throughout the menstrual cycle, decreasing by as much as 5 decibels during menstruation, when relevant hormones are at a minimum.

Homosexual women exhibit "masculinized" auditory systems, with fewer otoacoustic emissions and decreased hearing sensitivity, raising the question of how prenatal androgen exposure might affect mate selection. Conversely, McFadden said homosexual men do not show a feminine shift in hearing. This lack of a parallel shift may actually support other findings that homosexual men often show some physical characteristics of hypermasculinization, characteristics that are formed very early in prenatal development.