In this note, we show that the partial widths for the various two-body decay modes of the γ octet and of the δ decuplet are compatible with the approximate unitary symmetry of strong interactions. In Table I the experimental partial widths for decay into meson plus baryon are summarized. Two of these are used as input variables determining the eightfold-way D and F decay-coupling constants for the γ octet; the remaining five partial widths are calculated after adjustment of a radius of interaction.[5] With the same form factor, the calculation is repeated for the δ decuplet, for which there is a unique invariant coupling to meson plus baryon. In each case, agreement with experiment is excellent, in general to within the accuracy with which the partial widths are known.

Some of the agreement may be due merely to our use of a reasonable form factor. On the other hand, the theoretical result for $\Gamma(\Sigma_\gamma \to \bar{K}N):\Gamma(\Sigma_\gamma \to \pi\Lambda):\Gamma(N_\gamma \to \pi N)$ of about 1:3:16 (compared with the experimental values about 1:4:17) refers to modes of roughly the same momenta. Hence we see that the eightfold way supplies nontrivial coefficients. Moreover, the δ coupling strengths are consistently greater by an order of magnitude than the γ coupling strengths (e.g., $\Gamma(\Sigma_\delta \to \pi\Lambda) \approx 4\Gamma(\Sigma_\gamma \to \pi\Lambda)$, even though the γ mode has three times as much available energy as the δ mode).[6] These considerations preclude any purely kinematical explanation for the agreement between theory and experiment.[7]

Three-body decay modes of baryon resonances are less of a test of the eightfold way than two-body modes because there are many possible forms of symmetrical interaction involving two final-state mesons. However, it is instructive to consider the possible two-body decays of one baryon resonance into another baryon resonance plus a meson (giving, eventually, a three-body mode), e.g., $N_\gamma \to N_\delta\pi$, $\Sigma_\gamma \to \Sigma_\delta\pi$, $\Sigma_\gamma \to \Lambda_\beta\pi$.