**Kämmerling and Schmidt Reply**: In their Comment [1] to our Letter [2], Johnson and Cheng report theoretical values for the dipole matrix elements of the $4d_{5/2}$ photoionization in xenon at 94.5 eV photon energy which are obtained within the RRPA theory. Also Kelly [3] sent us such values calculated within the relaxed RRPA including overlap factors. In both theoretical results the amplitudes were found to be in approximate agreement with the experimental values, but there exists a striking discrepancy for the relative phases. This observation prompted us to reconsider our approach for solving the nonlinear equation system which connects the dipole matrix elements with the observables. A detailed analysis shows that the main problem is the unknown degree of circular polarization of the incident light (Stokes parameter $S_3$). In our approach $S_3$ was handled together with the dipole matrix elements as unknowns. In order to get better insight into the intricate relations between the involved quantities, we now decouple the unknown Stokes parameter $S_3$ from the unknown photoionization quantities by a different procedure: First, the equations for $\sigma$, $\mathcal{A}_{20}$, and $\beta$, which do not depend on $S_3$, are used to express $d_1$, $d_2$, and $d_3$ in terms of the experimental values for $\sigma$, $\mathcal{A}_{20}$, and $\beta$ and two relative phases $\Delta_1-\Delta_2$ and $\Delta_2-\Delta_3$. One is then left with four equations for the coefficients $A_2/A_0$, $B_2/A_0$, $A_4/A_0$, and $B_4/A_0$ which follow from the coincidence experiment and contain the two relative phases and the Stokes parameter $S_3$. These remaining expressions were analyzed in detail and it was found that it is disadvantageous to eliminate $S_3$ from the set of equations and then calculate the photoionization quantities as was done in our former approach. Therefore, solutions for preselected $S_3$ values are discussed. Exhausting the full range of allowed $S_3$ values with $|S_3| \le (1-S_1^2-S_2^2)^{1/2}$, that is, between $S_3=0$ and $S_3=\pm 0.3$, because $S_1=0.957(5)$ and $S_2=0.0$, we then obtain the following set of experimental values for the dipole matrix elements and their relative phases (the nomenclature is adapted to the foregoing Comment):

$$d_1(\epsilon p_{3/2})=0.126(38)\,,$$

$$d_2(\epsilon f_{5/2})=0.125(22)\,,$$

$$d_3(\epsilon f_{7/2})=0.483(62)\,,$$

$$\Delta_1(\epsilon p_{3/2})-\Delta_2(\epsilon f_{5/2})=\pm 0.9(1.2)\,,$$

$$\Delta_2(\epsilon f_{5/2})-\Delta_3(\epsilon f_{7/2})=\pm 0.1(1.2)\,.$$

Within the error bars, our former results are embedded in the data of our new approach. When comparing the new experimental values with the theoretical data from the foregoing Comment one can note the following: First, no disagreement can be stated anymore between experimental and theoretical values for the relative phases. However, the experimental errors are large due to the fully exhausted range allowed for $S_3$. Second, the magnitudes of the experimental matrix elements are still in good agreement with the theoretical prediction. Therefore, by this interplay between theory and experiment a satisfactory situation is achieved. In order to improve the experimental uncertainty for the relative phases, experimental methods which overcome the $S_3$ problem by either increased linear polarization ($S_1 \rightarrow 1$) or measured circular polarization are highly desirable.

B. Kämmerling and V. Schmidt
Fakultät für Physik
Hermann-Herder-Strasse 3
D-7800 Freiburg, Germany

Received 5 June 1992
PACS numbers: 32.80.Fb, 32.80.Hd

[1] W. R. Johnson and K. T. Cheng, preceding Comment, Phys. Rev. Lett. **69**, 1144 (1992).
[2] B. Kämmerling and V. Schmidt, Phys. Rev. Lett. **67**, 1848 (1991).
[3] Z. W. Liu and H. P. Kelly (private communication).