This time the difference for the 0.28 range is 35 electrons, about 32 and the difference in intensities would be about 74%, if oxyg contributions are neglected. Some of the reflections for which th situation occurs are: 220, 620, (10, 2, 0; 862), (660, 822), (10, 6, 0; 86 etc. Let us again look at Table 3 of the authors' paper and ag assuming the measurements to be of the same quality and intens distribution as for $x = 2$, we find

hkl	I_{calc}	I_{obs}	$\sigma(I_{obs})$
220	0.15	0.16	0.10
620	0.01	0.00	0.10
10, 2, 0 / 862	5.43	3.83	3.50
660 / 822	0.78	1.25	1.30
10, 6, 0 / 866	2.87	3.09	2.00

It is seen that for just this group which would be sensitive to t differences, the standard errors are very large indeed.

There is little point in further analysis of the x-ray powder metho I hope I have made the point that most of the reflections are insen tive to a wide difference in the distribution, and the few that a sensitive have large standard errors. It is probable that even t calculated large limits of error are conservative estimates becau of the inclusion in the calculation of the many reflections which a not sensitive to the distribution.

In fact, one may ask why, when the difference in neutron scatteri lengths of Ga and Fe is so much more favorable than that of the atom scattering factors of Ga^{3+} and Fe^{3+}, are the error limits for the neutr and x-ray investigation the same. Yet the R values for the neutr intensities were 1/4 to less than 1/2 those for the x-ray intensities a the average measurement error appears to be lower. In the case the neutron investigation the authors used only data which w not from coincident nonequivalent reflections. Even with the m favorable difference, the sensitivity is, on the average, small nonexistent. Of 25 reflections in their Table 4, there are six which ha contributions only from oxygen atoms: 431, 541, 543, 741, 820, 8 The 800 reflection, the strongest listed, is insensitive to the distri tion because *all* the cations present in the crystal contribute c structively to the intensity. (The agreement between the calcula

and observed values for the 800 is very good too.) The 640 is another strong reflection. It has contributions to the structure amplitude: $16f_c + 16f_d$. For $x = 2.5$ and the limiting compositions (0.77 ± 0.14) 0.63 and 0.91, we would have:

	Y	tetr	sum
$\{Y_3\}[Fe_{1.08}Ga_{0.92}](Fe_{1.42}Ga_{1.58})O_{12}$	12.00	13.28	25.28
$\{Y_3\}[Fe_{1.78}Ga_{0.22}](Fe_{0.72}Ga_{2.28})O_{12}$	12.00	12.48	24.48

The contribution from oxygen will be about 9.5 so the structure amplitudes, neglecting thermal motions, are 34.8 and 34.0, a difference of about 2%, or 4% in intensity. This is one-half the standard error of the measurement, and I emphasize again that this is for the range 0.28 (limits of error) not 0.06 (probable error). Needless to say, if we had done *all* the above on the basis of the 0.06 range, the results would appear to be even less significant.

Concluding remarks

I have included in this paper many pieces of work that we have done over the last five years or so and have not published previously. Some work has been done to check on results of others and to refute some conclusions by others with which I did not agree.

Now that I have finished, it seems that this paper could make a small book, but there are two reasons why it will not be one. First, the more important one is my having been privileged by the invitation to write this paper in honor of Professor G. MENZER, who solved the very important garnet structure. Second, I have been critical (I hope not too harshly) of several papers, and I think that it is infinitely simpler for those criticized to reply, if they so desire, to a journal article than to a book. But I should say that I shall not become engaged in any polemic as a result of this. For those who have been criticized, I should point out that I have also criticized myself in a few places—possibly with greater kindness.

Finally, I wish to express my thanks to all my colleagues, past and present, listed in the references, for their contributions to the garnet work. As to the crystal chemical work in particular, I wish to thank G. P. ESPINOSA for his continued dedication to it and for his contributions to the present paper.