Owczarek, Prellberg, and Brak Reply: In our recent Letter [1] we made a conjecture on the scaling form of the partition function at low temperatures of a single polymer (poor solvent). The canonical model of interest is that of self-avoiding walks (SAW) with nearest-neighbor attraction. We supported this conjecture with some long series for partially directed SAW in two dimensions and have subsequently calculated this form exactly [2]. As has been pointed out in our Letter, and in the preceding Comment [3], this scaling form is *mathematically* similar to forms found elsewhere in the literature including the theory of dense polymers [4]. To set this in context we mention that high temperature polymers are believed to be described by the critical $O(n)$ model, in the limit $n \to 0$, while low temperature polymers are related to the first order line of the tricritical O(0) model. In contrast, dense polymers are believed to be described by the low temperature phase of the critical O(0) model (here the temperature is associated with a different coupling than in the tricritical model). The scaling form conjectured arises as a generic form for low temperatures (first order or condensationlike behavior) [5] and hence the values of γ involved in each case are not *a priori* identical. Moreover, universality cannot be invoked since it has not been shown that there even exists a field theory equivalent in the continuum limit for collapsed, rather than dense, polymers. In the preceding Comment [3] the scaling form of a dense polymer system, which has no interactions, and a single interacting polymer are related in two dimensions. This is certainly intriguing and warrants further study.

The argument connecting dense polymers to collapsed ones is based on the idea that collapsed polymers are internally dense and on the assumption that the surface of the collapsed polymer is smooth, which induces the same value of $\sigma = \frac{1}{2}$. However, even if *on average* the surface is smooth, it is not clear to us that the sum over all configurations will lead to a value of γ at low temperature which is the same as in dense polymers where the surface is constrained to be smooth by the boundary conditions imposed. We point out also that the work on dense polymers was accomplished on the Manhattan lattice. However, it is believed that at the θ point this lattice constraint changes the partition function scaling. For example, the ratio of the open to closed walk partition functions will be different to that of walks on an isotropic lattice (that is, it is believed that $\gamma^D = \frac{9}{7}$ on the square lattice while $\gamma^D = 1$ on the Manhattan lattice). At low temperatures, it might be expected that lattice effects would be even stronger. Recent work [6] on the compact subset of self-avoiding walk configurations [7] also indicates behavior inconsistent with a conjecture identifying dense, compact, and collapsed polymers.

To shed some light on the conjecture we have extended and examined the available series for interacting walks and polygons. We have focused on the ratio of the partition functions and looked for the exponent γ^D. Preliminary analysis indicates a value for γ^D of 0.92 ± 0.09, less than that conjectured in the preceding Comment. Details are to be published elsewhere [8]. We point out also that current studies [9] show even more significant deviation of the results for collapsed polymers from those conjectured for dense ones [10]. Hence, we suggest that this numerical work casts doubt on the connection between dense and collapsed polymers and conclude that this is an exciting open question.

A. L. Owczarek, T. Prellberg, and R. Brak*
Department of Mathematics
The University of Melbourne
Parkville, Victoria 3052, Australia

Received 15 September 1993;
revised manuscript received 17 November 1993
PACS numbers: 61.41.+e, 05.70.Fh, 64.60.Cn

*Electronic address:
aleks,prel,brak@mundoe.maths.mu.oz.au

[1] A. L. Owczarek, T. Prellberg, and R. Brak, Phys. Rev. Lett. **70**, 951 (1993).
[2] A. L. Owczarek, J. Phys. A **26**, L647 (1993).
[3] B. Duplantier, preceding Comment, Phys. Rev. Lett. **71**, 4274 (1993).
[4] B. Duplantier and F. David, J. Stat. Phys. **51**, 327 (1988).
[5] M. E. Fisher, Physica (Utrecht) **3**, 255 (1967).
[6] C. J. Camacho and D. Thirumalai, Phys. Rev. Lett. **71**, 2505 (1993).
[7] T. Schmalz, G. Hite, and D. Klein, J. Phys. A **17**, 445 (1984).
[8] D. Bennett-Wood, R. Brak, A. J. Guttmann, A. L. Owczarek, and T. Prellberg (to be published).
[9] D. Bennett-Wood, A. L. Owczarek, and A. J. Guttmann (to be published). Work in progress on the amplitude ratio described in Eq. (11) of Ref. [10] is yielding a result for collapsed polymers close to half that conjectured for dense polymers.
[10] J. L. Cardy and H. Saleur, J. Phys. A **22**, L601 (1989).