Fig. 18. *I Ching* mandalas realized by the spiral mapping. (a) Type I order. (b) Type II order. (c) Type III order. (d) Type IV order.

initial point, in actual drawings, instead of the forward propagation, a spiral with the counterclockwise rotation is created backward. Applying the spiral mapping technique (see Appendix B) to the sequence of, e.g., Fig. 6(a), one obtains the transition

$$(0, 0) \to (6, 0) \to (6, 1) \to (2, 1) \to (2, 4) \to (-2, 4)$$
$$\to (-2, 1) \to (-6, 1) \to (-6, -2) \to (-4, -2)$$
$$\to (-4, -4) \to (2, -4) \to (2, -3)$$
$$\to \cdots \to (-6, -15) \to (-6, -17) \to (0, -17).$$

Here the adjacent points are joined with a segment line. The spiral pattern realized with this path is shown in Fig. 17(a), along with the other three, Figs. 17(b)–(d), which have been obtained for the data, respectively, in Figs. 6(b)–(d). Eventually, in order to yield a pattern with the four-fold rotation symmetry, the original pattern and its seven copies are superimposed. The final results are exhibited in Fig. 18, in which a variety of configurations are seen. Among them one would recognize the pattern shown in Fig. 18(b) as most entangled, whereas, in striking contrast to this, the one in Fig. 18(d) exhibits the utmost curiosity with its entire shape being far from the typical mandalic geometry such as a circle and a square. On the other hand, the pattern of Fig. 18(c) would be recognizable as the one considerably akin to an ideal form of mandalas, though its outermost contour dents, which appears to resemble a flower bud waiting for blooming. In pronounced contrast to these three, the drawing of

Fig. 18(a), which has been generated from the data of Fig. 6(a), possesses indeed the quality of an authentic mandala as an organic whole, representing a feature in common with a flower being full-blown. In other words, the present pattern could be appreciated as a golden mean between the two extremes (Figs. 18(b) and (d)) mentioned above. Again, we can find an evidence of concluding that the received (Type I) ordering of the sixty-four hexagrams is undoubtedly of most profound significance at least among their permutations currently available.

6. Conclusion

The sequential patterns of the sixty-four hexagrams in the *I Ching* (the Book of Changes) have been analyzed by calculating a divergence between adjacent hexagrams. Geometrically, the divergence is equivalent to the Hamming distance between nodes on a six-dimensional hypercube. Detailed comparisons have been made between the results for the received ordering of the hexagrams and those for other arrangements currently available. Emphasis has been on the finding that the received ordering hides a sophisticated mathematical structure, suggesting at the same time that it would hold great significance as an integral whole of a human archetype. Although the author might simply be playing with a crab on the seashore, he believes that the present paper makes surely a tiny contribution to revealing the secrets of the *I Ching*.