RAMPS AND RHOMBS

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Students of wordplay have long recognized a cornucopia of variant word-set arrangements. Pyramids, half-squares and diamonds have been themes in Word Ways from early issues on. Windmills, hollow diamonds, and hollow-cross forms are among other forms examined in this magazine's pages. My own past forays have tracked such shapes as hollow squares, compass roses, and word lattices.

The present review will concern another word arrangement which can variously be described as "ramps," "leaners," or "steps." Ramps have been largely neglected in past studies. Three simple examples, each containing the word "ROSS," "FAITH," or "ECKLER," will illustrate the concept.

<table>
<thead>
<tr>
<th>Ramp</th>
<th>Basal</th>
<th>Heckler</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSS</td>
<td>BARE</td>
<td>FANTATIC</td>
</tr>
<tr>
<td>FIBER</td>
<td>SORY</td>
<td>MATADOR</td>
</tr>
<tr>
<td>SUMOS</td>
<td>LOONS</td>
<td>RESERED</td>
</tr>
<tr>
<td>MOCHA</td>
<td>FORTS</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. (a) left 5-5 ramp; (b) right 5-5 ramp (rhomb); (c) left 7-4 ramp

Palmer C. Peterson did include four examples of the form in his theme articles, "Presidential Affairs" (May 1972) and "More Stately Forms" (August 1976). His ramps were interspersed among many pyramids, diamonds and half-squares, and were not highlighted. Two of his achievements were:

Peterson's accomplishments required a wide variety of words including initials, rare words, proper names and phrases.

What properties are shared by the five word patterns above? Simply these: each example consists of several words, where each succeeding word is offset from the preceding by a single position. As a result, the columns reading down each contain one or more letters. In the columns of more than one letter, the letters reading down form words.

In the first example, the downward words are RE, OAF, SRS, SEBUM, DEMO, ROC, and SH. (In my present study, unlike Peterson's usage, examples will include only words found in The Official Scrabble Dictionary, 3rd Edition.)

Our preceding examples illustrate that ramps can be categorized by three properties: (a) their offset, either right or left; (b) common length of horizontal words; (c) number of rows. Thus, the preceding examples are "left 5-5," "right 5-5," "left 7-4," "left 9-9," and "right 9-9," respectively.

Geometrically, ramps are parallelograms. A parallelogram whose sides are all equal is called a rhomb (or rhombus). So, any ramp whose horizontal words are the same length as the number of rows is a rhomb. Figures 1 and 2 each contain a left- and a right-offset rhomb.

These descriptors suggest some questions to which the form naturally gives rise:
(a) are some word ramps ambidextrous? That is, can the same word set be both left-offset and right-offset?
(b) can the same set of words form both a ramp and a word square?
In the present introductory article, questions (a) through (d) will be discussed briefly. Questions (e) and (f) will be left for a later article, since they both clearly require a larger word source than the OSPD.

First, ambidextrous word ramps are comparatively common, even restricting ourselves to words in the OSPD. One such example is:

\[
\begin{array}{ll}
\text{FAKED} & \text{FAKED} \\
\text{DIGIT} & \text{DIGIT} \\
\text{DARED} & \text{DARED} \\
\text{DELED} & \text{DELED} \\
\text{RAWER} & \text{RAWER} \\
\end{array}
\]

Figure 3. Ambidextrous rhomb of length 5. The same five words constitute a left-offset rhomb and a right-offset rhomb.

Secondly, "mixed-form rhombs" are common. I found some 2,055 rhombs of length 4 which were also word squares. These solutions used only OSPD words. For length-5 rhombs, only 26 solutions were found with OSPD entries. All were right-offsets: any hypothetical left-offset rhomb-cum-word-square would use only palindromes for its descending rhombic entries. The following examples are two rhombs which double as word squares:

\[
\begin{array}{lll}
\text{BABY} & \text{BABY} & \text{ACHES} \\
\text{ARIA} & \text{ARIA} & \text{CRUET} \\
\text{BIER} & \text{BIER} & \text{HURRY} \\
\text{YARD} & \text{YARD} & \text{EERIE} \\
\end{array}
\]

Figure 4. The same word set can form both a word square and a rhomb.

Thirdly, even given the relative paucity of longer words in the OSPD, left-offset 9-4 ramps restricted to the OSPD are exceedingly common. Left-offset 10-4 ramps are relatively rare. For 5-row ramps, the corresponding lengths are reduced: 8-5 ramps are common, but 9-5 ramps are rare. One example of each is:

\[
\begin{array}{ll}
\text{AARDVARKS} & \text{COMPRESSED} \\
\text{HIRAGANAS} & \text{MALEDICTED} \\
\text{MARINATED} & \text{DEADPANNED} \\
\text{GANGRENES} & \text{APOSTASIES} \\
\end{array}
\]

\[
\begin{array}{ll}
\text{BAALISMS} & \text{ABELMOSKS} \\
\text{ABASHING} & \text{ALEURONES} \\
\text{ACTINIAS} & \text{MARINATED} \\
\text{SLEEPIER} & \text{LIBERATED} \\
\text{ESSENCES} & \text{DISSEATED} \\
\end{array}
\]

Figure 5. Some 4-and 5-row left-offset ramps with longer horizontal words.

Fourthly, "long" ramps can be constructed, exceeding any specified length. For example, the left 4-rhomb consisting of the words DENS, ROTA, BUMP and DIES, can be cobbled together to make a ramp of length 8 or 12, or any multiple of 4, as in Figure 6. Hence, in determining rhombs with maximal number of rows, a further restriction is needed: only ramps with no repeated horizontal words should be allowed.
Figure 6. An 8- and a 12-row ramp creating by splicing together rhombs of length 4.

Clearly ramps of infinite length can be constructed in the way illustrated in Figure 6. However, ramps of infinite length are even easier to construct. Every word gives rise to an infinite right-offset ramp. Every word whose inverse is also a word gives rise to an infinite left-offset ramp:

```
  DRAW S  DRAW S  DRAW S
  F A I T H  F A I T H  F A I T H
```

Figure 5. Left- and right-offset ramps with infinite rows are trivial to construct.

The previous paragraphs are intended as a brief overview of a neglected topic. These examples will naturally suggest myriad further lines of inquiry to other readers. Additionally, rhombs of length four or five are relatively easy to devise by hand. Their construction can be a pleasant way to while away tedious business meetings or telephone calls!