ANAGRAMMING ONE POEM INTO ANOTHER

A. ROSS ECKLER
Morristown, New Jersey

In the February 1969 issue of Word Ways, Howard Bergerson dissected a poem into an alphabetical list of 478 words and invited readers to construct a new poem out of this raw material. One reader -- J.A. Lindon of Weybridge, Surrey, England -- took up the challenge, and in the next issue of Word Ways the original poem and the reconstruction were presented simultaneously.

It is interesting to examine these two poems in detail, noting their points of similarity and their differences. Is the reconstructor inevitably forced to create much the same poem as the original, or is he likely to come up with an essentially independent creation? In other words, to what extent is the content of a poem dictated by the stockpile of words which it uses?

To assess the similarity of two poems is decidedly a difficult and a subjective task. To what extent have Bergerson and Lindon conveyed the same message to the reader? The first two lines of their respective poems possess a remarkable similarity, introducing the concepts of darkness, snow, motion and trees:

Bergerson:
Blow blast. Whirl through the dusk, snow,
Downward swirling, then into the trees go.

Lindon:
Night sends me this whirl of snow,
Under the low trees the watery glow.

A cursory examination of the poems reveals that both authors associated the adjective lighted with the noun candle (Bergerson does it twice), and the adjective heartless with the noun men. Bergerson speaks of the wind's lonely hilt, and Lindon refers to the wind's lonely music. However, these are such natural associations that one should not be particularly surprised by the coincidence. On the other hand, the adjective human, appearing twice in the alphabetical list, ought to have a rather limited set of nouns to associate with (few authors would consider phrases such as human quilt or human heaven). Nevertheless, Bergerson comes up with human fate and human beings,
but Lindon has human mind and human wrong. Similarly, Berger-
son uses charred knot and snows melt, but Lindon prefers charred
wood and icicles melt. One begins to wonder: is it possible that
the two poems are really independent of each other, and the few co-
icidences to be ascribed to chance alone? (After all, when one
throws a pair of dice, one expects to get a matching pair in one-sixth
of the cases.)

This question can be settled only by taking a much larger sample
of the words in the poems. Fortunately, Bergerson has made it rel-
etively easy to compare the poems by insisting upon the condition
that the reconstruction have the same number of words in each line
and the same stanzas as the original. One measure of similarity is
the following: if word A and word B are near each other in the orig-
inal, one might expect word A and word B to be near each other in
the reconstruction as well (although they could both occur early in
one poem and late in the other). In other words, one can associate
with each word a pair of numbers -- the line in which the word occurs
in Bergerson's original, and the line in which it occurs in Lindon's
reconstruction. The words can then be plotted as points on a 57-by-57
grid (the number of lines in each poem); if the two poems are similar,
one would expect clusters of such points to appear.

In order to make such plotting unambiguous, one must use words
that appear exactly once in each poem. 159 of these words are listed
below, together with their locations in the original and the recon-
structed poems:

ache (6,19), ah (19,21), always (40,11), aspirations (56,7),
bakes (15,48), bark (12,49), battle (32,17), beings (42,12),
bland (10,7), blast (1,7), blazed (40,51), blow (1,43),
bread (16,30), build (6,35), burnt (16,47), charred (14,29),
chimney (15,51), clean (15,49), coal-oil (13,48), coat (4,33),
comforted (25,50), couch (22,16), crude (16,48), crystal (9,12),
darkness (33,9), days (49,55), death (45,52), determination (32,26),
die (43,4), doubt (44,37), downward (2,22), driving (3,5),
eat (19,30), eaves (4,7), elbow (23,15), eternity (57,47),
excelled (48,11), exists (37,32), falls (14,34), fed (25,12),
feel (50,55), felt (50,49), few (24,18), filled (9,34), finish (21,31),
fire (11,35), first (21,22), flies (51,10), floss (9,9),
found (28,12), forgiven (54,19), forever-receding (39,13),
future (52,46), gloaming (3,12), glow (5,2), go (2,42),
gods (54,20), goes (17,30), grates (14,49), grow (49,6),
hand (23,15), hardship (29,52), head (22,15), heartless (30,18),
heaven (56,20), hold (43,32), hunger (17,57), hurry (5,29),
icicles (4,50), ideal (48,23), imaginary (39,23), infinity (53,13),
kaleidoscope (51,9), knot (14,25), late (47,33), least (43,28),

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light on 1 or less 
contain less (44,18), lesser (17,27), lilt (27,16), listening (27,16), loaf (16,49), lonely (27,6), lost (27,23), low (11,2), lying (22,15), magnanimous (35,52), meant (31,37), melt (49,50), memory (46,9), men (30,18), months (49,33), moving (40,53), mud (12,53); musk (10,10), mystic (40,12), never (47,14), night (40,1), nowhere (37,20), ocean (53,44), old (48,33), oven (15,48), own (38,56), pain (29,33), pains (42,27), partly (55,26), pitch (12,44), plunge (53,22), quilt (23,15), rain (6,13), reach (56,27), remember (24,8), resolute (32,11), riving (7,6), rose (18,10), sends (10,1), seeings (45,11), short (3,26), silence (26,12), sinks (13,15), sit (19,54), slightly (18,50), slow (6,25), snows (49,43), something (44,23), sooner (20,34), soundless (3,10), split (12,7), stand (43,34), stove (14,47), strain (34,34), swirling (2,43), take (57,32), takes (16,47), theme (35,22), thoughts (45,4), thud (14,23), thy (3,22), time (47,51), tinsel (4,9), tragedy (46,38), trees (2,2), universe (37,17), veins (12,25), venal (30,21), versed (26,21), walls (10,5), watch (22,13), weaves (8,8), wet (11,53), whirl (1,1), white (12,39), window-pane (5,54), wind's (27,6), winter (7,34), women (30,56), wood (11,29), worlds (52,22), wrong (55,18), yellow (22,40)

What clusters of points actually occur? There are six word-pairs and one word-triple, summarized in the table below:

<table>
<thead>
<tr>
<th>Word Group</th>
<th>Line on which the Word Group is Located in Original Poem</th>
<th>Line on which the Word Group is Located in Reconstructed Poem</th>
</tr>
</thead>
<tbody>
<tr>
<td>heartless, men</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>lonely, wind's</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>lilt, listening</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>takes, burnt</td>
<td>16</td>
<td>47</td>
</tr>
<tr>
<td>bakes, oven</td>
<td>15</td>
<td>48</td>
</tr>
<tr>
<td>head, lying</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>elbow, hand, quilt</td>
<td>23</td>
<td>15</td>
</tr>
</tbody>
</table>

If all 159 words are plotted on a 57-by-57 grid, one cluster of points near (15,50) immediately attracts the eye: crude, loaf, takes, burnt, bakes, oven, clean, chimney, stove, grates, coal-oil and bark. Obviously, these words have a strong relationship to each other which both authors may have exploited.

Are these clusters of points evidence in favor of the hypothesis that the two poems are, in some sense, similar? Or is it possible that the poems are completely independent arrangements of words, and the observed clusters no more meaningful than the groupings one observes of raindrops striking the pavement at the onset of a shower? To shed
light on this question, each poem was divided into 15 sections of more 
or less equal size, each section (with one exception) being entirely 
contained within one of the original stanzas. The 159 words were then 
classified according to the section of each poem they were located in; 
for example, window-pane, located on line 5 in the original and on line 
54 in the reconstruction, was assigned to section 1 in the original and 
section 15 in the reconstruction. In short, each word was placed in 
one out of 15 x 15, or 225, possible classes corresponding to its loca-
tion in the two poems. The number of classes containing 0, 1, 2, . . . 
words was then totalled up; the results are given in column two of the 
table below.

If the 159 words were independently arranged in the two poems (that 
is, if the relative positions of any two words in one poem has no effect 
on their relative positions in the other poem), statisticians can calcul-
ate (using the Poisson distribution) the typical, or average, number 
of classes that will contain 0, 1, 2, . . . words. These average num-
bers are given in column three of the table below, and should be com-
pared with the observed numbers in column two:

<table>
<thead>
<tr>
<th>Number of Words in Class</th>
<th>Observed Number of Classes</th>
<th>Average Number of Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>119</td>
<td>110.9</td>
</tr>
<tr>
<td>1</td>
<td>74</td>
<td>78.5</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>27.8</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>6.52</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1.16</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.166</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>0.019</td>
</tr>
</tbody>
</table>

The most striking disparity between columns two and three is contained
in the seventh row. There, one sees that the actual number of classes
containing six words is over 200 times larger than it should be if the 159
words were independently arranged in the poems! Rather than believe
that Lady Luck has played such a monstrous trick on us, we prefer to
believe that this is evidence of similarity between the poems -- that
is, that both authors made a conscious effort to use the words (bakes,
oven, clean, stove, grates, coal-oil) in close association, and the
words (quilt, hand, elbow, watch, head, lying) in close association.
Note that one has already met seven of these words in an earlier table.

However, there is a further conclusion to be drawn. One concedes
that the authors had very similar ideas about the use of these twelve
words, but one must also conclude that, as far as the remaining 147
words are concerned, the authors bear no relation at all to each other.
More precisely, the knowledge of how one author arranged these 147 words is of no help in telling us how the second author arranged them.

COMMENT (Howard W. Bergerson): The thing that surprises me most about this interesting statistical analysis is the fact that both poems have in common one quite palpable feature which appears to slip through the statistical net. Notice that the second stanzas of the two poems have scarcely any significant words in common. By contrast, the first stanzas have all of these in common: sends, whirl, snow, trees, watery, glow, dusk, wall, driving, soul, riving, bland, blast, eaves, only, failing, weaves, tinsel, floss, soundless, musk.

What I am wondering is: Is there any approach within the existing repertoire of the statistician which might enable him to assess the probability that the second author would select from the stock-pile so many of the same words to "set the stage" (which is what the first stanza does) that the first author used?

About a year ago, Dr. E. N. Gilbert said, "I was struck by the correspondence of mood between the two poems." This must be the most convincing single demonstration of the influence of vocabulary on mood.

Assuming that the alphabetical lists induces a mood from the outset, and that this mood can be heightened by any one of many permutations of the words into a connected poem, one wonders just how different the moods of any two such permutations could be. Given an initial mood induced by the list, what is the probability that the mood will always direct certain words into certain ordained positions in the opening stanza of the poem?

REPLY (Author): Mr. Bergerson's observation is indeed confirmed by a statistical analysis similar to the one given above. Suppose that one divides the poem into 6 equal sections instead of 15, so that the first section is equivalent to the first stanza. If the two poems are random with respect to each other, about 6 out of the 159 words should appear in both of the first stanzas. One actually finds that 15 of these words appear in both of the first stanzas. Under the randomness hypothesis, the probability of 15 or more matched words is only .0013; I prefer to believe instead that some common factor, such as mood induced by vocabulary, is operating upon the two authors.