REFLECTIVE WORD NETWORKS

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In the February 1991 Kickshaws, Dave Morice introduced the concept of the palindrome ladder, one which starts with a word and travels to its reversal changing one letter at a time passing through a palindrome at its central rung. For example:

WORD-WARD-PARD-PART-MART-DART-DORT-TORT
TOOT
DROW-DRAW-DRAP-TRAM-TRAD-TROD-TROT

Although Morice challenged the reader to form the longest possible ladder without repeating words, I prefer to eliminate extraneous steps such as MART and TRAM and find the shortest palindrome ladder between two reversals.

The palindrome ladder can be generalized to the concept of a reflective word network. To fix ideas, consider four-letter words. To what extent can reversal-pairs such as TIME-EMIT or STEP-PETS and palindromes such as DEED or POOP be combined into a connected network? Amplifying my collection of Websterian words with suitable OED reversal-pairs, I easily amassed a collection of 379 reversal-pairs and 15 palindromes (ABBA, ANNA, BOOB, DEED, ECCE, ESSE, KEEK, KOOK, NAAN, NOON, OTTO, PEEP, POOP, SEES, TOOT), about 90 per cent of which can be assembled into a single network of Byzantine complexity. I illustrate below a small fragment, showing half of the 20-step span of the network from DACE to ECAD through PEEP or SEES (as well as the longer paths through NOON, POOP, TOOT, BOOB, KEEK, DEED, and ESSE):

NOON
NOOP-POOP
NOOS
NOWS
POWS
POLS-PAWS-MAWS-MOWS-MOOS-MOOD-BOOD-BOOB
PALP
DACE-DAGE-RAGE-RAGA-SAGA-SALA-SALP
PEEP
KEEP-KEEK
SAIP-SEIP-SEEP
SEES
SEED
SEYD
SEYS-SESE-EESE-ESSE

Looking for a more easily-diagrammable reflective word network, I restricted myself to words in the Official Scrabble Players Dictionary, yielding only 141 reversal-pairs and 12 palindromes (no ABBA, ESSE, or NAAN). The largest connected network, containing 110 words and including the palindromes DEED, SEES, PEEP, and
KEEK, is still too complex to diagram clearly because of the density of the network of the 47 SCVC-CVCS reversal-pairs (C stands for consonant, V for vowel). However, a sense of the network is given below. Only half of the network need be diagrammed because of the obvious symmetry around the palindromes (given in boldface). Below STEP, a selection of ladders leading to the most distant words is given. The span of the network is 18, from SLIM to MILS via the palindrome SEES.

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SEES
KEEL==REEL==SEEL DEEM==TEEM
PEEP==KEEP=========SEEP==DEEP==========NEEP
KEEK

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<th>STEP</th>
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STEP--STEW-STOW-SNOW--SNOT--SNIT--SLIT--SLIM
STEP--STOP--SWOP--SWOT--SNOT--SNIT--SLIT--SLIM
STEP--STOP--STOB--STUB--SNUB--SNUG--SMUG

plug scam seam slab slag slap slit slop smug snap snow snib snip snit snot snow snub snug span spar spas spat spay spik spin spit spot stab star staw stow stob stop stub stum stun swam swap swat swed swoop swot
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The second-largest connected network has 38 words including the palindromes TOOT and POOP. It differs from the first network in that there are non-palindromic crossings between reversal-pairs as well as palindromic ones. To illustrate this phenomenon, the entire network is shown with each reversal-pair appearing once in capitals and once in lower case:

```
BRAG
BRAD--TRAD
garb
darb--dart
TROH--TRAP
darb--dart
TROW--TRAP
darb--dart
DOOR--DOOM
TROT
port--part

|      |
|      |

door--room

| tool--TOOT--tort
| tool--TOOT--tort

moor--mood--moo--moot

HOOP

pool--pooh--POOP
```

The span of the network is 16, from BRAG to GARB via TOOT.

All other networks are very small, and do not include their own palindromes or reversal-pairs: SNED--SLED--FLED, GRUB--DRUB--DRIB--
DRAB-DRAY-DRAW, TANG-RANG-RANK, RAJA-RAGA-SAGA, and LAIR-LAID-LAUD-LEUD.

Five-letter words generate far sparser reflective word networks. The following words can all be found in either Webster's Second or Third Editions:

TIMID-TIMED-TIMER--TILER-TELER-SELER-SEDER
SEDES

dimit-demit-remit--relit-relet-reles-redes

LEPER-LEVER-LEVEL-revel-repel

SAGOS-SAGAS-sogas

KNUTS=KNITS=KNATS-KNAPS

GNATS SNAPS-STAPS-STOPS

GNAWS-SNAWS-StAWS-STOWS

STOTS

swang-swans-swats-swots

stang spans-spats-spots

stunk=stink=stank-spank

DEFER-REFER-refed

SOLON-SOLOS-nolos

OBoy!

 Morice

Sometimes Life Is L!

And Sometimes It's a Cup of T!