In an earlier article, I showed how many of the classic word ladders proposed by Lewis Carroll could be shortened with the aid of the computer. In this article, I use the computer to construct many new word ladders having various characteristics.

Minimum-length Word Ladders

Minimum-length, or ideal, word ladders change N letters in only N steps. Many minimum-length ladders can be constructed out of 4-letter words. With 5-letter words, one can find a ladder between almost any word-pair; some are minimum-length, but usually more than 5 steps are needed. With 6-letter words, a ladder between a pair of words chosen at random is usually impossible, but there are plenty of good pairs to be found. The computer can find minimum-length ladders between 6-letter words, but it is often difficult to find ones with meaningful relationships between the end words.

FOOT-fort-ford-fard-YARD
FOOL-ool-noll-null-MILE
HOOS-hogs-lags-mull-LARD
HERE-hern-tern-teen-THEN
HAIR-hail-ball-ball-BALD
TIGER-tamer-tames-lames-LAMBS
LAMBS-lane-bane-bones-BONES
SONNY-boney-bones-tones-times-TIMES
FUNKY-funks-dunks-dunes-dynes-DYKES
KINKY-Iinky-l iney-liner-l iver-LIVER
MISSUS-misses-masses-massed-massest-NANTED
CURIO-curies-curies-curies-curies-ruled-NANTED
WHACKY-whacks-shucks-shucks-stalls-stales-STATES
BRAZEN-brazes-crazes-crozes-chores-CHORUS
PASTAS-pastes-paste-poster-potter-potter-MOTHER
COOPER-conger-conner-tonner-tonnes-TEENES
BLOODY-bloods-broods-broads-brads-DBRADS
BLONDE-blonds-blinds-links-clicks-clicks-CHICKS
ROCKET-rocker-hocker-hanker-hanger-HANGAR
SHIVRS-shorts-shirts-shorts-whisks-whisky
CHARAS-ches-chores-chores-chokes-choked-cooked-HOOKED
STORED-stores-stores-shares-shares-CHARAS

In the fourth 6-letter example, chorus could be replaced with the more apt whores, but the ladder is no longer ideal.
Joining Transposals By Word Ladders

In the following, the end words are transposals of each other; in all but the last, every letter must be changed. Note that several of the end words are reversals of each other. I have not seen any other examples of these kinds of ladders.

RAJA—raga—rags—rims—aims—alas—alar—AJAR
CHEAT—cleat—bleat—blest—beast—leash—leach—TEACH
ESTER—eater—tater—tases—tams—tems—tease—TEASE
LARGE—merge—merge—venge—venae—venal—renal—REGAL
TRIPS—tripe—trine—shine—spine—spire—SPIRIT
STOUT—about—short—shots—soots—toots—TOOT
PORTS—puts—pours—sours—spurs—spurt—SPUR
KNAPS—snaps—swaps—swans—spans—SPAN

REFINS—rewins—rewing—rewing—serins—series—serves—selves—soaves—staves
RECAPS—remaps—remans—remend—remend—resend—reseed—rested—seared
—spared—spaced—SPACER
REPAID—repand—remand—remend—resent—resend—reseed—rested—raster—rasper—rapper—dapper
—draper—DIAPER

Assorted Word Ladders

Here are a few ODDS and ENDS, including a selection of 7-letter word ladders. A few of these were suggested by the books mentioned in the previous article. Purple-yellow is a good sequel to black-white. I like bandit—gallows because it takes 13 steps. I do not know of any 7-letter ladders besides those given here. I did not try to find 8-letter ones.

ODDS—adds—ands—ENDS
WOOL—wood—worn—warn—YARN
TOWN—tows—tots—pots—pits—pity—CITY
BEAU—bead—lead—load—lord—lore—LOVE
PAPER—taper—taped—TYPE
CARDS—cards—cells—dells—deals—DEALT
GAMBA—gamb—games—gales—galls—galls—GELLO
BREAD—break—bleak—blest—blast—boast—BOAST
CARVE—carse—corse—horse—house—rouse—ROAST
CHEEK—check—chink—chins—coins—coals—JOOLS
SKIRT—skint—skins—sains—waists—waits—WANTS
WHALE—while—whine—chines—coins—cons—cones—BONES
TOXIC—toxic—boric—basic—basis—bats—baste—WASTE
LAGER—layer—sayer—shyer—shoe—shoes—shots—shoot—STOUT
PUSSY—pussy—puree—pureter—paler—paler—TIGER
CUTSY—cutty—cuter—cliter—cliter—cliter—CLITER
SEVEN—seven—seven—seven—seven—sinks—sight—SIGHT
DRUNK—drank—brank—brans—brats—boats—bores—sorer—SOBER
BANJO—banc—bunco—bunk—bunks—punks—pins—pinas—SIMAR
THREE—threw—shred—sired—sired—tired—tires—tires—SIXTY
ANGEL—anger—agger—eager—eater—dater—dates—dames—DAMON
BLIND—blink—clink—clones—cions—lions—lims—inks—sinks—SIGHT
DISHES—dished—dashed—WASHED
All of the above are the shortest ladders (least links in Carroll's nomenclature) between the end words. When the computer found alternate paths of the same length, I usually chose links that had some association with the end words; cheek-chins-jowls is an example. For a final sample, chaos-order is a great word association, but the shortest ladder uses some uncommon words. Here it is, followed by longer ones using more familiar words.

A Sequence Of Word Ladders

Lewis Carroll converted wheat to bread, and flour to bread. This suggested to me the problem of converting wheat to flour to dough to bread, a much more difficult problem, since dough and toast have a different vowel-consonant pattern than the three words Car-
roll considered. Here are two solutions to the problem; I suspect that improvements are possible.


Stepwords

In this section, we require that every other link be a transposional. There are four variations, depending on how we define which type of link to use at each end; I illustrate the choices for isle-inch. If one exhibits transposal horizontally and letter-changes vertically, the reason behind the term stepword is evident. Unfortunately, too few words allow transposal for us to find many interesting ladders with transposals at both ends.

Here are some Carroll word ladders in stepword form.

And here are a few of my own inventions.

This rough
toast
Car-