

# PERMED ENDS

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The readers of Word Ways will be familiar with words whose first few letters are repeated, in the same order, at the end of the word. John Ferguson of Maryland called these *Heads 'n Tails* (Feb 1970, p 48). Examples of the genre include ICELANDIC, TORMENTOR, OUTSHOUTS and UNDERGROUNDER. By way of contrast, the first few letters might be repeated at the end of the word in reverse order, as in DETONATED and SELAGINELLALES (dfpf). The current investigation explores a third way in which the letters at the beginning of a word are repeated at the end of the word, namely in any permutation other than the same, or reverse, order. SIKORSKI and AESTIVATES are examples.

## Permutations

Listed below are examples of words whose first 3, 4 and 5 letters are repeated as the last 3, 4 and 5 letters of the words. If these letters are represented by numbers, then an initial 3-letter group 123 offers the 4 permutations 132, 213, 231 and 312 as possible endings (= 6 permutations less 123 and 321). Similarly, an initial 4-letter group 1234 offers 22 possible endings (24 less 1234 and 4321), whilst a 5-letter group 12345 offers 118 possible endings (120 less 12345 and 54321). For each permutation, one example is given for as many different letter groups as possible, irrespective of word length. So how many different letter groups are there in total? Consider a 3-letter group beginning with the letter A. The second letter can be any one of 25 and the third letter any one of 24. Thus there are  $25 \times 24 = 600$  different 3-letter groups beginning with A, excluding those with repeated letters which I do not include. Implicitly, there must be  $600 \times 26$  (letters of the alphabet) = 15,600 such 3-letter groups in total. Split-word transposals, such as HORSESHOER (cham), in which the letters of the first half of the word are repeated in the second half, are not allowed; there must be at least one letter separating the two groups of letters. Thus HORSESHOERS is allowed. Tautonyms, such as HUSH-HUSH, are not included.

All the examples are solid or hyphenated words; phrases are not included. The words are listed in alphabetical order. Unreferenced words can be found in the OED Second Edition as head words, variant forms and text words including citations. Non-OED references are listed at the end.

## Three-letter Permutations

### 123---132

ACROSARC (web2), ASHERAHS, BARABRA, BELIEVABLE, BRAKEBAR, CATALECTA (web2), CLASSICAL, CLORAMFENICOL (sted), CREANCER, DREADER, GAMMANUSIGMA (ww90175), HUTUKHTU (web2), HJORTSHOJ (tig), IANTHINA, IDENTIFIED, IGNORING, INOCULATION,



KHANKAH (web2), KNIPPERKIN, KNOCK-ON, KREEKER, LEILLELLIE, LEVER-VALVE, NECROMANCE, NYCROMANCY (biw), OLIVE-OIL, PREPPER, PSEUDOSCOPES, REBARBE, REGORGE, RESURSE, SIKORSKI, STERN-SET, TEISTIE, TREATER, TROUMPETOR, TRUDITUR, TYRANTRY, UERDURE

**123---213**

ADELEIDAE (web2), ATLANTAL, BIAJAIBA (pul), CATARACT, CIATICA, CYATYCA, DIAPSIDA, DIETHYLTOLUAMIDE (sted), DISCOIDS, DYSCOMFYDS, ENDEIGNED, ENSHRINES, FATHERCRAFT (web2), FIELD-WIFE, GAS-BAGS, GREEN-CHARGE, INCUDO-TYMPANIC, INSIGNIS, INTERKNIT, MASTOGRAMS (dor), MESEEMS, MISAIMS, MUSEUMS, NASORAEANS (cham), NATURANT, NIGGLING, NUSAUNS, PIEWIPE, PISTOL-WHIPS, PUSH-UPS, RAIYATWARI (cham), RESCUERS, RETROVERT, ROMANIFORM (web2), RUSH-HOURS, SETTEST, SIMPLISM, SITARIST, STANITSA, TAENIATE, TIEMANNITE, TOSSPOTS, TRIMURTI, WOLF-GROWL

**123---231**

AEROCAMERA (web2), AMINOACIDEMIA (web2), CARBON-ARC, CHIROGRAPHOSOPHIC, DAIRYMAID, DANCE-BAND, DARTBOARD, DEADHEAD, DELAFIELD, DIABOLIAD, DIRT-BIRD, DRAVOGRAD (tig), DREAD-DESIRED, EAGLE-PLUMAGE, EARTHENWARE, ECHELICHE, ENCUMBRANCE, ENGRANGE, ENSCONSE, ENTENTE, ENZENZE (bt), EQUIVOQUE, FEATHERLEAF (web2), GANTANG (web2), GENSENG (web2), GINGERING, GUNNUNG (web2), HACKNEY-COACH, HATHATH (web2), HIGHLEIGH (Devon), HOCHPOCH, HYPOGRYPH, KUCKUCK (cham), LEAF-MEAL, MESODESM, MISANTHROPISM, MORIFORM, NIAGARIAN, NOUMERACIOUN, PARACARP, PHILOSOPHYSHIP, PLATE-LAP, PRAISE-TRAP, PRE-PREP, RAIL-CHAIR, READY-TO-WEAR, SACROILIACS (web2), SAGBAGS, SAMSAMS, SAHIBAHS, SALICIONALS, SCHOLARCHS, SEMSEMS, SENTENS, SERVERS, SHANACHAS (web2), SHEATHES, SILKTAILS, SIMSIMS (web2), SINIGRINS (web2), SKATIKAS (web2), SLEPLES, SONATIONS (web2), SOUKOUS (cham), SOWLOWS (daw), SPECTROSCOPES, SPHYGMOGRAPHS (web2), STELLATES, STICTIS, STOMATOS (cham), STULTUS (cham), SUBSHRUBS, SUPERGROUPS, TANTNEQUANT, TENEMENT, TESTIEST (web2), THOROUGH-SHOT, TORCHWORT, TRADE-RAT, VLADISLAV (tig), WLADYSLAW (Gomulka)

**123---312**

ANIDIAN (web2), ALCHEMICAL, ALTAR-FRONTAL, ASITIAS (web2), CENTENCE, CHOLEDOCH, DEICIDE, DERWARDE, EAST-SEA, EDIFIED, ELIMIEL (cad), ENTERPARTEN, ESTIMATES, HERBURHE, HYPERTROPHY, ICHTHIC (cham), ICOSANOIC (sted), INSEISIN, INTESTIN, ISTHMITIS, KASALIYSKA (tig), KAZATZKA (cham), KOSCIUSKO (tig), LEAF-SCALE, LEDGE-HANDLE, LYSIGENOUSLY, MYOTOMY, OSTINATOS, OUGADOUGOU (web3), OWL-SWALLOW, PEARSHAPE, PERLETHORPE (Nottinghamshire), PHARMACOGRAPH (sted), PHOTOTROPH, REAWARE (web2), REINSPIRE, REOPHORE, REULURE, SCILFISC, SCYTTYSC, SENTENSE, SHABASH, SHESHBESH, SHIPPISH, SMITHISM, STANDFAST, STERNEST, STIGMATIST, STOCK-FROST, TEAMMATE, TEINEITE, TENENTE, TERRE-VERTE, THERTTIETH, THORN-MOTH, THREEPENNYWORTH, THULUTH (web2)

**Four-letter Permutations**

Examples were found for each of the 22 possible permutations.

**1234---1243**

DISEMBODIES, INDETERMINED, NIETZSCHEANITE, SIGNALISING, STREP-TASTER

**1234---1324**

BRIDEWELL-BIRD, INOSCULATIONS, NECROMANCER, SENSLESNES

**1234---1342**

ANTI-LATIN (web2), DREAD-DEAR, RECHERCHE



**1234---1423**

AESTIVATES, INSORPTIONS (sted), INTERSILIENT, NESCIENCES (web2), PAN-EUROPEAN, PREINSPIRE (web2), RESIDENTIARIES, TONIFICATION

**1234---1432**

ASELLARIALES (opc), GYNOMEROGONY (sted), MENISPERMINE, METASTIGMATE (web2)

**1234---2134**

ANTENNATE (web2), AURE-QUARE, AWRTHWART, CATERACTE, INSTITUTIONIST, NIERSTEINER

**1234---2143**

MENAGE-MAN, NOSE-BONES, PRELATE-PURPLE, RUDE-FEATURED

**1234---2314**

ENTREOUNTER, GIN-SLINGS, MARSHAL-AT-ARMS

**1234---2341**

CUBI-CUBIC, EPISCOPISE, ERITHRITE, HEAT-DEATH, HINCH-PINCH, HOTCHPOTCH, KANIKANIK, RIVER-DRIVER, SANDILANDS (Lincolnshire), SENTIMENTS, SINGLINGS, SLAP-SLAPS (web2), STEREOMETERS, TRANSMIGRANT

**1234---2413**

ENSCONCES, INSTANTIS (cham), RHEOPHORE

**1234---2431**

DIESELISED, SIGNET-RINGS, STREETERS

**1234---3124**

ICOSANOICS (sted), INTESTINE, PERSTIRPES, PORTER-POT, READY-PREPARED, TEAR-WATER, TENDER-SLANTED

**1234---3142**

ENDASPIDEAN, IDLE-BELLIED, INCOURCION, INTONATION

**1234---3214**

NORETHINDRONE, RED-SANDERS, VITELLIRUPTIVE (sted)

**1234---3241**

DOLIOLOID, FIRE-BRIEF, KRASNOYARSK (tig), SCIATICAS, SNIGGERINGS

**1234---3412**

ANTICHRISTIAN, DEHYDRORETINALDEHYDE (sted), ESOPHAGOSCOPES (sted), INTERTEIN, PHRASEOGRAPH

**1234---3421**

DEINCLINED, DIPHOSPHID (pul), NORTHALLERTON (North Yorkshire), NOTIFICATION, REALITY-REVEALER, RENT-HUNTER, SERICTERIES, SKINNYMALINKS, STRATOCRATS

**1234---4123**

BLEACHABLE (web2), CALISTHENICAL, DESUETUDES (web2), FENOPROFEN (sted), ICE-PRECIPICE, MESOSOMES, MICROTHERMIC (web2), OVER-DROVE

**1234---4132**

DREAM-READER, GRENZGANGER (cham), TRANSPLANTAR, TREACLE-WATER

**1234---4213**

NIGHT-WATCHING

**1234---4231**

ANTEPAGMENTA, BRACKET-CRAB, ENCUMBRAUNCE, ENDOMOTORSONDE (sted), GLASS-SLAG, SANITARIANS, SHLEMIEHLS, SONIFICATIONS (sted), STEARATES

**1234---4312**

ANTI-PURITAN, HYPOTROPHY, ICHTHYORNITHIC, ICTEROGENETIC, MYOTENOTOMY (web2), PHARMACOGRAPH (sted), STIRPICULTURIST



**Five-letter Permutations**

- 12345---12453 MARKET-MAKER  
 12345---12534 HORSE-SHOERS  
 12345---12543 CHENILLE-MACHINE  
 12345---13542 EDRIOASTEROID (web2)  
 12345---15243 UNDERBURNED (web2)  
 12345---15342 ASCENDANCES  
 12345---15423 RHYPAROGRAPHY  
 12345---23145 INCESSANCIES (web2)  
 12345---23415 ISAT-CHLORISATIC, TRANSMIGRANTS  
 12345---23451 DUST-ENCRUSTED (sg), NATIONALISATION, RACKENSACKER (ws),  
SHEARING-SHEARS  
 12345---25341 LUNAR-DIURNAL, TRANSVERSANT  
 12345---31245 ETHICOAESTHETIC (web2)  
 12345---31452 ULTRASTRUCTURAL  
 12345---32415 GIRDER-BRIDGE  
 12345---34125 PHRASEOGRAPHS  
 12345---34512 AISTHANESTHAI (cham)  
 12345---34521 DENIZENIZED (web2)  
 12345---35124 INTERLACUSTRINE  
 12345---41235 PHILADELPHIA  
 12345---41325 TRANSPLANTARS (note that TRANSPLANTAR fills the pattern 1234---4132)  
 12345---43125 PHARYNGOGRAPHY  
 12345---45123 MASTOCYTOMAS (sted)  
 12345---45213 NIGHT-FIGHTING  
 12345---51243 THREAD-FEATHER  
 12345---51324 NEGRO-MONGER

I have not searched for permutations of 6 or more letters. By chance, however, I came across EDRIOASTEROIDEA (web2) with the pattern 123456---354216, and GLACIOLOGICAL with the pattern 123456---615432. Will anyone take up the reins from here?

A related exercise springs to mind. The words SCINTICISTERNOGRAPHICS (inferred from SCINTICISTERNOGRAPHY in Stedman) and PROTOCOPROPORPHYRIA (sted) contain 3 different permutations of the letters C, I, S, and O, P, R respectively, reverse orders being allowed. Readers are invited to discover more such words. The letter groups may occur anywhere in the word.

**References for non-OED words**

**biw** = Book of Intriguing Words by Paul Hellweg, 1986

**bt** = Bloomsbury Thesaurus, 1993

**cham** = Chambers English Dictionary

**dor** = Dorland's Medical Dictionary

**opc** = Outline of Plant Classification by Sandra Holmes

**pul** = The Complete Word Game Dictionary by Pulliam & Carruth, Facts on File 1984

**sg** = from word list with Supergram program for Acorn computers

**sted** = Stedman's Medical Dictionary

**web2/3** = Webster's Second/Third Edition

**cad** = Cooper's Archaic Dictionary, 1876

**daw** = Dictionary of Archaic Words, J.O.Halliwell, 1989

**dfpf** = A Dictionary of the Flowering Plants and Ferns

by J.C. Willis, 7th Edition CUP 1966

**tig** = The Times Index Gazetteer of the World, 1965

**ws** = War Slang by Paul Dickson, 1994