SYMMETRIES OF THE ALPHABET

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The letters of the alphabet exhibit five varieties of symmetry (or non-symmetry):

A M T U V W Y have left-right (vertical) symmetry (.272) v
B C D E K have up-down (horizontal) symmetry (.218) h
N S Z have 180° (rotational) symmetry (.137) r
H I O X have all three symmetries (.205) a
F G J L P Q R have no symmetry (.168) n

In running text, the various symmetries appear with the indicated probabilities; for example, left-right symmetry occurs twice as often as rotational symmetry.

These appear to be all the possible theoretical symmetries. In particular, it is impossible to create a "letter" with two but not three symmetries, i.e., with left-right and rotational (but not up-down), with up-down and rotational (but not left-right), or with left-right and up-down (but not rotational) symmetry.

Can one locate a set of 120 five-letter heterograms which contain one letter with each kind of symmetry, arranged in all possible symmetry orders? Using only words in boldface from Webster's Second or Third (plus inferred forms such as past tenses and plurals), it appears to be impossible. One difficulty appears to be that vowels are contained in only 3 of the 5 symmetries. If one allows OED words or placenames, however, then a full collection is likely possible.

The collection below is restricted to Websterian words. Each possible ordering is identified by lower-case letters vhran. Although only a couple of examples are typically shown, a few orders are especially fecund:

navhr GIVEN LIVEN RIVEN GIVES LIVES FIVES RIVES LIMES RIMES RITES LOVES LOADS ROADS GOALS
hnnavr CLOYS CLOTS BLOTS BLOWS BROWS CROWS BLOWN BROWN CROWN CROWN BRIMS DROWN
rvanh SMILE SMIRK SHORE SWORD STILE SWIPE STOLE STOPE STORE STORK

ahnr
ahnr HEFTS
ahnr HENRY
ahnr HEAPS HEALS
ahnr
ahnr OLENT
ahnr OREAS
anhr
anhr
anhr OFTEN
anhr
anhr INEPT INERT
anhr INCUR
anhr INLET
anhr INRUB
anhr INTER
anhr INURE
anhr OWERS
anhr
avnh
avnr
avnh HARES
avnr HALSE
avnh OWNER HAZEL
avnr HAZLE
hann CORNY
hannr KORAN BOGUS
hannr CONGA DINGY
hannr DINAR
hannr BOARS CHAPS
hannr BHANG
hnarv BRINY KRONA
hnavr BROWN CLOTS
hnrav EPSOM
hnva
hnvar DRAIN BLITZ
hnvra BRUSH CLASH
hrav
hravn
hrnav ENJOY
hrnva

hnvan ESTOP
hrvna
hnvar BAIRN CAIRN
hvarn D YING
hnvar BARON CAPON
hnvarn BARON CAPON
hnran BASIL
hnrna BNJO
nahrv POESY
nahvr FOCUS LOCUS

narhv FONDU RISKY
narvh GONAD
navhr GIVEN LOVES
navrh FOUND PHASE
nharv FEINT PEONY
nhavr REOWN
nhavr RESOW
nhvra PESTO LENTO
nhvar LEMON
nhvra LEASH

nrahy
nrahv GNOME
nrhav
nrhva
nrvah PSYCH
nrvarh RAIDS
nrvarh GUISE
nrvarn RADON
nrvarh

nvrh
nvrh PANIC RUNCIN
nvrha LYNCH JUNCO
nvrh NVOLY
nvrhn SHEAF SIBYL
nvrhn SHREW SILKY
nvrhom SHRUB SOLVE
nvrhro NITER SOWER
nvrhn SHAPE SHARK
nrvh SKIRT
nrvh SCOWL SKIMP

rvahn STOEIP
rvahn SMILE SMIRK
rvhan NADIR
rvhna SACRO
rvnah SALIC
rvnah

vahnr TIERS
vahr
vanhr WORDS MILKS
vanrh WORSE

varhn WISER
varhn AISLE TINGE
vhanr ACORN ADORN
vhrn
vhnar AEGIS MELON
vhnra VERSO WELSH
vhran TENOR
vhrna
vnahr ALIEN TRIES
vnarah ALONE ARISE

vnhar VLEIS
vnhr

vnrah

vnrah

vrhn UNDOG
vrhna

vmah ASPIC

vmha

Finally, a challenge to computer programmers: can the alphabet be partitioned into five groups so that all 120 permutations can in fact be found among Websterian heteronyms?