DESIGNER ISOMORPHS

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It is twenty years since isomorphs were given significant room in Word Ways; "A Pattern Word Quiz," by Mary and Harry Hazard, appears in the November 1980 issue. In view of this time lapse, readers might find it useful to be reminded of the terminology associated with isomorphs:

- **Isomorphs**: Word Ways uses the term *isomorph* to denote words having the same letter pattern. Thus, both the words in that panda delight, EXCESS BAMBOO, have the letter pattern 123144.

- **Pattern Words and Non-pattern Words**: A word with at least one repeated letter is called a *pattern* word, as distinct from a non-pattern word in which all the letters are different (heterogram). When considering isomorphs, it is more satisfying to use pattern words than non-pattern words.

- **Crashes**: Two words of the same length are said to *crash* if they contain the same letter(s) in the same position(s). Non-crashing isomorphs are considered superior to crashing isomorphs like AMERICAN KENTUCKY, both words of pattern 12345617 but with the crashing letter C.

A Brief History of Isomorphs in Word Ways

Before embarking on Designer Isomorphs, it seems an appropriate time to take a brief look at the history of isomorphs in Word Ways. The word isomorph made its debut in Word Ways in the August 1969 Kickshaws, then under the auspices of David Silverman. His examples include the non-crashing pair ALFALFA ENTENTE with the letter pattern 1231231, and the crashing (letter H) pair SWEETHEART BLOODHOUND with the pattern 1233453674. (I found BATTLEFLIE in the OED as a non-crashing isomorph of SWEETHEART, and POLLENLIKE in Webster’s Second as a non-crashing isomorph of BLOODHOUND.)


The interest in isomorphs during the 1970s was kept alive by a series of pattern word lists produced by Professor Jack Levine, the words taken from Webster’s Second and Third Editions with derived words ( plurals, past tenses, etc.) added. Although Levine produced the lists as an aid to solving simple cryptograms, substitution ciphers in which the divisions between the words are preserved, the lists also served to make the task of finding isomorphs much easier. Levine produced three pattern word lists: *A List of Pattern Words of Lengths Two Through Nine* (1971), *A List of Pattern Words of Lengths Ten Through Twelve* (1972), and *A List of Pattern Words of Lengths Thirteen to Sixteen* (1973). Only small numbers of each list were produced and they quickly became unobtainable.
Other pattern word lists, most of which have been referred to in Word Ways, include

- *Cryptodyct* by Eldridge and Thelma Goddard (1976) [based on a small dictionary, and probably out of print]
- *Pattern-Word List (Vol. 1)* by Frederick D. Lynch, Aegean Press (1977) [words up to 10 letters, no longer listed in the Aegean Press catalogue]
- *Pattern and Nonpattern Words of 2 to 6 Letters, Pattern and Nonpattern Words of 7 & 8 Letters, Pattern and Nonpattern Words of 9 & (Some) 10 Letters, Pattern and Nonpattern Words of 10 Letters (Complete), Pattern and Nonpattern Words of 11 Letters, Pattern and Nonpattern Words of 12 Letters, Pattern and Nonpattern Words of 13 to 15 Letters* by Richard V. Andree, Raja Press (1977-1983) [based on Webster’s Seventh Collegiate, with derived words added; at least the first four volumes were issued in limited editions, and are probably out of print]

Here are some of the more significant non-crashing isomorphs that have appeared in Word Ways. In the May 1972 Kickshaws David Silverman exhibited a pair of isomorph transposals from Levine’s list: POOPES OPPOSE, and in the Aug 1972 Kickshaws Mary Youngquist added two more pairs: RITTER TERRIT and OPPOSIT POOPITS. In Feb 1973 Leslie Card claimed that CHECKBOOK had no isomorph. (I found two in the OED, both variant forms of embezzles: EMBESILLS and EMBESYLLS.) What is the longest pair of non-crashing isomorphs? Using Levine’s list, Ross Eckler presented DEMULSIFICATION GYNAECOMORPHOUS in the Aug 1973 Colloquy, and David Silverman added several more 15-letter examples in the Aug 1974 Kickshaws, including CINEMICROGRAPHY METHAEMOGLOBINS and COUNTER-MARCHING HEMISAPROPHYTIC. ‘Flash’ (a pseudonym of one of Dave Silverman’s friends) listed CONCEPTUALISM EXCEPTIONABLY in the Nov 1974 Kickshaws; both words are in Webster’s Collegiate. Notice how the letter string CEPT occurs in both words without crashing.

In “The Patterns of State Names” in the November 1977 Word Ways, Ross Eckler set about finding the commonest English words having letter patterns matching the various state names. He found isomorphs for 27 of the single-word states, 19 of them non-crashing. In the list below, the non-crashing ones are denoted by asterisks; I have replaced Ross’s crashing isomorphs with non-crashing ones.

- Alabama exegete*
- Alaska emerge*
- Arizona example*
- Arkansas enseurer
- California undertaken*
- Colorado paranoia
- Delaware brainier
- Georgia already*
- Hawaii recess*
- Illinois effected*
- Indiana keckses
- Kansas headed*
- Kentucky diamonds
- Louisiana metabasis
- Maryland somebody*
- Michigan starting*
- Minnesota hurricane
- Missouri terrible*
- Montana clearer*
- Nebraska conserve
- Nevada houses*
- Ohio that*
- Oklahoma abstract*
- Oregon either*
- Virginia believed*
- Washington introduced*
- Wisconsin begrudged*
Designer Isomorphs

With the exception of isomorph transposals, POOPES OPPOSE etc. (see above), it would appear that isomorph examples of the various forms of wordplay have not been given prominence in Word Ways. Here, I attempt to remedy this situation. Palindromic and tautonymic isomorphs, being numerous and therefore trivial, are not included. All the examples below are non-crashing isomorphs. Most of the words can be found in the Oxford English Dictionary, Second Edition, either as headwords, variant forms or text words including citations. Sources for non-OED words are given at the end.

ASSIGNING A = 1, B = 2 through Z = 26

1. Balanced Words (average letter value 13.5)
   - REILLY - STUCCO - VACUUM
   - QUININES - PETITION
   - RIVERISH - TOMATOES
   - SPARTANS - TRIALIST
   - NEPHROLOGY - VOWELISING

2. Century Words (letters total 100)
   - FOOTSY - OZZIES
   - PLUMULE - REVIVES
   - PLUNGING - EDMONTON

3. Lightweights and Heavyweights (average letter value given in brackets)
   - BABBAGE (2.857) - ZYZZYVA (21.571)

4. Numerical Palindromes
   - EMETIC - GIGMEN (both 23.32)
   - PARROT - BROOMY (both 35.53)

5. Numerical Tautonyms
   - HELPED - MICKIE (both 25.25)
   - BUMMER - WHEELS (both 36.36)

6. Both Numerical Palindromes and Numerical Tautonyms
   - RACIAL - FIGLIA (both 22.22)
   - SMACKS - ETHISE (both 33.33)
   - CUTEST - PISTES (both 44.44)
   - UNSAYING - CRUMHORN (both 55.55)

7. Numerical Palindrome Transposals
   - CATERS - REACTS (both 24.42) – no repeated letters

ALPHOMES

1. Alphomes (letters in alphabetical order)
   - BERRY - FILLS
   - ADEEMS - BILLOT
   - FLOOSY

2. Reverse Alphomes (letters in reverse alphabetical order)
   - UPPIE - ZOOEA
   - UNHEED - YVONNE
   - SPOOK - TREED

3. Alphomes and Reverse Alphomes - one word of each
   - BELLOOT - SPOONNE

CONSONANTS AND VOWELS

1. Consonants (including Y) and Vowels - one word of each
   - TRYSTS - IUAEIE (or OUEIOI)
   - SYLPHS - AIQUEA

2. Consonants (excluding Y) and Vowels - words of each
   - VMFF - PWLL
   - IEUU - AUUE
   - TWTH - IOIE

3. Consonants and Vowels in Corresponding Positions
   - ISOMORPH - ABIDINGS
   - PATTERN - DUNNOCK
   - KIBBUTZ
   - CRASHES - SWINDON

4. Consonants and Vowels Alternating
   - EPIDEMIC – ITEMIZED – the vowels EIEI have been replaced by the vowels IEIE
5. **Monovowel Words with Vowels and Consonants in Corresponding Positions**
   
   **CATAMARANS** - **VISIBILITY**

6. **Monoconsonantal Words with Consonants and Vowels in Corresponding positions**
   
   **BOBBIE** - **TATTOU**   **BAOBAB** - **REARER**   **ANNONE** - **EVVIVA**

7. **AEIOU Words**
   
   **AUTOSITE** - **PERIOURA**

**DOUBLE LETTERS**

1. **Two Sets of Double Letters**
   
   **ABBESS** - **BOOTEE**   **CESSPOOL** - **DOLLBEER** - **GARROTTE** - **TUPPENNY**

2. **Two Sets of Double Letters Adjacent**
   
   **ALLAAS** - **EFFEER** - **LEELLY**

3. **Two Sets of Like Double Letters**
   
   **ASSESS** - **BOOHOO** - **TEEPEE**

**GEOMETRICAL WORDS** (see WW Aug. and Nov. 1997)

1. **Triangles** (letter ratio 1.2.3.)
   
   **MISSIS** - **WEDDED** - **HORROR** - **FALLAL** - **LYNNYN**

2. **Rhombuses** (letter ratio 1.1.2.2.3.)
   
   **FETTERERS** - **TIFFINING**

3. **Pentagons** (letter ratio 1.2.2.3.)
   
   **DEADHEAD** - **GINGLING** - **HOCHPOCH**

4. **Hexagons** (letter ratio 2.2.3.)
   
   **ALFALFA** - **SOUSOUS** - **ENSENSE** - **HATHATH** - **TZITZIT**

5. **Trapeziums** (letter ratio 2.3.)
   
   **ESSEE** - **LEELL**   **COCO** - **NANNA** - **SESESSE** - **REREE** - **TOTOO**

6. **Eggtimers** (letter ratio 1.2.2.)
   
   **BOOBY** - **ERRED** - **COCOA** - **JUJUS** - **PAPAL** - **VIVID**   **GIGLI** - **ILIAL** - **TETHE**

**LETTER GROUPS**

1. **Letters taken from the First and Second Halves of the Alphabet - one word of each**
   
   **AMALGAM** - **USUROUS**   **CAMILLA** - **SYRUPPY**   **CHILLED** - **UROOTS**

   **CLICKED** - **SUNSPOT**   **GLACIAL** - **SYNTONY**   **GIMMICK** - **OUTTURN**

   **HECKLED** - **UNSTONY**   **CHEMICAL** - **OUTSWORN**

   **BALDFACED** - **OUTSPURNS**   **KAMACHILE** - **ZOROTYPUS** (which, with an average letter value of 19.44, is a contender for the heaviest 9-letter word)

2. **Odd and Even Letters of the Alphabet - one word of each**
   
   **MOSSY** - **PHFFT**   **MIMIC** - **PHPHT**

3. **Tall Letters and Narrow Letters**
   
   **flitt - idyll (tall)**   **censuses - unserene (narrow)**

4. **Tall Letters and Narrow Letters - one word of each**
   
   **flightily - aero-screw**

5. **Curved Letters and Straight Line Letters - one word of each**
   
   **COUSCOU** - **MANXMAN**   **COCCOUS (W2)** - **MAMMATE**   **JOCOSUS -HELENIN**
6. Horizontally-Symmetrical Letters
   BEECH - COOED - ICCH

7. Vertically-Symmetrical Letters
   AXOTOMY - MUTATIO

8. Horizontally- and Vertically-Symmetrical Letters - one word of each
   TOMATO - DECIDE

9. Typewriter Left Hand and Right Hand - one word of each
   DEADER - ONIONY REREAD - LILUM SERVER - UNKINK
   DESSERT - MILLION REGRETS - KINKILY

10. Typewriter Top Row
    PIERROT - QUIPPER PIPPIER - TETTERY

11. Typewriter Top Row and Middle Row - one word of each
    WETTER - DALLAS TERRERE - HADDADA

MEANINGFUL

1. Thematic
   Isomorphs may exhibit a common theme. Reading across the page, we find isomorph pairs
   relating to mammals, birds, attire, plants (2 examples) and climate (a triple), respectively:
   GIBBON - POSSUM LINNET - PUUFFIN PANAMA - BIKINI
   LILUM - JOJOBA VANILLA - TOBACCO
   NORTHERN - CLIMATIC - DRENCHED

2. Synonyms (or near synonyms)
   MAXIMUM - EXTREME HUBBUB - POWWOW DOSSED - SLEEPS
   KILLINGS - MASSACRE ENVIRONS - LOCATION EGGS - SEED
   SMELL - WHIFF KICKOFF - CONCUSS (in the world of football!)

3. Antonyms (or near antonyms)
   LESSER - COMMON

NUMERICAL LETTER SERIES

1. Square Letters (a,d,i p y)
   DADDA - PIPPI

2. Fibonacci Letters (a,b,c,e,h,m,u)
   CAABA - HEEME (or MEECE) BUCCA - HAMME
   BACACH - CUBUBE

3. Prime Letters (b,c,e,g,k,m,q,s,w)
   SKEEG - BEGGS BEEBE - ESSES ESSEW - KEEKS

4. Roman Letters (/,V,X,L,C,D,M)
   MIIL (or its reversal LIIM) - ILLLD

PHRASES

1. Two Word Phrases
   MAFFIA PEDDLE ROBBER SNOOPS TENNIS VOLLEY
   FUELED CAREERS IDIOTIC ANAGRAM PROPOSE TUITION
   SKIMMIA BLOSSOM SQUEEZE CHASSIS ESTIMATE SYMPTOMS
   SUBURBAN DETECTOR INTRINSIC ORATORIOS STURDIEST PERISCOPE
   TELEVISING SATANANLOGY

2. Three Word Phrase
   ENGLAND REDUCES CAPITAL
REVERSALS

1. Reverse Isomorphs

Choose a pattern word and make a note of its letter pattern starting from the end of the word rather than the beginning. Thus the State of KENTUCKY has the reverse letter pattern 12345672. Now search for non-crashing words with that pattern. They include DEXTROSE and GENDARME.

Once again, here are the pattern single-word States, but this time they have been allocated isomorphs which are non-crashing when read in reverse:

<table>
<thead>
<tr>
<th>State</th>
<th>Isomorph</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALABAMA</td>
<td>OLOROSO</td>
</tr>
<tr>
<td>ALASKA</td>
<td>STASIS</td>
</tr>
<tr>
<td>ARKANSAS</td>
<td>none found</td>
</tr>
<tr>
<td>CONNECTICUT</td>
<td>DELAWARE - SPICIEST</td>
</tr>
<tr>
<td>HAWAII</td>
<td>EENING</td>
</tr>
<tr>
<td>KANSAS</td>
<td>MEMBER</td>
</tr>
<tr>
<td>KENTUCKY</td>
<td>PLATEFUL</td>
</tr>
<tr>
<td>MARYLAND</td>
<td>CONDEMS</td>
</tr>
<tr>
<td>MASSACHUSETTS</td>
<td>none found</td>
</tr>
<tr>
<td>MONTANA</td>
<td>POPCORN</td>
</tr>
<tr>
<td>NEBRASKA</td>
<td>CATCHING</td>
</tr>
<tr>
<td>OHIO</td>
<td>PULP</td>
</tr>
<tr>
<td>PENNSYLVANIA</td>
<td>none found</td>
</tr>
<tr>
<td>WASHINGTON</td>
<td>ADULATIONS</td>
</tr>
<tr>
<td>WISCONSIN</td>
<td>CROCKFORD</td>
</tr>
<tr>
<td>ALASKA</td>
<td>LAMENTABLY</td>
</tr>
<tr>
<td>CALIFORNIA</td>
<td>COLORADO - MAXIMUMS</td>
</tr>
<tr>
<td>MICHIGAN</td>
<td>BROADWAY</td>
</tr>
<tr>
<td>MISSOURI</td>
<td>OTHELLOS</td>
</tr>
<tr>
<td>MISSISSIPPI</td>
<td>none found</td>
</tr>
<tr>
<td>NEVADA</td>
<td>DEDUCT</td>
</tr>
<tr>
<td>OREGON</td>
<td>ARCHER</td>
</tr>
<tr>
<td>TENNESSEE</td>
<td>none found</td>
</tr>
<tr>
<td>VIRGINIA</td>
<td>CEMENTED</td>
</tr>
</tbody>
</table>

2. Dual Isomorphs

The same word may act as both isomorph and reverse isomorph. These words have the same letter patterns running backwards as well as forwards, even though they are not palindromes. They include: OOLOROSO - 1213141 (see ALABAMA above) and the Shakespearean characters BOTTOM - 123324, CRESSIDA - 12344567, CAESAR - 123425

SHIFTS

1. Alphabetic Shifts

Any word whose letters are shifted \( n \) places along the alphabet will always form a word which is a non-crashing isomorph of the original word.

\[
\begin{align*}
\text{BABE} + 14 &= \text{POPS} & \text{BOMB} + 6 &= \text{HUSH} & \text{ADDER} + 1 &= \text{BEEFS} \\
\text{FILLS} + 6 &= \text{LORRY} & \text{SNEER} + 1 &= \text{TOFFS} & \text{STEEDS} + 1 &= \text{TUFFET} \\
\text{PRIMERO} + 3 &= \text{SULPHUR} & \text{and a triple: BEEF} + 10 &= \text{LOOP} + 4 &= \text{PSST} \\
\end{align*}
\]

2. Typewriter Shifts

Words shifted one key to the left: NIDD - BUSS TIFF - RUDD GARRY - FLEET

Words shifted one key to the right: USA - DIDS CUSS - VIDD SWEET - DERRY

SPECIAL PATTERNS

1. Identical Trigram Heads and Tails

<table>
<thead>
<tr>
<th>INSULINS</th>
<th>GALENGAL</th>
</tr>
</thead>
</table>

2. Identical Tetragram Heads and Tails

<table>
<thead>
<tr>
<th>OUTSHOUTS</th>
<th>RESTOREST</th>
</tr>
</thead>
</table>

3. Reverse Trigram Heads and Tails

<table>
<thead>
<tr>
<th>SCATICS</th>
<th>REVOLVER</th>
</tr>
</thead>
</table>

4. Agamemnon Words

<table>
<thead>
<tr>
<th>AGAMEMNON</th>
<th>MIMULUSES</th>
</tr>
</thead>
</table>

5. Memnon Words

<table>
<thead>
<tr>
<th>MEMNON</th>
<th>GIGOLO - USURER</th>
</tr>
</thead>
</table>
6. Split-word Transposals

Words like BILABIAL and HORSESHOER, in which the letters of the first half of the word are repeated in a different order in the second half, can be called split-word transposals. They constitute a special type of pair isogram. Some split-word transposals are isomorphs.

AROROA - GUNUNG - KHAHAK - SAEAES
CNICIN - DREDER - ISAIAS - TERTRE
SHIPPISH - TEAMMATE

SHOOSSH - HECCHHE
AENEAN - NATANT - OYNYON
PRAEPARE - TEISTIES

MISCELLANEOUS

1. Dictionaries

OXFORD - EUREKA - INKISH - ALBANS
WEBSTER - CLEARLY - FACTUAL
MERRIAM - STOOGES

CULLINS - FREEDOM - BLOOMED
CASSELL - WHOOPEE - PIGGOTT

2. Elements

MERCURY - THULIUM

3. Personal Names

DAVID - EMILE - SILAS
CLARA - IRENE
NANCY - SUSAN

Last Words

All but the last (triple) of these isomorphs are apposite and/or make a phrase:

element iridium
smelled blossom
hemmed cotton
historical fairytales

thesaurus jargonning
thatched property
Mormonic tax-taker
isosmorphs Britisher Reaganite

sprayers drenched
mediaeval braveries
narrated colloquy

Here are two phrases made from reverse isomorphs:

Nevada cactus
Washington implicated

Sources of Non-OED Words

Bacach, coccus, dollbeer, gunung, Hathath, ilial, jojoba, Neillia, reree (Webster’s Second)
shoosh (Webster’s Third)
axotomy (Stedman’s Medical Dictionary)
Perioura, Zyzyva (Nomenclator Zoologicus)
Aiouea (A Dictionary of the Flowering Plants and Ferns, by J.C. Willis, CUP 1966)
jocosus, vowelising (Chambers English Dictionary)
Aroroa, Azzaz, Khahak (The Times Index-Gazetteer of the World)
Oueioi (Language on Vacation, by Dmitri Borgmann, p 156)
phpht (Official Scrabble Players Dictionary)