PUZZLES AND CODES

(Go here for more information: benguterson.com >> The Winterhouse Trilogy >> Puzzles and Codes)

Elizabeth Somers–the main character in the *Winterhouse* books–loves puzzles and codes, and there are a lot of them in *Winterhouse*. Anagrams are Elizabeth's particular favorite. An anagram is where you take a word or phrase, and then you rearrange the letters to form another word or phrase, like this: "astronomers" can be turned into "moon starers," or "stormy weather" can become "may throw trees." A few years ago, I realized my last name, "Guterson," can be turned into the word "sturgeon." Here are a few entertaining anagrams:

Conversation = Voices rant on
Debit card = Bad credit
The countryside = No city dust here
Vacation time = I am not active
A decimal point = I'm a dot in place

Another type of puzzle Elizabeth and her friend Freddy Knox enjoy is known as a Word Ladder: start with two words (the starting word and the ending word), and then–changing only one letter at a time to create a new word– you work your way from your starting word toward your ending word. It sounds kind of confusing, but an example will probably make things clear, so, here's a Word Ladder where we start with "cold" and turn it into "warm":

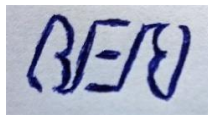**COLD**
CORD
CARD
WARD
WARM

Another fun type of wordplay that can be found in *Winterhouse* and that will turn up a bit more in the sequel to *Winterhouse* is something called an ambigram. While there are many different types of ambigrams, the basic idea is that a certain word or phrase can be looked at from a different direction or orientation and it will still make a word or phrase. Sounds very complicated, for sure, but just take a look at this example–if you turn the word "ambigram" upside down, you'll still see the word "ambigram":

Here's another, which occurs in the *Winterhouse* sequel–"faith" can be read either right-side-up or upside-down:

One more–when I was about 12 or 13, I figured out how to write my own first name as an ambigram:

The most important sort of code in *Winterhouse* is one known as the Vigenere cipher. This is a very old and sort of complicated method of writing in code language, but by using it, a person can create coded messages that are very difficult to break. Here is the part from *Winterhouse* where Elizabeth first encounters the Vigenere cipher:

After a bit of tossing and turning when she realized she wasn't going to get back to sleep, Elizabeth dressed, brushed her hair and teeth; and then, to fully put her thoughts at ease, she began reading *A Guide for Children*, including chapters on "How to throw your voice," and "How to disguise yourself with unique costumes." She thumbed through the book and found one near the end entitled "How to write unbreakable codes by using the Vigenere Cipher." It began like this:

Dear reader, this is the single most important chapter in the entire book, because codes and secret messages are very dear to my heart. If you have found this book, study this chapter very carefully!

Elizabeth felt a chill go through her. She continued to read.

The Vigenere Cipher is one of the greatest secret-code methods ever invented. If you learn it, you can write codes that are next-to-impossible to break, and so you can write messages to your friends that no one else will be able to read. All you need is a keyword that you and your friend both know—but make sure you don't forget the keyword! Beyond that, if you can follow the instructions in this chapter, you will be well on your way to writing coded sentences that will look like gobbledygook to other people, but will conceal your deepest secrets in safety.

She read the chapter carefully, which even had an alphabet grid on one page and an example to work through. The grid—or Vigenere Square, as Riley S. Granger called it—looked like this:

✕	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

The example in the book was the sentence: "Look at the beautiful picture," while the keyword was "hotel"; and Riley S. Granger explained that by using the keyword, a person could transform "Look at the beautiful picture" into the unbreakable code sentence of "Scho la hai mlonxtmie ttjhnvp."
    The way it worked was by "laying" your keyword over the sentence you wanted to turn into a code, and then using the Vigenere Square to help you along. That is, you matched the "h" in "hotel" with the "l" in "look," and where they intersected in the grid you found the letter "s." Working through the entire sentence gave you this:

h	o	t	e	l	h	o	t	e	l	h	o	t	e	l	h	o	t	e	l	h	o	t	e	l
l	o	o	k	a	t	t	h	e	b	e	a	u	t	i	f	u	l	p	i	c	t	u	r	e
s	c	h	o	l	a	h	a	i	m	l	o	n	x	t	m	l	e	t	t	j	h	n	v	p

That's incredible, Elizabeth thought. *No one could break that.*