Box Code Puzzle

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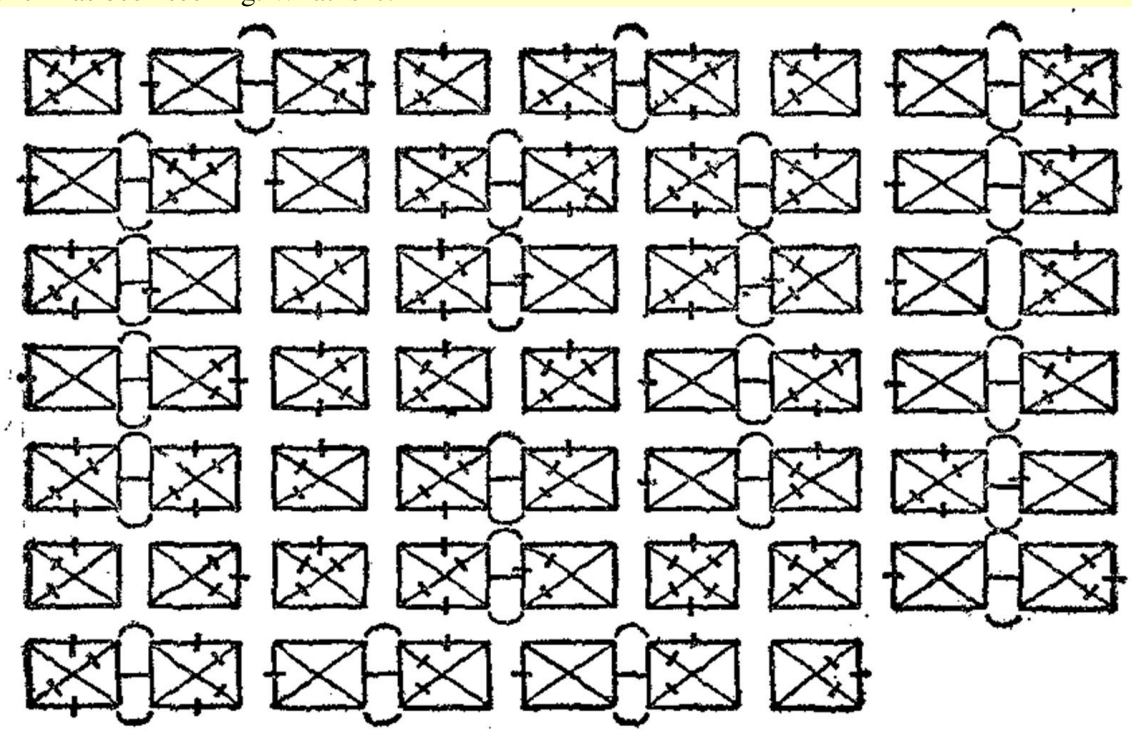
This is an intriguing puzzle from *Futility Closet* ([1]).

In Robert Chambers' 1906 novel *The Tracer of Lost Persons*, Mr. Keen copies the figure below from a mysterious photograph. He is trying to help Captain Harren find a young woman with whom he has become obsessed.

"It's the strangest cipher I ever encountered," he says at length. "The strangest I ever heard of. I have seen hundreds of ciphers—hundreds—secret codes of the State Department, secret military codes, elaborate Oriental ciphers, symbols used in commercial transactions, symbols used by criminals and every species of malefactor. And every one of them can be solved with time and patience and a little knowledge of the subject. But this … this is too simple."

The message reveals the name of the young woman whom Captain Harren has been seeking. What is it?



As is usual with these types of puzzles, I felt foolish that I couldn't see the immediate, simple interpretation of the boxes—after a great deal of effort. So I solved it using the usual cryptographic methods that rely heavily on logic and letter frequencies, though the message is a bit short for that.

My Solution

Since I couldn't figure out what the boxes meant (I considered they might represent binary numbers), I replaced them with numbers (Figure 1), similar to what I did in solving the "Mystery of

the Dancing Men".[1] There turned out to be only eight distinct boxes.

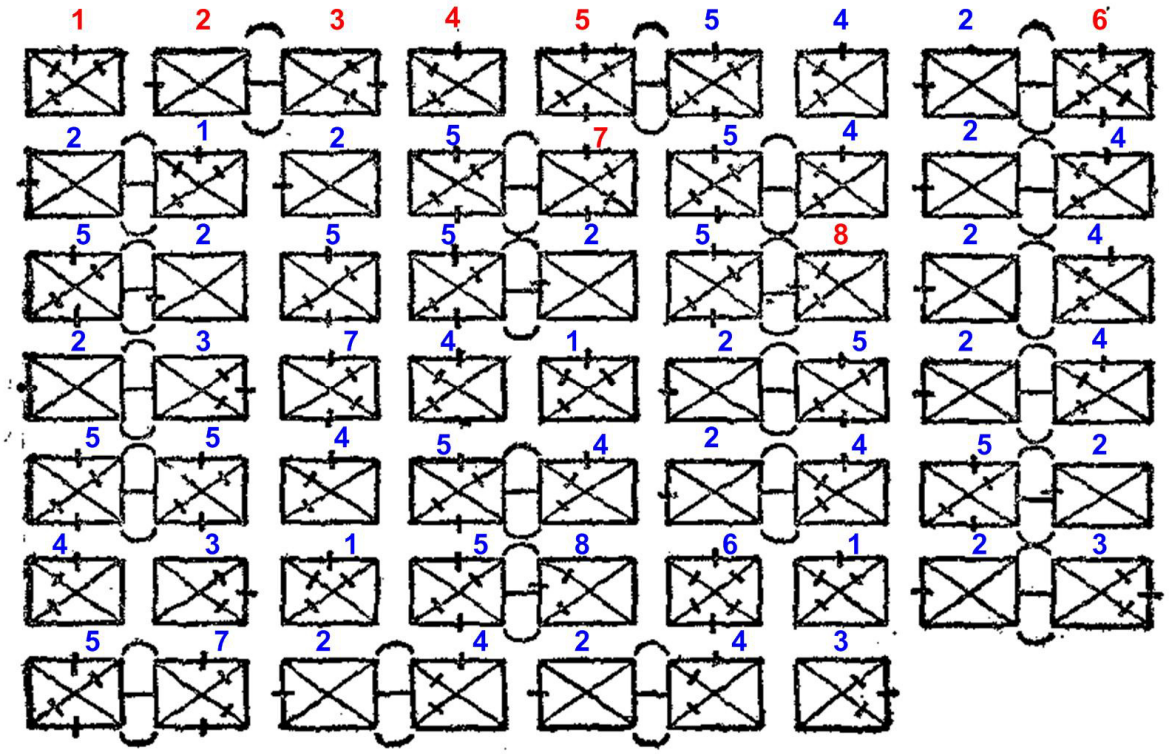


Figure 1

This assignment yields the following sequence of numbers representing the message. I assumed the linked boxes represented two-digit numbers.

1 23 4 55 4 26 21 2 57 54 24 52 5 52 58 24 23 7 4 1 25 24 55 4 54 24 52 4 3 1 58 6 1 23 57 24 24 3

I ended up with the following frequencies for the assigned numbers (boxes).

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2

Since this was supposed to be such a "simple" code, I hoped that meant it was a simple substitution, such as numbering the letters of the alphabet from 1 to 26:

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
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
single digits									**double digits**										**double digits**							

This suggests each box represents a digit and the double digit assigned numbers represent the 10s and 20s, that is, 2 and 5 represent either 1 or 2. It also means that 0 would only appear in a double digit and not a singleton. And there was only one number, 8, that satisfied this. (Actually, there was a missing singleton, 9, since there were nine letters in alphabet mapping. But we shall see why it was not plausible to assign 0 to that number.)

Now consider letter frequencies in English:[2]

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[1] https://josmfs.net/2021/12/04/mystery-of-the-dancing-men/

[2] https://pi.math.cornell.edu/~mec/2003-2004/cryptography/subs/frequencies.html

E	T	A	O	I	N	S	R	H	D	L	U	C	M	F	Y	W	G	P	B	V	K	X	Q	J	Z
12	9.1	8.1	7.7	7.3	7.0	6.3	6.0	5.9	4.3	4.0	2.9	2.7	2.6	2.3	2.1	2.1	2.0	1.8	1.5	1.1	0.7	0.2	0.1	0.1	0.1

Since T has such a high frequency and J such a low one, it seems plausible to suppose 58 represents 20 and so T, and that 28 represents 10 and so J. The assumed necessary existence of T supports our elimination of 9 representing 0, that is, T should be in the message, and it would not be if 9 were zero. Therefore, 2 → 1 → A and 5 → 2 → B. But that means 22 → 11 → K and 25 → 12 → L, and 52 → 21 → U and 55 → 22 → V:

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2
Actual #		1			2			0		11			12			10		21			22			20
Translation		A			B					K			L			J		U			V			T

1 23 4 V 4 26 21 A 57 54 24 U B U T 24 23 7 4 1 L 24 V 4 54 24 U 4 3 1 T 6 1 23 57 24 24 3

Now the most frequent letters in English among the single digits are E and I. So try 4 → 5 → E and 1 → 9 → I. Then we have 24 → 15 → O and 54 → 25 → Y, and 21 → 19 → S and 51 → 29 → (no letter), which also satisfy the frequency table to some extent:

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2
Actual #	9	1		5	2			0	19	11		15	12			10	29	21		25	22			20
Translation	I	A		E	B				S	K		O	L			J		U		Y	V			T

I 23 E V E 26 S A 57 Y O U B U T O 23 7 E I L O V E Y O U E 3 I T 6 I 23 57 O O 3

As the message is starting to be revealed, we see we are on the right track. Now since S and O have already been found, that leaves N as the last high frequency letter in the teens. So assume 23 → 14 → N. Then 3 → 4 → D and 53 → 24 → X:

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2
Actual #	9	1	4	5	2			0	19	11	14	15	12			10	29	21	24	25	22			20
Translation	I	A	D	E	B				S	K	N	O	L			J		U	X	Y	V			T

I N E V E 26 S A 57 Y O U B U T O N 7 E I L O V E Y O U E D I T 6 I N 57 O O D

We have used five out of the nine single digit letters leaving C, F, G, and H to use for the last two single numbers 6 and 7. Since we are looking for the name of a woman, 6 → 8 → H seems plausible. Then we have 26 → 18 → R and 56 → 28 → (no letter):

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2
Actual #	9	1	4	5	2	8		0	19	11	14	15	12	18		10	29	21	24	25	22	28		20
Translation	I	A	D	E	B	H			S	K	N	O	L	R		J		U	X	Y	V			T

I N E V E R S A 57 Y O U B U T O N 7 E I L O V E Y O U E D I T H I N 57 O O D

Finally, it looks like 57 is W. So 7 → 3 → C and 27 → 13 → M:

Assigned #	1	2	3	4	5	6	7	8	21	22	23	24	25	26	27	28	51	52	53	54	55	56	57	58
Counts	4	1	2	5	1	1	1	0	1	0	3	6	1	1	0	0	0	3	0	2	2	0	2	2
Actual #	9	1	4	5	2	8	3	0	19	11	14	15	12	18	13	10	29	21	24	25	22	28	23	20
Translation	I	A	D	E	B	H	C		S	K	N	O	L	R	M	J		U	X	Y	V		W	T

I N E V E R S A W Y O U B U T O N C E I L O V E Y O U E D I T H I N W O O D

or

I NEVER SAW YOU BUT ONCE. I LOVE YOU. EDITH INWOOD

Note that F and G are missing from the translation line for single digits, P and Q are missing from the teens, and Z from the 20s.

Futility Closet Solution

From Futility Closet: "The solution is given in Chapter X of Chambers' novel—which, incidentally, inspired a radio program that ran for 18 years." Here is the "obvious" interpretation of the boxes that I missed:

CHAPTER X

"Come!" said the Tracer suddenly; "this won't do. There are too few symbols to give us a key; too few repetitions to furnish us with any key basis. Come, Captain, let us use our intellects; let us talk it over with that paper lying there between us. It's a simple cipher—a childishly simple one if we use our wits. Now, sir, what I see repeated before us on this sheet of paper is merely one of the forms of a symbol known as Solomon's Seal. The symbol is, as we see, repeated a great many times. Every seal has been dotted or crossed on some one of the lines composing it; some seals are coupled with brackets and armatures."

"What of it?" inquired Harren vacantly.

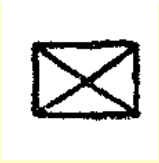
"Well, sir, in the first place, that symbol is supposed to represent the spiritual and material, as you know. What else do you know about it?"

"Nothing. I bought a book about it, but made nothing of it."

"Isn't it supposed," asked Mr. Keen, "to contain within itself the nine numerals, 1, 2, 3, 4, 5, 6, 7, 8, 9, and even the zero symbol?"

"I believe so."

"*Ex*actly. Here's the seal



Now I'll mark the one, two, and three by crossing the lines, like this:

one,

two,

three,

Now, eliminating all lines not crossed there remains

the one,

the two,

the three,

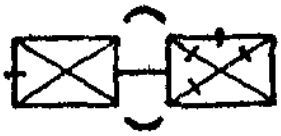
And here is the entire series:

and the zero—"

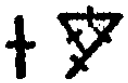
A sudden excitement stirred Harren; he leaned over the paper, gazing earnestly at the cipher; the Tracer rose and glanced around the room as though in search of something.

"Is there a telephone here?" he asked.

"For Heaven's sake, don't give this up just yet," exclaimed Harren. "These things mean numbers; don't you see? Look at that!" pointing to a linked pair of seals,



"That means the number nineteen! You can form it by using only the crossed lines of the seal.



Don't you see, Mr. Keen?"

"Yes, Captain Harren, the cipher is, as you say, very plain; quite as easy to read as so much handwriting. That is why I wish to use your telephone—at once, if you please."

"It's in my bedroom; you don't mind if I go on working out this cipher while you're telephoning?"

"Not in the least," said the Tracer blandly. He walked into the Captain's bedroom, closing the door behind him; then he stepped over to the telephone, unhooked the receiver, and called up his own headquarters.

"Hello. This is Mr. Keen. I want to speak to Miss Borrow."

In a few moments Miss Borrow answered: "I am here, Mr. Keen."

"Good. Look up the name Inwood. Try New York first—Edith Inwood is the name. Look sharp, please; I am holding the wire."

He held it for ten full minutes; then Miss Borrow's low voice called him over the wire.

"Go ahead," said the Tracer quietly.

"There is only one Edith Inwood in New York, Mr. Keen—Miss Edith Inwood, graduate of Barnard, 1902—left an orphan 1903 and obliged to support herself—became an assistant to Professor Boggs of the Museum of Inscriptions. Is considered an authority upon Arabian cryptograms. Has written a monograph on the Herati symbol—a short treatise on the Swastika. She is twenty-four years of age. Do you require further details?"

"No," said the Tracer; "please ring off."

Then he called up General Information. "I want the Museum of Inscriptions. Get me their number, please." After a moment: "Is this the Museum of Inscriptions?"

"Is Professor Boggs there?"

"Is this Professor Boggs?"

"Could you find time to decipher an inscription for me at once?"

"Of course I know you are extremely busy, but have you no assistant who could do it?"

"What did you say her name is? Miss Inwood?"

"Oh! And will the young lady translate the inscription at once if I send a copy of it to her by messenger?"

"Thank you very much, Professor. I will send a messenger to Miss Inwood with a copy of the inscription. Good-by."

He hung up the receiver, turned thoughtfully, opened the door again, and walked into the sunlit living room.

"Look here!" cried the Captain in a high state of excitement. "I've got a lot of numbers out of it already."

"Wonderful!" murmured the Tracer, looking over the young man's broad shoulders at a sheet of paper bearing these numbers:

9—14—5—22—5—18—19—1—23—25—15—21—2—21—20—15—14—3—5—9—12—15—22—5—25—15—21—5—4—9—20—8—9—14—23—15—15—4.

"Marvelous!" repeated the Tracer, smiling. "Now what *do* you suppose those numbers can stand for?"

"Letters!" announced the Captain triumphantly. "Take the number nine, for example. The ninth letter in the alphabet is I! Mr. Keen, suppose we try writing down the letters according to that system!"

"Suppose we do," agreed the Tracer gravely.

So, counting under his breath, the young man set down the letters in the following order, not attempting to group them into words:

INEVERSAWYOUBUTONCEILOVEYOUEDITHINWOOD.

Then he leaned back, excited, triumphant.

"There you are!" he said; "only, of course, it makes no sense." He examined it in silence, and gradually a hopeless expression effaced the animation. "How the deuce am I going to separate that mass of letters into words?" he muttered.

"This way," said the Tracer, smilingly taking the pencil from his fingers, and he wrote:

I—NEVER—SAW—YOU—BUT—ONCE. I—LOVE—YOU. EDITH INWOOD.

References

[1] "Box Code", *Futility Closet*, November 9, 2021. (https://www.futilitycloset.com/2021/11/09/a-box-code/)
