

A 42-letter Pangrammatic Window

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A *pangrammatic window* is a block of text containing each letter of the alphabet exactly once. A distinction is made between deliberate attempts to create such windows and those occurring by chance in published text. The canonical example of a deliberate pangram is **The quick brown fox jumps over the lazy dog**, but shorter examples are possible. Here we are concerned with accidental cases. A 42-letter pangrammatic window is identified in *Cube Route* by Piers Anthony, representing a significant improvement over the previous record of 47 letters for an Internet search result and 56 letters for a published novel. Nine other examples equalling or bettering the previous record for a published book are presented.

In 1907, Pearson [5] gave a 65-letter pangram found in the novel *The Beth Book* by Sarah Grand. The 65 letter barrier remained unbroken until 2002 when Keith [3] gave two 64-letter examples. In February 2006, Keith [4] further lowered the record to 56 letters giving four examples of pangrammatic windows of less than 60 letters based on a search of texts from Project Gutenberg. In May 2006, Chaikin [2] uncovered a 47-letter example in Google search results for an on-line movie review.

The pangrammatic windows representing historical records are included below. In each case the text has been expanded to the surrounding sentence boundaries and the actual window is shown in bold. Similarly, the length of the pangrammatic window is shown in bold at the start of description.

65 *The Beth Book*, Sarah Grand (1897) [5]:

It was an **exquisite deep blue just then, with filmy white clouds drawn up over it like gauze** to veil its brightness.

64 *A French Encounter*, Cathy Williams (1992) [3]:

Alyssia's heart was beating ferociously, and there was a throbbing in her temples that was **making her feel quite dizzy. Or maybe it was just his proximity having that effect** on her.

56 *In the Courts of Memory*, Lillie de Hagermann-Lindencrone (1912) [4]:

I sang, and thought I sang **very well**; **but he just looked up into my face with a very quizzical expression**, and said, "How long have you been singing, Mademoiselle?"

47 On-line search result [2]:

JoBlo's movie review of *The Yards*: **Mark Wahlberg, Joaquin Phoenix, Charlize Theron.**

And now the newly discovered pangrammatic windows:

56 *The Ringworld Throne*, Larry Niven (1996):

To Beedj she **quickly added**, '**Beedj, this is for size, to leave me larger. I expect Whand will go with Moonwa first...**'

56 *Night Flight*, Lawrence Watt-Evans a short story first published in *Flights of Fantasy*, Mercedes Lackey (ed.) (1999):

It was still early in the morning of the following day when Princess Kirna, escorted by what appeared to be a crippled **wizard's ghost**, **arrived safely back at Quonmor Keep. Judging by the expression on her father's face**, her arrival was not half as surprising as the first thing she said when shown in the audience chamber.

56 *A Falcon Flies*, Wilbur Smith (1980):

'With the major objectives of the **expedition unfulfilled?**' **Zouga asked quickly.** '**The major objectives were to find Fuller Ballantyne, and report on the slave trade, both of which we can accomplish if we march down the slave road to the sea.**'

55 *Hackers*, David Bischoff (1995):

Jim Wilkins, Junior Executive, held the steaming mug of top-quality Zabar's Kona coffee, 2 percent milk, no sugar, waiting for arrival.

55 *Wolf and Raven*, Michael A. Stackpole (1998):

I gave Lynn's hand a squeeze. "They would be except for players like Jimmy here."

55 *Dragon and Thief*, Timothy Zahn (2003):

But going that way would mean a longer walk, and Jack was already feeling **jumpy about being here. Navigating the maze of boxes would be quicker**, and would offer the extra bonus of keeping him out of sight.

54 *An Introduction to Kolmogorov Complexity and Its Applications*, Li & Vitányi (2nd ed., 1997):

Ibid, 43:544-546, 1937. [455] J. Tyszkiewicz. **On the Kolmogorov expressive power of Boolean query languages.**

52 *Earth Logic*, Laurie J. Marks (2004):

Some rather ostentatiously loosed their clubs, which they generally used only to defend the goats **from predators, but they relaxed quickly enough when Zanja gave proper greetings to the headwoman.**

50 *The Godmother's Apprentice*, Elizabeth Ann Scarborough (1995):

The great man was gone for a long time at the stop **in Wexford. Normally, Jack might have taken out his squeeze box** and busked for a time to earn a few coins, but Carnahan had locked the squeeze box in the car.

42 *Cube Route*, Piers Anthony (2003):

"We are all from Xanth," Cube said quickly. "Just visiting Phaze. We just want to find the dragon."

The *Cube Route* example occurs on page 98 of 2004 First Mass Market Edition published by Tor. It is worth noting that

"We are all from Xanth," Cube said quickly. "Just visiting Phaze.

forms a 48-letter pangram and removes the need for a third sentence. *Cube Route* is the 27th novel in Piers Anthony's long running series about Xanth. Notice that the title itself is a form of word play, since $\sqrt[3]{27} = 3$. Originally Anthony planned the series as a trilogy, but more and more books were written until he called this the final book of the first trilogy. In addition to the *Cube Route* example, I have verified the *Kolmogorov Complexity*, *The Ringworld Throne*, and *A Falcon Flies* examples against print versions. The others are only verified in ebook versions.

A tricky question arises when evaluating the goodness of a particular pangrammatic window. Clearly, shorter windows are in some sense better, but there are secondary criteria like the presence or absence of proper nouns and whether or not the window spans sentence or paragraph boundaries. Another way to measure goodness is to measure the entropy of window against a corpus of English text. The closer the example is to the corpus, the lower the entropy, and in a certain sense the more English-like the example is. To this end, Table 1 gives the entropy of selected pangrammatic windows calculated using a 4-gram model of English text built according to the PPMC method [1]. Two different entropies are given, E_1 is the entropy from the start of the sentence to the end of the sentence containing the pangrammatic window and E_2 is the entropy solely on the pangrammatic window. Both are expressed in bits per character. By this measure the *Dragon and Thief* pangrammatic window is most typical of English. The entropy measure seems to capture my intuitive feel for these examples with the *Kolmogorov Complexity* and JoBlo's movie review scoring the worst.

Length	E_1	E_2	Pangrammatic window
65	2.49	2.63	<i>The Beth Book</i>
64	2.23	2.16	<i>A French Encounter</i>
56	2.14	2.08	<i>In the Courts of Memory</i>
56	2.81	2.76	<i>The Ringworld Throne</i>
56	2.29	2.96	<i>Night Flight</i>
56	2.26	2.46	<i>A Falcon Flies</i>
55	3.08	3.02	<i>Hackers</i>
55	2.27	2.26	<i>Wolf and Raven</i>
55	2.10	2.27	<i>Dragon and Thief</i>
54	3.55	3.64	<i>Kolmogorov Complexity</i>
52	2.37	2.58	<i>Earth Logic</i>
50	2.37	2.52	<i>The Godmother's Apprentice</i>
47	3.56	3.45	JoBlo's movie review...
42	2.44	2.65	<i>Cube Route</i>
32	2.64	2.80	The quick brown fox...

Table 1: Entropy measure.

References

- [1] Timothy C. Bell, John G. Cleary, and Ian H. Witten. *Text Compression*. Advanced Reference Series. Prentice Hall, Englewood Cliffs, NJ, 1990.
- [2] Eric Chaikin. Joaquin through the pangram window. *Word Ways*, 39(2), 2006.
- [3] Mike Keith. New record pangrammatic windows. *Word Ways*, 35(4), 2002.
- [4] Mike Keith. Sub-60-letter pangrammatic windows. *Word Ways*, 39(1), 2006.
- [5] A. Cyril Pearson. *The Twentieth Century Standard Puzzle Book*. E. P. Dutton, 1907.