

## Search for Extra-Terrestrial Intelligence

The following is from *The Sixth Book of Mathematical Games from Scientific American* by Martin Gardner.

Suppose you want to send a message to extra-terrestrials that stands a reasonable chance of being understood, even though it is quite unlikely that any recipient is familiar with any human language. One way is to exploit the assumption of the universality of arithmetic. (How reasonable is this assumption? I suggest reading: R. W. Hamming, Mathematics on a distant planet, *American Mathematical Monthly* **105** (1998) 640–650.) The following proposed message to extraterrestrials was devised by Ivan Bell in 1960.

Letters from A through Z (omitting O and X) provide the 24 symbols. (Each symbol is presumably radioed by a combination of beeps, but we need not be concerned with those details.) The punctuation marks are not part of the message but indications of time lapses. Adjacent letters are sent with short pauses between them. A space between letters means a longer pause. Commas, semicolons, and periods represent progressively longer pauses. The longest time lapses come between paragraphs, which are numbered for the reader's convenience; the numbers are not part of the message. To minds in any solar system the message should be crystal clear except for the last paragraph, which is somewhat ambiguous; even if properly deciphered, it could be understood fully only by inhabitants of one of our solar system's planets.

1. A. B. C. D. E. F. G. H. I. J. K. L. M. N. P. Q. R. S. T. U. V. W. Y. Z.
2. A A, B; A A A, C; A A A A, D; A A A A A, E; A A A A A A, F; A A A A A A A, G; A A A A A A A A, H; A A A A A A A A A, I; A A A A A A A A A A, J.
3. A K A L B; A K A K A L C; A K A K A K A L D. A K A L B; B K A L C; C K A L D; D K A L E. B K E L G; G L E K B. F K D L J; J L F K D.
4. C M A L B; D M A L C; I M G L B.
5. C K N L C; H K N L H. D M D L N; E M E L N.
6. J L A N; J K A L A A; J K B L A B; A A K A L A B. J K J L B N; J K J K J L C N. F N K G L F G.

7. B P C L F; E P B L J; F P J L F N.
8. F Q B L C; J Q B L E; F N Q F L J.
9. C R B L I; B R E L C B.
10. J P J L J R B L S L A N N; J P J P J L J R C L T L A N N N. J P S L  
T; J P T L J R D.
11. A Q J L U; U Q J L A Q S L V.
12. U L W A; U P B L W B; A W D M A L W D L D P U. V L W N A; V  
P C L W N C. V Q J L W N N A; V Q S L W N N N A. J P E W F G H L  
E F W G H; S P E W F G H L E F G W H.
13. G I W I H Y H N; T K C Y T. Z Y C W A D A F.
14. D P Z P W N N I B R C Q C.