

JSM 2009 - Session #367 - August 4, 2009

What Do Students Hear When We Say 'Random?': Empirical Results from a Study of Lexical Ambiguity

Jennifer Kaplan, Michigan State University, kaplan@stt.msu.edu

Diane Fisher, University of Louisiana at Lafayette, dgf9042@louisiana.edu

Neal Rogness, Grand Valley State University, rognessn@gvsu.edu

Abstract: Language plays a crucial role in the classroom. The use of specialized language in a domain can cause a subject to seem more difficult to students than it actually is. When words that are part of everyday English are used differently in a domain, these words are said to have lexical ambiguity. Studies in other fields, such as mathematics and chemistry education suggest that in order to help students learn vocabulary instructors should exploit the lexical ambiguity of the words. This presentation is part of a sequence of studies designed to understand the effects of and develop techniques for exploiting lexical ambiguities in the statistic classroom. This session will focus on research results from pre- and post-testing students' definitions, both every day and statistical, of the word "random," contrasting students' preconceptions of the meaning of random with the statistical definition.

Presentation Slides available at: <http://www.stt.msu.edu/~kaplan/>

Other Publications and Presentations from this research:

Kaplan, J.J., Fisher, D., & Rogness, N. (in progress, 2009) Lexical Ambiguity in Statistics: What do students learn about the words: association, average, confidence, random and spread? *Journal of Statistics Education*

Kaplan, J.J., Fisher, D., & Rogness, N. (in review, 2008). Lexical Ambiguity in Statistics: What Do students know about the words: association, average, confidence, random and spread? *Journal of Statistics Education*.

Fisher, D., Kaplan, J.J., & Neal Rogness (2009) Letting Go of Assumptions About How Students Understand Statistical Language. Invited Breakout Session, *United States Conference on Teaching Statistics (USCOTS) 2009*. Columbus, OH.

Hilton, S., Kaplan, J., Hooks, T., Harrell, L., Fisher, D. & Sorto, M.A. (2008) Collaborative projects In statistics education. *JSM Proceedings*, Statistics Education Section. Alexandria, VA: American Statistical Association.

References:

Durkin, K. & Shire, B. (1991a). Lexical ambiguity in mathematical contexts. In K. Durkin & B. Shire (Eds.) *Language in Mathematical Education: Research and Practice*. Philadelphia, PA: Open University Press, 71 – 84.

Lemke, J. (1990). *Talking Science: Language, Learning and Values*. Norwood, NJ: Ablex Publishing Corporation.

Leung, C. (2005). Mathematical vocabulary: Fixers of knowledge or points of exploration. *Language and Education*, 19(2), pp. 127 – 135.

Shultz, T. & Pilon, R. (1973). Development of the Ability to Detect Linguistic Ambiguity. *Child Development*, 44, pp. 728 – 733.

Thompson, D. & Rubenstein, R. (2000). Learning mathematics vocabulary: Potential pitfalls and instructional strategies. *Mathematics Teacher*. pp. 568 – 574.

RESULTS

Table 1: Students Everyday Definitions of Random	Number of Students (%)			
	Pilot Study		Validation Sample	
	Pretest	Posttest	Pretest	Posttest
colloquial: out of the ordinary, haphazard, weird	29 (44%)	26 (54%)	49 (49%)	38 (58%)
Selecting without prior knowledge, criteria or method	14 (21%)	8 (17%)	17 (17%)	9 (14%)
Without order or pattern	10 (15%)	7 (15%)	8 (8%)	2 (3%)
By Chance	5 (8%)	2 (4%)	11 (11%)	3 (4%)
Other: without bias, unpredictable	3 (4%)	1 (2%)	6 (6%)	5 (8%)
Unable to be coded	5 (8%)	4 (8%)	9 (9%)	9 (14%)

Table 2: Students Statistical Definitions of Random	Number of Students (%)	
	Pilot Study	Validation Sample
Unable to be coded	4 (8%)	6 (9%)
Other	6 (12%)	7 (11%)
Vague: by chance	2 (4%)	2 (3%)
Without order or reason	10 (21%)	25 (38%)
Unexpected, not predicable, unplanned	4 (8%)	10 (15%)
Without bias, representative, fair	11 (23%)	13 (20%)
Statistical: every element is equally likely	5 (10%)	3 (4%)

Example of random classified as other

Sentence: We used a random variable today.

Definition: random: unknown

Example of random as unexpected or not predictable

Sentence: I was picked for a random sample.

Definition: Not pre-determined.

Example of vague definition of random

Sentence: For the survey, a random sample was picked.

Definition: by chance that something occurred.

Example of random as without bias or fair

Sentence: The sample population is a random sample.

Definition: Sample is equally representative of all groups of the population.

Example of random as without order or reason

Sentence: It was a random sample, which provides independence.

Definition: Random: persons were chosen not based on any reason.

Example of random as equally likely

Sentence: We took a random sample of the students.

Definition: everyone was equally likely to be chosen for the sample

