

EENG663 Game 1: Verbal Representation of Course Content

Activity summary

Overview: Word game similar to Taboo, Catch Phrase, Unspeakable, Battle of Words, and Word Charades.

Setting: in class

Curricular elements: gaming

Prerequisites: completion of a majority of the course

Topics/concepts covered: everything in the course to date

Learning outcomes: After completing this activity, students should be able to:

- Know the definitions of most of the major concepts covered in the course
- Explain course concepts using alternative phrasing than the standard definitions

Expected time to complete: one 1-hour class session

Required hardware/materials: A whiteboard (for scoring), dry-erase markers, and a timer. The instructor should also print this handout on heavy card stock and use a paper cutter to separate the cards.

Required instructor interaction: The instructor serves as scorekeeper and moderator

Common mistakes/pitfalls: Some students forget the rules or don't pay attention to them. Students might miss the point of the activity if it is not reinforced; it is recommended to periodically encourage the students to prepare for this game throughout the course, so they spend time trying to understand how to explain each concept without repeating the definition verbatim rather than attempting to figure it out on the fly.

Method of assessment: Scored by instructor during game play. The winning team can be offered bonus points or non-grade-related perks.

Contributors: Richard Martin and Andrew Klein

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Game 1: verbal representation of course content

This is a word game similar to *Taboo*, *Catch Phrase*, *Unspeakable*, *Battle of Words*, and *Word Charades*.

Overview

- The object of the game is for one person to draw on the whiteboard and get their teammates to guess as many words as possible, without speaking. Gesturing is acceptable, charades are not.
- The point is for you to try to understand the meaning of the terms rather than just the verbatim definitions. Keep this in mind as you progress through the course material.

Setting Up

- Divide the players into two teams.
- Team A chooses one of their players to be their first Clue-giver, and a second player as a wingman.
- A player from Team B sits beside Team A's Clue-giver to observe the cards and check for rule violations.
- The wingman can also see the cards and assists the Clue-giver by discretely offering definitions and suggestions, but otherwise cannot interact with Team A.
- After Team A has completed a turn, the teams swap roles.

Playing the Game

- The Clue-giver draws a card. The word at the top is the Password that the Clue-giver is trying to get his or her teammates to say. The words below the Password are the forbidden words the Clue-giver can't say when giving clues.
- As soon as a card is drawn, the Clue-giver starts the timer and starts giving clues that will make teammates say the Password. The clues can't break any of the rules listed below.
- Go through as many words as you can within the time limit. You may pass, but you will lose 1 point per pass.

Rules for Clues

- No form or part of any word on the card may be given as a clue.
- No gestures, sound effects or noises may be made, such as Doppler effect sounds ("neeeeeeeooooow") or engine noises. If you make engine noises while playing, I will record it and post it on the school's social media accounts.
- You cannot say the Password "sounds like" or "rhymes with" another word.
- No initials or abbreviations can be given if the words they represent are included on the card (or vice versa).
- There is no penalty for wrong guesses, but please don't simply run through guesses of all the course-related words each turn (i.e. regardless of what the Clue-giver is saying). That defeats the pedagogical purpose of the game.

Scoring/Losing Points

- Each time a teammate shouts out the correct Password, the Clue-giver's team scores a point.
- Getting buzzed (-1 point): During the Clue-giver's turn, the members of the opposing team watch the Clue-giver and the cards. If any of the rules are broken, the buzzer is sounded by the opposing team. The Clue-giver removes the card, draws a new card, and continues playing.
- Passing on a card (-1 point): You may choose to pass on a card at any time during your turn.

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| Estimation | Bayesian | Deterministic | Bias |
| <ul style="list-style-type: none"> • Detection • Continuous • Discrete • Value • Determine | <ul style="list-style-type: none"> • Prior • Knowledge • Classical • Distribution • LRT | <ul style="list-style-type: none"> • Random • Prior • Fixed • Constant • Variable | <ul style="list-style-type: none"> • Mean • Expected • Error • Difference • Fox News |
| Variance | Mean Squared Error | UMVU | Max Likelihood |
| <ul style="list-style-type: none"> • Distribution • Spread • Mean • Second-Order • Moment | <ul style="list-style-type: none"> • Metric • Off • Minimize • Performance • Incorrect | <ul style="list-style-type: none"> • Bias • Best • Always • Ideal • Efficient | <ul style="list-style-type: none"> • Classical • Random • Optimum • Estimation • GLRT |
| CRLB | Fisher Info. | Efficient | Classical |
| <ul style="list-style-type: none"> • Efficient • Fisher Info. • Best • Unbiased • Optimum | <ul style="list-style-type: none"> • CRLB • Matrix • Inverse • Derivative • Curvature | <ul style="list-style-type: none"> • Bound • Optimum • CRLB • Best • Lowest | <ul style="list-style-type: none"> • Random • Max Likelihood • UMVU • Music • Deterministic |
| Cost Function | Risk | Mean | Median |
| <ul style="list-style-type: none"> • Penalty • Uniform • MSE • Error • Bayes | <ul style="list-style-type: none"> • Expected • Cost • Average • Penalty • Board Game | <ul style="list-style-type: none"> • Expected • Average • MMSE • Estimate • Moment | <ul style="list-style-type: none"> • Average • Distribution • Middle • Center • Half |

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| Posterior | Parameter | PDF | Norm |
| <ul style="list-style-type: none"> • After • Measurement • A Priori • Before • Knowledge | <ul style="list-style-type: none"> • Quantity • Variable • Unknown • Thing • Estimate | <ul style="list-style-type: none"> • Random • Variable • Uncertainty • Likelihood • Often | <ul style="list-style-type: none"> • Length • Sum • L2 • Metric • Frobenius |
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| Gradient | Gaussian | Correlation | Covariance |
| <ul style="list-style-type: none"> • Derivative • Slope • Downhill • Difference • Vector | <ul style="list-style-type: none"> • Distribution • Normal • Q-function • Noise • Karl Friedrich | <ul style="list-style-type: none"> • Covariance • Second • Coefficient • Sigma • Variables | <ul style="list-style-type: none"> • Correlation • Second • Moment • Sigma • Variables |
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| Noise | Linear | Nuisance | Error Ellipse |
| <ul style="list-style-type: none"> • White • Gaussian • Background • Thermal • Error | <ul style="list-style-type: none"> • Model • Affine • Slope • First • Approximate | <ul style="list-style-type: none"> • Unwanted • Parameters • Extra • Variables • Annoying | <ul style="list-style-type: none"> • Contour • Performance • Region • Covariance • Conic |
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| Convex | Matlab | i.i.d | Least Squares |
| <ul style="list-style-type: none"> • Derivative • Concave • Curve • Slope • ROC | <ul style="list-style-type: none"> • Computer • Software • Program • Code • Simulate | <ul style="list-style-type: none"> • Random • Assumption • Property • Joint • White | <ul style="list-style-type: none"> • Estimate • Norm • Regression • Error • Fit |
| Detection | Hypothesis | Decision | Likelihood Ratio Test |
| <ul style="list-style-type: none"> • Discrete • Estimation • Continuous • Hypothesis • Decide | <ul style="list-style-type: none"> • Test • Detection • Discrete • Choice • Null | <ul style="list-style-type: none"> • Detection • Discrete • Choice • Hypothesis • Pick | <ul style="list-style-type: none"> • Detection • Hypothesis • Probability • Distribution • Threshold |
| SNR | Minimax | Neyman-Pearson | Lagrange Multiplier |
| <ul style="list-style-type: none"> • Background • Error • Power • Over • Strength | <ul style="list-style-type: none"> • Priors • Detection • Worst-Case • LRT • Costs | <ul style="list-style-type: none"> • Detection • Threshold • False Alarm • LRT • Radar | <ul style="list-style-type: none"> • Constraint • NP Test • Cost • Optimization • Inequality |
| False Alarm | ROC Curve | Composite | UMP Test |
| <ul style="list-style-type: none"> • Error • NP Test • Detection • Mistake • Radar | <ul style="list-style-type: none"> • False Alarm • Detection • Probability • Convex • Performance | <ul style="list-style-type: none"> • Hypothesis • Decision • Parameter • Continuous • Detection | <ul style="list-style-type: none"> • Detection • Best • NP Test • Constraint • Optimum |

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| Generalized LRT | Radar | Threshold | Priors |
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| Binary | Communication | M-ary | Source Localization |
| <ul style="list-style-type: none"> • One • Zero • Two • Simple • Detection | <ul style="list-style-type: none"> • Link • Transmit • Signal • Talk • Message | <ul style="list-style-type: none"> • Multiple • Binary • Many • Hypotheses • Detection | <ul style="list-style-type: none"> • Transmitter • Estimate • Find • Where • Project |
| Rcvd Signal Strength | Sensor | Transmitter | Observation |
| <ul style="list-style-type: none"> • Power • Signal • Amount • Distance • Project | <ul style="list-style-type: none"> • Receiver • Measure • Device • Observe • Record | <ul style="list-style-type: none"> • Send • Message • Comm. • Emitter • Receiver | <ul style="list-style-type: none"> • Measure • Record • Value • Obtain • Raw Data |
| Matrix | Vector | Transpose | Expected |
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| Exponential | Statistical | Arg Max | Search |
| <ul style="list-style-type: none"> • Gaussian • Distribution • Tail • Log • e | <ul style="list-style-type: none"> • Random • Deterministic • Probability • Chance • Process | <ul style="list-style-type: none"> • Optimize • Best • Value • Derivative • Peak | <ul style="list-style-type: none"> • Optimize • Grid • Program • Minimum • Find |
| Decision Region | Q-function | Software Radio | Ultra Wideband |
| <ul style="list-style-type: none"> • Area • Hypothesis • Detection • Choose • Likely | <ul style="list-style-type: none"> • Gaussian • Integrate • Error • Erfc • Numerical | <ul style="list-style-type: none"> • RTL-SDR • USB Dongle • program • signals • hardware | <ul style="list-style-type: none"> • Comm. • PPM • Impulse • Noise Radar • Transmit |
| MUSIC | Matched Filter | Probability of Error | LaTeX |
| <ul style="list-style-type: none"> • Frequency • Narrow • Tone • Carrier • Project | <ul style="list-style-type: none"> • Correlator • Detection • Structure • Integrate • Same | <ul style="list-style-type: none"> • Q-function • Detection • Mistake • Performance • Bits | <ul style="list-style-type: none"> • Word • Processing • PDF • Report • Project |
| Contours | Environment | Model | Periodogram |
| <ul style="list-style-type: none"> • Level • Height • Altitude • Curve • Slice | <ul style="list-style-type: none"> • Background • Model • Area • Place • Green | <ul style="list-style-type: none"> • Structure • Formula • Probability • Equation • Diagram | <ul style="list-style-type: none"> • Frequency • MUSIC • Tone • FFT • Project |

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| Limit | Proof | Antenna | Closed-Form |
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| <ul style="list-style-type: none"> Asymptotic Infinity Large Bound Goes | <ul style="list-style-type: none"> Theorem QED Evidence True Alcohol | <ul style="list-style-type: none"> Sensor Signal Listen Transmit Receive | <ul style="list-style-type: none"> Expression Equation Formula Simple Compact |
| | | | |
| Thesis | Research | Algorithm | |
| <ul style="list-style-type: none"> Research Document Advisor Publish Write | <ul style="list-style-type: none"> Thesis Sponsor Advisor Publish Classes | <ul style="list-style-type: none"> Process Recipe Steps Method Numerical | <ul style="list-style-type: none"> |
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