



ON THE WAY TO A BETTER WORLD



- In order to solve story problems, learners must comprehend problem text (Kintsch & Greeno, 1985)
- Successful problem-solvers coordinate:
 - **Surface model:** Literal text
 - **Textbase:** Info arranged in propositional form
 - **Situation model:** Understanding of actions and relationships
 - **Problem model:** Formal equations and operands
- The *readability level* and *topic* of problems may interact with cognitive and non-cognitive factors

Readability: Coh-Metrix

- Provides 108 quantitative measures of (McNamara et al., in-press):
 - **Surface code**: Difficulty of words and syntax
 - **Textbase**: Ease

Topic Incidence - LiWC

- Dictionary-based text analysis program (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007)
- The topic of a story problem was determined by whether it had at

Study 1: Results

- **Moving from 3 to 4 sentences** reduced corrects by an estimated 4.4% ($p < .01$), increased incorrects by an estimated 2.75% ($p < .05$) and increased hints by an estimated 1.4% ($p < .01$)
 - Other measures of length (DESWC, DESSL) sometimes significant as well.
- **Third person singular pronouns** (3PS; he/she/it) associated with more correct answers ($p < .05$) and fewer hints ($p < .01$)
 - Changing a problem with no 3PS to a problem that has 10% of its words as 3PS should increase correct answers by an estimated 3.6%
- Increasing the **standard deviation of the amount of semantic overlap between sentences** significantly decreased correct answers
 - Moving from SD = 0 to SD = 0.3 would decrease corrects by 4%
- Using **concrete words** significantly reduced hints (*low schools only*)
- Using **words with multiple meanings** (word polysemy) significantly decreased corrects and increased incorrects (*expression-writing only*)
 - Each additional meaning decreases corrects by 4.6% and increases incorrects by 4.6%

Study 1: Results

- Words involving **social processes** decrease incorrect answers ($p < .05$) by an estimated 2.09%

