

Teacher, teach thyself: Expectations of teaching on learning from text

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Background

3 stages of teaching (Bargh & Schul, 1980)

1. Preparation to teach

2. Presentation of material

3. Feedback from students

Teaching can improve learning for the student and teacher.

Just expecting to teach has improved performance on (Bargh & Schul, 1980; Benware & Deci, 1984; Fiorella & Mayer, 2013; Nestojko, Bui, Kornell, & Bjork, 2014):

- Recognition tests
- Free recall
- Short Response
- Fill-in-the-blank
- Immediate open-ended tests
- **But NOT delayed tests**

Expecting to teach might be increasing only memory for the text. No clear evidence that it is increasing comprehension of the text. (Kintsch, 1994)

Research Questions

Does expecting to teach...

1. lead to benefits in memory for complex text?
2. lead to benefits in comprehension of complex text?
3. alter processing of the material during study?



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GRFP

Method

214 undergraduates

Expectation Instruction: Teach*, Test

20-min Study + Note-taking

Tests: Immediate, 1-week delay

Instruction:

The purpose of studying and learning the text is so that you will...

- **Test:** ...score as high as possible on a test based on the text.
- **Teach:** ...*be able to teach the contents to another student so they will score* as high as possible on a test based on the text.

Tests:

- 5 text-based MC questions (TB)
- 5 inference MC questions (INF)
- Free Recall

Complex Expository Text

- 1,350 words, 147 idea units
- Written at 11th grade level

In general, alcoholic fermentation is a process where sugar is broken down into ethanol alcohol and carbon dioxide. In more specific terms, the process of alcoholic fermentation begins when glucose (sugar) comes into contact with the yeast. The glucose provides the yeast cells with the necessary energy to complete the process of fermentation. The glucose is then broken down to yield a molecule of energy (ATP) for the yeast cell. In addition to ATP, two molecules called pyruvate are made. The pyruvate is then converted by the yeast cell into the byproducts, carbon dioxide (CO₂) and alcohol (ethanol).

There are thousands of species of yeast which vary in the amount of total amount of sugar they can convert. Attenuation refers to the percentage of sugar the yeast can convert to carbon dioxide and ethanol. Yeast strains, on average, attenuate 65-80 percent, meaning that there is a small percentage of residual sugar that remains in the beverage. Champagne yeasts are a strain of yeasts that typically attenuate to a higher percentage, around 75 percent. When brewers or wine makers want to achieve a beverage with high alcohol content they can use yeast with high attenuation like Champagne yeasts because more sugar will be converted to alcohol. This would result in a product with very little glucose left in the product.

Memory for text:
5 Text-Based Questions

What are the byproducts of fermentation?

- Ethanol and CO₂*
- Glucose and Ethanol
- Pyruvate and CO₂
- Alcohol and Pyruvate

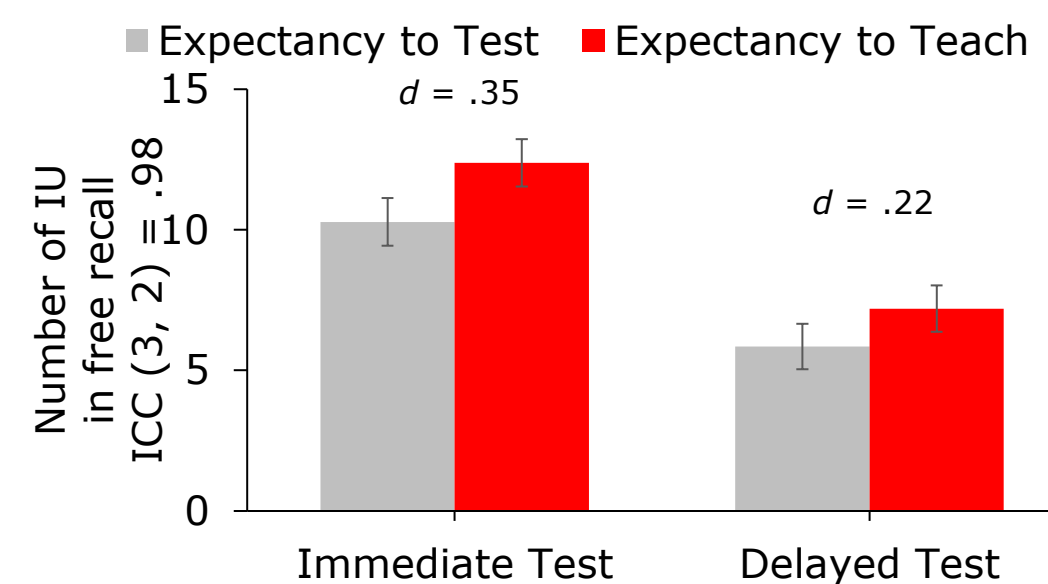
Comprehension of text:
5 Inference Questions

If yeast cells have a low attenuation, what is most likely to happen to the beer or wine?

- It will contain residual sugars.*
- It will have a high alcohol content.
- It will take a longer amount of time to ferment.
- It will create a toxic environment.

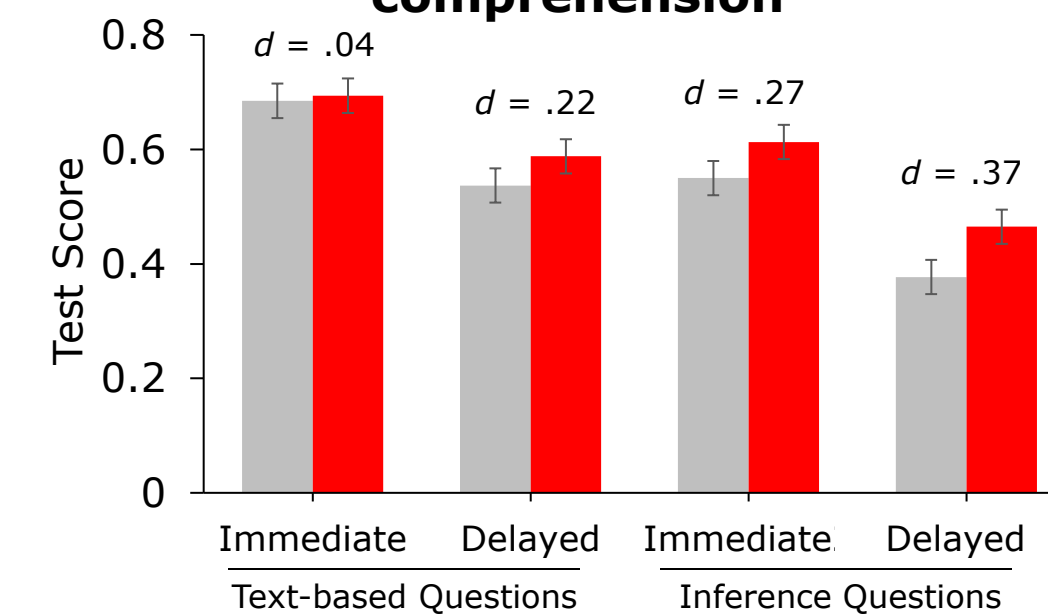
Results

Expecting to teach improves recall



Teach>Test: $F(1, 208) = 4.32, p = .04, \eta^2_p = .02$
Imm>Delay: $F(1, 208) = 33.40, p < .001, \eta^2_p = .14$
Interaction: $F < 1$

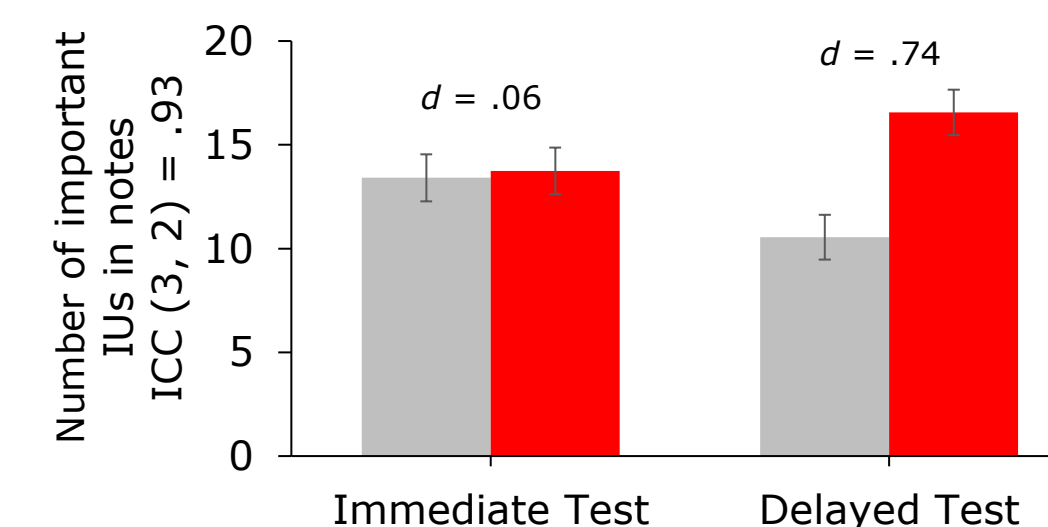
Expecting to teach improves comprehension



TB Teach=Test: $F < 1$
Imm>Delay: $F(1,208)=15.07, p<.001, \eta^2_p=.07$
No Interaction: $F < 1$

INF Teach>Test: $F(1,208)=5.33, p=.02, \eta^2_p=.03$
Imm>Delay: $F(1,208)=24.10, p<.001, \eta^2_p=.10$
No Interaction: $F < 1$

Expecting to teach alters note-taking



Teach>Test: $F(1, 208) = 8.22, p = .005, \eta^2_p = .04$
Imm=Delay: $F < 1$
Interaction: $F(1, 208) = 6.47, p = .01, \eta^2_p = .03$

Conclusions

1. Does ETT lead to benefits in memory?
 - Higher mean recall
 - No benefit on text-based questions
2. Does ETT lead to benefits in comprehension?
 - Higher mean performance on inference questions
 - New evidence of comprehension benefits on at-grade-level texts
3. Does ETT alter processing during study?
 - Greater number of IU in notes when participants expect to teach in the future

Small effects, but manipulation was subtle

- Variation in how participants prepared
- Need to structure preparation

Preparation to teach

1st read: Encode textbase

Free resources to focus on situation model during study (Millis et al., 1998)

2nd read: Develop mental model

Goals influence reading on the second-pass (Yeari et al., 2015)

Constructive Activity

Creating lesson plan or outline may lead to improved comprehension

Presentation of material

Feedback from students

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