

CCSE

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# KI i undervisning: ChatGPT and active learning in science

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*Center for Computing in Science Education*

*IDEA Seminar: Kunstig intelligens i fremtidens utdanning*

*15 March, 2023*



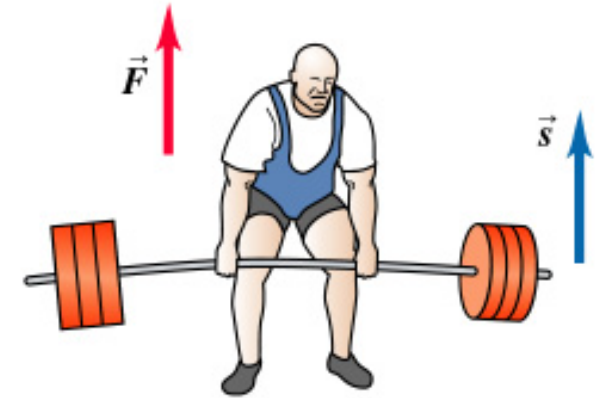
UiO : Det matematisk-naturvitenskapelige fakultet



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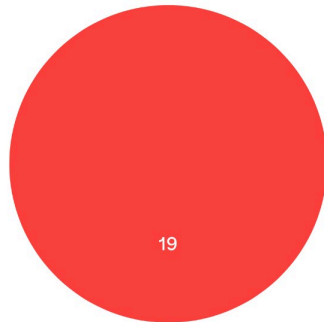


En vektløfter løfter en vekt opp fra gulvet.  
Mens han løfter den:



1. gjør han et positivt arbeid på vekten, og vekten gjør et positivt arbeid på ham.
2. gjør han et negativt arbeid på vekten, og vekten gjør et positivt arbeid på ham.
3. gjør han et positivt arbeid på vekten, og vekten gjør et negativt arbeid på ham.
4. gjør han et negativt arbeid på vekten, og vekten gjør et negativt arbeid på ham.

Studentene:

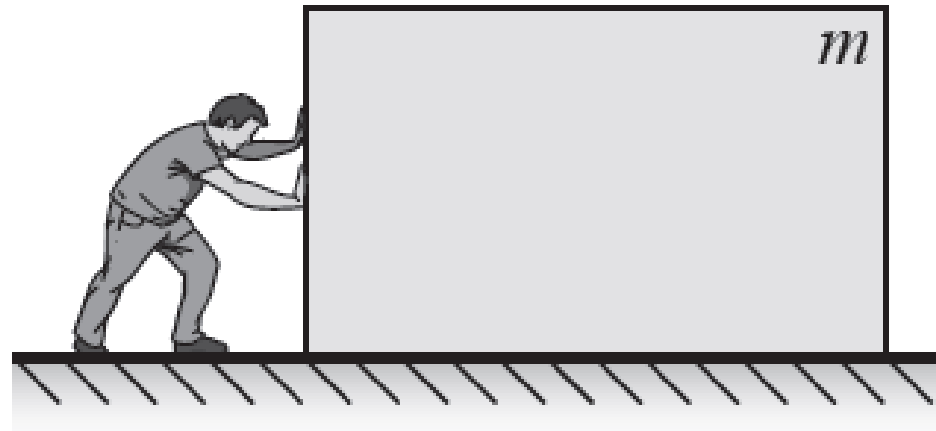


✓ 3.

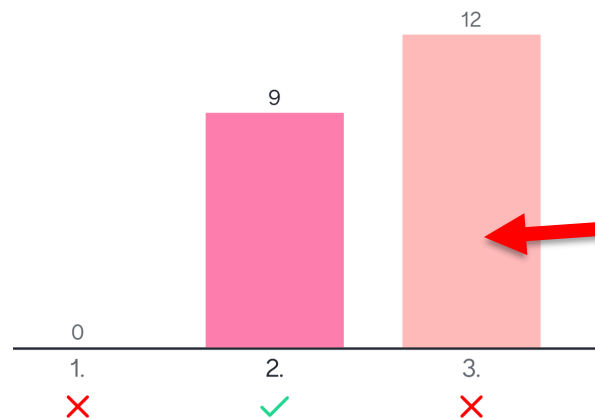
ChatGPT: 3

Du beveger en kasse med masse  $m$  1 meter til høyre, og tilbake igjen 1 meter til venstre. Friksjonskraften er  $F_d = \mu_d N$ . For den totale bevegelsen gjør **friksjonskraften**:

1. Positivt arbeid på kassen.
2. Negativt arbeid på kassen.
3. Ikke noe arbeid på kassen.



**Studentene:**



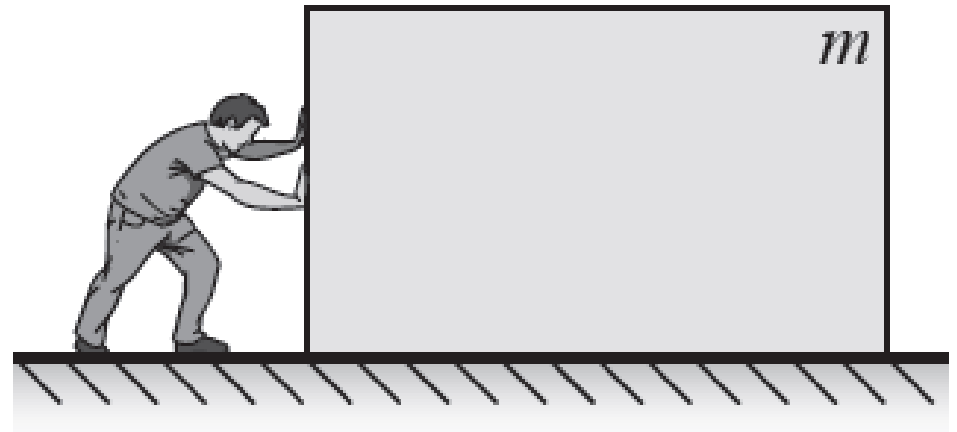
**ChatGPT: 3**



# ChatGPT and Misconceptions

Students have certain **misconceptions** about science  
ChatGPT displays these same **misconceptions** about science

**Misconception:**  
Work depends on  
total displacement



# A Stable Misconception



What about the fact that the box and ground become warm while it is being pushed?



The fact that the box and ground become warm indicates that some of the work done on the box by the person pushing it has been dissipated as heat due to the friction between the box and the ground. This is an example of mechanical energy being converted to thermal energy.

[...]



If the work due to friction is negative during the first movement and positive during the second, how can it be zero total?

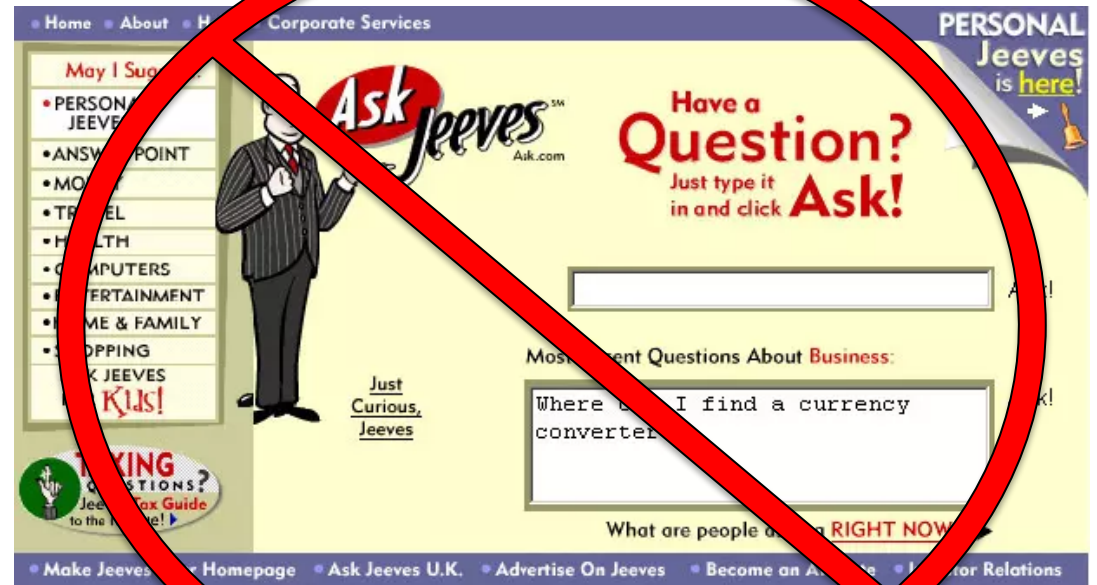


I apologize for the mistake in my previous response. You are correct that the work done by friction during the first and second movements is negative, not positive during the second movement. Therefore, the net work done by friction on the box over the entire motion is indeed negative.

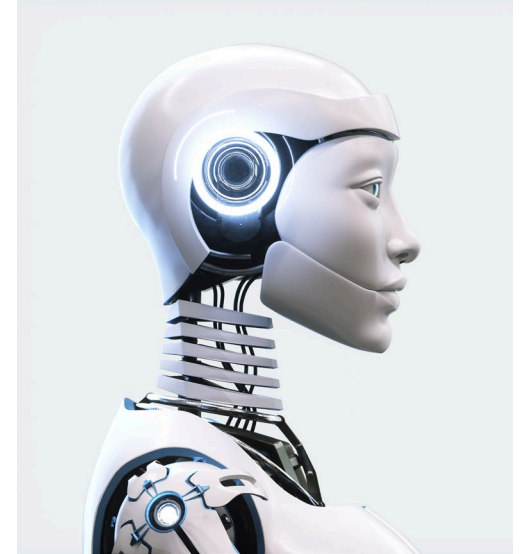
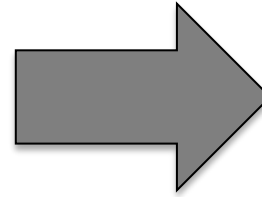
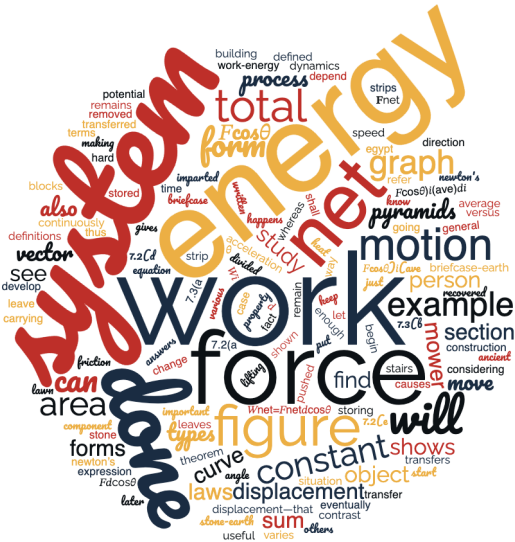
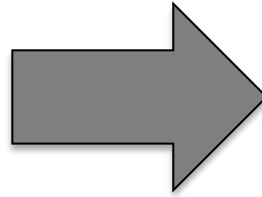
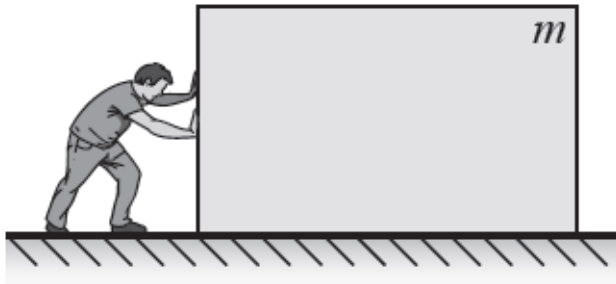
# ChatGPT is no oracle



Image: Warner Bros. Pictures



# ChatGPT is a Representation ...of a Representation





Bibliography - STCSE

archiv.ipn.uni-kiel.de/stcse/

## Bibliography - STCSE

### Students' and Teachers' Conceptions and Science Education

Compiled by Reinders Duit

Formerly: Helga Pfundt & Reinders Duit  
Bibliography - Students' Alternative Frameworks and Science Education  
Bibliographie - Schülervorstellungen und naturwissenschaftlicher Unterricht

*New and Final Version  
"March 2009"  
available!*

The bibliography attempts to document research on teaching and learning science with a certain emphasis on research from constructivist perspectives. The role of various students' and teachers' conceptions in the teaching and learning process is given particular attention. The bibliography includes about **8400 entries**. Articles on empirical investigations and theoretical issues are taken into account. The sources are the leading journals and publications on teaching and learning science, proceedings, conference papers and occasional papers in English and German.

The bibliography is based on a collection of papers on students' pre-instructional (alternative) conceptions Helga Pfundt started in the late 70s. Since 1984 Reinders Duit has taken care of the bibliography. Initially, the focus was on students' conceptions of various science topics. As this area has developed towards constructivist perspectives of conceptual change the emphasis of the bibliography has also changed. The new name of the bibliography takes these changes into account.

Please notice: This is the last version of the bibliography available. After more than 30 years it has become more and more difficult to adjust the initial system of keywords to the rapid developments in science education research. A major revision of the bibliography would be necessary. As new powerful search means have become available it does not seem necessary any more to continue the bibliography.

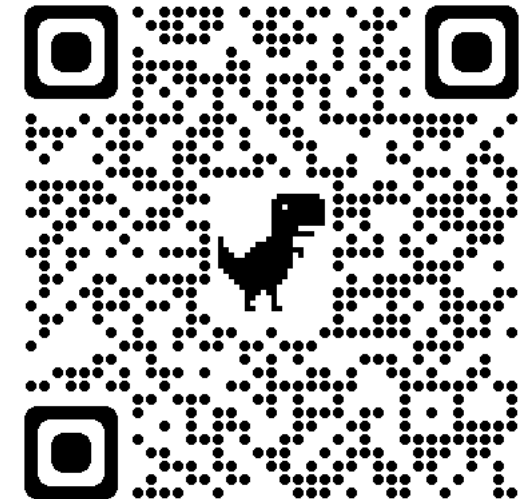

Reinders Duit, March 23, 2009

**More information:**  
Please read the "[Introduction](#)"

If you want to **download the complete bibliography**, please click [here](#)!

**Major issues documented:**

- Theoretical orientation of studies on teaching and learning science
- Students' conceptions of various kinds
- Teachers' conceptions of various kinds
- Instruction taking conceptions into account (e.g., conceptual change approaches)
- Teacher education



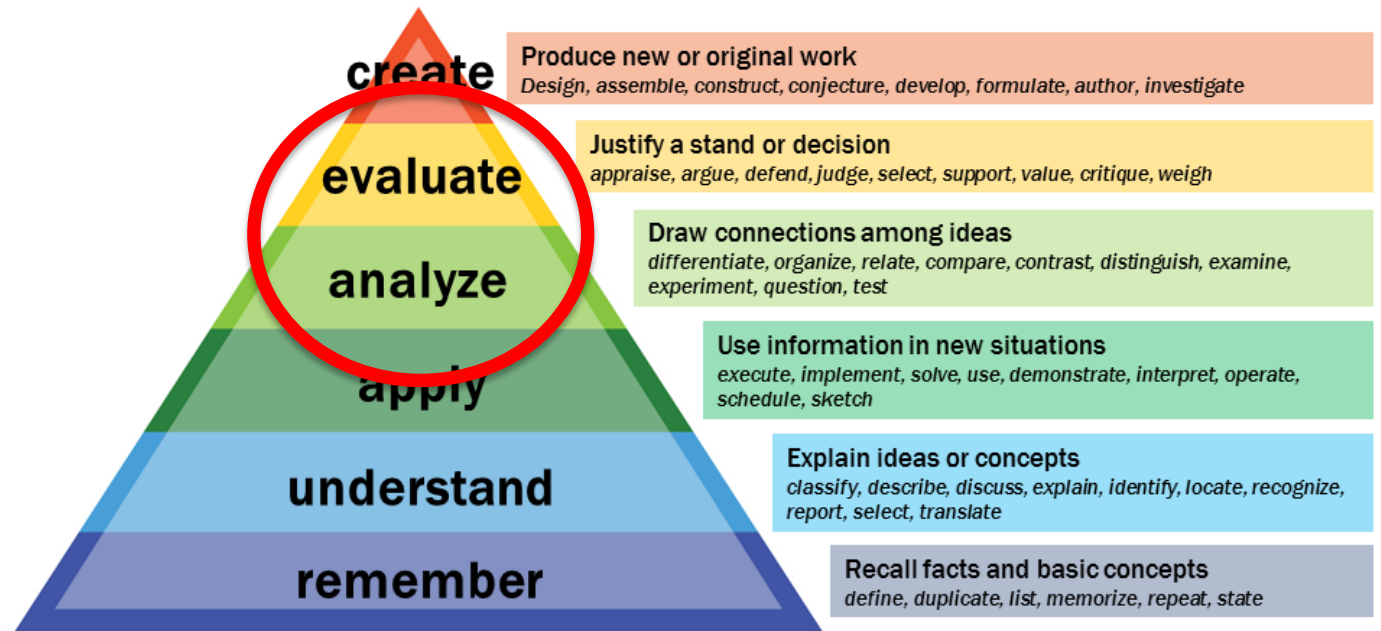
~8400 Misconceptions-based research articles  
as of 2009

# How do we use ChatGPT in instruction?

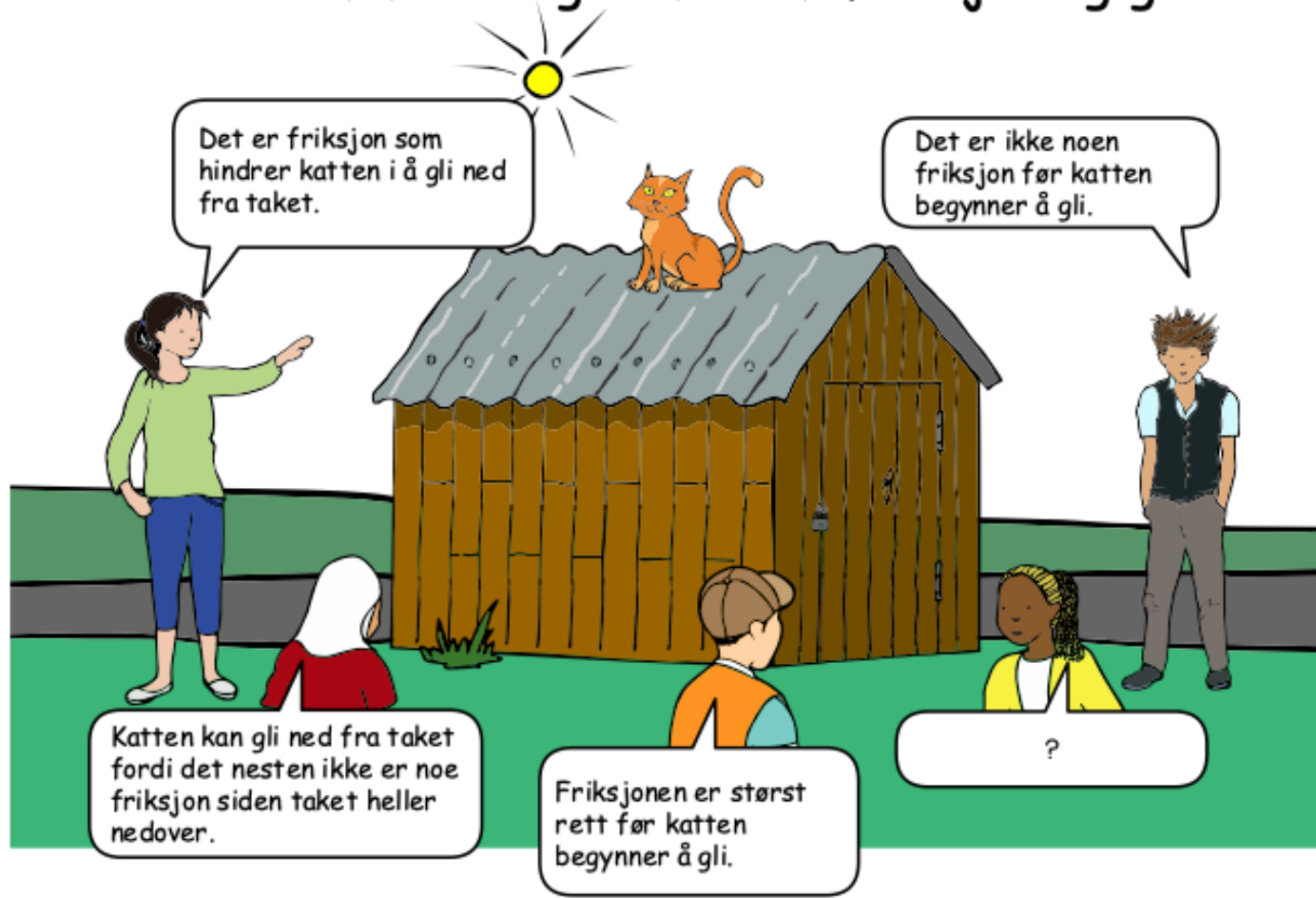
ChatGPT is...

- **Good** at **summarizing** text and information
- **Bad** at providing **accurate** information

## Bloom's Taxonomy

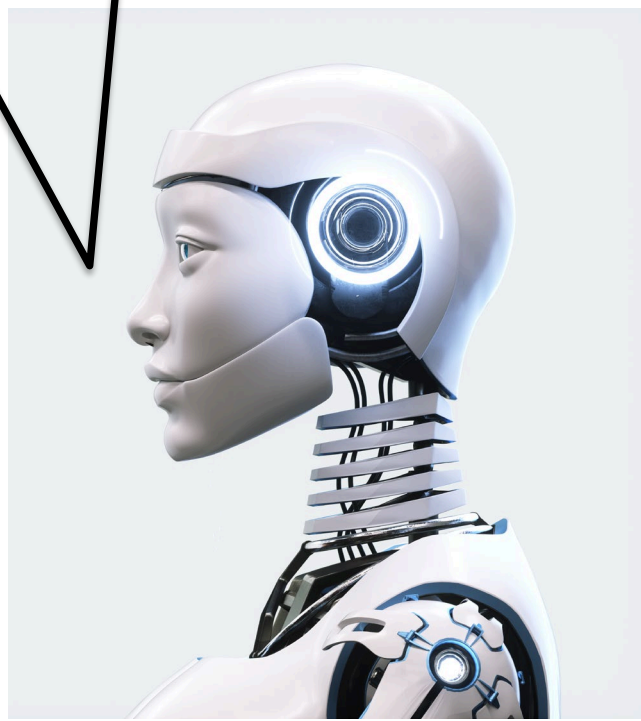


# Hva er sammenhengen mellom friksjon og glid?



Hva mener du?

The negative work done during the first movement is exactly offset by the positive work done during the second movement. As a result, the net work done by the frictional force over the entire motion is zero.

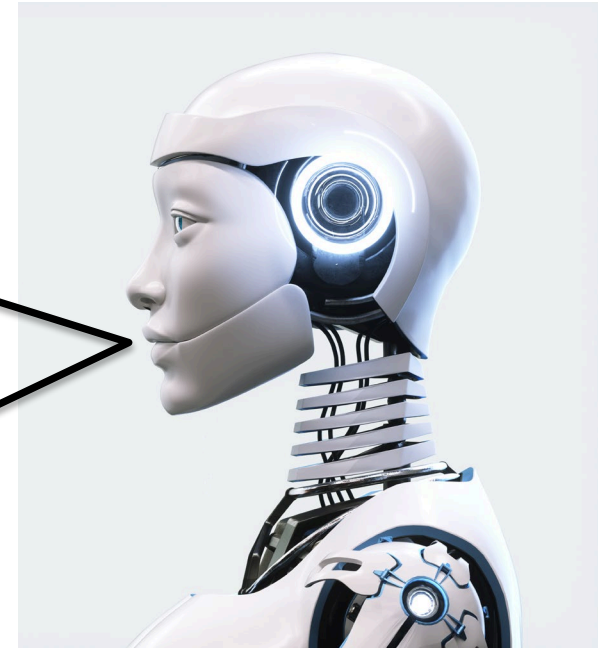


# ChatGPT as a errorful dialogue partner



If the work due to friction is negative during the first movement and negative during the second, how can it be zero total?

I apologize for the mistake in my previous response. You are correct that the work done by friction during the first and second movements is negative, not positive during the second movement.



**THANK YOU!**