11. MLE versus Method of Moments

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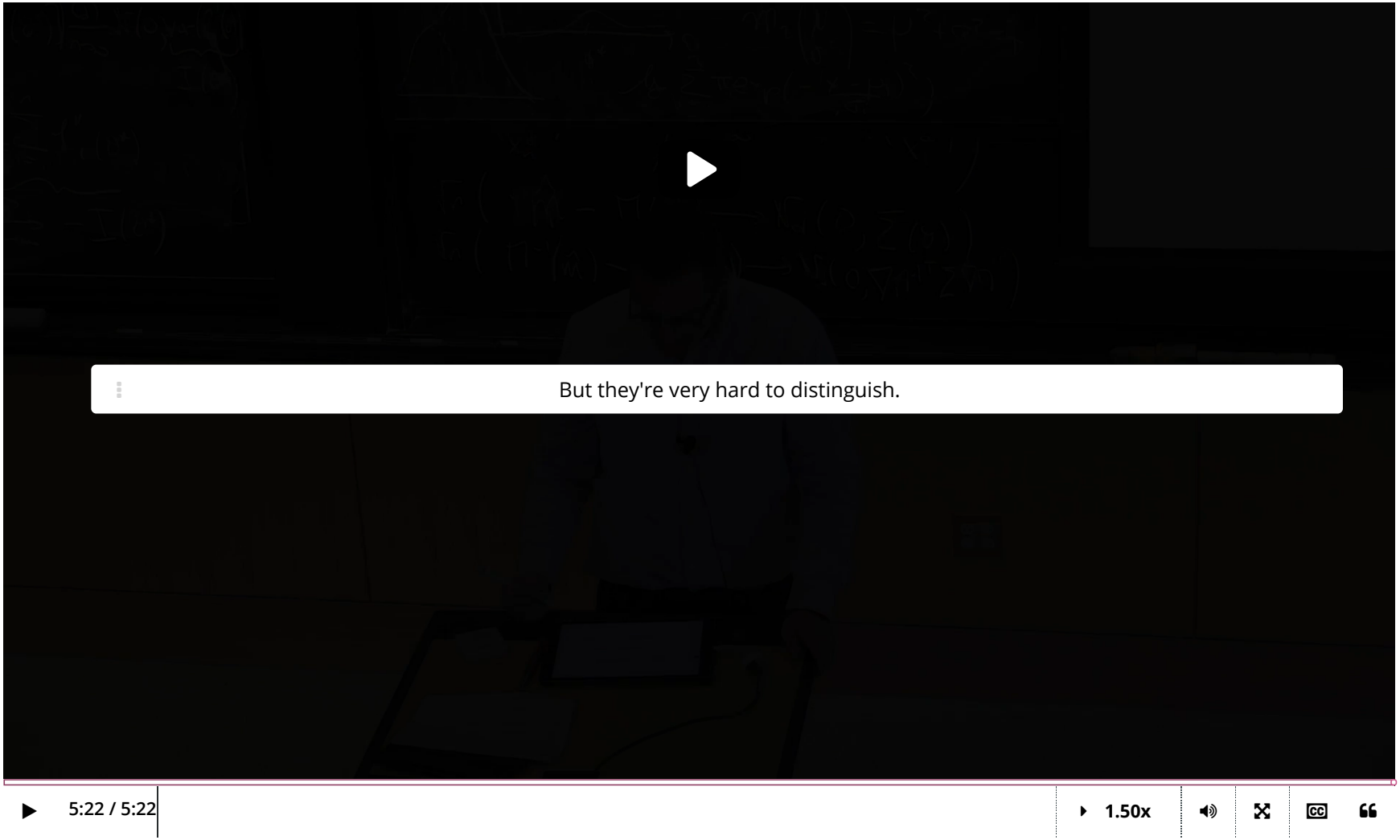

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MLE vs. Method of Moments

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Which of the following are advantages of using the MLE over the method of moments estimator? (Choose all that apply.)

Remark: All of the choices below are true statements; your task is to figure out which of these choices are indeed advantages.

- [x] In general, the MLE provides a more accurate estimator than the method of moments estimator.
- [ ] If the likelihood has several local maxima, then we may not be able to compute the MLE efficiently
- [x] The method of moments requires you to find d so that the first d moments uniquely determine the distribution of interest. To compute the MLE, this step is not necessary.

✔

Solution:

We examine the choices in order.

- As stated in the slides, if we compare the quadratic risks of the method of moments estimator and the MLE, then the MLE has better performance in general. Hence "In general, the MLE provides a more accurate estimator than the method of moments estimator." is correct.
- Since the MLE is not always computationally tractable, this is a disadvantage. Optimizing the likelihood function can be very inefficient if the likelihood function is complicated and has several local maxima which require testing. Hence "If the likelihood has several local maxima, then we may not be able to compute the MLE efficiently" is an incorrect response.
- "The method of moments requires you to find d so that the first d moments uniquely determine the distribution of interest. To compute the MLE, this step is not necessary." is correct. The expression of the moments map ψ in terms of the parameter θ can be quite complicated, so it may be difficult to deduce how many moments (or *degrees of freedom*) are needed to uniquely recover the true distribution from moments. It is not necessary to make assumptions on or work with the moments map to use the MLE, so this is another advantage.

Submit You have used 1 of 3 attempts

Answers are displayed within the problem

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Karl Pearson crab paper

Here is a link to [Pearson's paper on crabs][1] that is mentioned in the lecture. [1]: https://royalsocietypublishing.org/doi/abs/10.1098/rsta.1894.0003

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