

# New study explains a secret to more efficient learning

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A new study could hold the key to learning languages, teaching children colors or even studying complex theories.

The research, published in *Cognitive Science*, adds to the existing evidence that adults, children and students of all ages learn better when

seeing an object before hearing its description. The study builds on past research by focusing on learning in "inconsistent" environments featuring different teaching styles or distracting noises.

"Understanding how the learning process occurs, and what factors affect it, may help instructors improve methodologies of education," said Timmy Ma, a research associate at Dartmouth.

Learning environments can often complicate the [learning process](#). For example, a student taking a course with both a teacher and a teaching assistant needs to adapt to the ways the different instructors teach the same subject. Even the varying ways teachers talk and behave can complicate learning.

For the study, researchers intentionally provided confusing information to mimic these types of inconsistencies to subjects that were tasked to learn the names of three fictional characters—"yosh," "wug" and "niz"—using two types of learning methods.

The first method, "object-label learning," is when a student sees an object first and then is provided with the label. This means seeing a color before being told its name. Or hearing a description of a physical force before being hearing its formal title.

The second learning procedure is "label-object learning," the reverse order in which a [student](#) sees a label first.

Subjects in the study were asked to match the pictures of the characters with their made-up names. The presentation of information was intentionally misleading to see if learners have an easier time dealing with the inconsistency depending on the way the input was presented—either object first or label first.

The results of the study indicate that students who see objects first and then hear the name—object-label learners—process inconsistent information better than learners who hear the name first and then see the object.

Researchers detected that learners that interact with the object before hearing the name perform "frequency boosting"—the ability to process noisy, inconsistent information to identify and use the most frequent rule.

For example, when teachers interchangeably use "soda" or "pop" to describe the name of a carbonated beverage, the children who use frequency boosting will learn to use the term that is used most frequently.

A key feature of frequency boosting is that learners will also use the rule more consistently than the instructor.

"When trying to teach a child about colors, such as blue or red, not many people think about the best way to do it. People just say this is blue and point to an object. From this research, we can say that the order of presentation actually matters and that seeing the object first creates a stronger association to the name," said Ma who conducted the research while a Ph.D. candidate at the University of California, Irvine.

The research team also used mathematical modeling to confirm the observations as well as provide a theoretical explanation as to why one type of learner is different from the other.

"This research combines experiments with a novel [mathematical model](#) to show that object-label learners deal better with inconsistencies. It's exciting to see that the math theory explains the [observational data](#)," said Ma.

According to the research team, understanding how people learn could have broad applications. For example, foreign language learning programs could benefit from showing images before introducing the name of an object. The results can also be applied to math, science or any other subjects where students need to make similar associations.

**More information:** Timmy Ma et al, Object-Label-Order Effect When Learning From an Inconsistent Source, *Cognitive Science* (2019). [DOI: 10.1111/cogs.12737](https://doi.org/10.1111/cogs.12737)

Provided by Dartmouth College

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