

# Parsing the parts of an academic article

## With examples from a fictional study on cat zoomies<sup>1</sup>

In the course of your education, you will need to summarize or synthesize what we learn from professional academic research. Often your professor will want you to emphasize certain aspects of the research in your argument, which can be hard if you don't know some basic research terminology. Here is some guidance to help you understand what your professor means when she says something like, "Yes, you have identified the argument these authors are making, but what is the *finding*?"

## 1 Puzzle/Question

The puzzle or question of the study is the thing that the researcher has observed that she wants to explain. Though sometimes the question is about *whether* something happens, more commonly the question relates to *why* something happens.

Example: My question with this study is why cats, who have done nothing but eat and sleep all day, suddenly tear around at top speed in the middle of the night, without warning or obvious provocation.

### 1.1 Outcome/dependent variable

The outcome or dependent variable is the thing that the researcher wants to explain. It follows directly from the puzzle or question. This outcome must be defined and measured in some way; the measurement can range from a simple yes/no to a complex calculation. There must also be variation across cases: if the outcome is always the same, there is nothing to explain.

Example: The dependent variable is the presence or absence of zoomies, which are defined as episodes in which the cat is moving at more than 3x average-cat-speed without chasing anything.

## 2 Theory or argument

The theory is the answer the researcher proposes to the question she just asked. Importantly, the theory is just a *possible* answer. The author has presumably provided reasons why we should find her answer reasonable a priori<sup>2</sup> but she has not yet shown that the theory supported by evidence, and may in fact ultimately conclude that the evidence does not support the theory. Be careful not to confuse theories with either hypotheses or findings (see below).

Example: I theorize that cat zoomies are a remnant of ancient cat instincts, which energized cats to hunt just before dawn, when nocturnal prey are tiring and diurnal prey are just beginning to be active. I argue that this is reasonable based on existing literature on the persistence of instinct

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<sup>1</sup>Credit for this idea and the phrase "cat zoomies" goes to Allison Harris.

<sup>2</sup>*A priori* means based on logic and existing knowledge, without reference to actual data or empirical evidence. Authors try to make their theories convincing before they test them, in part because testing an implausible theory is not a good use of anyone's time, and in part because real-world outcomes can have many causes, and the author wants us to believe *her* proposed cause is the right one.

in domesticated animals (Pavlov Jr. 1947), and the hunting habits of wild cats (Kratt and Kratt 2007).<sup>3</sup>

## 2.1 Determinant/predictor/independent variable

The independent variable is the thing that the author thinks causes or predicts the outcome. As with the dependent variable, the independent variable must vary (or it can't explain an outcome that varies). It must also be defined and measured. Sometimes the researcher simply observes how the independent variable varies naturally. Sometimes the researcher directly controls the independent variable; in this latter case, the study is an experiment.

Example: The independent variable is the time of day, specifically whether it is within an hour before dawn, according to official sunrise tables.

## 3 Hypotheses

The hypotheses are the patterns the author argues we should observe in the world if her theory is the correct explanation. Hypotheses generally propose that, when two or more groups are compared, the dependent variable will be higher or more common in some groups than others, and that this will be correlated to differences in the independent variable.

Example: If my theory is correct, cats will be most likely to zoom in the hour just before dawn than at any other time of day or night.

## 4 Test

The test is what the researcher did to determine whether the expectation outlined in the hypothesis is what actually occurs in reality. Tests vary widely, but always involve comparing changes in the independent variable to changes in the outcome/dependent variable.

Example: To test the hypothesis, I set up inconspicuous ground-level cameras in the homes of 623 cats, and noted any occasion in which a blur of cat rushed past the camera. After confirming with the owner whether the blur was, in fact, a zoomie (e.g. no one was playing with the cat; the cat was not actively hunting), I recorded whether or not it occurred within the hour before dawn in local time. I compared the number of zoomies that occurred in the hour before dawn with the average number of zoomies per hour for the remaining 23 hours of the day.

## 5 Finding

The finding is the pattern the authors actually observed in the data after running their test. It explains how the dependent variable changes when the independent variable changes, or, alternatively, identifies the conditions, if any, that predict when the outcome is more or less likely. Since sometimes theories are wrong, a researcher may also find that there is no pattern, and that the

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<sup>3</sup>I have no idea if this is reasonable. I am a political scientist, not an animal behaviorist. Just go with it.

independent variable is not related to the dependent variable.

Example: I find that though cats are more likely to zoom at night, they are not more likely to zoom in the pre-dawn hour specifically. In the hour before dawn, 12% of cats in the sample zoomed. This is consistent with the 13% of cats zooming, on average, during any other hour from sunrise to sunset.

## 6 Conclusion

The conclusion is the author's statement about whether or not their finding is consistent with their hypothesis.

Example: The findings are inconsistent with the hypothesis that cats zoom in the hour before dawn. This suggests that my theory of the causes of cat zoomies is incorrect, and that zoomies are not related to instincts to hunt immediately before dawn.

## 7 Implication

The implication is what the conclusion means for our broader understanding of the way the world works.

Example: Unfortunately, my findings indicate that we are no closer to understanding why cats engage in this infuriating behavior. I acknowledge that any attempt to explain cat behavior is likely futile. Because they are cats.

## 8 An abstract

A paper abstract generally provides all of the information above. The independent and dependent variables may or may not be identified directly, and some details may be cut to ensure the abstract is sufficiently short. Nevertheless, you can usually find what you need need in the abstract, and in the following order: question, theory, hypothesis, finding, conclusion and implication.

Example: Why do cats suddenly tear around at top speed in the middle of the night? I propose that cat "zoomies" are a remnant of ancient cat instincts, which energized cats to hunt just before dawn, when their prey was slowest. If my theory is correct, cats will be most likely to zoom in the hour just before dawn than at any other time. To test the theory, I observed 623 cats with cameras, and recorded the time of every observed zoomie. I compared the number of zoomies that occurred in the hour before dawn with the average number of zoomies per hour for the remaining 23 hours of the day. I find that, while cats are more likely to zoom at night, they are not more likely to zoom in the pre-dawn hour specifically. The findings are inconsistent with the hypothesis, suggesting that my theory of the causes of cat zoomies is incorrect. Unfortunately, our findings indicate that we are no closer to understanding why cats engage in this behavior.