



GETTING OUT OF THE LABORATORY TO MAKE EXPERIMENTS REAL: CAN SPORTS FANS INFLUENCE MUAY THAI JUDGES?

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To find out if one thing actually causes another, carefully controlled experiments are needed. Experiments usually take place in a laboratory. However, to examine how people respond to things that happen in real life, in particular places at particular times, it can also be important to step outside the laboratory. This article discusses how to have enough control in an experiment to be confident that something caused something else to happen, yet to also be confident the same effect would happen with other people, at other times, and in other places. This article will explain why it can be important to conduct experiments in real-life settings and will illustrate this using an experiment that a colleague and I conducted on the effect of crowd noise on the judges during a sport called Muay Thai [1]. However, it will begin by exploring how experiments are used to find cause and effect.

INDEPENDENT VARIABLE

An independent variable is a variable that isn't changed by the other variables being measured and is used to see if it causes some kind of change in another variable (the dependent variable). So in an experiment, we keep every variable the same except the ones we're interested in (independent variable), and when we change these in a structured way, we can see if and how this changes the outcome (dependent variable). For example, if we wanted to see which switch on a switchboard turned on a light bulb - the easiest way would be to start pressing and releasing them one by one, without touching the others, and seeing which press caused the bulb to turn on.

DEPENDENT VARIABLE

A dependent variable is something that depends on other things. The dependent variable is what we measure to see if it has changed. For example, a judge's score is the dependent variable in the study, because it could be different depending on the influence of the cheering of the crowd.

HOW DO WE KNOW FOR CERTAIN SOMETHING CAUSES SOMETHING ELSE TO HAPPEN?

It is really important to understand what causes particular things to happen, but we often do this without much thought. For example, we might know that it was the sound of our alarm clock that caused us to wake up at a certain time in the morning. However, it is not always as easy to link cause and effect in this way. We often cannot be sure which things that could influence an outcome actually do. Scientists call these things that could influence an outcome *variables*. So, when we run experiments, we try to keep every variable the same except the one we are interested in studying (called the **independent variable**). When we change the independent variable in a specific way, we can see if and how this changes the outcome of the experiment (which we call the **dependent variable**). One simple example would be setting up an experiment to see if a particular plant food improved plant growth over a month. First, we would get 20 of the same type of plants of a similar age and size. In this example, plant type, age, and size at the start of the experiment are variables that we want to keep the same. Next, we would divide the plants into two groups by numbering them and randomly drawing numbers. The first 10 plants would go into our treatment group—the plants that get the plant food. The second 10 plants will go into what we call our *control group*—these are the plants that do not get plant food. This method of assigning things to groups is called *randomization*, and it makes sure that every plant involved in our study has an equal chance of being picked for either group. This is the best way to make sure that the groups are as equal as possible. Then, for a month, we give the plant food to the treatment group but not to the control group. All the other variables are kept exactly the same—the plants get the same amount of sunlight, the same environment, and the same water. We measure the size of the plants (our dependent variable) before and after the month of treatment and compare measurements. If the plants in the treatment group have grown more than those in the control group, we know that it was the plant food that caused the extra growth and not something else, because everything else was the same between the two groups.

In order to examine if sports fans can actually cause judges to change their opinion on who should win, and also to see if this could also be applied to other judges too, we did an experiment looking at the effect of a noisy home crowd on judges scoring **Muay Thai** fights [1] (Figure 1). Muay Thai fights are held in a standard boxing ring, with two competitors fighting for five, 3-min rounds. Muay Thai fighters, kick, punch, knee, elbow, and grapple with their opponent in an attempt to gain a points victory or get the referee to stop the fight. In our experiment, judges scored Muay Thai fights (the dependent variable) while either listening to the cheering of the actual crowd at ringside, or while using noise-canceling headphones to judge in complete silence (noise is the independent variable) (Figure 2).

FIGURE 1

Muay Thai.



FIGURE 1

FIGURE 2

Internal and external validity.

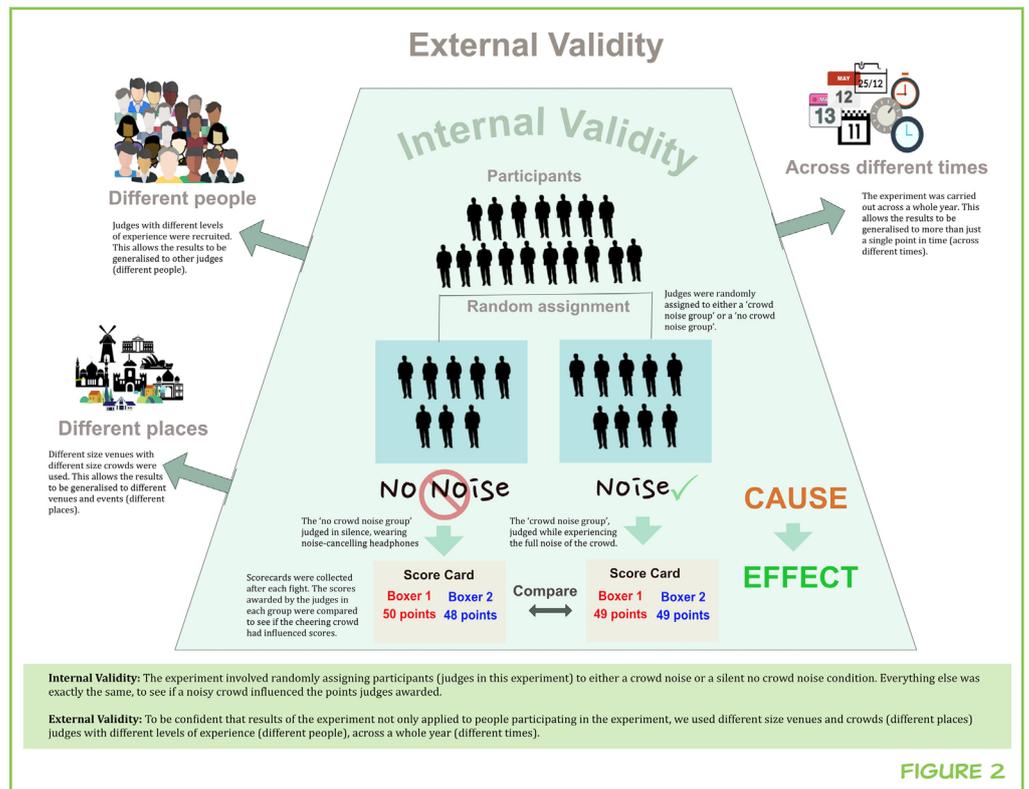


FIGURE 2

MUAY THAI

The national sport of Thailand involving a form of boxing where two competitors wearing boxing gloves compete against one another in a standard boxing ring over five rounds. The rules allow them to kick, punch, knee, elbow, and grapple with their opponent using full-contact strikes in an attempt to get the referee to stop the fight in their favor or get judges to award them more points than their opponent.

HOME ADVANTAGE

The advantage given to competitors and teams who compete at a home venue in front of supportive fans.

INTERNAL VALIDITY

The extent to which we can determine cause and effect relationships in an experiment that we do in the laboratory.

EXTERNAL VALIDITY

The extent we can generalize the results from a laboratory experiment to the wider population - the real world.

WHAT DO WE KNOW ABOUT THE ADVANTAGE OF PLAYING AT A HOME VENUE?

When designing experiments, the first thing scientists do is look at the research conducted by other people on the topic they plan to investigate. So, to set the scene for the experiment that we are going to look at in this article, let us look at what other researchers have found about the influence of crowds on sports.

Sports teams and individual athletes tend to win a higher number of games when playing at their home stadium or venue than when they play away games. This is so common it has a name—it is known as **home advantage**. Home advantage is found in both team sports and individual sports where a judge, referee, or umpire plays a major role in deciding who wins—sports such as basketball, soccer, and boxing. It seems that fans cheering for their favorite team might actually influence who wins a game or competition, by influencing referees, umpires, and judges. Carefully controlled experiments are the only way to find out if crowds really can effect sports officials' decisions.

CAN FANS REALLY INFLUENCE SPORT OFFICIALS?

One previous experiment looked at the influence of crowd noise on whether soccer referees decided to award a foul or not [2]. The researchers were able to make sure that differences in the decisions made by referees were influenced by the crowd noise conditions *only* (crowd noise or no crowd noise), rather than differences in the referees themselves. The researchers did this by dividing the group of referees randomly into two groups. One group watched a video of soccer tackles with crowd noise, and the other group watched the same video but in total silence. When research teams find differences using this type of study design, they can be confident it was crowd noise that made the difference—this is something known as **internal validity**. However, the researchers cannot have confidence that their findings will hold true for other officials *outside* of a laboratory without considering some additional things.

DO RESULTS FROM A LAB EXPERIMENT ALSO HAPPEN IN REAL LIFE?

To decide how likely it is that research findings can be applied to real-life situations outside of the laboratory, researchers use an idea called **external validity**. A laboratory study can have high internal validity but low external validity. For example, a researcher can be confident that one thing has caused another to change within in the experiment, but they can be less confident these changes will happen outside of the experiment, in the real world. In studies examining crowd noise, this would mean that researchers are confident that crowd noise has a genuine effect on sports officials' scores or decisions in the lab experiment (internal validity), and that these findings would be the same in other settings (like in real life) and with different officials (external validity).

Researchers can do particular things to help improve the external validity of their experiments. These things include selecting participants who are similar to the wider group being researched; using a series of different settings that reflect the diversity found outside the lab; using a range of participants who might respond differently to the experiment; exploring the cause and effect relationship across more than a single point in time; and making sure the settings and tasks the participants take part in are realistic [3].

REPRESENTATIVE DESIGN

Experimental designs that capture the important features of the real-life situation being investigated, including participants, tasks, and settings.

Psychologist and researcher Egon Brunswik [4] proposed something similar to external validity, which he called **representative design**. He suggested that when researchers want to investigate how individuals respond to different things, it is important to do the study in a location where these things would normally happen and not an artificial environment. So, a study looking at how crowd noise might change sports official's decisions would lack representative design if the sports officials were not actually at a sports venue where the decisions they make actually count. The idea is that if sports officials make decisions in a laboratory, where there is no pressure from actual fans or players, it is not quite the same as making decisions at a live event.

MAKING OUR STUDY REAL

In our crowd noise study, we attempted to improve external validity and representative design in a number of ways. First, we did our study at actual competitions (representative design) but still used the type of control used in a traditional laboratory experiment (internal validity). Second, we used actual judges as participants (representative design). By doing these things we made it more likely that our results would apply to similar real-life settings (external validity).

To compare the effect of actual noise on decisions we used two conditions: a crowd noise condition and a no crowd noise condition. The crowd noise condition involved judges experiencing the natural crowd noise they usually would hear while sitting at ringside scoring fights. The judges in the no crowd noise condition wore headphones that canceled out all crowd noise. Judges then scored each round of each fight using the actual scoring system used for judging competitions (representative design). Because we used actual judges' scores in the real-life location, we were able to look at the findings in a way that allowed us to determine the real impact of crowd noise on the judges' decisions.

DID THE CROWD AFFECT MUAY THAI JUDGES?

We found that live crowd noise had an effect on judges' scores. The judges who scored fights while listening to crowd noise gave 0.53 more points to the home fighter than did those judges who watched in silence (no crowd noise). This

might seem like a small difference, but it means in closely contested fights, the judges assigned to the different groups (crowd noise or no crowd noise) gave a winning score to different fighters in 13% of the fights they judged. In these fights, judges in the crowd noise condition awarded fights to the home fighter (the fighter with the noisiest fans), while judges in the no crowd noise condition awarded the fight to the away fighter; the fighter with far less crowd support, but the fighter who actually put in the better performance in these particular fights. So, when the fights were closely contested, crowd noise made a real difference in the fighter the judges thought won.

HOW CAN A CROWD INFLUENCE OFFICIALS?

By applying representative design to improve external validity, our study clearly showed that a crowd can influence sports officials' decisions. But how is that possible? When researchers design experiments, they often have particular theories in mind that give reasons about why things happen. How can a crowd have such a sway on a referee, judge, or umpire? We think it may have something to do with what psychologists call *conformity*. When officials conform, or “go with the crowd” and allow their decisions to be influenced by the views of sports fans, this is called a **conformity effect** [5]. Sports officials could be influenced in two ways by conformity effects. First, they might think that the crowd adds useful information to their own view of what happened and that the opinion of the majority of cheering fans could guide them toward the correct decision. Second, they might go with the crowd's view so that the crowd likes them or because they feel intimidated by the crowd. Using real competitions like those used in our study is the only way to explore the conformity effect, when there are real consequences to the decisions the judges make.

In our study we felt that when the competition was close, the cheers of the crowd may have reassured judges when they were giving scores. However, we also felt that the judges may have been swayed by a conscious or unconscious worry that they might upset the crowd by making an unpopular decision or that fans might make lots of negative comments on social media after the event.

APPLYING OUR FINDINGS TO OTHER SPORTS

Because we used a range of different real competitions in our study, as well as actual judges and live crowds, we feel confident that our findings hold true for Muay Thai in the UK and beyond. We also feel the findings are true for other sports related to Muay Thai, such as mixed martial arts and boxing. These sports generally involve similar types of crowd, equally passionate fans cheering their favorite fighters, and involve ringside judges scoring fights using a similar system. There are still questions to be answered, such as “how much noise is needed to influence judges?” or “how intimidated do judges need to feel to be influenced?” Should we expect that crowd noise has more

CONFORMITY EFFECT

A type of social influence involving someone changing their belief or behavior in order to fit in with a particular group.

influence on judges in huge venues such as a sold out MGM grand in Las Vegas as opposed to a smaller stadium?

WHAT COULD WE DO TO FIND EVEN MORE OUT ABOUT HOW THE CROWD CAN INFLUENCE OFFICIALS?

Along with other researchers studying the influence of crowd noise on sports officials, we have not investigated the content of crowd noise, meaning what the noise was actually made up of. In Muay Thai, coaches shout advice to their fighters from ringside during a fight and cheer when their fighter strikes their opponent, and this may influence judges. Equally, protests made by high profile competitors and coaches can also make judges think carefully about future decisions. In our future studies, it would be interesting to see if these things do change judges' decisions.

CONCLUSION

Experiments are an important way to determine cause and effect, but for researchers to be confident that their findings can be applied in real-life situations, it is important to consider external validity and representative design. The study we used to explore these ideas suggests that crowd noise can change the decisions of real sports officials during actual competitions. Because we used representative design to ensure high external validity, we can be confident that these findings will be true in the real world.

ACKNOWLEDGMENTS

I would like to thank Dr. Nigel Balmer for his invaluable contribution to the original study. I would also like to thank Roshni Myers for her comments and for proofreading the article.

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SUBMITTED: 21 August 2016; **ACCEPTED:** 10 April 2017;
PUBLISHED ONLINE: 08 May 2017.

EDITED BY: Micah M. Murray, University of Lausanne, Switzerland

CITATION: Myers TD (2017) Getting Out of the Laboratory to Make Experiments Real: Can Sports Fans Influence Muay Thai Judges? *Front. Young Minds* 5:13. doi:10.3389/frym.2017.00013

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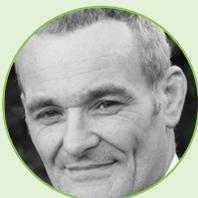
REVIEWED BY



EMILY, 12 YEARS OLD

Hi, my name is Emily, and I am 12 years old. I love to swim, draw, and read. My favorite writer is L. J. Smith, who wrote “Vampire Diaries.” I just finished reading *Hunger Games*. I also like science and math. That is why I chose math and physics as an option at school. During the holidays, I often go to England or to Canada. More than half of my family lives abroad. Some also live in Amsterdam. I have only gone to Holland once. Last summer I went to Japan. It was so fun. We traveled from Tokyo to Fukuoka in a camper-van.

AUTHOR



TONY D. MYERS

I am a Reader at Newman University, Birmingham in the UK. I am interested in a number of things, but particularly in things that influence people’s behavior. I have investigated different influences on sports officials, especially in the sport of Muay Thai. I am interested in this sport in particular, because I referee, judge, and coach Muay Thai. I have been lucky enough to coach several World, European, and British Muay Thai champions, as well as refereeing and judging across the world. At university, I lecture human science students in research methods, statistics, and sport psychology, as well as I supervise masters and PhD students. Outside of university and sports coaching, I enjoy spending time with my wife and young son. *tony.myers@newman.ac.uk